

# **MaxiCharger AC/AC Pro**

# **Installation and Operation Manual**

**Version 1.0** 

**UL Model** 

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## Safety

The safety messages herein cover situations Autel is aware of. Autel cannot know, evaluate or advise you as to all of the possible hazards. You must be certain that any condition or service procedure encountered does not jeopardize your personal safety.

- Read and follow all warnings and instructions before installing and operating the charger.
- This charger should only be installed by a licensed electrician in accordance with all local codes and ordinances.
- This charger must be grounded through a permanent wiring system or an equipment-grounding conductor.
- Do not install or use this charger near flammable, explosive, harsh, or combustible materials, chemicals or vapors.
- Children should be supervised when around this charger.
- Do not insert fingers or foreign objects into the electric vehicle connector.
- Do not use the charger if the flexible power cord or EV cable is frayed, broken, or damaged, or if it fails to operate.
- Do not use the charger if the enclosure or the EV connector is frayed, broken or otherwise damaged, or fails to operate.
- Use 90 °C wire copper conductors or refer to local ordinances.
- Do not operate the charger outside its operating range.
- Incorrect installation and testing of the charger could potentially damage the vehicle's battery, components, and/or the charger itself.
- Handle the charger with care during transportation. Do not subject it to strong force or impact or pull, twist, tangle, drag or step on the equipment, to prevent damage to it or any components.
- Neutral must be bonded to Ground upstream at the transformer or panel for each separately derived system.

Les messages de sécurité ci-après couvrent les situations dont Autel a connaissance. Autel ne peut pas connaître, évaluer ou vous conseiller sur tous les dangers possibles. Vous devez être certain que toute condition ou procédure de service rencontrée ne compromet pas votre sécurité personnelle.

- Lisez et suivez tous les avertissements et toutes les instructions avant d'installer et d'utiliser la borne de recharge.
- Cette borne de recharge ne doit être installée que par un électricien agréé, conformément à tous les codes et règlements locaux.

- Cette borne de recharge doit être mise à la terre par un système de câblage permanent ou un conducteur de mise à la terre de l'équipement.
- N'installez ni n'utilisez cette borne de recharge à proximité de matériaux, de produits chimiques ou de vapeurs inflammables, explosifs, agressifs ou combustibles.
- Les enfants doivent être surveillés lorsqu'ils se trouvent à proximité de cette borne de recharge.
- N'insérez pas vos doigts ou des objets étrangers dans le connecteur du véhicule électrique.
- N'utilisez pas la borne de recharge si le câble d'alimentation flexible ou le câble VE est effiloché, cassé ou autrement endommagé, ou s'il ne fonctionne pas.
- N'utilisez pas la borne de recharge si le boîtier ou le connecteur VE est effiloché, cassé ou autrement.
- endommagé, ou s'il ne fonctionne pas.
- Utilisez des conducteurs en cuivre à 90°C ou consultez les réglementations locales.
- Ne faites pas fonctionner la borne de recharge en dehors de sa plage de fonctionnement.
- Une installation et un test incorrects de la borne de recharge peuvent potentiellement endommager la batterie du véhicule, ses composants et/ou la borne de recharge elle-même.
- Manipulez la borne de recharge avec précaution pendant le transport. Ne la soumettez pas à une force ou à un choc important, ne la tirez pas, ne le tordez pas, ne l'emmêlez pas, ne la traînez pas et ne marchez pas dessus, afin d'éviter de l'endommager ou d'endommager l'un de ses composants.
- Le neutre doit être relié à la terre en amont du transformateur ou du tableau pour chaque système dérivé séparément.

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# **1** Using This Manual

This manual describes the installation and use of the MaxiCharger AC and AC Pro. Prior to installation, read through this manual to get familiar with the instructions of this charger to ensure a successful installation and smooth operations.



#### **NOTICE**

Illustrations used in this manual are only examples; the actual products or screens may differ.



#### **NOTE**

Les illustrations utilisées dans le présent manuel n'est donné qu'à titre d'exemple; les produits ou écrans réels peuvent être différents.

## 1.1 Signal Word



#### **DANGER**

Indicates an imminently hazardous situation with a high risk level which, if the danger is not avoided, will cause death or serious injury.



#### **DANGER**

Indique une situation dangereuse imminente avec un niveau de risque élevé qui, si le danger n'est pas évité, causera la mort ou des blessures graves.



#### **WARNING**

Indicates a potentially hazardous situation with moderate risk level which, if the warning is not obeyed, can cause death or serious injury.



#### **AVERTISSEMENT**

Indique une situation potentiellement dangereuse avec un niveau de risque modéré qui, si l'avertissement n'est pas respecté, peut causer la mort ou des blessures graves.



#### **CAUTION**

Indicates a potentially hazardous situation with a medium risk level which, if the caution is not obeyed, may cause minor or moderate injury or damage to the equipment.



#### **ATTENTION**

Indique une situation potentiellement dangereuse avec un niveau de risque moyen qui, si la prudence n'est pas respectée, peut entraîner des blessures mineures ou modérées ou des dommages à l'équipement.



#### NOTICE

Provides helpful information such as additional explanations, tips, and comments.



#### NOTE

Fournit des informations utiles telles que des instructions supplémentaires, des conseils et des commentaires.

## 1.2 Revision History

Version	Date	Descriptions
Version 1.0	2024.12	Initial version

# **2** General Introduction

This charger is designed to charge plug-in hybrid electric vehicles (PHEVs) or fully electric vehicles (EVs). It will provide you with reliable, intelligent, and scalable charging solutions.

This manual will instruct you how to install and use this charger.

#### **Intended Use**

This charger is intended for the AC charging of EVs. It is intended for both indoor and outdoor use.



#### **DANGER**

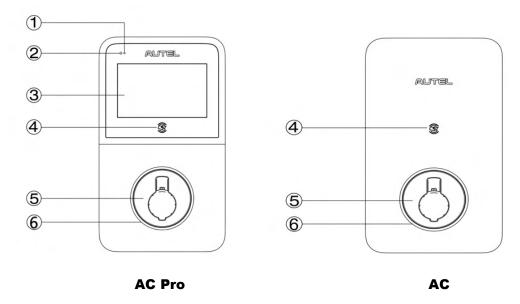
- If you use the charger in any way other than described in this manual or other related documents, possible death, injury and damage to property can occur.
- Use the charger only as intended.



#### **DANGER**

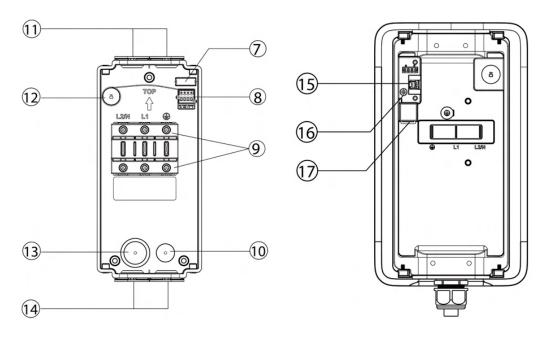
- Si vous utilisez le chargeur d'une manière autre que celle décrite dans ce manuel ou dans d'autres documents connexes, des risques de mort, de blessures et de dommages matériels peuvent survenir.
- Utilisez le chargeur uniquement comme prévu.

## 2.1 Product Overview



**Front View** 

- 1. Energy Pulse Output (Infrared Ray)
- 2. Ambient Light Sensor Detects ambient brightness
- 3. Touchscreen
- 4. RFID Reader
- 5. Holster
- 6. LED Indicator

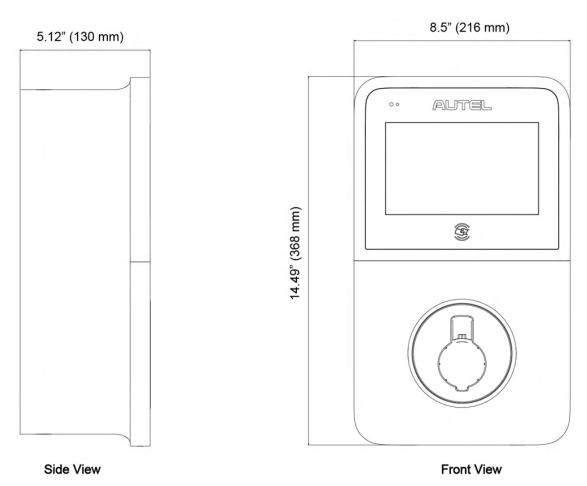


**Wire Box** 

**Charger Rear View** 

- 7. Built-in Spirit Level
- 8. RS485 & IO Terminal
- 9. AC Input Terminal Block
- 10. Rear Data Cable Entry
- 11. Top Entries
- 12. RFID (Radio Frequency Identification) Tag
- 13. Rear Power Cable Entry
- 14. Bottom Entries
- 15. SIM Card Socket (SIM card: optional)
- 16. Current Selector
- 17. Ethernet Port

## 2.2 Product Dimensions



## 2.3 In the Box

Ensure that all parts are delivered according to the order. Check the packages for the following parts.

Charger 1 PC	**************************************	Wire Box 1 PC	Self-tapping Screw M1/5" (5 mm) x 1 <sup>3</sup> / <sub>5</sub> " (40 mm) 3 PCS	
Wall Anchor M5/16" (8 mm) x 1 <sup>3</sup> / <sub>5</sub> " (40 mm) 3 PCS		Screw M1/5" (5 mm) x 2/5" (10 mm) 4 PCS	Screw Plug 4 PCS	<b>QQ</b>
Quick Reference Guide 1 PC		Packing List	T25 Torx Screwdriver	W
Zip Tie 1 PC	*	Sealing Ring 2 PCS		

## 2.4 Recommended Tools

Tape Measure	Pencil	
Wire Stripper	Step Bit 1 <sup>3</sup> / <sub>8</sub> " (35 mm)	
Power Drill	Drill Bit 5/16" (8 mm)	
Torque Driver 35 lbf·in (4 Nm)	Phillips Bit PH2	
Multimeter	Conduit Fitting 1" (25.4 mm)	
Flathead Screwdriver		



#### **NOTICE**

The tools mentioned above are not included in the package. Ensure they are readily available prior to installation.



#### **NOTE**

Les outils mentionnés ci-dessus ne sont pas inclus dans l'emballage. Assurez-vous qu'ils sont disponibles avant.

# 3 Installation

## 3.1 Electrical Design

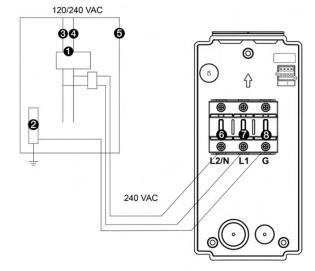
## 3.1.1 Upstream Wiring

Chargers are considered continuous load devices (EVs draw maximum load for long durations); therefore, electrical branch circuits must be sized at 125% of the load for North American installations, in accordance with National Electric Code (NEC) requirements. (For other regions, refer to local code.) This means that for a maximum 80 A load at 208/240 V output to an electric vehicle, 100 A breaker is required.

Wiring must be sized in accordance with NEC requirements for continuous load devices. Typically, 3 AWG (26.67 mm²) insulated electrical wire is used, depending upon the rating of the circuit and the distance between the electrical panel and the charger. The AC input terminal block accepts a maximum of 2 AWG (33.63 mm²).

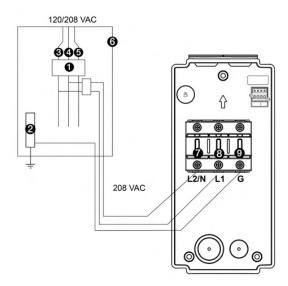
#### 240 VAC Panel

- 1. Main Breaker
- 2. PE Bus
- 3. L1
- 4. L2
- 5. Local Service or Sub Panel
- 6. L2/N
- 7. L1
- 8. Ground/PE



#### 208 VAC Panel

- 1. Main Breaker
- 2. PE Bus
- 3. L1
- 4. L2
- 5. L3
- 6. Local Service or Sub Panel
- 7. L2/N
- 8. L1
- 9. Ground/PE



## 3.1.2 Grounding Requirements

The charger must be connected to a grounded, metal, and permanent wiring system. An equipment-grounding conductor must be run with circuit conductors and connected to an equipment-grounding terminal or lead on the charger.

A grounding conductor, compliant with applicable codes, must be grounded at the service equipment or, when supplied by a separate system, at the supply transformer.

Neutral is not used to power the charger but must be properly connected to ground, at the panel transformer, to provide necessary voltage reference relative to ground.

## 3.2 Preparing for Installation

#### 3.2.1 Installation Requirements

- Install the charger on a flat and vertical surface capable of supporting its weight (e.g., a finished wall or pedestal). The maximum weight of the charger is approximately 20.7 lbs. (9.4 kg).
- Install the charger in a location that allows the charging cable to remain within its bending tolerance.
- Position the charger in a location where it is not vulnerable to being damaged.
- Ensure the electrical panel supports a 240 V dedicated circuit with a new, dedicated, and non-GFCI two-pole circuit breaker, in accordance with local codes and ordinances.
- The recommended installation height for the charger is between 33.5 and 45.3 inches (850 to 1150 mm). The minimum outdoor installation height is 24 inches (600 mm) and that of indoor is 18 inches (450 mm). For ADA accessibility, mount the charger at a height of 27.6 33.5 inches (700 850 mm).



#### **CAUTION**

A supplement surge protection breaker must be installed at the service panel if the installation area experiences frequent thunderstorms.



#### **ATTENTION**

Un disjoncteur supplémentaire de protection contre les surtensions doit être installé sur le panneau de service si la zone d'installation connaît des orages fréquents.

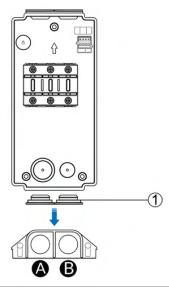
## **3.2.2 Cable Entry Options**

The recommended cable entry options are described below. The preparation work varies depending on the entry options.

	A: Power Cable
Cable Entry Option	(Line/neutral: 3 AWG (26.67 mm²) for 80A current chargers and 6 AWG (13.3 mm²) for 50A current chargers; PE: minimum 8 AWG (8.37 mm²). Copper wire only.)
	B: Data Cable (Ethernet and RS485 cable)

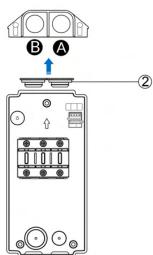
## **Bottom Entry:**

Manually remove the plugs (1) from the bottom of the wire box.



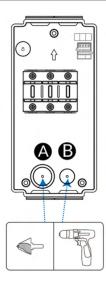
### **Top Entry:**

Manually remove the plugs (2) from the top of the wire box.



## **Rear Entry:**

Use a power drill with the  $1^3/8''$  (35 mm) step bit to drill into the rear cable entries.



## 3.3 Installing the Charger



#### **DANGER**

Risk of shock. Turn off the power to the outlet at the circuit breaker until the installation is completed.



#### **DANGER**

Risque de choc électrique. Coupez l'alimentation de la prise au niveau du disjoncteur jusqu'à ce que l'installation soit terminée.



#### **NOTICE**

It is suggested that the configuration be finished on the Autel Operation and Maintenance Platform before the installer installs the chargers. Refer to  $\underline{4.2.1}$  for more details.

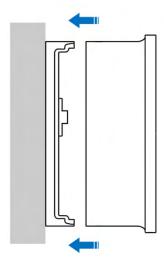


#### **NOTE**

Il est recommandé de terminer la configuration sur la plate-forme d'exploitation et de maintenance Autel avant que l'installateur n'installe les bornes de recharge. Pour plus de détails, voir le point <u>4.2.1</u>.

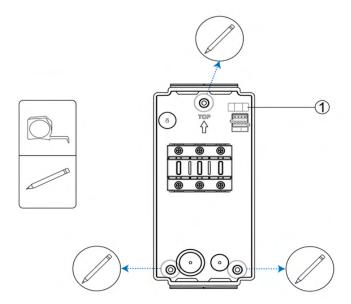
#### STEP 1

Manually detach the wire box (1) from the main unit (2).



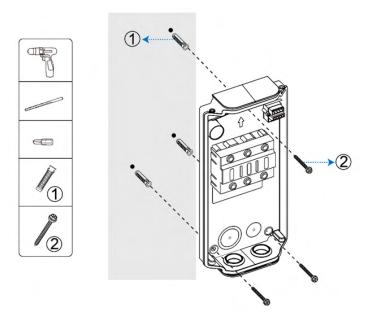
### STEP 2

- 1. Place the wire box against the wall at a height of 33.5 45.3 inches (850 1150 mm). Level it using the built-in spirit level (1).
- 2. Mark the three mounting holes using a pencil and remove the wire box temporarily.



#### STEP 3

- 1. Drill 2 inches (50 mm) into the three holes measuring 5/16 inch (8 mm) in diameter.
- 2. Tap the three wall anchors (1) into the holes.
- 3. Place the wire box against wall aligning with the three holes. Then insert and tighten the three M1/5" (5 mm) x  $1^3/5$ " (40 mm) self-tapping screws using a power drill with the Phillips bit (PH2) to secure the wire box.



## 3.4 Cable Connection



#### **CAUTION**

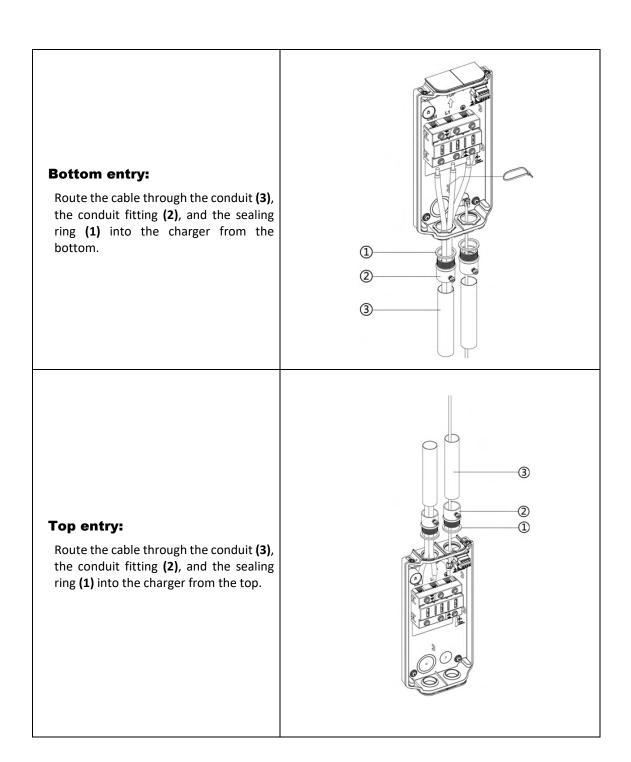
For the power cable, use copper conductors with the wire size being 3 AWG (26.67 mm<sup>2</sup>).



#### **ATTENTION**

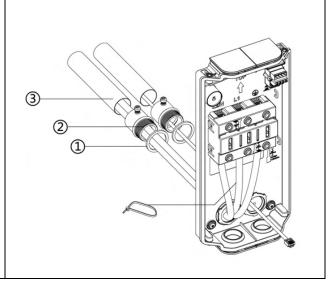
Pour le câble d'alimentation, utilisez des conducteurs en cuivre de calibre 3 AWG (26.67 mm²).

Prepare the conduits and conduit fittings (1-inch recommended) and route them into the charger according to the cable entries.



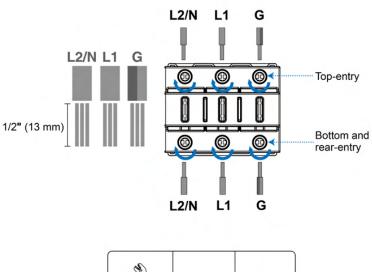
### **Rear entry:**

Route the cable through the conduit (3), the conduit fitting (2), and the sealing ring (1) into the charger from the rear.



#### 3.4.1 Power Cable Connection

- 1. Loosen the terminal screws using a Phillips screwdriver with a PH2 bit or a flathead screwdriver with the tip size being 1/4" (6 mm) x 0.035" (0.9 mm).
- 2. Strip the wires to 1/2 inch (13 mm) and push them into the holes.
- 3. Connect the wires (L1, L2, and Ground) according to the diagram and tighten each terminal screw to 35 lbf·in (4 Nm).
- 4. Use the zip tie to organize the cables (for bottom and rear entries). See the table above for details.

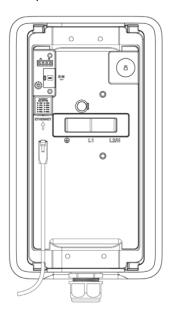


### **3.4.2** Internet Connection

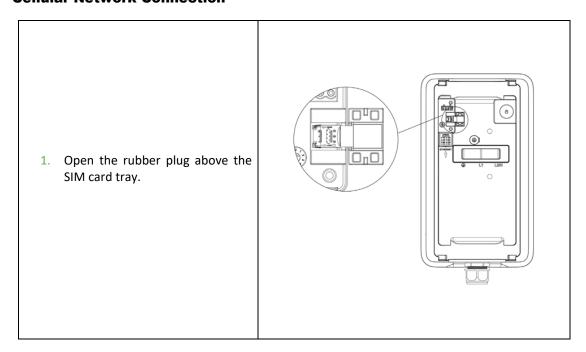
This charger can be connected to the Internet via Ethernet, cellular network or Wi-Fi.

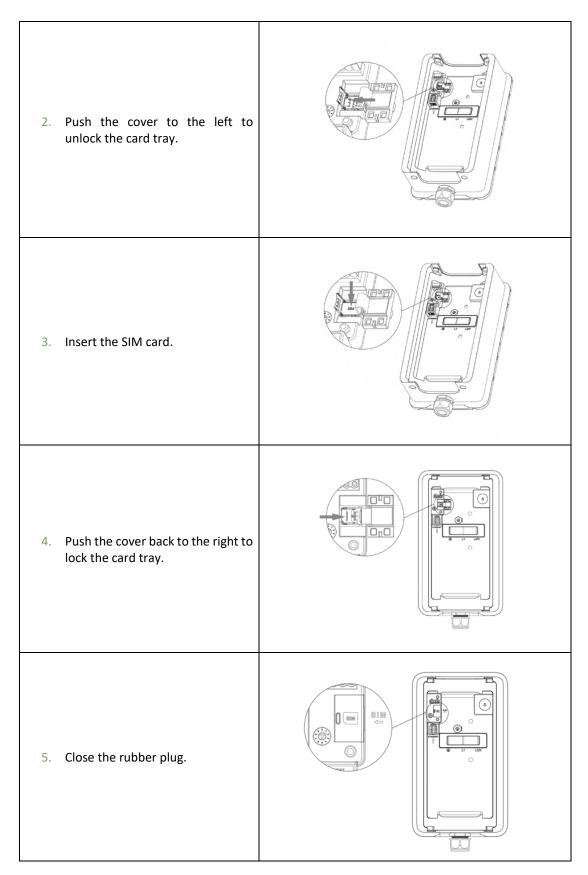
#### **Ethernet Connection**

Plug the Ethernet cable into the RJ45 port at the back of the main unit.



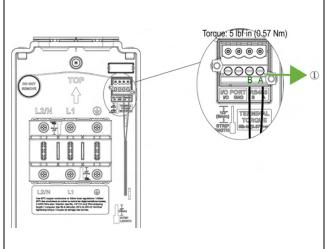
#### **Cellular Network Connection**





### 3.4.3 RS485 Cable Connection (Optional)

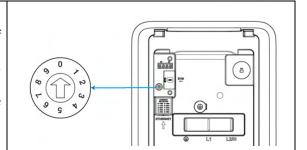
- Use a flathead screwdriver to press and hold the buttons (1) above the connector holes on the RS485 terminal block.
- 2. Strip the RS485a and RS485b cables to 1/3" (8 mm) and push them into the holes as indicated. Release the buttons and then secure the cables by tightening the screws to 5 lbf·in (0.57 Nm) using a flathead screwdriver with the tip size being 1/8" (3 mm) x 1/40" (0.6 mm).



## 3.5 Adjusting the Rated Current (Optional)

This charger allows you to manually set a lower maximum current using the built-in current selector when installing the charger on a circuit rated lower than the maximum rating for the charger.

Locate the current selector on the back of the main unit. Then use a flathead screwdriver with the tip size being 1/8" (3 mm) x 1/40" (0.6 mm) to set the DIP switch to the appropriate position per the table below.





#### **CAUTION**

To reduce the risk of fire, only connect the charger to a circuit with a branch circuit over-current protection of 125% of the selected maximum amperage setting of the device in accordance with ANSI/NFPA 70 (US) CSA C22.1 (Canada).



#### **ATTENTION**

Pour réduire le risque d'incendie, ne branchez la borne de recharge que sur un circuit doté d'une protection contre les surintensités de 125 % de l'intensité maximale sélectionnée pour l'appareil, conformément à la norme ANSI/NFPA 70 (États-Unis) et à la norme CSA C22.1 (Canada).

Position	Amperage (A)	Circuit Breaker Rating (A)
0	16	20
1	16	20
2	24	30
3	32	40
4	40	50
5	48	60
6	50	70
7	64	80
8	72	90
9	80	100

#### NOTICE



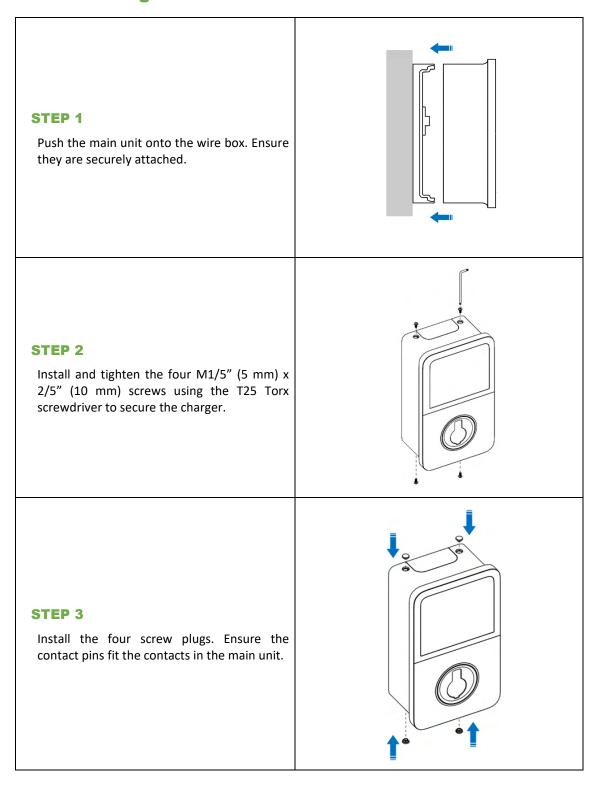
- The information mentioned in the table above can also be viewed below the current selector on the charger.
- When the DIP switch is at 0, the corresponding amperage is 16A.
- The maximum current is limited by the power rating of a charger. For this model, the maximum current is 80A.

#### NOTE



- Les informations mentionnées dans le tableau ci-dessus peuvent également être consultées sous le sélecteur de courant de la borne de recharge.
- Lorsque le commutateur DIP est à 0, l'ampérage correspondant est de 16A.
- Le courant maximal est limité par la puissance nominale de la borne de recharge. Pour ce modèle, le courant maximum est de 80A.

## 3.6 Finishing Installation



The installation is now completed.

# 4 Operation

## 4.1 Powering On

Once all electrical connections have been safely made, switch on the power to the circuit from the circuit breaker and wait for the power supply to come on. There will be a series of self-checks. Make sure that the charger works correctly and safely.



#### **WARNING**

Be careful when working with electricity.



#### **AVERTISSEMENT**

Soyez prudent lorsque vous travaillez avec de l'électricité.

## 4.2 One-stop Commissioning (For Commercial Use)

The commissioning of the chargers will be completed by the owner or the site operator, the installer and the commissioning personnel. The steps are as follows.

- The owner or the site operator adds the devices, creates the site, configures the devices and designates the installation ticket on the Autel Operation and Maintenance Platform.
- The installer installs the chargers and checks the installation.
- The commissioning personnel synchronizes the configuration to the chargers.



#### **NOTICE**

- > The installer and the commissioning personnel can be the same person.
- The screenshots in this section take the case of the MaxiCharger AC Pro as an example.

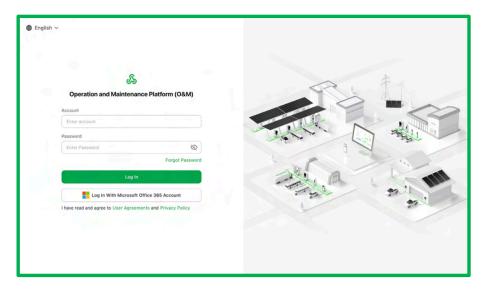


#### NOTE

- Le personnel de mise en service et l'installateur peuvent être la même personne.
- Les captures d'écran de cette section prennent le cas du MaxiCharger AC Pro comme exemple.

## 4.2.1 Configuration

1. Log in to the Autel Operation and Maintenance Platform by inputting the account and the password. The URL of the platform is <a href="https://omcb-us.autel.com/">https://omcb-us.autel.com/</a>.



4-1 Log-in Screen



#### **NOTE**

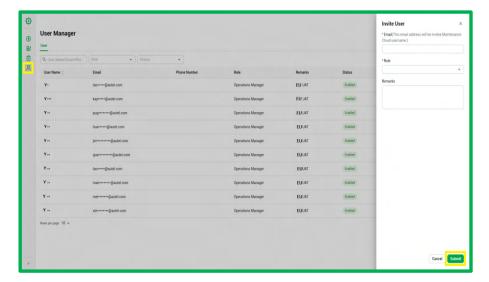
Autel will assign an account to the customers whose purchase order can be checked in our system and send them an email where there is a link for them to set the password for their account. If you have any questions, contact Autel technical support or your local selling agent.



#### **NOTE**

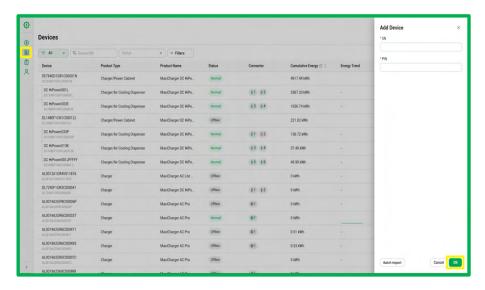
Autel attribuera un compte aux clients dont le bon de commande peut être vérifié dans notre système et leur enverra un email contenant un lien leur permettant de définir le mot de passe de leur compte. Si vous avez des questions, contactez l'assistance technique d'Autel ou votre agent de vente local.

2. Input the email of users that you want to invite and set their roles on the **User Manager** screen.



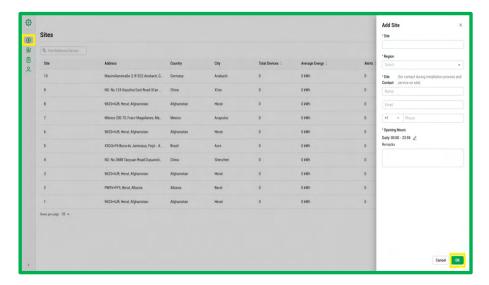
4-2 User Manager Screen

3. Input the SN (serial number) and PIN of the devices that need to be configured on the **Devices** screen to add them to the platform. The SN can be found on the nameplate and the PIN can be found on the *Quick Reference Guide*.



4-3 Devices Screen

4. Input a name for the site, select the region for it, and leave your name and email or phone number on the **Sites** screen to create a site. Then click on **Enter Site Creation Guide** to proceed.



4-4 Sites Screen

#### NOTICE

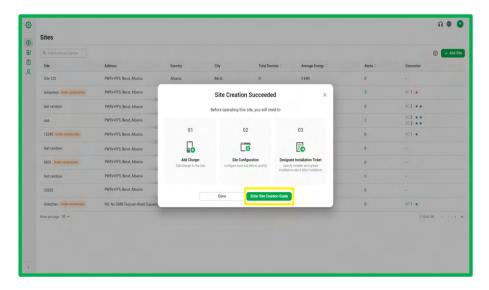


- You can choose to enter your phone number or email.
- If you choose to enter your email, you will receive notifications concerning the status of the installation ticket (confirmed or cancelled) and the installation work (started or completed).

#### NOTE

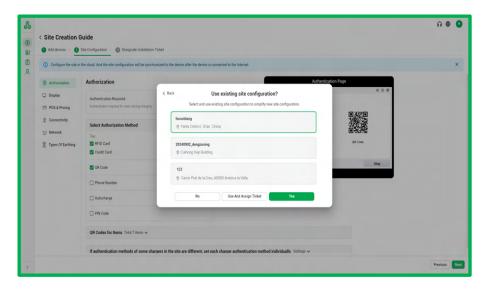


- Vous pouvez choisir de saisir votre numéro de téléphone ou votre adresse email.
- Si vous choisissez de saisir votre adresse email, vous recevrez des notifications concernant le statut du ticket d'installation (confirmé ou annulé) et les travaux d'installation (commencés ou terminés).



4-5 Site Creation Screen

5. After entering the **Site Creation Guide** screen, add devices by selecting the SN of the devices that you need to configure. Also, conduct site configuration. For this, choose whether to use the existing site configuration or not. If you use the existing configuration, you can designate the ticket directly. If you don't, make such configurations as authorization, display, POS & Pricing, connectivity and Network for the devices.



4-6 Site Creation Succeeded Screen



#### **NOTICE**

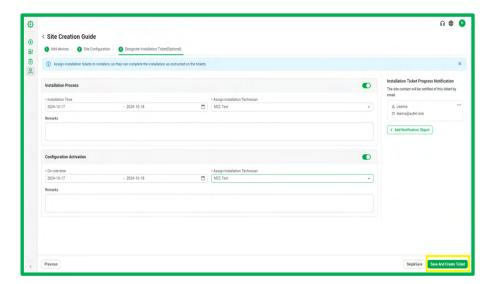
The display configuration is only available to the MaxiCharger AC Pro.



#### **NOTE**

La configuration de l'affichage n'est disponible que pour le MaxiCharger AC Pro.

6. Select installation time and installation technician for **Installation Process** and on-site time and installation technician for **Configuration Activation**. The technicians that can be selected are users invited before.



4-7 Designating Installation Ticket



#### **NOTICE**

**Installation Process** and **Configuration Activation** can be assigned to the same technician or two different technicians. If the two tasks are assigned to two different people, both of them should download and log in to the Autel Config app to complete their task separately.



#### **NOTE**

Le Processus d'installation et l'Activation de la configuration peuvent être confiés au même technicien ou à deux techniciens différents. Si les deux tâches sont confiées à deux personnes différentes, elles doivent toutes deux télécharger l'application Autel Config et s'y connecter pour effectuer leur tâche séparément.

### 4.2.2 Commissioning





To commission the devices, the installer and the commissioning personnel need to log in to the Autel Config app. The account for the installer and the commissioning personnel is the email address the owner or the site operator leaves when inviting them. The password can be set by them via the link in the email sent to them after being invited.

#### **NOTE**



Pour mettre en service les appareils, l'installateur et le personnel de mise en service doivent se connecter à l'application Autel Config. Le compte de l'installateur et du personnel de mise en service est l'adresse email que le propriétaire ou l'opérateur du site a laissée lorsqu'il les a invités. Le mot de passe peut être défini par ces personnes via le lien figurant dans l'email qui leur est envoyé après l'invitation.

#### 4.2.2.1 Installation Process

1. Scan the QR code below to download the Autel Config app to your mobile device from the Google Play or App Store.





2. Log in to the Autel Config app by inputting the account and password.



4-8 Log-in Screen



#### **NOTICE**

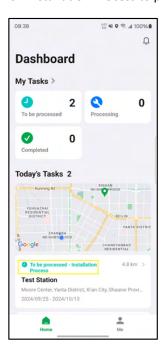
Make sure all devices and the Config app are running the latest software versions.



#### **NOTE**

Assurez-vous que tous les appareils et l'application Config fonctionnent avec les dernières versions logicielles.

3. On the **Dashboard** screen, click on **Installation Process** to proceed.



4-9 Dashboard Screen

4. On the **Task Details** screen, click on **Start Process** to proceed.



4-10 Task Details Screen



#### NOTICE

In this step, you can select one device and click on the > icon to the right of the serial number of the device to go to the **Installation Check** screen directly. In this case, you need to find the correct device in the site whose serial number is in line with that of the one you select.





Au cours de cette étape, vous pouvez sélectionner un appareil et cliquer sur l'icône > à droite du numéro de série de l'appareil pour accéder directement à l'écran de Vérification de l'installation. Dans ce cas, vous devez trouver le bon appareil sur le site dont le numéro de série correspond à celui de l'appareil que vous avez sélectionné.

5. Scan the QR code on one device to enter the **Installation Check** screen. On the screen, you can see what needs to be checked. Click on **Start Check** to proceed.





4-11 Installation Check Screens

6. On the **Electrical Components** screen, click on the + icon to upload photos of the screen display as shown on the screen to finish the check of the first item. Then click on the > icon on the lower right corner to proceed.



4-12 Electrical Components Screen

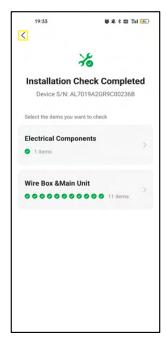
7. On the **Wire Box & Main Unit** screen, upload photos to finish checking the item shown on the screen. Then click on the > icon to check the next item.



4-13 Wire Box & Main Unit Screen

8. Repeat **step 7** to check the remaining items. After all items are checked, click on the < icon on the upper left corner to go to the **Installation Check Completed** screen. Then click on the < icon on the **Installation Check Completed** screen to go back to the **Task Details** screen.





4-14 Wire Box & Main Unit and Installation Check Completed Screens

9. On the **Task Details** screen, click on **Continue Process** and then follow **steps 4 to 8** to finish checking a new device.



4-15 Task Details Screen

10. After all devices are checked, click on Complete Process to end the task of Installation Process.

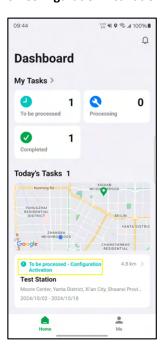




4-16 Task Details Screens

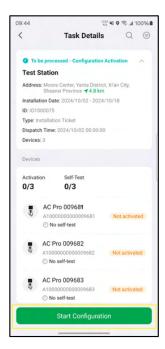
#### **4.2.2.2 Configuration Activation**

- 1. Download the Autel Config app and log in to the app as instructed in 4.2.2.1.
- 2. On the Dashboard screen, click on **Configuration Activation** to check the task details.



4-17 Dashboard Screen

3. On the Task Details screen, click on **Start Configuration** to proceed.



4-18 Ticket Details Screen

4. Scan the QR code on a device according to the product type to synchronize the configuration. For MaxiCharger AC Pro, scan the QR code on the screen; for MaxiCharger AC, scan the QR code on its body.



4-19 Scanning Screen



#### **NOTICE**

For sites with SmartBox, scan the QR code on the body of a SmartBox first.

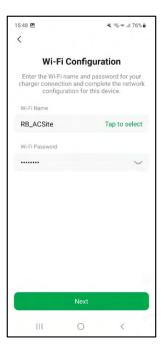


#### **NOTE**

Pour les sites avec SmartBox, scannez d'abord le code QR sur le corps d'une SmartBox.

- 5. Configure the network for the device.
  - 1) Select **Wi-Fi Configuration** and configure the Wi-Fi for the device. Then click on the **Next** button to proceed.





4-20 Network Configuration and Wi-Fi Configuration Screens

2) Select **APN Configuration** and enable the cellular data switch of one SIM card. Then click on the **Next** button to proceed.





4-21 Network Configuration and APN Configuration Screens



#### **NOTICE**

If the Wi-Fi or APN has been configured during the site creation and configuration, its name and password will be entered by default. A new Wi-Fi or a new APN can be set manually.



#### **NOTE**

Si le Wi-Fi ou l'APN a été configuré lors de la création et de la configuration du site, son nom et son mot de passe seront saisis par défaut. Un nouveau Wi-Fi ou un nouvel APN peut être configuré manuellement.

6. Hold your phone near the device to connect to its hotspot.



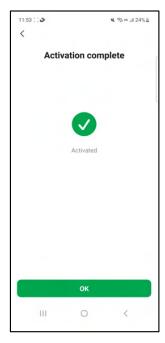
4-22 Connecting to Hotspot Screen

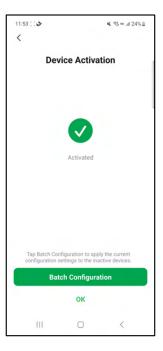
7. After your phone is connected to the hotspot of the device, the configuration will be synchronized to the device.



4-23 Configuration Synchronization Screen

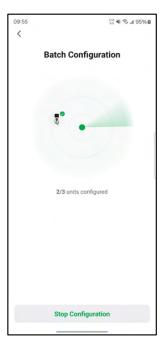
8. After the configuration is synchronized, the device will get activated. Tap **Batch Configuration** to apply the current configuration settings to the inactive devices.





**4-24** Activation Screens

9. The batch configuration will be completed automatically. During the configuration process, the inactive devices will get activated and restart. You can check the process on the screen.



4-25 Batch Configuration Screen

#### NOTICE



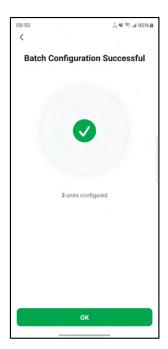
If it takes a long time to apply the current configuration settings to some inactive devices, you can click on **Stop Configuration** or the < icon on the upper left corner of the Batch Configuration screen to go back to the **Task Details** screen so that you can see which devices are not activated. Scan the QR code on the screen or body of the devices individually to apply the configuration settings.

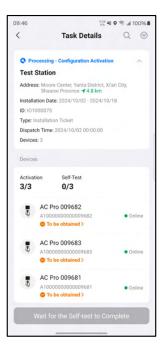
#### **NOTE**



Si l'application des paramètres de configuration actuels à certains appareils inactifs prend beaucoup de temps, vous pouvez cliquer sur Arrêter la configuration ou sur l'icône < dans le coin supérieur gauche de l'écran Configuration par lots pour revenir à l'écran Détails de la tâche afin de voir quels appareils ne sont pas activés. Scannez le code QR sur l'écran ou le corps de chaque appareil pour appliquer les paramètres de configuration.

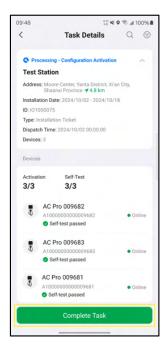
10. After the batch configuration is successful, click on the **OK** button to go back to the **Task Details** screen.

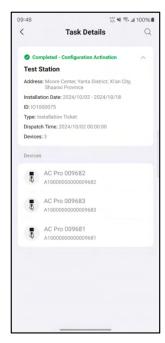




4-26 Batch Configuration Successful and Task Details Screens

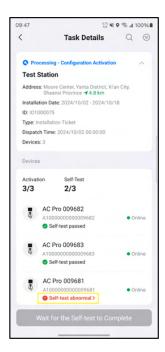
- 11. Wait for the self-test to complete.
  - 1) If all devices pass the self-test, click on **Complete Task** to end the task of Configuration Activation.





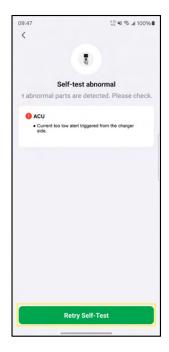
4-27 Task Details Screens

2) If the self-test is abnormal for some of or all of the devices, click on **Self-test abnormal** below the device's SN to see what is abnormal.

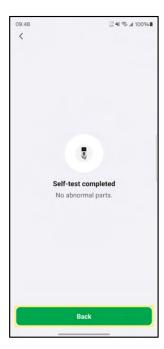


4-28 Self-test Abnormal Screens

I. Check the abnormal parts shown on the screen and click on **Retry Self-test**. Then wait for the self-test to complete again. After the self-test is completed, click on **Back** to go back to the Task Details screen.







4-29 Self-test Screens

II. On the Task Details screen, click on **Complete Process** to end the task of Installation Process.

## 4.3 Adding the Charger (For Residential Use)

1. Scan the QR code below to download the Autel Charge app to your mobile device from the Google Play or App Store. For iOS users, you will be redirected to the App Store; for Android users, you will be redirected to the Google Play.





- 2. Open the Autel Charge app on your mobile device, and log in with your phone number or email. If you do not yet have an account, register with your phone number first.
- 3. Scan the QR code or manually enter the SN and PIN from the *Quick Reference Guide* to add the charger.
- 4. Follow the on-screen instructions to connect your charger via its hotspot and connect it to the Internet. Then choose a desired function to start.



#### **NOTICE**

The hotspot of the charger can be opened by tapping the button on the connector.



#### NOTE

Le point d'accès de la borne de recharge peut être activé en appuyant sur le bouton situé sur le connecteur.

## 4.4 Display Descriptions



#### **NOTICE**

This section only applies to the MaxiCharger AC Pro. The images are subject to change; please refer to the actual product.



#### **NOTE**

Cette section s'applique uniquement au MaxiCharger AC Pro. Les images sont susceptibles d'être modifiées; veuillez vous référer au produit réel.

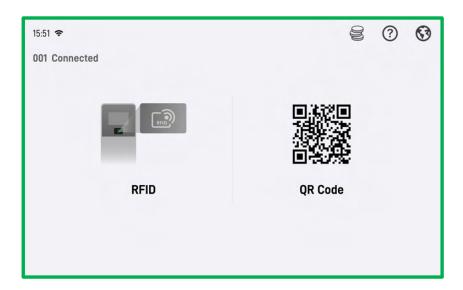
#### **Function Button Descriptions**

Function Button	Description	
Home	Tap to return to the Standby Screen.	
Cancel	Tap to cancel an operation.	
Stop	Tap to stop charging.	
Finish	Finish Tap to finish a charge session and enter Charging Details Screen.	



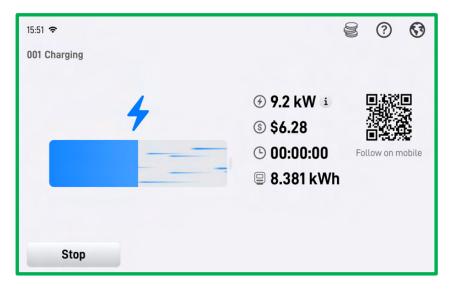
4-30 Standby Screen

- 1. Upper information bar—adjusts the language and checks the charging fees
- 2. Main screen—demonstrates connector information



4-31 Authorization Screen

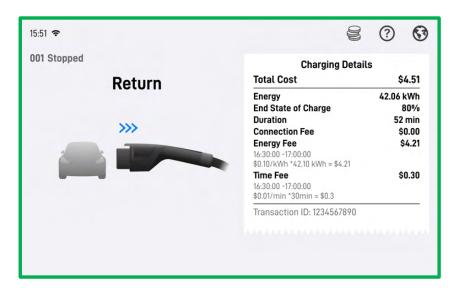
Choose a method (RFID card or QR Code) to authorize charging on the Authorization Screen.



4-32 Charging Screen

Once the connector is properly connected, the vehicle will establish communication with the charger and a charge session will start.

The power, cost, charging duration, and energy will appear on the Charging Screen. Tap the **Stop** button to stop charging.



4-33 Charging Details Screen

If a charge session is ended, the Charging Details Screen will appear.

## 4.5 Starting Charging

- 1. Remove the connector from the holster.
- 2. Plug the connector into the EV charging port.
- 3. Choose one of the following ways to start a charge session:
  - Use the Autel Charge app by tapping Start on the Charging screen.
  - Tap your RFID card on the RFID reader.
  - If the Auto Start function is enabled in the Autel Charge app, the charger will automatically start charging once the connector is properly connected.
  - If you have set a charging schedule in the Autel Charge app, the charger will initiate a charge session automatically as scheduled.
  - If the charger has a display, tap on the touchscreen and authorize charging via QR code or RFID card.



#### NOTICE

Ensure that the EV is charging. If charging issues persist, try reconnecting the connector or contact Autel technical support.



#### NOTE

Assurez-vous que le VE est en train de se charger. Si vous pensez que le véhicule ne se charge pas correctement, essayez de rebrancher le connecteur ou contactez l'assistance technique d'Autel.

## 4.6 Stopping Charging

#### NOTICE



- ➢ If the connector is unplugged from the EV during a charge session, the charger will automatically disconnect the power supply. This stops all charging operations.
- When the vehicle is fully charged, the charger will automatically disconnect the power supply.

#### NOTE



- Si le connecteur est débranché du VE pendant une session de charge, la borne de recharge déconnecte automatiquement l'alimentation électrique. Toutes les opérations de charge sont alors interrompues.
- Lorsque le véhicule est complètement chargé, la borne de recharge déconnecte automatiquement.
- 1. To stop charging, choose any of the following ways:
  - Wait for the charge session to end and no further actions are required in the case of scheduled charging or Auto Start.
  - Tap the Stop button on the Charging Screen of the Autel Charge app.
  - Tap the RFID card on the RFID reader.
  - If the charger has a display, tap Stop on the Charging Screen.
- 2. Unplug the connector from the EV and return it to the holster.

## 4.7 **LED Descriptions**

## **LED Descriptions**

Color	Light	Description	
Yellow	Solid Yellow	<ul> <li>The charger is not activated.</li> <li>The charger is disabled after being activated.</li> </ul>	
	Flashing Yellow	The charger is being activated.	
	Streaming Yellow	Batch configuration status.	
	Breathing Yellow	The charger is upgraded.	
Green	Solid Green	The charger is available.	
Blue	Solid Blue	The connector is plugged into an EV and the charger waits for authentication.	
		An EV finishes charging and the connector waits for being unplugged.	
	Breathing Blue	Charging status.	
Red	Solid Red	<ul><li>Malfunction status.</li><li>The charger is unavailable.</li></ul>	
Cyan	Solid Cyan	The charger has been reserved.	
	Cyan light flashes three times.	The charger's hotspot is opened manually.	

## Troubleshooting

Item	Problems	Solutions
1	The MaxiCharger AC Pro is successfully added, but the Bluetooth connection fails.	Check whether the QR code on the charger is consistent with the QR code on the Quick Reference Guide. If so, make sure the Bluetooth is enabled on your mobile device; if not, contact customer support.
2	The charge session does not start as scheduled.	Do not insert the connector into your EV charging port before setting up a charging schedule for the first time. Insert the EV charging cable after the schedule is set up.
3	Over-voltage	Use the multimeter to check whether the voltage on the power input is too high. If the result is greater than or equal to 276 V, 115 % of the rated voltage (240 V), contact local power grid company.
4	Under-voltage	Use the multimeter to check whether the voltage on the power input is not sufficient. If the result is less than or equal to 166.4 V, 80 % of the rated voltage (208 V), contact local power grid company.
5	Ground fault	Ensure the charger is grounded correctly.
6	Power failure	Ensure the switch to the circuit breaker is on.
7	Over-heating	Check whether the EV charging cable is securely connected.
		Ensure the operating temperature is within the specified range on the product label.
		Stop charging. Restart charging until it is within the operation temperature range.
8	Residual current detected	Unplug the vehicle and plug in again. If the problem persists, contact customer support.

9	Bluetooth communication failure for the MaxiCharger AC Pro	Ensure the Bluetooth is enabled on your mobile device and the charger is powered on and operating properly.
		Forget the charger in the Bluetooth settings on your mobile device and pair the charger to your device via Bluetooth again.
		If the problem persists, contact customer support.
10	Update failure via Bluetooth for the MaxiCharger AC Pro	Make sure the charger is in idle status.
		Make sure the Bluetooth connection is working properly.
		If the problem persists, contact customer support.
11	Internet connection failure	Try to connect another device to the same Internet verifying the Internet connection is working properly
		If the problem persists, contact customer support.

# Specifications

Item	Description	
Input/Output Power Rating and Current	19.2kW (240V AC 80A) Output amperage adjustable via mobile app, from 6A to 80A, support 16A, 24A, 32A, 40A, 48A, 50A, 64A, 72A, 80A via the DIP switch	
Input/Output Voltage 208/240V AC 50/60Hz		
Input Power Connections	L1, L2, input power connections and Earth Ground, support high-leg delta wiring configuration	
Input Cord	Hardwired	
Connector Type	SAE J1772	
Charging Cable Length	MaxiCharger AC: 19 ft. (6 m); 25 ft. (7.5 m)  MaxiCharger AC Pro: 19 ft. (6 m); 25 ft. (7.5 m)	
round Fault Detection 20 mA CCID		
Protection	Overcurrent, overvoltage, undervoltage, overtemperature, integrated surge protection	
Connectivity	4G Wi-Fi Ethernet RS485 (Modbus, expand smart energy meter, etc.) Wi-SUN	
Card Reader	ISO 15693, ISO 14443 A/B, ISO 18092	
Metering Accuracy	±1%, NTEP/CTEP Certified	
Status Indication	MaxiCharger AC: LED/App  MaxiCharger AC Pro: LEDs and 7-inch LCD, 800 x 480 touch screen	
Vehicle Communication	ISO 15118-2/20	
User Interface	Autel Charge APP; Autel Charge Cloud	

Communication Protocols	OCPP 1.6J, OCPP 2.0.1 (for the MaxiCharger AC Pro)	
<b>Current Control Method</b>	App, hardware DIP switch (Dial)	
Software Update	OTA updates via web portal	
Authentication Methods	PnC, Autocharge, RIFD	
Mounting	Wall or floor using a pedestal (ADA)	
Enclosure Ratings	NEMA 3S, IK10	
Operating Altitude	9842 ft. (3000 m)	
	MaxiCharger AC: -40 to 131 °F (-40 to 55 °C)	
<b>Operating Temperature Range</b>	MaxiCharger AC Pro: -31 to 131 °F (-35 to 55 °C)	
	Derate when above 113 °F (45 °C)	
Storage Temperature Range	–40 to 158 °F (–40 to + 70 °C)	
Dimensions (H x W x D)	14.5" x 8.5" x 5.1" (368 x 216 x 130 mm)	
Package Dimensions (H x W x D)	19.4" x 14.6" x 10" (492 x 370 x 254 mm)	
Weight	MaxiCharger AC: approx. 20.3 lbs. (9.2 kg)	
vveignt	MaxiCharger AC Pro: approx. 20.7 lbs. (9.4 kg)	
Safety Standards	UL 2594, UL2231-1, UL2231-2, UL 1998, CSA C22.2. NO.280	
Codes and Standards	FCC Part 15 Class B, ENERGY STAR, OpenADR 2.0b, NEC Article 625	
Lifespan	10 + years	
Warranty	5 years: the charger body, backplate and all internal components	
	1 year: the display screen, charging cable and connector	

## **7** Compliance

#### FCC regulatory conformance:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference.
- (2) This device must accept any interference received, including interference that may cause undesired operation.

**NOTE:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

**NOTE:** The manufacturer is not responsible for any radio or TV interference caused by unauthorized modifications to this equipment. Such modifications could void the user's authority to operate the equipment.

#### **RF Exposure**

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

#### IC regulatory conformance:

This device complies with CAN ICES-3 (B)/NMB-3(B).

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil est conforme à la norme CAN ICES-3 (B)/NMB-3 (B).

Cet appareil contient des émetteurs / récepteurs exempt (s) de licence qui sont conformes aux RSS exemptes de licence d'Innovation, Sciences et Développement économique Canada. Son fonctionnement est soumis aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.
- (2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.

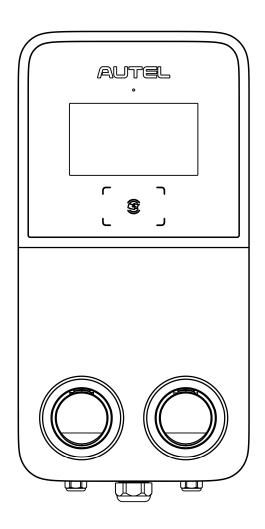
#### **RF Exposure**

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body. This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Cet équipement est conforme aux limites d'exposition aux rayonnements de la IC établies pour unenvironnement non contrôé. Cet équipement doit être installé et fonctionner à au moins 20cm de distance d'un radiateur ou de votre corps.







## **MaxiCharger AC Ultra**

**User Manual (EU)** 

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contents, including but not limited to the product specifications, functions, and illustrations.

Autel will not be liable for any direct, special, incidental, indirect damages or any economic consequential

damages (including the loss of profits).

**9** IMPORTANT

Before operating or maintaining this unit, please read this manual carefully, paying extra attention to the

safety warnings and precautions.

For Services and Support:

Web: www.autelenergy.eu

Tel: (844) 765-0150

Email: evsupport.eu@autel.com

Address: Landsberger Str. 408/4. OG 81241 Munich, Germany

For technical assistance in all other markets, please contact your local selling agent.

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## **1** Using This Manual

This manual describes the installation and use of the MaxiCharger AC Ultra. Prior to installation, read through this manual to be familiarized with the instructions of this MaxiCharger to ensure a successful installation and smooth operations.

#### 1.1 Conventions

The following conventions are used.

#### 1.1.1 Bold Text

Bold text is used to highlight selectable items such as buttons and menu options.

#### 1.1.2 Notes and Important Messages

#### **Notes**

A **NOTE** provides helpful information such as additional explanations, tips, and comments.

#### **Important**

**IMPORTANT** indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

#### 1.1.3 Hyperlink

Hyperlinks or links that take you to other related articles, procedures, and illustrations are available in electronic documents.

#### 1.1.4 Illustrations

Illustrations used in this manual are only examples; the actual product(s) or screens may vary.

#### 1.1.5 Revision History

Version	Date	Descriptions
V1		Initial version

## **2** Safety

For your own safety and the safety of others, and to prevent damage to the charging station and vehicles upon which it is used, it is important that the safety instructions presented throughout this manual be read and understood by all persons operating or coming into contact with the charging station.

### 2.1 Safety Messages

Safety messages are provided to help prevent personal injury and equipment damage. All safety messages are introduced by a single word indicating the hazard level.

## A DANGER

Indicates an imminently hazardous situation with a high risk level which, if the danger is not avoided, will cause death or serious injury.

### **MARNING**

Indicates a potentially hazardous situation with moderate risk level which, if the warning is not obeyed, can cause death or serious injury.

## **CAUTION**

Indicates a potentially hazardous situation with a medium risk level which, if the caution is not obeyed, may cause minor or moderate injury or damage to the equipment.

### 2.2 Safety Instructions

The safety messages herein cover situations Autel is aware of. Autel cannot know, evaluate or advise you as to all of the possible hazards. You must be certain that any condition or service procedure encountered does not jeopardize your personal safety.

#### **▲ SAFETY WARNINGS**

- Read and follow all warnings and instructions before installing and operating the MaxiCharger.
- Only a qualified electrician is allowed to install, service, repair and relocate the MaxiCharger.
- The user must not attempt to service or repair the MaxiCharger as it does not contain user-serviceable parts.
- Switch off input power before installing the MaxiCharger. Keep the power off until it is fully installed and secure.
- Do not use explosive or readily flammable substances near the MaxiCharger.
- Do not use the MaxiCharger if the charging cable is frayed, broken or otherwise damaged, or fails to operate.
- Do not use the MaxiCharger if the enclosure or the EV connector is frayed, broken or otherwise damaged, or fails to operate.
- In the event of danger and/or an accident, a qualified electrician must immediately disconnect the electrical supply from the MaxiCharger.

- Refer to the vehicle user manual to check if the vehicle releases hazardous or explosive gases when charging.
- Follow the instructions given in the vehicle user manual before choosing the charging location of the MaxiCharger.
- Do not direct powerful water jets toward the MaxiCharger.
- Do not operate the MaxiCharger with wet hands.
- Do not put the charging handle into any liquid.
- Do not install or open the MaxiCharger in wet environment (such as rain or heavy fog).
- Ensure that the charging cable is positioned so that it will not be stepped on, tripped over, driven over or otherwise subjected to excessive force or damage. Where applicable, ensure that the charging cable is correctly stowed when not in use and that the charging handle does not touch the ground.
- Keep the charging handle away from heat sources, dirt or water.
- Use this MaxiCharger to charge compatible electric vehicles only. Refer to the technical specifications in this manual. Refer to the vehicle manual to check if the vehicle is compatible.
- Only use the MaxiCharger under the specified operating conditions in this manual.
- Local regulations may be applicable and may vary depending on your region/country of use. The qualified
  electrician must always ensure that the MaxiCharger is installed in accordance with the local regulations.

### **CAUTION**

- Ensure that the charging cable is not damaged or tangled prior to use.
- Do not insert fingers into the charging port.
- Do not leave objects inside the charging port.
- Keep and use (electro) magnetic devices at a safe distance from the MaxiCharger.

#### 2.3 Disposal Instructions

Handling waste incorrectly can have a negative effect on the environment and human health due to potential hazardous substances. Discard the charging station correctly can facilitate the reuse and recycling the materials and environmental protection.

- Obey the local rules when discarding parts, packaging materials or the charging station.
- Discard electrical and electronic equipment separately in compliance with the WEEE-2012/19/EU Directive on waste of electrical and electronic equipment.
- Do not mix or dispose the charging station with the household waste.

#### 3 **General Introduction**

This MaxiCharger AC Ultra is designed to charge an electric vehicle (hereinafter called "EV"). Tailored for commercial use, it features fast and efficient charging experience while offering best-value design and smart charging.

This manual will instruct you on how to install and use this charging station.

#### **Intended Use**

The MaxiCharger AC Ultra is intended for the AC charging of EVs. It is intended for both indoor and outdoor

#### **A** DANGER

- If you use the charging station in any way other than described in this manual or other related documents, possible death, injury and damage to property can occur.
- Use the charging station only as intended.

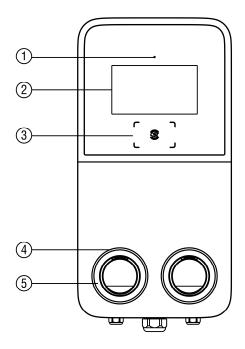
#### **⊘** NOTE

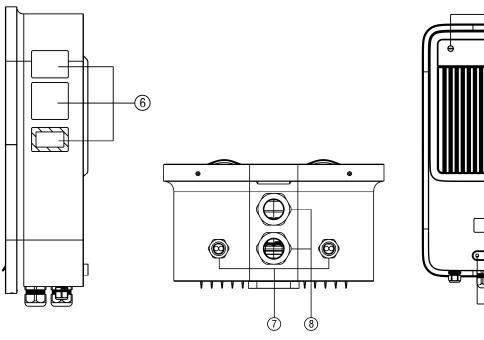
The images and illustrations depicted in this manual may differ slightly from the actual ones.

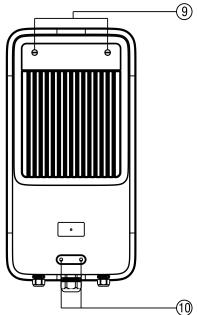
# 3.1 Product Overview

# MaxiCharger AC Ultra

- 1. Ambient Light Sensor detects ambient brightness
- 2. Display
- 3. RFID Reader
- 4. Status LED (Refer to 8.2 LED Descriptions for details)
- 5. Socket
- 6. Product Label
- 7. Ethernet Cable Port
- 8. AC Inlet Hole
- 9. Upper Mounting Screw
- 10. Mounting Hole







# 3.2 In the Box

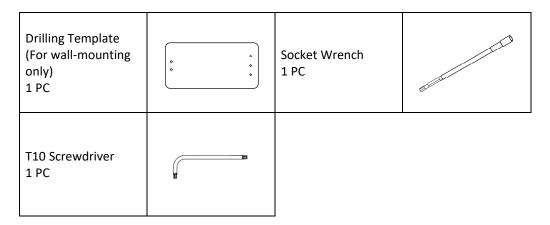
# Main Kit

Charging Station 1 PC	( 8 )	Wall Dock 1 PC	
Screw (M6 x 50) (For wall-mounting only) 5 PCS		Wall Anchor (For wall-mounting only) 5 PCS	
Quick Reference Guide 1 PC		Packing List 1 PC	

# **Pedestal Kit**

Pedestal 1 PC	Expansion Bolt (M16 x 150) 4 PCS	
Screw (M6 x 16) 3 PCS	Screw (M6 x 25) 2 PCS	
T25 Screwdriver 1 PC	Drilling Template 1 PC	
Quick Reference Guide 1 PC	Packing List 1 PC	

### **Tool Kit**



# 3.3 Recommended Tools

- Tape measure
- Spirit level
- Pencil
- 8 mm drilling bit
- Drill
- Wire stripper
- Crimp Connector
- Crimping plier
- Phillips screwdriver

# **⊘** NOTE

The tools mentioned above are not included in the package. Ensure they are readily available prior to installation.

# 4 Installation

# 4.1 Prepare for Installation

### 4.1.1 Choose Location

### For Wall-mounting:

- Install the charging station on a flat and vertical surface capable of supporting its weight (e.g. a finished brick or concrete wall).
- Install the charging station in a location that allows the charging cable to remain within its bending tolerance.
- The charging station should be installed 450 mm above the surface at a minimum.
- Position the charging station in a location where it is not vulnerable to being damaged.

## For Pedestal-mounting:

- A horizontal, level, and sound foundation is required for installation. To ensure safe and permanent anchoring, the concrete strength level should be above C30.
- The base must permit the running off of any water that has entered the base.
- The diameter of the embedded cable should not exceed 110 mm. All cables must be laid precisely in the center of the concrete foundation from the base and should have an excess length of 1-1.5 m for the remaining installation activities.
- Do not mount the pedestal on asphalt.
- The foundation can be flush with the surface.

### 4.1.2 Checklist

- The local installation regulations are identified and followed.
- All necessary permits are obtained from the local authority that has jurisdiction.
- The existing electrical load has been calculated to find the maximum operating current for the charging station installation.
- A miniature circuit breaker (MCB) and residual current device (RCD) are installed upstream and have ratings that correspond to the local power supply and required charging power.
- The correct cables are available at the installation site, and there is sufficient cable length to strip and connect the wires.
- The recommended installation tools are available at the site. Refer to 3.3 Recommended Tools.

### 4.1.3 Electrical Design



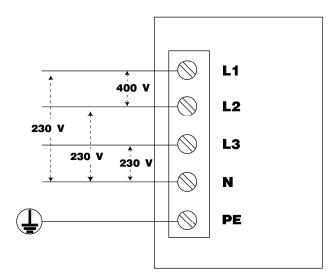
Connecting the MaxiCharger to the power supply other than specified in this section can cause incorrect installation and the risk of electric shock, as well as damage to the charging station, and injury or death.

	TN-system	PE cable
Earthing System	<ul><li>TT-system</li><li>IT-system</li></ul>	Earth electrode installed separately (self-installed)
Power Input	Three-phase	400 V AC ± 15%, 50 Hz
MCB (Miniature Circuit Breaker)	The power supply MCB must match the power rating of the charging station.	

Observe the descriptions below for power supply connection of the charging station, depending on the specifications of the power supply cabinet.

### 400 V AC, Three-phase with Neutral

For three-phase using a Wye-connected secondary, all three phases (L1, L2, and L3) and neutral must be connected. Each phase voltage must measure 230 V to neutral.



# 4.2 Unpack

- 1. Open the package.
- 2. Remove the charging station from the box.
- 3. Remove all packaging material from the charging station.
- 4. Discard the packaging material.
- 5. Ensure that all parts are delivered according to the order. Refer to 3.2 In the Box.
- 6. Do a visual inspection of the charging station and the parts for damage. In case any damage is found or the parts are not consistent with your order, contact the delivery and Autel support.

# 4.3 Mechanical Installation

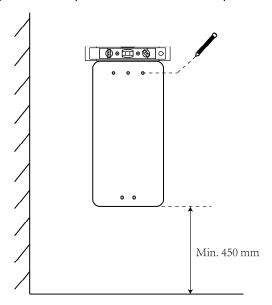
There are two ways to mount the charging station:

- Mounting on a wall
- Mounting on a pedestal

# 4.3.1 Mounting on a Wall

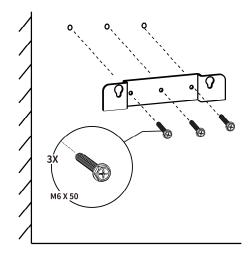
## STEP 1

- 1. Place the drilling template against the wall, minimum 450 mm above the surface. Then level it using a spirit level.
- 2. Mark the five mounting holes with a pencil and remove the template.



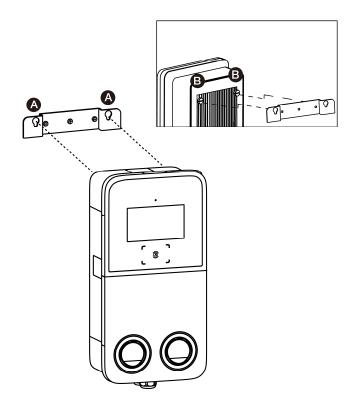
## STEP 2

- 1. Drill five 8 mm holes to a depth of 50 mm.
- 2. Insert five 8 mm wall anchors into the holes.
- 3. Place the wall dock on the wall, aligning with the three upper holes. Level it with a spirit level. Then insert three M6 x 50 screws into the holes. Tighten the screws to 5-7 Nm using the socket wrench.



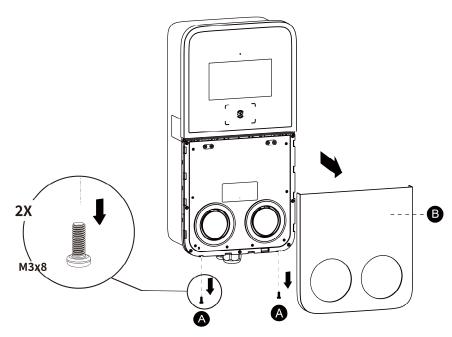
# STEP 3

Attach the charging station onto the wall dock by inserting the two mounting screws (B) on the back of the charging station into the two upper mounting holes (A). Slide the charging station downwards to engage the screws.



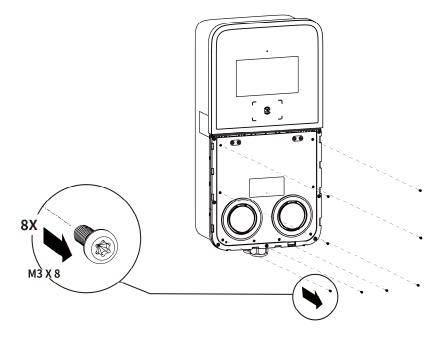
# STEP 4

Loosen the two M3 x 8 screws (A) at the bottom of the charging station using the T10 screwdriver and remove the faceplate (B). Set them aside.



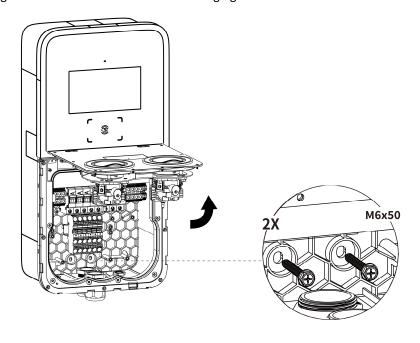
# STEP 5

Remove the eight M3 x 8 screws using the T10 screwdriver. Set them aside.



# STEP 6

Flip the maintenance cover up. Then insert two M6 x 50 screws into the two lower holes. Tighten the screws to 5-7 Nm using the socket wrench to secure the charging station.

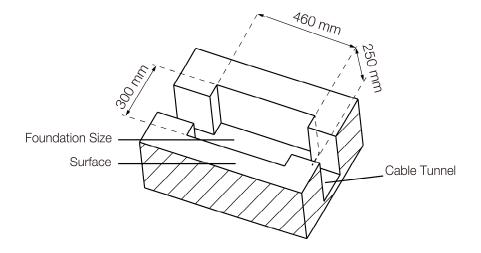


# 4.3.2 Mounting on a Pedestal

# **Preparing the Foundation**

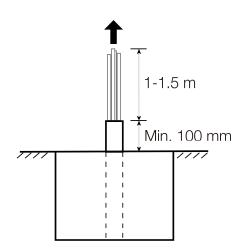
# STEP 1

- 1. Dig a hole with the size of  $460 \times 300 \times 250 \text{ mm}$  (L x W x H).
- 2. Trench and excavate an opening to accommodate the wiring conduit.



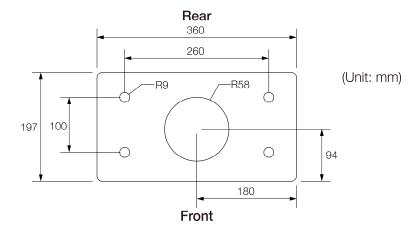
# STEP 2

- 1. Run the conduit to the designated location. The conduit stub-up is recommended 100 mm above the surface at a minimum.
- 2. Pour concrete into the hole and wait until it has hardened.
- 3. Feed the AC input cable and the Ethernet cable (if available) out of the conduit. Ensure a length of 1-1.5m is available above the foundation to allow wiring to reach the AC terminals.



# **Drilling Holes**

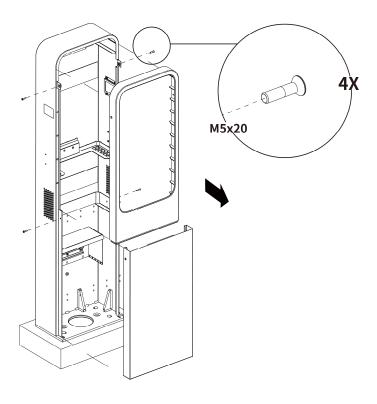
- 1. Place the drilling template on the foundation, aligning its central hole with the conduit stub-up. Then level the template using a spirit level.
- 2. Mark the four mounting holes on the foundation. Remove the drilling template.
- 3. Drill into the holes measuring 18 mm in diameter and 160 mm in depth.



# **Installing the Pedestal**

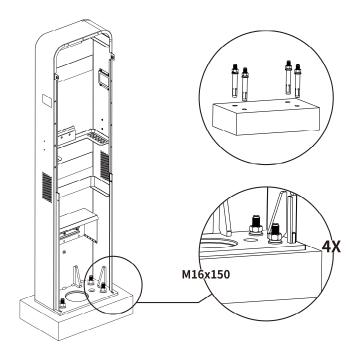
# STEP 1

Loosen the four M5 x 20 security screws on both sides using the T25 screwdriver to remove the upper and lower front covers. **Set them aside**.



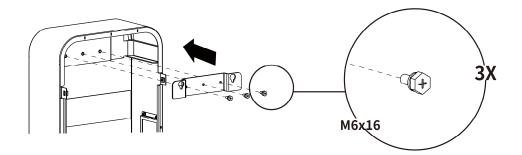
# STEP 2

- 1. Place the pedestal onto the foundation, aligning with the conduit stub-up and four mounting holes.
- 2. Tap the included M16 x 150 expansion bolts into the four mounting holes. Tighten the bolts to 140 Nm to secure the pedestal.



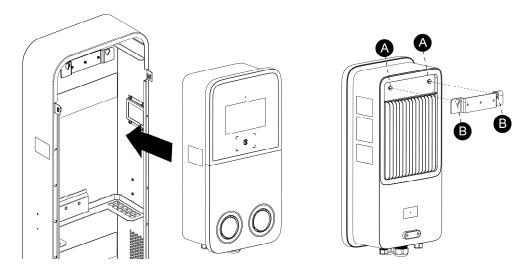
# **Mounting the Wall Dock**

- 1. Align the wall dock with the three mounting holes on the pedestal.
- 2. Insert the three included M6 x 16 screws into the holes and tighten them to 5-7 Nm using the socket wrench.



# **Mounting the Charging Station**

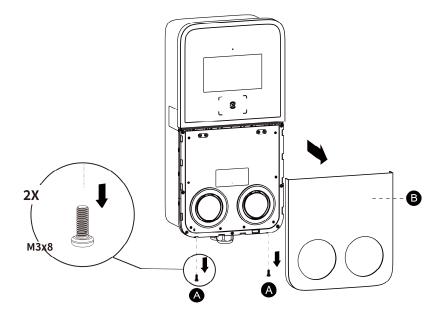
Hang the charging station onto the wall dock by aligning the two mounting screws (A) on the back of the charging station with the two holes (B) of the wall dock.



# **Securing the Charging Station**

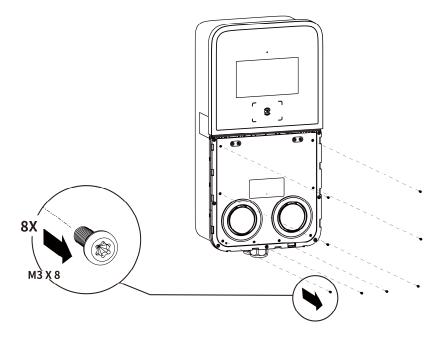
# STEP 1

Loosen the two M3 x 8 screws (A) at the bottom of the charging station using the T10 screwdriver and remove the faceplate (B). Set them aside.



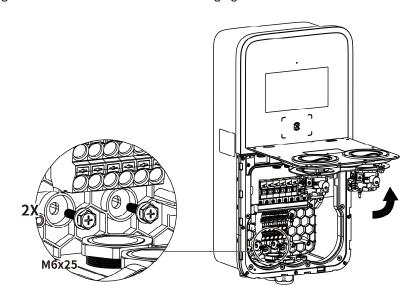
# STEP 2

Remove the eight M3 x 8 screws using the T10 screwdriver. **Set them aside**.



# STEP 3

Flip the maintenance cover up. Then insert two M6 x 25 screws into the two lower holes. Tighten the screws to 5-7 Nm using the socket wrench to secure the charging station.

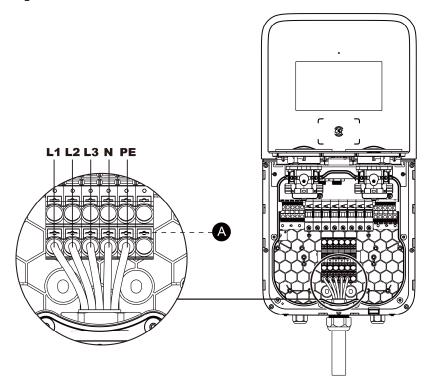


# 4.4 Power Supply Wiring

# **⊘** NOTE

Use minimum 16 mm² copper wire. Choose based on the power supply available and the distance from the distribution box.

- 1. Loosen the cable gland at the bottom of the charging station and feed the AC input cable through it.
- 2. Cut and strip the wires to the required length.
- 3. Crimp the wires to the crimp connectors using a crimping plier.
- 4. Use a flathead screwdriver to hold the release button (A) above the connector hole and push the wires into the holes as shown:
  - L1 (Brown)
  - L2 (Black)
  - L3 (Grey)
  - Neutral (N, blue)
  - Earth (PE, green/yellow striped)
- 5. Fix the cable gland.

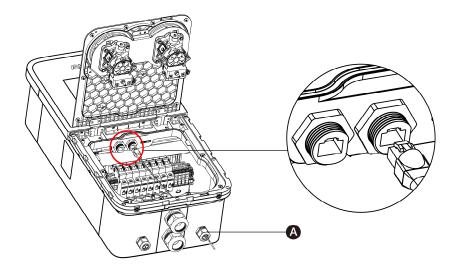


# 4.5 Connecting to the Internet

The MaxiCharger AC Ultra can access the Internet via Ethernet cable, cellular network or Wi-Fi.

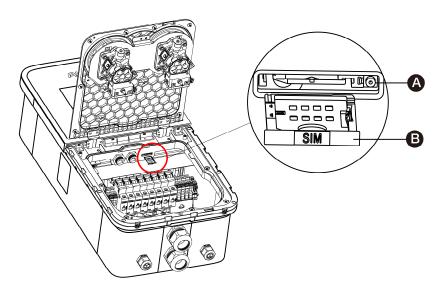
## 4.5.1 Via the Ethernet Cable

- 1. Insert the Ethernet cable with the RJ45 plug through either of the bottom Ethernet cable port (A).
- 2. Plug the Ethernet cable into either of the RJ45 port as shown.



## 4.5.2 Via Cellular Network

- 1. Eject the SIM card tray (B) by pressing the tiny button (A) next to it.
- 2. Place the SIM card into the tray. Ensure it is inserted correctly.
- 3. Push the card tray back in place.



## 4.5.3 Via Wi-Fi

To connect the MaxiCharger to the Internet via Wi-Fi, please refer to 5.1 Initial Setups.

# 4.6 Complete Installation

- 1. Ensure that all installation and wiring are secured and correct. Then flip the maintenance cover down. Reinstall and tighten the eight M3 x 8 screws.
- 2. Reinstall the faceplate and the two M3 x 8 screws. Tighten them accordingly. The installation is now complete.

# 4.7 Energize the Charging Station

- Ensure all electrical connections are clean, tight, and free of wire strands and metal shavings.
- Turn on the circuit breaker.
- Wipe all surfaces with a soft cloth dampened with warm water.

The charging station is now ready for commissioning.

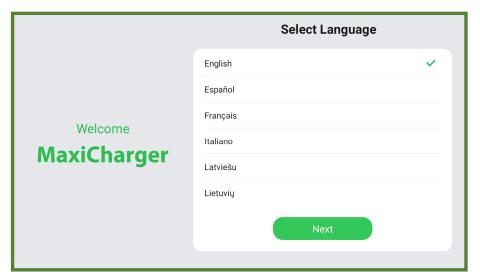
# **5** Settings

# 5.1 Initial Setups

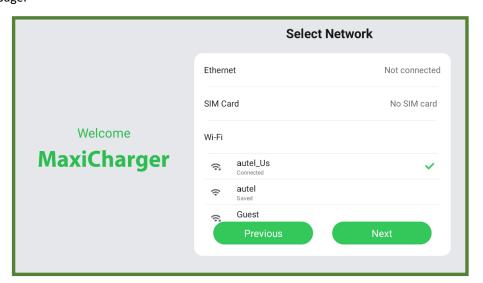
When the MaxiCharger is powered on for the first time, it is required to complete the initial setups by the installation engineer.

Follow the instructions below:

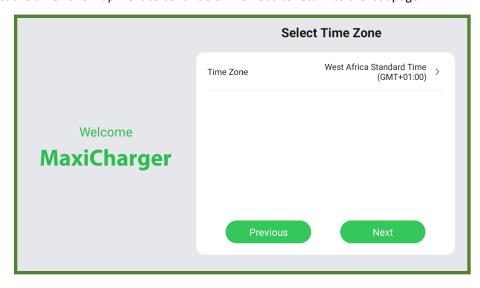
1. Select the language. Tap Next to continue.



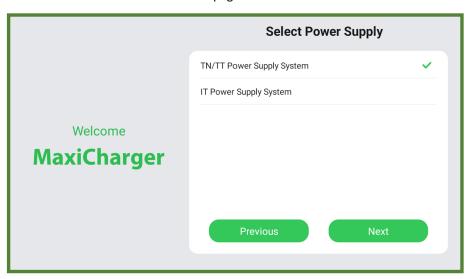
2. Select a local network and enter the Wi-Fi password. If the MaxiCharger has been connected to the Internet via SIM card or Ethernet cable, skip this step. Tap **Next** to continue or **Previous** to return to the last page.



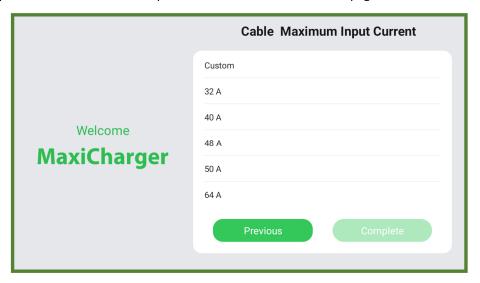
3. Select the time zone. Tap **Next** to continue or **Previous** to return to the last page.



4. Select the proper power supply system. This MaxiCharger supports both TN/TT and IT systems. Tap **Next** to continue or **Previous** to return to the last page.



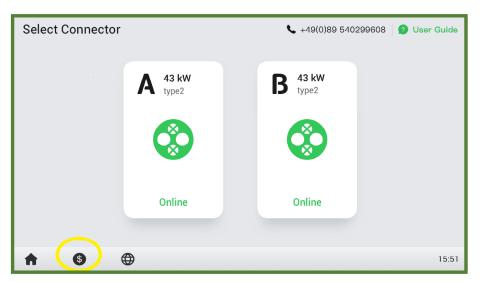
5. Select the maximum input current based on the ratings of the MaxiCharger and local grid capacity. Tap **Complete** to finish the initial setups or **Previous** to return to the last page.



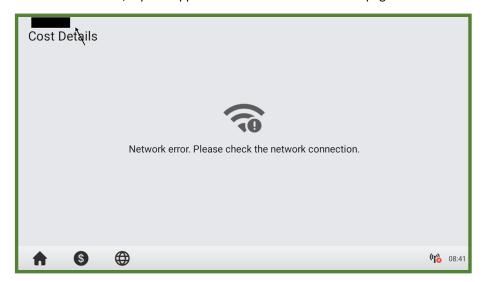
# 5.2 Change the Default Settings

Usually, the MaxiCharger has been set up before shipment, so there is no need for further setups other than described above. To change the default settings:

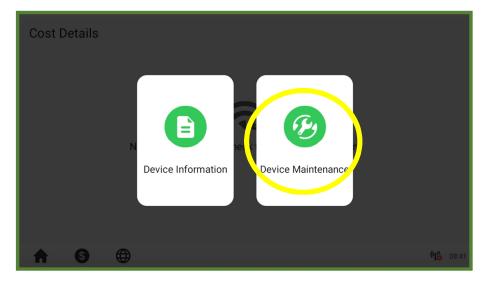
1. On the Standby Screen, tap the "currency (\$)" icon on the lower-left corner to enter the Cost Details Screen.



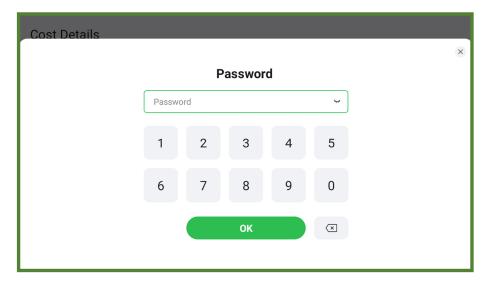
2. On the Cost Details Screen, tap the upper-left corner to enter the next page.



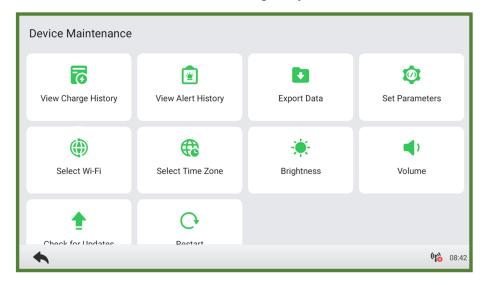
3. Select **Device Maintenance** on the screen.



4. A password prompt will appear. Enter the last 6 digits of the product's serial number to continue, which can be found on the product label.



5. On the Device Maintenance Screen, choose a setting to adjust.



6. In some cases where the MaxiCharger uses a third party platform instead of Autel cloud platform, you may need to manually set the parameters by tapping **Set Parameters** on the Device Maintenance Screen.

# 6 Operation

# **6.1 Charging Operations**

Before beginning a charge session, scan the QR code below to download the Autel Charge app to a mobile device from the Google Play or App Store. Then register an account. You are now ready to use the app to charge the vehicle.







## 6.1.1 Start Charging

- 1. Insert the charging handle into the charging port on the EV and the charger socket outlet.
- 2. Choose from the following ways to start a charge session:
  - Tap the RFID card on the RFID reader.
  - Use the Autel Charge app by tapping Start on the Charging Screen.
  - If a charging schedule is set in the Autel Charge app, the charger will initiate a charge session automatically as scheduled. (Scheduled charging case.)
  - If the Plug-and-charge function is enabled in the Autel Charge app, the charger will automatically start charging once the charging handle is properly connected. (Plug-and-charge case.)

# **⊘** NOTE

Ensure the EV is charging. The status LED on the charger should be breathing green. If you suspect the vehicle is not charging properly, try reconnecting the charging handle or contact Autel technical support.

## 6.1.2 Stop Charging

### **⊘** NOTE

- If the EV charging handle is unplugged during the charge session, the charging station automatically disconnects the power supply. This stops all charging operations.
- When the vehicle is fully charged, the charging station will automatically disconnect the power supply.
- 1. To stop charging, choose either of the following two ways:
  - Wait for the charge session to end and no further actions are required in the case of scheduled charging or plug-and-charge.
    - The status LED will flash green.
    - The Autel Charge app displays that the EV is fully charged.
    - The display will show that the EV is fully charged.
  - End the charge session by tapping the RFID card on the RFID reader again or via the Autel Charge app by tapping **Stop** on the Charging Screen.
- 2. Remove the charging handle from the charger socket outlet and the EV charging port.

# 6.2 Display Descriptions

# **6.2.1 Standby Screen**

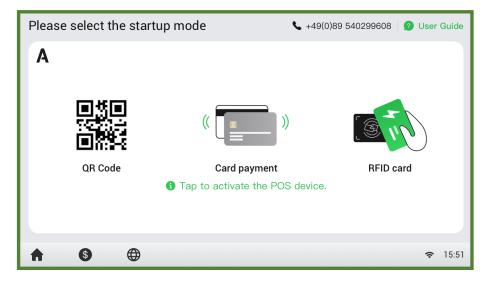


- 1. Top screen displays customer support info and a **User Guide** button (tap to view charging instructions)
- 2. Middle screen tap to select a connector
- 3. Bottom screen tap to return to the Home page, view the charging costs, and adjust the language

The display shows the Standby Screen when the charging station is in idle status, indicating that the charging station is ready for use. When this screen appears, choose connector A or B to enter the Authorization Screen.

### 6.2.2 Authorization Screen

Choose an authorization method to start a charge session — QR code, RFID card or credit card (optional).



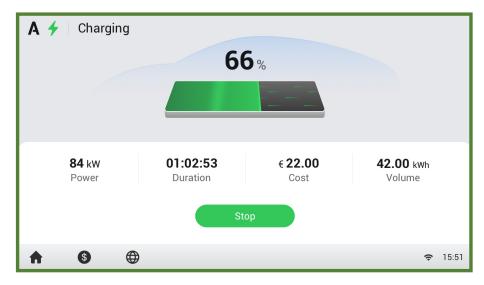
# 6.2.3 Start Charging Screen



# 6.2.4 Charging Screen

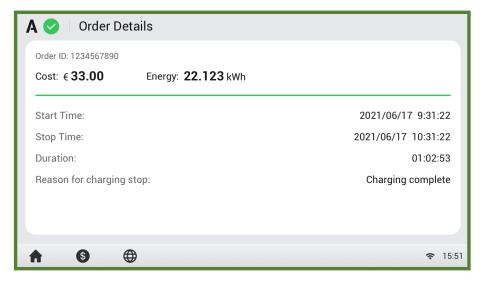
The Charging Screen will show the real-time charging progress, current power, charging duration, current cost, as well as volume.

If needed, tap the **Stop** button on this screen to stop charging.



### 6.2.5 Order Details Screen

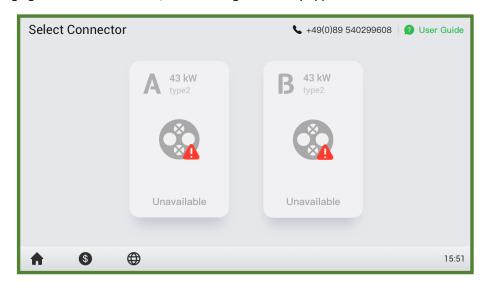
When the charge session ends, the Order Details Screen will appear.



### 6.2.6 Error Screen

The display shows different error messages depending on the error type. Resolve the problem(s) by following the on-screen instructions, contacting Autel technical support or trying another MaxiCharger. Below is an example for the error screen:

If the charging handle is not available, the following screen may appear.



# Troubleshooting

# 7.1 Troubleshooting Table

Item	Problems	Solutions	
1	The charging station is successfully added, but the Bluetooth connection fails	Check whether the QR code on the charging station is consistent with the QR code on the Quick Reference Guide. If so, make sure the Bluetooth is enabled on your mobile device; if not, contact customer support.	
2	The charge session does not start as scheduled	Do not insert the connector into your EV charging port before setting up a charging schedule for the first time. Insert the EV charging cable after the schedule is set up.	
3	Over-voltage	Use the multimeter to check whether the voltage on the power input is too high. If the result is greater than or equal to 120 % of the rated voltage (276 V), contact local power grid company.	
4	Under-voltage	Use the multimeter to check whether the voltage on the power input is not sufficient. If the result is less than or equal to 70 % of the rated voltage (161 V), contact local power grid company.	
5	Ground fault	Ensure the charging station is grounded correctly.	
6	Power failure	Ensure the switch to the circuit breaker is on.	
7	Over-heating	<ul> <li>Check whether the EV charging cable is securely connected.</li> <li>Ensure the operating temperature is within the specified range on the product label.</li> <li>Stop charging. Restart charging until it is within the operation temperature range.</li> </ul>	
8	Residual current detected	Unplug the vehicle and plug in again. If the problem persists, contact customer support.	
9	Bluetooth communication failure	<ul> <li>Ensure the Bluetooth is enabled on your mobile device and the charging station is powered on and operating properly.</li> <li>Forget the charging station in the Bluetooth settings on your mobile device and pair it to your device via Bluetooth again.</li> <li>If the problem persists, contact customer support.</li> </ul>	
10	Update failure via Bluetooth	<ul> <li>Ensure the charging station is in idle status.</li> <li>Ensure the Bluetooth connection is working properly.</li> <li>If the problem persists, contact customer support.</li> </ul>	
11	Internet connection fails	<ul> <li>Try to connect another device to the same Internet, verifying the Internet connection is working properly.</li> <li>If the problem persists, contact customer support.</li> </ul>	

# Specifications

# 8.1 Product Specifications

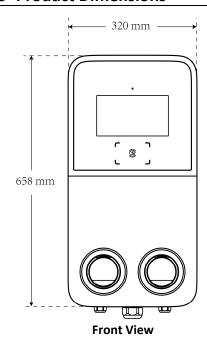
Item	Description
AC Power Output Rating	2 x 22 kW
AC Power Input Rating	400 V ± 15%, three-phase, 50 Hz
Network Type	TN, IT, and TT
Circuit Breaker	40 A
Input Wiring Scheme	400 V AC, three-phase (3P + N + PE)
Connector Type	IEC 62196 Type 2 socket or socket with shutter
Display	8-inch touchscreen with 1280 x 720 resolution
Metering	MID, Eichrecht
Ground Fault Detection	Type A 30 mA + DC 6 mA
Protection	Overcurrent, overvoltage, undervoltage, integrated surge protection
Connectivity	<ul> <li>4G</li> <li>Bluetooth</li> <li>Wi-Fi</li> <li>Ethernet</li> <li>RS485</li> </ul>
Card Reader	ISO 15693, ISO 14443, Credit Cards
Communications Protocol	OCPP 1.6J (upgradable to OCPP 2.0.1)
Mounting	Wall-mounted or floor using a pedestal
Enclosure Ratings	<ul> <li>IP54</li> <li>IK10</li> <li>Indoor or outdoor installation</li> </ul>
Operating Temperature	(-40 to 55 °C)
Storage Temperature	(-40 to 70 °C)
Dimension (H x W x D)	320 x 170 x 658 mm
Weight	15.4 kg
Operating Humidity	≤ 95%, non-condensing
Operating Altitude	2000 m

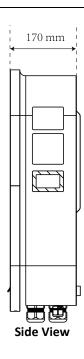
Item	Description
Safety and Compliance	IEC/EN 61851-1, EN 62311, EN 62479, IEC/EN 62955
Codes and Standards	EMC Class B, UKCA, BSI 7671
Warranty	3 years

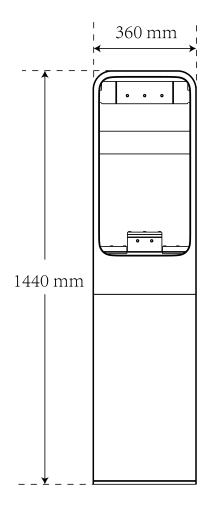
# 8.2 LED Descriptions

LED	Description	
	Solid Green: The charging station is in standby mode.	
	<ul> <li>Breathing Green: An EV is connected and a charge session has started.</li> </ul>	
	Flashing Green: A charge session has ended.	
Status LED	Solid Red: An error has occurred.	
Status LED	<ul> <li>Solid Yellow: The charging station is not available due to any of the followings:</li> </ul>	
	<ul> <li>The firmware is upgrading.</li> </ul>	
	<ul> <li>The charging station is reserved.</li> </ul>	
	<ul> <li>It is temporarily disabled by the backend.</li> </ul>	
RFID LED	Solid Green: The RFID function is enabled.	
	Not Illuminated: The RFID function is disabled.	

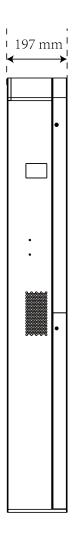
# **8.3 Product Dimensions**











**Pedestal Side View** 

Pedestal Weight: 27.25 kg Pedestal Material: Stainless Steel SUS430

# 9 Compliance

The product is in conformity with the following standards and/or other normative documents:

EN 301 489-1 V2.2.3

EN 301 489-3 V2.1.1

EN 301 489-17 V3.2.4

EN 301 489-52 V2.1.1

EN 300 328 V2.2.2

EN 300 330 V2.1.1

EN 301 908-1 V13.1.1

EN 301 908-2 V13.1.1

EN 301 908 -13 V13.1.1

EN 301 511 V12.5.1

EN 50663

EN 50665

BS EN IEC 61851-1

EN IEC 61851-1

IEC 61851-21-2

EN IEC 61851-21-2

EN 50470-1

EN 50470-3





MANUAL

# Terra DC wallbox Installation Manual

Version 1.9



# **Notice**

This document contains information about one or more ABB products and may include a description of or a reference to one or more standards that may be generally relevant to the ABB products. The presence of any such description of a standard or reference to a standard is not a representation that all of the ABB products referenced in this document support all of the features of the described or referenced standard. In order to determine the specific features supported by a particular ABB product, the reader should consult the product specifications for the particular ABB product.

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#### **Version Control**

Version	Date	Remarks
1.0	27-01-2021	Added "Appedix C – Use with Mobile Cart"
1.1	06-05-2021	Added Fuel Indication Labels
1.2	14-06-2021	Added Service part about mobile Cart.
1.3	07-07-2021	Added "Recommended periodic Mainteinance" paragraph
1.4	07-07-2021	Added Meter Box paragraph
1.5	09-17-2021	Added notes to "install cable glands" paragraph
1.6	12-10-2021	Minor adjustment – removed Meter Box paragraph
1.7	04-05-2022	Added instructions for mounting gun holder
1.8	16-05-2022	Added DE Fuel Indication Labels
1.9	06-20-2023	Par. 5.4.1 note about number of people required to lift the DCWB



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# **Glossary**

#### AC

Alternating Current.

#### CCS

Combined Charging System. This is the name of the charging protocol of European and North-American car makers.

#### **CHAdeMO**

DC fast charging method for electric vehicles.

#### Contractor

Entity hired by the owner / site operator to do engineering, civil and electrical installation work.

#### DC

Direct Current.

#### ΕV

Electric Vehicle.

#### Grid provider

Company responsible for the transportation and distribution of electricity.

#### нмі

Human Machine Interface; the display/screen on the charger.

#### NOC

ABB Network Operating Centre; remotely checks the correct functioning of the charger.

#### Owner

The legal owner of the charger.

#### OCPP

Open Charge Point Protocol. Open standard for communication with charge stations.

#### PE

Protective Earth.

#### PPE

Personal Protective Equipment.

Equipment such as safety shoes, helmet, glasses, gloves.

#### **RCD**

Residual Current Device. Breaks the connection if a residual current is detected.

#### **RFID**

Radio-Frequency IDentification. RFID is acommunication technology by means of radio waves to transfer data over a very short distance between a reader and an electronic tag or card.

#### Site operator

This entity is responsible for the day to day control of the charger. The site operator can be the owner, but not necessarily.

#### User

The owner of an electric vehicle, who uses the Charge Station to charge that vehicle.





## 1 Introduction

## 1.1 Preface

This guide describes and physical installation of the Terra DC Wallbox at its location.

The Terra DC Wallbox Charge Stations are easy to install DC fast chargers for electric vehicles. Fast chargers are electrical installations with high electric currents. Therefore, the installation must be planned carefully, and must be done by certified personnel only (according to local standards). Local regulations shall take precedence if they list different installation requirements than prescribed in this Installation Manual.

The Terra DC Wallbox European and NAM version is physically the same charger. The main difference is the input power they can be supplied by (three-phase for the first, single phase for the second). The differences Terra DC Wallbox EU and NAM, and the consequences for the installation are described in a separate section 1.3.

As the physical installation of both types is equal, they will be referred to hereafter as Terra DC Wallbox only and this will account for both types, unless specifically stated otherwise.

Both types come in different versions, depending on the outlet types. The different versions are described in a separate paragraph.

Before installing the DC WALLBOX CHARGER, read this Installation Guide carefully and attentively. Follow the instructions in this Installation Guide. ABB is not responsible for any damage that has been caused by not or incorrectly following and executing the instruction described in this manual.

## 1.2 Intended document users

This document is intended to be used by:

- Customers who purchased a Terra DC Wallbox, or are in the process of ordering and want to know in more detail how it has to be installed.
- Contractors who are responsible for site preparation and/or installation of a Terra DC Wallbox (EU or NAM).

# 1.3 Similarities and differences between Terra DC Wallbox EU and NAM

The Terra DC Wallbox EU and NAM chargers are identical in their outer appearance and physical dimensions. The physical installation of the Terra DC Wallbox EU and NAM can thus be handled in a very similar way.

On the inside of the system there are some differences. The Terra DC Wallbox EU version has a AC input board provided with contact blocks for main connection that are designed to be connected with a three phase + neutral power grid. On the other hand the

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NAM version has a different AC input board designed to be connected with a one phase+ neutral power grid.

## 1.4 Terra DC Wallbox version description

The Terra DC Wallbox is available in different versions depending on the available outlets.

The versions are:

Version	CCS2	CCS 1	CHAdeMO EU	CHAdeMO UL
Terra DC Wallbox C EU	Χ			
Terra DC Wallbox J EU			X	
Terra DC Wallbox CJ EU	Х		X	
	XX			
			XX	
Terra DC Wallbox C UL		Х		
Terra DC Wallbox J UL				Х
Terra DC Wallbox CJ UL		Х		Х
		XX		
				XX

- C CCS (Combo) standard
- J CHAdeMO standard

## 1.5 Signs

The following signs are used on the equipment and in this manual:



### DANGER Hazardous voltage

Identifies a hazard that could result in severe injury or death through electrocution.



## WARNING

#### Various

Identifies a hazard that could result in severe injury or death.



## WARNING Rotating parts

Identifies a hazard that could result in injury due to the presence of rotating or moving parts.

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WARNING Pinch Hazard

Identifies a hazard that could result in injuries, in which some body parts are pinched or crushed.



CAUTION Various

Identifies a hazard that could result in damage to the machine, other equipment, and/or environmental pollution.



## CAUTION Environmental damage

Identifies a hazard that could result in environmental damage and/or environmental pollution.



#### NOTICE

Contains remarks, suggestions or advice.

## 1.5.1 Owner responsibilities

The owner and site operator are required:

- To operate the charge station with the protective devices installed and to make sure all protective devices are correctly installed after carrying out installation or maintenance.
- To write an emergency plan that instructs people what to do in case of emergency.
- To prepare the site where the wall box charge station will be installed, according to the requirements described in this guide.
- To make sure that there is enough space around the charger to carry out maintenance work.
- To appoint a person responsible for the safe operation of the charge station and for the coordination of all work.
- The owner is cautioned that changes or modifications not expressly approved by ABB could void the owner's authority to operate the equipment and ABB's warranty policy
- Neither ABB nor its affiliates shall be liable to the purchaser of this product or third parties for damages, losses, costs or expenses incurred by purchaser or third parties as a result of: an accident, misuse or abuse of this product or unauthorized modifications, repairs or alterations to this product, or failure to strictly comply ABB operating and maintenance instructions.

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## 1.5.2 Tilting and handling



#### WARNING

#### Heavy equipment

The Terra DC Wallbox weighs about 70 kg. Handling Instructions:

- 1. Consider always two people to install and hang to wall a Terra DC Wallbox.
- 2. Do not drop the Terra DC Wallbox.

## 1.5.3 Sharp edges



#### WARNING

#### Sharp metal edges

There could be sharp metal edges inside the Terra DC Wallbox. It is recommended to wear mash protecting gloves when working inside the charger.

### 1.5.4 Electric hazards



#### **DANGER**

#### Hazardous voltage

The Terra DC Wallbox contains conductors under hazardous electrical voltages. The grid terminals on the internal DIN rail may carry hazardous voltages, even if all circuit breakers are switched off.

## 1.5.5 Installation safety



#### **DANGER**

## Hazardous voltage

Instructions:

- 1. Always switch off the external group switch upstream (Main breaker, RCD and disconnect or) before performing any installation, disassembly, repair or replacement of components.
- 2. Do a voltage check and make sure that the electrical power is disconnected from the system.
- 3. Only ABB certified technicians are permitted to commission the Terra DC Wallbox.
- 4. When the system is in an open or dangerous condition, do not allow unqualified persons to go near it. Instruct and warn people about the potential harmful high voltages.
- 5. The installation and maintenance personnel must supply their own lighting equipment, since the Terra DC Wallbox has no lights inside the cabinet.
- 6. Always connect the Protective Earth (PE) first, before connecting the neutral (N) and Phase (P) wiring.
- 7. Correctly lock the door after installation or service operations.

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# 1.6 1.6 Environment and disposal of waste



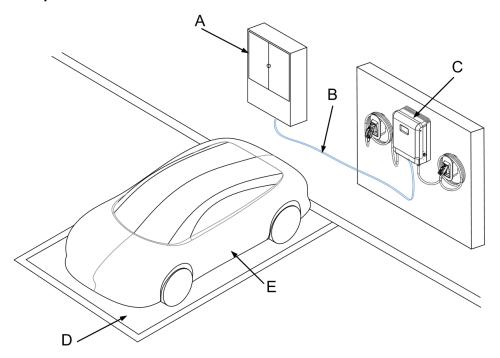
### NOTICE

Always observe the local rules and regulations with respect to processing (non-reusable) parts of the Terra DC Wallbox.

# 2 Description of the product

# 2.1 Overview of the system

## 2.1.1 Complete overview

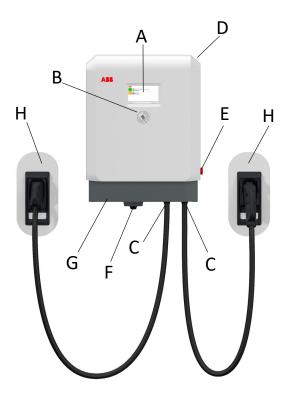


Example of a complete installation

- A Power distribution board of the owner
- B Cables in cable conduit (if required)
- C Terra DC Wallbox
- D Parking space for charging
- E Electric vehicle

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#### 2.1.2 **Outside view**

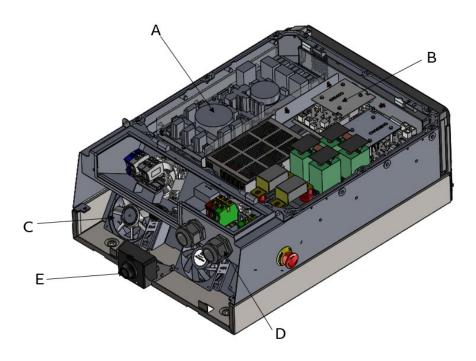


- Α
- Display / HMI RFID card reader В
- С Charge outlets DC
- D Air outlet

- Emergency button Ε
- F AC input cable
- G Air inlet
- Н Gunholder (optional)

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#### 2.1.3 Inside view



- A AC input board
  B CPI and IMI boards
- C External Fan (2x)

D Cable gland for DC output(2x) E Cable gland for AC input

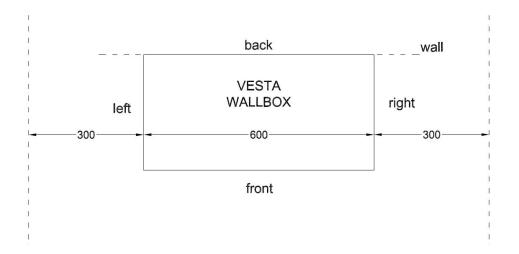
# 2.2 Geometry of infrastructure

# 2.2.1 Required space for placing and maintaining the Terra DC Wallbox wallbox

The Terra DC Wallbox requires a minimum space of  $900 \times 1200$  mm. This space is calculated as follows:

- Size Charger W x D x H: 304.5 x 512 x 770 mm.
- Bottom side 600 mm (400 mm from the Terra DC Wallbox in order to avoid obstacles for the electrical connection).
- Left and right side 300 mm, in order to operate without obstacles on the lateral side of the Terra DC Wallbox.

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## 2.2.2 Ventilation and airflow of the Terra DC Wallbox

The Terra DC Wallbox has an air inlet on the bottom side and outlet on the top side.



## NOTICE Free air flow

If necessary, take precautions to prevent snow or objects from blocking the in- and outlets.



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## 2.3 Electrical engineering

The electrical installation must be completed according to the local safety and electrical regulations and laws.

In general, the installer should follow the following prescriptions for the electrical installation of the devices upstream the installation.

#### **IEC prescription:**

- Installation of charging stations must be according to IEC 60364-7-722 and/or any applicable national rules
- Each charging station must be individually protected via a separate upstream RCD (Residual Current Device) at least of type A with a rated residual operating current not exceeding 30 mA.
- As all variant have an internal a DC fault current monitoring function, a DC fault current over 6 mA does NOT occur on the AC-input side of the TERRA DC WALLBOX, and thus an upstream RCD of type B is not required, nevertheless local regulation could require a RCD of Type B independent of internal DC fault current limitation NOTE. According to the standard for RCDs, type A RCDs are able to tolerate 6 mA of DC fault current while still maintaining their correct functionality.
- Fuses or equivalent circuit breaker rated to respect the charger specifications must be used (ref. cfr 16.1, IEC 61851-1:2017)

#### North American prescriptions:

- Each charging station must be connected via a separate GFCI (Ground Fault Circuit Interrupter /or equivalent RCD device) for the personal protection from the hazard of electric shock
- Fuses or equivalent circuit breaker rated to respect the charger specifications must

## 2.3.1 Requirements External RCD/GFCI



#### **NOTICE**

## External RCD/GFCI not included in delivery scope

Upstream RCD/GFCI's are explicitly excluded from ABB's delivery scope and belong to the scope of the installation company. The locally certified installation company can base the RCD/GFCI device type, amongst other external factors, on below charger characteristics.

### DC-charging side requires immunity for short current peaks over PE

When the charger engages the DC charging (at the beginning of every charger session in the pre-charge phase) a relay switches and turns on the input to the power modules. A synchronic engagement of the phases in the relay in combination with the electrical capacity in the input power part, can cause incidental very short (25 microseconds) current peaks of up to 60A over the Protective Earth. The amplitude of the Ampere peaks can vary with the location and is dependent on grid and earth impedance. Given the switching characteristics of the DC section of the charger we give you the advice to select an RCD/GFCI that has proven to be able to withstand these short current peaks (high immunity).

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# CAUTION Responsibility to comply with local regulations

The installation company is responsibly to design and install the electrical installation according the local regulations.

## 2.3.2 Conductor and cable diameter

The diameter of the electrical conductor of the ground cables depends on the length, method of installation, etc. This must be determined by your contractor.

The maximum cross section is 35 mm<sup>2</sup>.

The maximum diameter of the (grid) cable entering the cabinet is 32 mm. The minimum diameter with the standard fitted cable gland insert is 22 mm.

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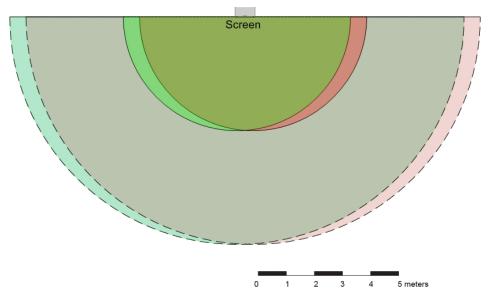
# 3 Site design

A site for EV charging can be designed in many different setups. This section is intended to give some useful information on the placement of a charger with respect to parking spaces and the vehicle inlets for the charging cable.

## 3.1 Cable reach

The charge cables of the Terra DC Wallbox charger can reach from 3.5 to 7 meters long. The DC cables leave the charger on both right and left sides. The cables and the connectors mounted on the cables are different for each charging standard and make them more or less flexible to reach out.

The figure below shows an example the charger in the center with each type of connector and how far it can reach out. The green circle with continuous line describes the CHAdeMO cable 3.5m, the red circle with continuous line the CCS cable 3.5m. The broken lines describe the previous cables with a length of 7m.

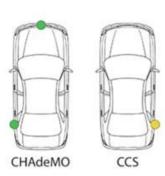


# 3.2 Different alignment possibilities

The charge inlets on a car can be located at different positions. The most common cars have their inlets located either on the front of the car, or on the left or right back side.

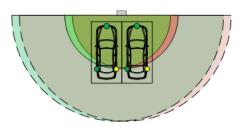
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Charging inlet locations of important EVs

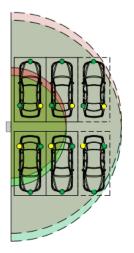


This makes some positions of the charger with respect to the parking space more favorable than others. Please keep this in mind when designing a site. Some possible situations are showed below:

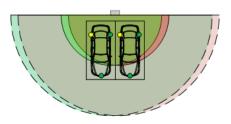
Forward parking



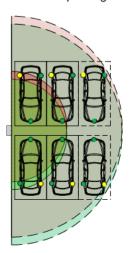
Lateral Backward parking



Backward parking



Lateral Forward parking



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## 4 Site construction

## 4.1 About construction

The construction phase includes all work required to prepare the location and make it ready for the placement and connection of the Terra DC Wallbox charger. The construction phase can start when:

- The wall preparation work is done.
- · All necessary permits are granted.
- The grid connection is available.

## 4.2 Power feed

The power cable enters the charger from below. Use foam or proper cable lugs/glands to prevent the entrance of animals from the AC inlet/Ethernet cable.

## 4.3 Instruction for a wall bearing

- Drill and tap 4 holes and insert the plug for fixation (M8 with 40mm minimum length) in the wall at the indicated positions, refer to technical drawing in the Appendix A par. 11.1.
- 2. Doing the four holes above, make sure that the free spaces for the cables of the Terra DC Wall Box are respected, refer to par. 2.2.1.

## 4.4 Power cable

- Cable type: two different cables
  - o 3P+N+PE, shielded cables are optional if required by local law.
  - o P+N+PE (or 2P+PE), shielded cables are optional if required by local law.
- Optional cable shielding must be attached to the PE Rail at both ends of the cable.
- The diameter of the cable conductor must be determined by your contractor / electrician.
- The maximum diameter surface of the cable conductor is 35 mm<sup>2</sup>.
- The PE conductor of the power cable must have the same diameter as the phase conductors.

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## 4.5 Internet connection

The preferred method of communication is to use the wireless 2/3G modem that is integrated into the Charger. A customer SIM card is not required, a subscription for the SIM card is provided by ABB for selected countries.

If there is no wireless signal available, a standard wired internet connection is required. This connection must meet the following requirements:

- Ethernet, RJ45.
   Cable type: 8P+PE, shielded.
- Recommendations:
  For distances of 75 meters or less; HELUKAT 600E.
  Distances over 75 meters require a custom engineered project.
- Recommended minimum bandwidth: upload: 128 kb/s download: 4 Mmb/s.
- Recommended availability: 99,9%.
- The connection must be available for the ABB service engineer and the NOC (Network Operation Center).
- Please contact ABB for a specific configuration.

In case the separate internet connection is not used, please assure the cable entry hole is closed, to assure the IP54 grade of the cabinet, and prevent insects and small animals to enter the cabinet.

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# 5 Receiving, Placing and connecting

## 5.1 Receiving the IP BOX

The product is delivered by a transport company to a warehouse where it will be handed over.

Transporting the Terra DC Wallbox to its final location (last mile service) is not standard included in the order.



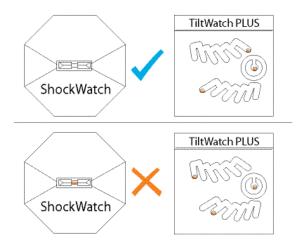
#### **NOTICE**

The delivery truck unloads the pallet carrying the Terra DC Wallbox.

The movement of the Terra DC Wallbox to its final location is the responsibility of the customer / contractor.

Check whether the Terra DC Wallbox has not been shaken or tilted.

• The cabinet is equipped with Shock Watch and Tilt Watch indicators.



Checking the Shock Watch and Tilt Watch PLUS sensors:

If the Shock Watch indicator is red, or the Tilt Watch PLUS indicator is tilted over 30°:

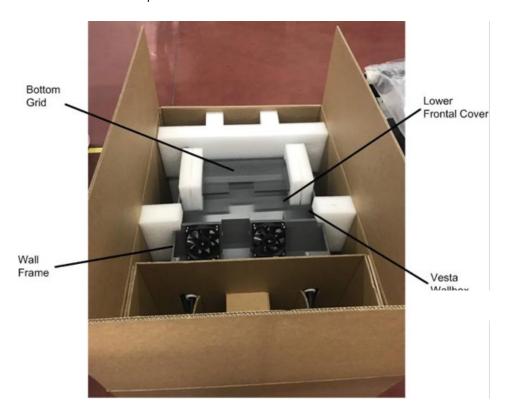
- 1. Do not refuse the delivery / receipt.
- 2. Make a notation on the delivery receipt and inspect cabinet for damage.
- 3. If damage is discovered, leave cabinet in original package and request immediate inspection from carrier within 3 days of delivery.
- 4. Contact your local ABB office..

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## 5.2 Unpacking IP Box, mounting preparations

## 5.2.1 Unpacking

The packaging of the Terra DC Wallbox can be removed without the use of tools and be careful because it could pollute of the environment.



- 1. Remove the plastic protection profiles.
- 2. Remove the Bottom Grid and the Lower Frontal Cover
- 3. Remove the Screws Package and make sure that contains:
  - Four hex bolts M8
  - Four screws M5
  - Two bolts M5
- 4. Remove the Wall Frame
- 5. Remove the Terra DC Wallbox.
- 6. For all components above, remove the outside and inner side shrink wrap.

## 5.2.2 Mounting preparations

Unpacking the IP BOX and verify that all the following items are present:

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- M8x30 8.8 hex bolts (4x)
- M5 mounting screws (4x)
- M5 mounting bolts (2x)
- Wall frame
- Frontal cover
- · Bottom grid cover

## 5.3 Move cabinet to position

### 5.3.1 Options

The only option to move the Terra DC Wallbox from the delivery truck to the location is through a forklift truck (refer to Page 25).



### DANGER Hazardous voltage

Make sure the main switch of the power supply group for the product is set to the OFF position. Do a voltage check to make sure there is no electrical power on the cables or on the system and secure against resetting.



### NOTICE Warranty

Damage due to moving the cabinet to its position is not considered a warranty issue.

## 5.4 Mounting the Terra DC Wallbox

Preconditions:

- Tools: Spanners size 17.
- Guide the power cable through the central cable gland and if required the Ethernet cable through the smaller gland.

## 5.4.1 Mounting the Terra DC Wallbox



#### NOTICE

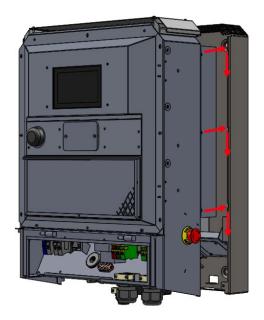
The minimum number of people required to lift and install the Terra DC Wallbox must be determined based on the relevant local regulation with taking into account the maximum allowed weight per person as well as the usage of the appropriate and suitable lifting equipment. The definition of the exact lifting equipment and working method for lifting is the responsibility of the installation contractor.

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- 1. Carefully lower the Terra DC Wallbox onto its location.
- 2. Make sure not to entrap the cable(s).
- 3. Put the cabinet in the correct position on the wall bearing aligning the four holes of the cabinet with the correspondent ones on the wall bearing.
- 4. Tighten the four M8 screws with 8.8 hexagonal bolts.



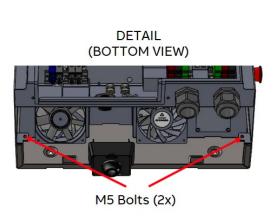
5. Put the unit on the cabinet correctly aligning the 6 bolts (3 for each lateral side) between them.



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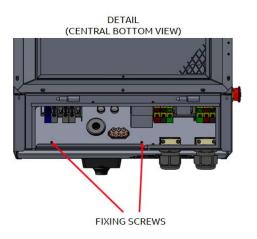
6. Tighten the two M5 bolts on the lower side of the unit. Pay attention to the internal fan power supply cable.





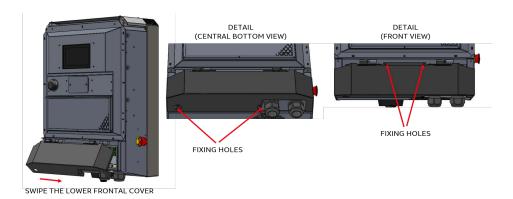
- 7. Let the power supply cable pass through the central gland and tight it.
- 8. <u>AFTER</u> the cable connection (refer to para 5.4.2 and 5.5), take the bottom grid and put it on the lower side of the unit and fix it tightening two screws as showed in the following picture.



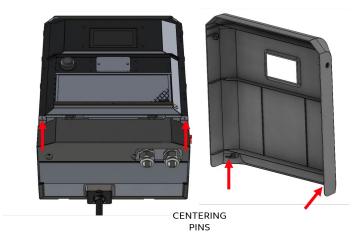


9. Take the lower frontal cover and put it on the lower side of the unit and fix it tightening two screws as showed in the following picture.

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10. Center the holes on the plastic cover with the pins on the box (see picture)



11. Put the central cover on the unit and fix it tightening two screws located on the left and right side of the cover and (see detail on the following picture). Center the bottom pins and then rotate the cover and tight the 2 lateral screws.

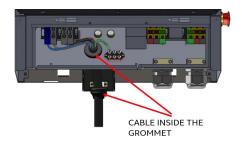


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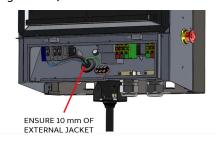
## 5.4.2 Install cable gland(s)

The maximum diameter of the grid cable is 32 mm.

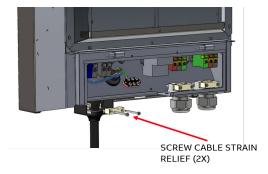
The minimum diameter of the grid cable is 22 mm with the standard fitted cable gland insert.



1. Slide the cable inside the grommets, ensure at least 10mm of cable external jacket inside the box (see notes at the end of this §, Before sliding the cable inside the grommet).



2. Push the cables back through the gland plate, until sufficient cable length is left to reach the cable terminals, make sure the PE cable is longer than the other cables.



3. Tighten the strain relief.

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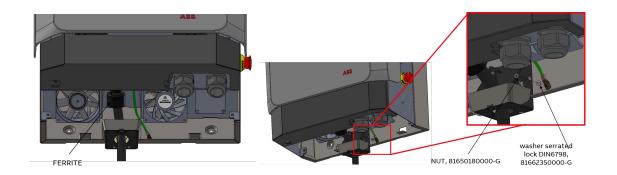


#### 4. Slide the cable cover and screw the two screws

In case the separate internet connection is not used, please assure the cable entry hole is closed, to assure the IP54 grade of the cabinet, and prevent insects and small animals to enter the cabinet.

**NOTE 1**: a ferrite core is provided with the wallbox (plastic tie wrap with outlet cable) and needs to be installed in commissioning phase. The Ferrite needs to be inserted in the AC in cable and located in the screw cable cover (see picture below, left).

**NOTE 2**: a floating grounding cable is provided that is connected to the ground node. The mentioned cable has to be connected to the wall frame PEM in order to guarantee equal ground potential (see picture below, right).



## 5.5 Connect cables

## 5.5.1 Connect PE of power cable

Preconditions:

• Tools: Wire stripper pliers; wire-end lug pliers; wire-end lug.

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DANGER Hazardous voltage

Make sure that the main switch of the power supply group for the product is set to the OFF position. Perform a voltage check and make sure that the electrical power is disconnected from the system.





1. Cut the PE wire of the power cable to the correct length to reach the PE connector.



#### NOTICE

For safety, it is recommended to make the PE wire longer than the phase wires. This makes sure that the PE wire stays connected as longest, if the Terra DC Wallbox is moved by a collision.

- 2. Use wire stripper pliers to remove 20 mm of the insulation from the end of the PE wire and attach the cable lugs.
- 3. Pull the covers a way from the connectors and remove them.
- 4. Loosen the bolts of the PE connector.
- 5. Attach the PE wire on to the PE connector.
- 6. Tighten the bolts. The advised torque value is 1.3Nm.

## 5.5.2 Connect power cable

#### Preconditions:

• Tools: Wire stripper pliers; wire-end lug pliers; wire-end lugs.



## DANGER

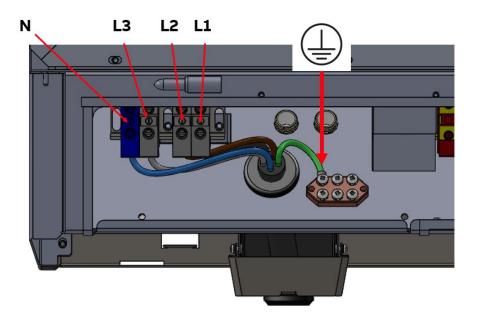
## Hazardous voltage

Make sure that the main switch of the power supply group for the product is set to the OFF position. Perform a voltage check and make sure that the electrical power is disconnected from the system.

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- 1. Cut the 3 phase and neutral wires of the power cable to the correct lengths to reach the connectors.
- 2. Use wire stripper pliers to remove 20 mm of the insulation from the ends of the wires and attach the cable lugs.
- 3. Pull the covers a way from the connectors and remove them.
- 4. Loosen the bolts of the connectors.
- 5. Attach the four wires on to their connectors as indicated on the label on the relative terminal block (see the following picture as example).
  - From left to right (as showed in the following picture):
    - N terminal block blue
    - L1 terminal block grey
    - L2 terminal block grey
    - L3 terminal block grey

**NOTE:** if there is a NAM connection, only "N" and "L1" terminal blocks are present.



- 6. Tighten the bolts. The advised torque value is 1.3Nm.
- 7. Connect the Fan connector to the mating one located on the lateral cable-gland

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#### 5.5.3 Connect network cable



#### WARNING

Leave the main switch switched off. The Terra DC Wallbox is not ready for use yet. Please contact the ABB Service department at least one week in advance to make an appointment for commissioning.



#### NOTICE

Only connect the network cable if a wireless 2G/3G connection is not possible.

#### Preconditions:

• Tools: Network cable pliers, RJ45 connector; network cable straight,

1.Cut the network cable to the correct length to reach the Ethernet connector. The connector is located behind the right side door, near the bottom of the charger.

2.Use network cable pliers to install an RJ45 connector on to the network cable. Using the Ethernet colour standard EIA/TIA T568A

3.Insert the RJ45 connector in to the Ethernet connector.

## 5.6 Instruction for Mounting the DC Wallbox Gun Holders

## 5.6.1 General

This document is intended to provide an instruction for service team / installers in order to be able to properly install the terra DC wallbox gun holders.

### 5.6.2 General description

The Terra DC wallbox is provided with two types of gun holders. A standard gun holder is provided with all the DC wallboxes. The standard Terra DC wallbox gun holder is illustrated in Fig.1 and 2Error! Reference source not found. An optional gun holder is also available as an optional / spare part and can be ordered as external kit. The optional gun holder is illustrated in Fig. 3 and 4. All the above described gun holders include adapters for CCS or Chademo charging guns.

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## 5.6.3 Mounting instructions

The gun holders described above are intended for a very simple installation. Standard gun holder is provided with 3 holes for wall hooking while optional one is provided with a wall mounted hooking bar (10 in Fig.3) to be mounted to wall. The recommended dowels to be used are of 10 size for both cases.

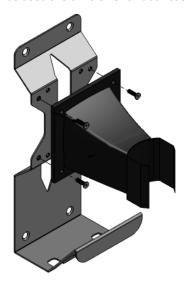


Figure 1: Series production Terra DC wallbox gun holder (Chademo model).

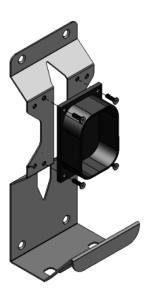


Figure 2: Series production Terra DC wallbox gun holder (CCS model).

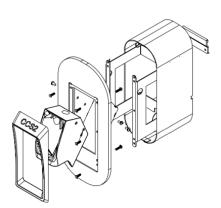
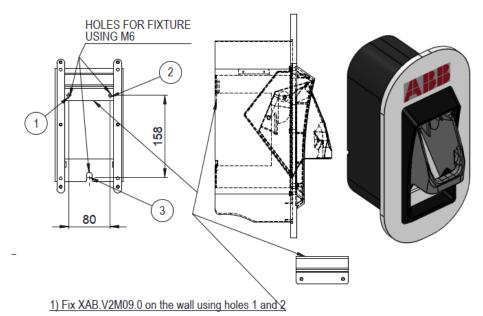


Figure 3: Terra DC wallbox optional gun holder.



Figure 4: Terra DC wallbox optional Gun holder; front and side view.

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- 2) Fix the system on the bracket (XAP.V2M09.0)
- 3) Fix Screw on hole number 3

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# 6 Commissioning

## 6.1 Commissioning preparation

Commissioning is the last phase necessary to get the Terra DC Wallbox operational. The purpose is to check the safe functioning of the charger for its operational purpose.

A certified service engineer from the ABB Service department or a trained engineer by ABB is required to perform the commissioning. During this commissioning, the safety and the functioning of the charger will be tested.

Before the service engineer can start, the following conditions must be met:

- All work described in Preparation (starting page TBD), Construction (starting page TBD) and Placement and connection (Starting page TBD) is done.
- Power is available.
- A local technician is present for assistance and to switch on the power.
- Internet access must be available in case 2/3G is not functional.
- A Combo compliant electric vehicle must be available for testing CCS charging.
- A CHAdeMO compliant electric vehicle must be available for testing the CHAdeMO charging.
- Any electric vehicle for instructing the site operator.



#### NOTICE Warranty

It is not allowed to move the Terra DC Wallbox, after it is commissioned.

In case the Terra DC Wallbox is moved without approval from ABB, the warranty will be considered void. In case of relocation please contact the local ABB Service department.

Commissioning is executed according to the Check list, this check list can be found in the Helios Suite Service tool that is available to the certified commissioning engineers or their supervising ABB organization. Also the following data is required for input:

- End-user Contact person (Create a contact if it doesn't exist).
- Charger address (Check the mentioned address, it will be the address the charger was shipped to).
- Coordinates longitude and latitude for plots on the maps. If there are more chargers on 1 location, make sure the coordinates are slightly different (at least 0,0001 degrees) to prevent being displayed on the same location.
- Site name if this is useful for better recognition (eg Shell petrol station Amsterdam).
- External fuse of the charger.
- SAT (Site Acceptance Test) date.

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- Location remarks (any special remarks about the site, eg behind a gate, no photo cameras allowed etc.)
- Add a picture of the surrounding of the charger, upload the local CAF document A4 on the page of the charger in PDF
- Change Deliver status to < SAT>.

After completing the Site Acceptance Test, ABB's Network Operation Center will be triggered to perform a final check on the connection and configuration of the charger.

Upon approval the charger will be operational and initialized for use.

# 7 Identification of infrastructures compatibility labels

To facilitate the charging of electric cars all around Europe, according to *EN 17186:2019* 'Identification of vehicles and infrastructures compatibility - Graphical expression for consumer information on *EV* power supply', labels to indicate power supply for electric road vehicles are introduced in the Terra DC Wallbox.

These identification labels are provided inside with a bag in the packaging and include two kind of labels, for European countries and for Germany. During commissioning, dependent of country of DCWB installation, must be apply labels as explained below.

# 7.1 Installation in EU country (except Germany)

In EU country, except that for Germany, it must be install during commissioning the labels from set below.



Code XLP.02865.0 (spare code YVD.01282.0 - 6AGC103241)

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## 7.1.1 Label for charger type

Outlet	Identifier
CCS	•
CHAdeMO	M

## 7.1.2 Labels to be use and position single outlet



## 7.1.3 Labels Position dual outlet



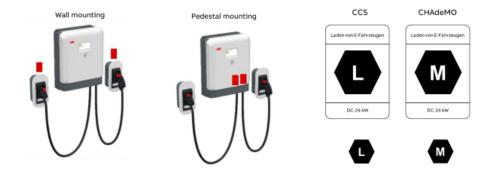
# 7.2 Installation in Germany

In Germany, the label that must be used during commissioning are the labels below.



Code XLP.02874.0 (spare code YAS.V2M03.0 - 6AGC108688)

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# 8 Maintenance and Cleaning of the cabinet

## 8.1 Recommended Preventive maintenance

The charger must be inspected and serviced yearly by an ABB trained/certified technician.

#### **NOTES**

Air Filter: The air filters must be inspected every 12 months and replaced if required.

Environment characteristic and number of charging sessions may increase or decrease the number of replacements during the lifetime of the charger.

- A. De-energize unit, make sure that unit is de-energized with appropriated instruments (multimeter), open cover, inspect air filter, clean or replace as needed.
- B. Check input connections and terminations for proper toque values
- C. Check Grounding resistance
- D. Exercise input breaker and output DC breakers
- E. Open HMI cover, inspect capacitors and fuse connections.
- F. Clean interior with a HEPA vacuum.
- G. Blow out rear cooling fins and remove any debris
- H. Reassemble unit, energize verify input voltage, perform a charging session.
- I. Using the connected network verify charging session details.

## 8.2 Cleaning of the cabinet

The Terra DC Wallbox Charger is powder coated. This coating must be kept in good condition.

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Clean the Terra DC Wallbox Charger three times a year in the following way:

- Remove rough dirt by spraying with low-pressure tap water.
- Apply a neutral or weak alkaline cleaning solution and let it soak.
- Remove dirt by hand with a non-woven nylon hand pad.
- Rinse thoroughly with tap water.
- Do a check on the coating and on the front cover for damage.



#### **NOTICE**

When the Terra DC Wallbox Charger is exposed to rain, it is sufficient to clean it twice a year.



#### **CAUTION**

Do not apply high-pressure water jets. Water may leak into the Terra DC Wallbox Charger. If a high-pressure water jet has been used, make sure that the inside of the Terra DC Wallbox Charger is dry.

- Only use cleaning agents with a pH value between 6 and 8.
- Do not use cleaning agents with abrasive components.
- Do not use abrasive tools.

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# 9 Technical Data

# 9.1 Electrical data

Input		
Supply voltage	3 phase, 400 V AC: PE, N, L1, L2, L3 (EU)	
Input voltage range	400 V AC +10%, -15%(50 Hz)	
Maximum rated input current& power	40A, 24kVA	
Power factor	> 96%	
Efficiency	95% at nominal output power	
DC output (C)		
Maximum output power	22,5 kW (peak 24kW)	
Output voltage range	150-950 V DC (CCS 2)	
Maximum output current	60 A DC +/- 5% (CCS 2)	
DC output (J)		
Maximum output power	22,5 kW (peak 24kW)	
Output voltage range	150-500 V DC (CHAdeMO)	
Maximum output current	60 A DC (CHAdeMO)	

General	
DC connection standard	EN61851-23 / DIN 70121 CCS 2 CHAdeMO 1.0
DC cable length	3,5 or 7 meters +/- 10%
DC plug type	CCS 2 / JEVS G105 CHAdeMO
RFID data	
RFID system	FeliCa™1, NFC reader mode
Network connection	GSM / CDMA modem
	10/100 Base-T Ethernet

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## 9.2 Mechanical data

Mechanical data	
Dimensions (H x W x D)	770 mm x 585 mm x 300 mm
Weight	70 kg
Volume	0,135 m <sup>3</sup>
Dimensions including packaging (H X W x D)	650 mm x 1200 mm x 800 mm
Weight including packaging	80 kg
Mechanical impact protection	IK10

# 9.3 Environment

Environmental data	
Ingression protection	IP54
Temperature range – Operation	-35°C to + 55°C
	(derating applies between 45°C and 55°C)
Temperature range - Storage	-40 °C to +70 °C
Humidity	20% - 95% RH - non-condensing
Operational noise level	55 dBA @25°C
Altitude	2500 m max.

## 9.4 Certifications

CE Certification

EMC: EN 61000-6-4 Class A emission; EN 61000-6-3 Class B emission (pending); EN 61000-6-2 immunity.

LVD: IEC 61851-23, IEC 61851-1, IEC 62196, IEC 60950, EN 61010, EN 60335 (see certificate)

RFID: ISO/IEC 14443 A/B, ISO/IEC15693, ISO 18902 NFC

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# 10 Contact information



## NOTICE

## In case of problems

Please contact your local ABB Service organization or Service partner for first line problem analysis and solving. In case they cannot solve the problem, they will contact the second line Service organization.

## **ABB** in your country

Please contact ABB in your country for sales, delivery and service information.

### **ABB EV Infrastructure global**

ABB EV Infrastructure

Address: Heertjeslaan 6, 2629JG, 2629 JD Delft, Netherlands

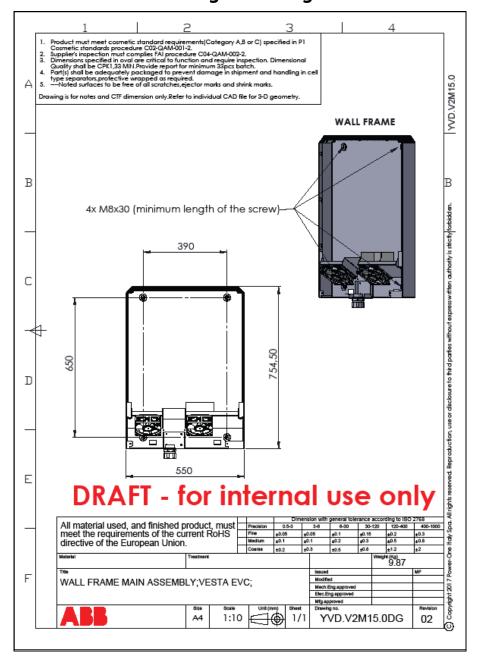
Telephone +31 800 9103

Mail info.evi@nl.abb.com

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# 11 Appendix A - Concrete foundation

# 11.1 Terra DC Wallbox Charger drawing



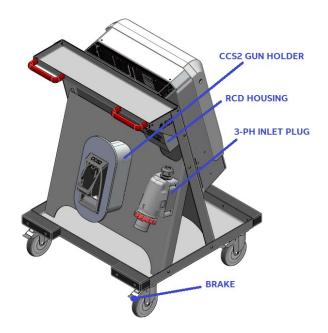
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## 12 Appendix C – Use with Mobile Cart

## 12.1 DC WALLBOX mobile Cart



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Terra DC WALLBOX Charger is provided and assembled with a stainless steel trolley for DC WALLBOX

DC Wallbox mobile cart include:

- stainless steel material AISI grade 304 (1.4301) material thickness 4.0 mm
- 2 push handles made from plastic (color: red RAL 3000)
- gun-holder CCS type 2 gold version
- CEE inlet connector 63A 5P IP 67
- base plate design with rubber fenders and 4 150 mm diameter wheels
- castors made from non-marking and electrically conductive material, with locking brakes
- 40 A, A type, 30 mA Residual Current Circuit Breaker

dimensions (W x D x H): 800 x 820 x 1125/1202,5 mm

Available only with:

- ABB6AGC077815 TERRA DC WALLBOX CE 24 C 0-7M-0-0
- ABB6AGC077816 TERRA DC WALLBOX CE 24 C 7-7M-0-0

### 12.2 Recommendations for use

• Using between temperature range of -20°C to +45°C

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- To supply the mobile cart is recommended the using of the type **H07RN-F with 5** cores as AC supply cable (not provided). Section of cores 6 mm<sup>2</sup> (5G6).
- Ensure that earth connection is provided to the cart from AC cable
- Do not storage AC supply cable (not provided) on the mobile cart
- Remote serviceability operations may be performed only during turn on of the DC Wallbox mobile cart.
- Do not leave the product exposed to weather conditions (rain, sun, frost, etc) for long time OR we need to advise proper storage instructions
- Do not use DC Wallbox Mobile Cart outdoor uncovered in heavy rainy or extreme weather conditions



#### NOTICE

The DC Wallbox Mobile Cart is equipped with A-Type 40 A RCD. Is recommended to use in the upstream power line protection devices with equal or greater rated current. Protection of power line upstream of DC Wallbox Mobile Cart is up to customer in order to respect local regulations.



### **NOTICE**

The DC Wallbox Mobile Cart is designed to works only in flat areas. It is recommended to not incline the cart taking by handles in order to overcome steps. To rise or fall to a different level please use ramps (for small difference) or pallet truck (in case of greater differences). Ramps have to be able to support the 160 kg of the product plus the operator weight.

### 12.2.1 Steps to use the Mobile Cart

1. Remove the brakes from the wheels of the cart before trying to move it



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2. Move the cart to desired location



7. When desired location is reached, put the brakes of each castor, this will keep the cart from rolling away when you want it to stay put.



8. Connect the AC inlet with AC 3-phase power supply cable when NOT POWERED by disconnecting the upstream switch (We need to show what is the upstream switch and the location of it, i think it sounds confusing and we need to rephrase). I assume that also clients will read this

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- 5. Locking securely the plug with screw locking system and turn on the upstream switch
- 6. Open the door of the RCD housing installed in the cart and turn on the RCD and wait and verify about DCWB is turned on. Close the door of the housing



7. Remove the connector CCS2 from gun holder and connect with vehicle

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8. Now it is allowed to start the charging session. Press "start" button in the screen



- 9. At the end of charging session remove the connector from the vehicle and can be possible to start another charging session in other vehicles that can be reached, otherwise put in the gun holder
- 10. Cable have to be wrapped around gun holder

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- 11. Open the door of the RCD housing and turn off the RCD, then close the door
- 12. Turn off the switch upstream the AC 3-phase supply cable
- 13. Remove AC 3-phase cable socket
- 14. Release the castors brakes and move the cart in the parking position.
- 15. Put in the brakes until next use

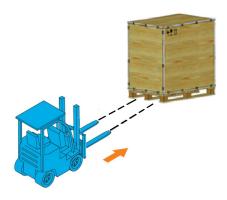
### 12.3 Mobile cart certification

- CE
- LVD: EN61851-1:2019 EN 61851-23:2014
- Mechanical test: EN 13150:2001 (point A.3.7), EK5/AK5 14-04.0: 2014-09, EK5/AK5 14-04.0: 2014-09, ASTM D4169-16

### 12.4 Handling and unpackaging

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### 12.4.1 Move Package with a forklift truck



### Preconditions:

- A minimum of two persons is required: one person to operate the forklift truck, the other person to guide the Mobile Cart to its location.
- 1. Place forks width like as pallet size
- 2. Inlet the forks of the forklift truck between
- 3. Lift and move the cart with the forklift truck.

### 12.4.2 Unpackaging

### Preconditions

• Tools: screwdriver PH

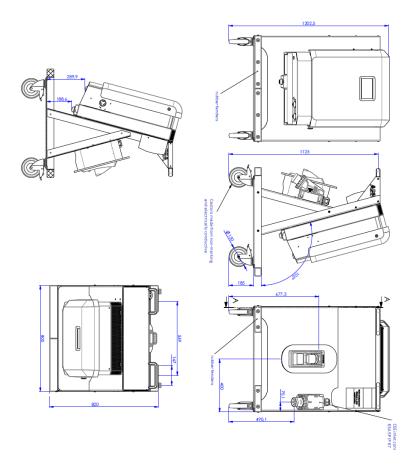
A minimum of two persons is required to handle Mobile cart get off from packaging



- 1. Remove the packaging material from the mobile cart
- 2. Remove locking axes that lock mobile cart
- 3. Unblock castors brakers
- 4. Get off the mobile cart from pallet

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## 12.5 Mechanical drawings



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## 13 Appendix B - Disposal instruction

# 13.1 Directive on Waste Electrical and Electronic Equipment (WEEE – 2012/19/EU)

ABB ENGLISH	X	FRANÇAIS	ESPAÑOL	NEDERLASNDS	DANSK
ENGLISH  Electrical and electronic equipment t tely collected in compliance with the waste electrical and electronic equip - 2012/19/EU)	Directive on	Équipements électriques et électroniques col- lectés séparément conformément à la Directive relative aux déchets d'équipements électriques et électroniques (WEEE - 2012/19/EU)	Aparatos eléctricos y electrónicos recopilados de modo separado en conformidad con la Directiva sobre residuos de aparatos eléctricos y electróni- cos (WEEE - 2012/19/EU)	NEDERLASNDS  Elektrische en elektronische apparatuur worden atzonderlijk ingezameld in naleving van de vereisten van de Richtlijn betreffende afgedankte elektrische en elektronische apparatuur (WEEE - 2012/19/EU)	Elektrisk og elektronisk udstyr indsamles særskilt i overensstemmelse med direktiv om affald af elektrisk og elektronisk udstyr (WEEE - 2012/19/EU)
The sprited (prossed of elevisor daily) indicates that the mount shall not be used with your household was been seen as the property of the product shall not be used with your household waste. If there is made on the product.  For most waste collection point for the reproduct.  For most windows department your continuation of the product waste of the product of the product waste of the product will be product the product of the product will be product the product will be product with the product waste of the product will be producted our environment and the product will be producted.	abled or dispo- end of use.  our local com- ecycling of the  ir Government  othy.  ssibly have a  human haealth  With your co- s product, you	Co agricolo producile intendità gracoli ser la produti follogia quito fini devi e candidi rin del praci del traita discliga quito fini devi e candidi rin del prace del discligato del produci del collecta grapporgia pose la molta prima del produci del consolidari del produci per la prima prima prima del produci por per la prima prima prima del produci per per produci confere del collecto del produci per produci confere del sutationicos perimane. En visidant sur l'environnement et la sande humane. En visidant sur l'environnement et la sande humane. En visidat à la mine au setta control de ce produit, voso con- recyclage de ce produit et à produjor l'environnement.	Los productos identificación con este almitodo (spo- plerio Datadian i destin asiliamo como rela- pida Datadian de destin asiliamo como del presidente del serio del del del Este produció delse reregiamo a un punto de reco- gida de la comunidad local para su recoperación. Para may cartadiano del produción del Desentos de su fuerta del produción del Desentos de su Apratamento de Disposición del Desentos de su Apratamento. El manejo inadicicado de los residoos appore relos pre- para la salado humano el medio antiente. Cerci a re- ceiva del como del produción de la como del se valorización de lates productos uside comitányo de manera importante a la producción de nuestro medio ambiente.	First general (doorpacturales philatula or vietar) expensively approach good and the product as the product where products were product was deep product as and despite production. Help product made despite production was despited production. Neem soon meer informatic contact op met de reinvance overheidsschlight your admiratulation and use to bestatut a vertical production of the product of the production of the product of	Synthetic (no construent distilluction of most little production storyer of production storyer of production storyer of production storyer or production storyer. I production storyer or production s
	Ø	Ī	Ī	Ī	
DEUTSCH		ITALIANO	PORTUGUÊS	SVENSKA	SUOMI
Elektro- und Elektronikgeräte sind sammeln in Einklang mit der Ri Elektro- und Elektronik-Altgeräte (WE EU)	l getrennt zu ichtlinie über EEE - 2012/19/	Apparecchiatura Elettrica ed Elettronica oggetto di raccolta differenziata in conformità alla Direttiva sui Riffutt di apparecchiature Elettriche ed Elettro- niche (WEEE - 2012/19/EU)	Equipamentos Eléctricos e Electrónicos recolhi- dos seletivamente de acordo com a Diretiva re- lativa aos residuos de equipamentos elétricos e eletrónicos (WEEE - 2012/19/EU)	Elektriska och elektroniska produkter ska samlas in separat i enlighet med direktivet om avfall som utgörs av eller innehåller elektrisk eller elektronisk utrustning (WEEE - 2012/19/EU)	Sähkö- ja elektroniikkalaitteet on kierrätettävä erikseen sähkö- ja elektroniikkalaiteromusta an- netun direktiivin (WEEE - 2012/19/EU) mukaisesti
Dieses Symbol (ausgekreuzte Mülltonne dukt bezeichnet, dass Altgeräte usw. nicht wie normaler Haushaltsabfall in d	den Müll gege-	Il simbolo (un bidone sbarrato da una croce) indica che il prodotto non deve essere smaltito con i rifluti dome- stici, alla fine della sua vita.	O símbolo (caixote de lixo de rodas com uma linha cruzada) em seu produto indica que o produto, no fim da sua vida útil, não deve ser misturado ou eliminado com o lixo doméstico comum.	Denna symbol (en överkorsad soptunna) på produkten innebär att produkten ej ska blandas eller slängas med ditt hushållsavfall när den är förbrukad.	Tuotteeseen merkitty symboli (yitise ruksattu jätesäiliö) osoittaa, että tuotetta eli saa sekoittaa elikä hävittää talousjätteiden kanssa.
ben werden dürfen, sondern zum Recy hierfür vorgesehenen Annahmestelle at: Für nähere Informationen wenden Sie s für Müllentsorgung zuständigen örtliche	tzugeben ist. sich bitte an die in Behörden.	Questo prodotto deve essere consegnato al punto di raccolta rifiuti della propria comunità locale per il suo riciclaggio. Per ulteriori informazioni, rivoluersi all'organo statale	Este produto deverá ser entregue a uma estação de recotha de lixo da comunidade local para a reciclagem do produto.  Para mais informações, entre em contacto com o	Produkten ska lämnas till en lokal insamlingsplats för denna slags produkter för återvinning Kontakta kom- munkontoret för nämnare detaljer om var du finner sådana insamlingsplatser. Olämplig avfallshantering kan få negativa effekter på	Tuote on luovutettava sopivaan tällaisten laitteiden kierrätyksestä huolehtivaan keräyspisteeseen. Pyydä lisätietoja jäteasioista vastaavilta paikallisilta viranomaisilta.
Bei unsachgemäßer Entsorgung bestellt nachteliger Auswirkungen auf Umwel dheit durch potentiell gefährliche Site her Kooperation zur ordnungsgemäß- fördem Site die Wiederwerwendung, und die Rückgewindung von Stoffen ut Umweltschutz bei.	it und Gesun- stanzen. Durch en Entsorgung das Recyding	prepoto allo smallmento dei rifila nel propio paese, Uno smallmento dei rifila imporpristi poi avere effetti negativi sull'ambiente e sulla salute umana causa di sodame potenzialmente periodose. Collabo- rando allo smallmento corretto di questo prodoto, contribusca di militaro, anincidago e e recupero del prodotto, e alla profescione del nostro ambiente.	Departmento de Tratamento de Lino do Governo do seu país.  O tratamento de lixo incorrecto podería provocar um eletio negativo no moi amériente e saúde haruma devido a substâncias potencialmente periposas. Com a sus cooperação para a eliminação, credicapem e produto, contificiad para a realização, reciclapem e recuperação do produto, e rosso meio ambiente seal prolegido.	miljör och på månsktig hällsa då en produkt kan in- meliklat fatiga ameriklat på kan produkt kan in- meliklat fatiga ameriklat i kotskalfningen av dema produkt för att klora till derivning, återanvändning och en hällsosammare miljö.	Tämän tuotteen asiammukaisen hävittämisen vamitamisella audetaan seitämäisen amukaitellä syytämisestä audetaan seitämäisen amukaitellä syytämisestä ja terveyfeen kohdistuval haittavaltutalaset, joka vali alaheita muosaa tuusukaitella siitämisestä suotammukaitella siitämisestä suotammisestä vali varmistamaan, etää tuota uuotelenaksiksiän, kieritelään ja keritään ja ympäristöä suojellaan.
	Ø	X	X	X	Ø
ČESKY		POLSKI	SLOVENŠČINA	EESTI	SRPSKI
Elektrická a elektronická zařízení shromažďují odděleně v souladu o elektrickém a elektronickém odpa 2012/19/EU)	se Směrnicí	Sprzęt Elektryczny i Elektroniczny podlegający selektywnej zbiórce zgodnie z Dyrektywą (WEEE - 2012/19/EU)	Električna in elektronska oprema se zbira ločeno v skladu z Direktivo o odpadni električni in elektronski opremi (WEEE - 2012/19/EU)	Elektri- ja elektroonikaseadmed tuleb koguda eraldi kooskõlas elektri- ja elektroonikaseadmete direktiiviga (WEEE - 2012/19/EU)	Električna i elektronska oprema koju treba saku- piti zasebno u skladu sa Direktivom o odbačenoj električnoj i elektronskoj opremi (WEEE - 2012/19/ EU)
Symbol (přeškrtnutá popelnice na kr Vašem výrobku označuje, že výrobek se jeho používání nesmí míchat a vyhazov běžným odpadem z domácnosti.	olečkách) na e po ukončení vat společně s	Symbol (przekreślony kosz) na Twoim produkcie ozna- cza, że produkt nie powinien być mieszany lub usuwa- ny z Twoimi odpadami pochodzącymi z gospodarstwa domowego, po jego zużyciu.	Oznaka (prekrížan smetnjak na kolesih) na vašem izdelku označuje, da se tega izdelka po končani uporabi ne sme mešati ali odvreči z ostalimi gospodinjskimi odpadki.	Sümbol (ristiga maha tõmmatud vagun) tootel osutab, et käesolevat toodet ei tohi peale selle kasutuskõlbma- tuks muutumist visata ära koos muu majapidamises tekkiva prügiga.	na vašem proizvodu označava da se proizvod po isteku svog radnog veka ne sme pomešati, niti bacati zajedno sa otpadom iz domaćinstva. Oval proizvod se mora predati na mestu za prikupljanie
Tento výrobek je třeba odložit na ur místo ve vaší oblasti pro provedení rec výrobku.	rčené sběmé cyklace tohoto	Produkt ten powinien zostać dostarczony do lokalnego komunalnego punktu zbiórki odpadów, w celu recyklin- gu produktu.	Ta izdelek je potrebno oddati vaši lokalni deponiji z odpadki za predelavo takšnih izdelkov. Za podrobnelše podatke se obmite na državni urad za	Käesolev toode on ümbertöödeldav ning tuleb viia ko- halikku prügikogumis- või ümbertöötlemiskeskusesse.	otpada za reciklažu u vašoj lokalnoj zajednici.  Za dodatne informacije molimo kontaktirajte nadležni
Pro další informace se obratte na místní správy zabezpečující sběr a likvidaci odp Nesprávné nakládání s odpady by mohlo				Täpsema informatsiooni saamiseks palume pöörduda	organ za odlaganje otpada u vašoj zemlji.
dek negathní vív na životní prostředí a z důvodu možného vzniku škodilých i vaší spolupráce při správném způsobu z tohoto výrotku příseplete ke znovu vystž obnové výrotku příšeníž naše životní p ochráněno.	padů. o mít za násle- a lidské zdraví látek. Pomocí znehodnocení íti, recyklaci a	W celu uzyskania wejszej ilości informacji, prosimy o skontalkowanie się z krajowym wydzalem Zarządza- san Gospodafia Qodadam w krom ilawa na Gospodafia Qodadam w krom ilawa Niewischoe manipolowanie objadam imoże negalyw- nie odoszalywać na środowiskio i zokow kudu, wisu- tek polencjalnych substanian ilekszpiecznych. Wspó- przując przy pradowym uzunięciu bog produku, przyczyniaz się do prosiwego użycia, resyllingu i przyczyniaz się do prosiwego użycia, resyllingu i odgywał produkti i w tem spodeł nasce środowisto sięcze chronone.	cal podacióneje bodoláse se ricinier far accent usa az zación encent hori visi tablé no apolición provinciarje z odpodá reoptime posiedor no adole in zaciónej lastí. 2 visióm sodelovargem pri pravinciem odstrarigenaju lega lobela, propriemorée il promoti productivo de la construcción de la provincia podación y la construcción de la construcción podación de la construcción de la construcción podación de la construcción de la construcción podación de la construcción podación de la construcción podación de la construcción podación de la construcción podación	Täpenen informationori saannieski palume põõrkuda seile riigisatusus polio Tile niligis. Inis lopeide prüji-majanduse puuluvale regulatsiooriologa. Kõuseleva tole vale kalistilemine selle kõrvaldamisel võib põhjastada võimalilisest riiskianistest tulenoval võib põhjastada võimalilisest riiskianistest tulenoval loe. Toote korrektive käistisemine ka peale selle kaaputasidismatises maivartiis ja Tile kaasasi kideolova toote kootuvalasutusse või ümbettõõtuseses saalisti-eed vaab Tele Isanõimatuse kaitsta ühest tootoislaskiskorsaa.	organ za odlaganje objada u valoj zemiji. Hepozalni rukovanje i obladavano in negativno da objavani konstruktura i objavani pod
z důvodu možného vzniku škodivých l vaší spolupráce při správném způsobu z tohoto výrobku příspějete ke znovu využ obnově výrobku příčemž naše životní p	padů. o mit za násle- l lidské zdraví látek. Pomocí znehodnocení čití, recyklaci a orostředí bude	W celu uzyskania większej ilości informacji, prosimy o śściowanie się z krajowym Wycizielem Zarządza- nia Gospodanie o pododanie w Twom kraju. Niewiskaćowe manipulowania odpadami może negatyw- nie oddziaływać na środowisko 1 zówole ludzi, wska- nie oddziaływać na środowisko 1 zówole ludzi, wska- nej odpodanie na świetnie odpadami podowie po- pracując przy prawidowym usunięcu lego poduktu, przyczyniasz się do ponownego użycia, recyklingu i odzysku produktu i w len sposó hazase środowisko.	odstranjevanje odpadkov v vaši državi. Zaradi nevarmih snovi ima lahko napačno upravljanje z odpadki negativne posledice na okolje in zdravje ljudi. Z vašim sodelovanjem pri pravilnem odstranjevanju tega izdelka, pripomorete k ponovni uporabi i rezidičnimu in nadmestihi izdelka. Naše	selle riigisautuse poole Teie riigis, mis tegeleb prügi- majandusse puulivarle regulatsioonidega. Käesoleva toote vale käsitlemine selle kõrvaldamisel võib põhjustada võimalikest riiskianietest tukenevat negatiliveet riigi, mis keekkonnate kuit a Teie tervise- le. Toote korrektine käsitsemine ka peale selle käsu- tukkõltimatikas muullumisti ja Teie kaaaabi kilesoleva toote korduvkasutusse või ümbentõõtusesee saatmi- sel avah Teile läsvõimatuske kalista ühist lootuskesi avah Teile läsvõimatuske kalista jahts lootuskesi van teine vala teile suomatuse kalista mis vala vala teile suomatuse kalista vala kalista vala vala teile suomatuse kalista vala vala kalista vala kalista vala vala vala vala vala vala vala va	organ za odlaganje otpada u vašoj zemlji. Nepravilno nukovanje otpadom može negativno da utiče na životnu sredinu i zdravlje ljudi, zbog potencijal- no opasnih supstanci. Vašom saradnjom na pravilnom odlaganju ovog proizvoda, Vi doppiniosile ponovnom knrščenju, recikliranju i sakupljanju proizvoda što če
z důvodu možného vzniku škodivých l vaší spolupráce při správném způsobu z tohoto výrobku přispějete ke znovu využ obnově výrobku přičemž naše životní p	padů. o mít za násle- a lidské zdraví látek. Pomocí znehodnocení íti, recyklaci a	W celu uzyskania większej ilości informacji, prosimy o śściowanie się z krajowym Wycizielem Zarządza- nia Gospodanie o pododanie w Twom kraju. Niewiskaćowe manipulowania odpadami może negatyw- nie oddziaływać na środowisko 1 zówole ludzi, wska- nie oddziaływać na środowisko 1 zówole ludzi, wska- nej odpodanie na świetnie odpadami podowie po- pracując przy prawidowym usunięcu lego poduktu, przyczyniasz się do ponownego użycia, recyklingu i odzysku produktu i w len sposó hazase środowisko.	odstranjevanje odpadkov v vaši državi. Zaradi nevarmih snovi ima lahko napačno upravljanje z odpadki negativne posledice na okolje in zdravje ljudi. Z vašim sodelovanjem pri pravilnem odstranjevanju tega izdelka, pripomorete k ponovni uporabi i rezidičnimu in nadmestihi izdelka. Naše	selle riigisautuse poole Teie riigis, mis tegeleb prügi- majandusse puulivarle regulatsioonidega. Käesoleva toote vale käsitlemine selle kõrvaldamisel võib põhjustada võimalikest riiskianietest tukenevat negatiliveet riigi, mis keekkonnate kuit a Teie tervise- le. Toote korrektine käsitsemine ka peale selle käsu- tukkõltimatikas muullumisti ja Teie kaaaabi kilesoleva toote korduvkasutusse või ümbentõõtusesee saatmi- sel avah Teile läsvõimatuske kalista ühist lootuskesi avah Teile läsvõimatuske kalista jahts lootuskesi van teine vala teile suomatuse kalista mis vala vala teile suomatuse kalista vala kalista vala vala teile suomatuse kalista vala vala kalista vala kalista vala vala vala vala vala vala vala va	organ za odagane opada u valoj zemiji.  Neparativo nakovaje opada u valoj zemiji.  Neparativo nakovaje opada može nepatino da utiče na živina sredinul zdravje ljed, zbog potincijali- no opadnih spatami, kaloma srazdijem na priod odaganej vodg protovodi, vi doprovole pomnosim odaganej vodg protovodi, vi doprovole pomnosim odaganej vodg protovodi, vi doprovoda što će zalebili valo živinim sredina.
z divodu mažmého vzniku škodných valá spokupináce při sprámém zpúsobu ubohol výrobku přispějete ke znovu využ obrové výrobku přišemž naše životní p ochraněno.	padů. omit za násle- la lidské zdraví látek. Pomocí zmehodnocení dli, recyklaci a zoosfedí bude omikus beren- onikus beren- onikus beren-	W dali uzpalania welekszii ilokoli informacji, prominy oracharikowanie się z knapomi Wydoślami z Pazagdzina Goopodnia Odpadami w Teom Inzija.  Newbeldnie manipolinani ilozafosimi note nepalywne oddaziaływać na środowalaci z prowie budzi welanie oddaziaływać na środowalaci z prowie budzi welanie oddaziaływać na środowalaci z przyczypiaza się do pomonienejo użycia, rejektingu i odposia podadaki u ile na popedo nasze środowała będzie chronone.	odizativanjani odozalov v vala dizav.  Zazadi neramith nosti ma talkon opazačino programjeni z odpazda negarina positi ma talkon opazačino positi od opazačina positi na positi	selle nigisutute poola file nigis, me legeleb prigi- mignatuse publimica polabiliconides, il Klassolava tode vale klatifiamire selle klivitatimire il klob poliputadi. Visilinistet iniskinnetti bilenenti negiliniste ili klasimetti bilenenti negiliniste ili klasimetti bilenenti negiliniste ili klasimetti bilenenti negiliniste ili klasimetti bilenenti pi tre la kazalita ili klasimetti pi klasimetti pi tre la kazalita ili klasimetti pi tre	rogina za odagane opada u valda jezeniji. Neparativa zakovanje opadam maše negatimo da utiče na živčnu serdiru i stranjeli jezi, dzogo ploresjezimo ogazanie spalastva i dostam sazalijom na paralitom na paralitom na paralitom na paralitom na paralitom kondicejna, recelatoraja i sakuplanija prozvoda što će zaštititi valju životnu srediru.
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**Caution:** This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

DC Wallbox CE= EMC CLASS B.

CE DC Wallbox are all EMC CLASS B.

UL Single phase are EMC Class A

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## **AUTEL**



## **Installation and Operation Manual**

MaxiCharger DC Compact (UL)

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## 1. Using This Manual

This manual describes the installation and use of the MaxiCharger DC Compact. Prior to installation, read through this manual to become familiar with the instructions of this MaxiCharger to ensure a successful installation and smooth operations.

### 1.1 Conventions

The following conventions are used.

#### 1.1.1 Bold Text

Bold text is used to highlight selectable items such as buttons and menu options.

#### 1.1.2 Illustrations

Illustrations used in this manual are only examples; the actual product(s) or screens may vary.

### 1.1.3 Notes and Important Messages

### Note

A NOTE provides helpful information such as additional explanations, tips, and comments.

#### Important

Indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

#### 1.1.4 Procedures

An arrow icon indicates a procedure.

### To charge an EV

- 1. Park an EV with the charging port within reach of the connector.
- 2. Plug in the vehicle. Avoid any extensive stretch of the charging cable.
- 3. Start the charge session.
- 4. Stop the charge session.

#### 1.1.5 Revision History

Version	Date	Descriptions
V1	2023.05.12	Initial version
V2	2023.07.14	Product structure update

### 1.2 Terminology

Term	Definition
AC	Alternating current
ccs	Combined Charging System, a standard charging method for electric vehicles
сси	Communication Control Unit, a control unit used to communicate with the BMS (Battery Management System) and control the power delivery to the EV
CHAdeMO	Abbreviation of CHArge de MOve, a standard charging method for electric vehicles
DC	Direct current
EV	Electric vehicle
ОСРР	Open charge point protocol, open standard for communication with charge stations
RCCB	Residual current circuit breaker
RCD	Residual current device, a device that breaks an electrical circuit when it detects a current leakage
RFID	Radio-frequency identification, a method of charging authentication
SPD	Surge protection device, a device intended to protect electrical devices from voltage spikes in AC circuits
тси	Transaction Control Unit, intelligent hardware to handle the human-machine interface, metering, transaction, and communication with back office

## 2. Safety

### 2.1 Safety

The safety messages herein cover situations of which Autel is aware. Autel cannot know, evaluate or advise you as to all of the possible hazards. You must be certain that any condition or service procedure encountered does not jeopardize your personal safety.

### **A** DANGER

Indicates an imminently hazardous situation with a high risk level which, if the danger is not avoided, will cause death or serious injury.

### **A**WARNING

Indicates a potentially hazardous situation with moderate risk level which, if the warning is not obeyed, can cause death or serious injury.

### **A** CAUTION

Indicates a potentially hazardous situation with a medium risk level which, if the caution is not obeyed, may cause minor or moderate injury or damage to the equipment.

- Preview the standard operating procedures and ensure that local building and electrical codes are reviewed before installing the MaxiCharger.
- Read the manual before installing or using the MaxiCharger.
- Do not use the MaxiCharger if the cabinet, power cord or charging cable are frayed, have broken insulation or shows any other signs of damage.
- Do not install or use the MaxiCharger if the enclosure is broken, cracked, open, or has any other indication of damage.
- The information provided in this manual in no way exempts the user of responsibility to follow all applicable codes or safety standards.
- This document provides instructions for the MaxiCharger and should not be used for any other product.
   Before installation or use of this equipment, review this manual carefully and consult with a licensed contractor, licensed electrician or trained installation expert to ensure compliance with local building codes and safety standards.

### 2.2 Owner Responsibilities

The owner runs the MaxiCharger for commercial or business use or has authorized a third party to use it. The owner should protect the user, other employees or third parties when the MaxiCharger is in use. The owner bears the responsibilities as follows:

- Know and obey the local codes and ordinances.
- Ensure all employees and third parties are qualified to operate the MaxiCharger.
- Ensure the MaxiCharger has installed the protective devices.
- Ensure all the protective devices are installed after installation or maintenance.
- Ensure the space around the MaxiCharger is sufficient to carry out installation or maintenance work.

- Ensure there is a plan in place in case of an emergency.
- Ensure there are no safety hazards on the site.
- Have a site operator available who undertakes the safe operation of the MaxiCharger and all the coordination of work if the owner takes no part in the work.
- Ensure the installation engineer follows the local codes and ordinances, the installation instructions, as well as the specifications of the MaxiCharger.

### 2.3 Installation Engineer Qualifications

- Fully understands the equipment and its safe installation procedures.
- Qualified according to local regulations to carry out the installation work.
- Able to follow all the local regulations and this manual to complete the installation of the MaxiCharger.

### 2.4 Usage Instructions

Do not operate the MaxiCharger and immediately contact the manufacturer if any of the following situation arises:

- Damage on the enclosure, charging cable or connector
- Lightning has struck the MaxiCharger
- Fire or flames at or near the MaxiCharger
- Any sign of water damage on the MaxiCharger

### 2.5 Signs on the MaxiCharger

Symbol	Risk Description
$\triangle$	General risk
4	Hazardous voltage that gives risk of electrocution
Z	Waste from electrical and electronic equipment
	Hot surface that gives risk of burn injuries

### 2.6 Disposal Instructions

Potential hazardous substances of the MaxiCharger can have a negative impact on the environment and human health if the waste is not handled properly. Dispose any waste as needed to protect the environment and promote the reuse and recycling of the materials.

## 3. General Introduction

The MaxiCharger DC Compact offers the best value with 40kW smart charging power, advertising, and communication capability in a perfect size to fit almost any application.

#### **Intended Use**

This MaxiCharger is intended for the DC charging of EVs. It is intended for both indoor and outdoor use.

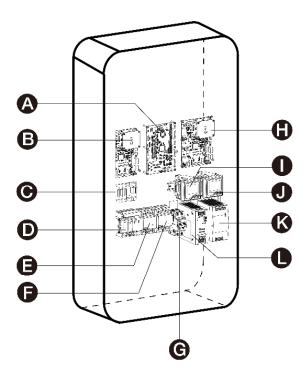
- Fleet
- Highway
- Commercial Parking
- Others

### **A** DANGER

- The equipment must be operated as described in this manual or other related documents released by Autel. Failure to comply may result in human injury and/or damage to the property.
- Use the equipment only as intended.

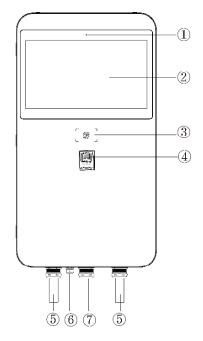
### 3.1 Product Overview (Inside)

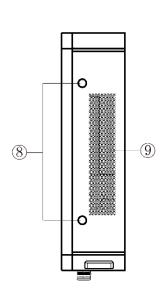
- A Equipment Control Unit (ECU)
- B Communication Control Unit 1 (CCU1)
- **C** Power Hub
- **D** Surge Protection Device (SPD)
- E AC Contactor 1
- F AC Contactor 2
- **G** Residual Current Circuit Breaker (RCCB)
- H Communication Control Unit 2 (CCU2)
- I Energy Meter 1
- J Energy Meter 2
- K 48 V Auxiliary Power
- L 24 V Auxiliary Power

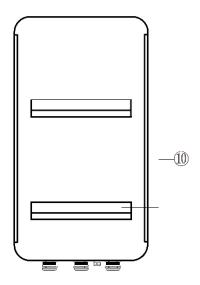


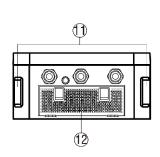
### 3.2 Product Overview (Outside)

- 1. Ambient Light Sensor detects ambient brightness
- 2. 21.5-inch LCD Touchscreen
- 3. RFID Reader
- 4. POS Device (Optional)
- 5. Charging Cable
- 6. Ethernet Cable Inlet Hole
- 7. AC Inlet Hole
- 8. Lock
- 9. Vent each on the right and left side
- 10. Groove
- 11. Lifting Handle
- 12. Inlet Air Filter Bezel









## 4. Preparation

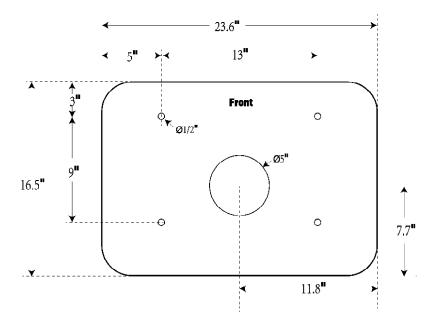
### 4.1 Before You Begin

- Read through this manual prior to installation to be familiarized with the installation steps.
- Ensure the appropriate wiring, circuit protection, and metering is in place at the installation site, according to the specifications, wiring diagrams, and grounding requirements.
- Ensure the MaxiCharger is connected to a grounded, metal, permanent wiring system. Otherwise, an equipment-grounding conductor must be run with the circuit conductors and connected to the equipment grounding terminal or lead on the product.
- Ensure the installation site has a load capacity sufficient to support the MaxiCharger.
- Ensure adequate CDMA (Verizon or Sprint) or GSM (AT&T, Rogers) cellular coverage is available at the
  installation site. Cellular repeaters may be required in underground garages or other enclosed parking
  structures
- Ensure the space around the MaxiCharger is sufficient to carry out installation or maintenance work.

### 4.2 Location Requirements

Before mounting the MaxiCharger, choose a suitable mounting location that meets the following requirements:

- Ensure the charging connector of the MaxiCharger can sufficiently reach the vehicle's charging port with the chosen cable length. The standard charging cable length is 18 feet (5.5 m), and a 24.6 feet (7.5 m) cable is also available.
- Ensure that there is sufficient space to install the MaxiCharger. For the pedestal-mounting models, refer to the pedestal's drilling template dimensions described below:



### 4.3 Installation Tools and Materials

The MaxiCharger DC Compact includes the following installation options:

- Floor-standing using a pedestal
- Trolley-mounting
- MaxiCharger with pedestal
- MaxiCharger with trolley

### ⊗ NOTE

 "MaxiCharger with pedestal" and "MaxiCharger with trolley" indicate that the MaxiCharger has already been installed on a pedestal or trolley before shipment.

A----

No mechanical and electrical installation are required for the "MaxiCharger with trolley" model.

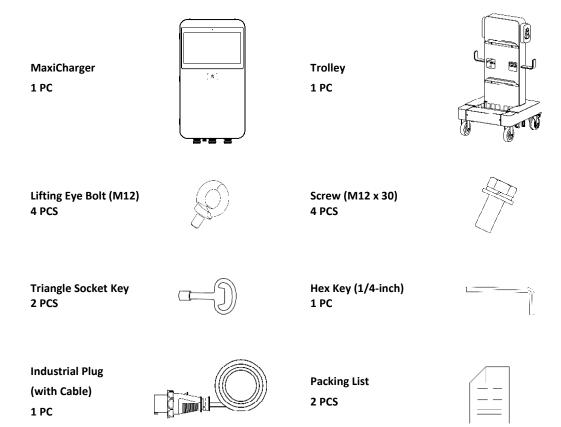
Refer to the corresponding list in accordance with the order.

### 4.3.1 In the Box

### For floor-standing installation:

MaxiCharger 1 PC	(*)	Pedestal 1 PC	
Expansion Bolt (M12 x 80) 4 PCS		Screw (M12 x 30) 4 PCS	
Lifting Eye Bolt (M12) 4 PCS	Ø	Hex Key (1/4-inch) 1 PC	
Drilling Template 1 PC		T25 Torx Screwdriver 1 PC	<b>8</b> (
Triangle Socket Key 2 PCS		Packing List 2 PCS	

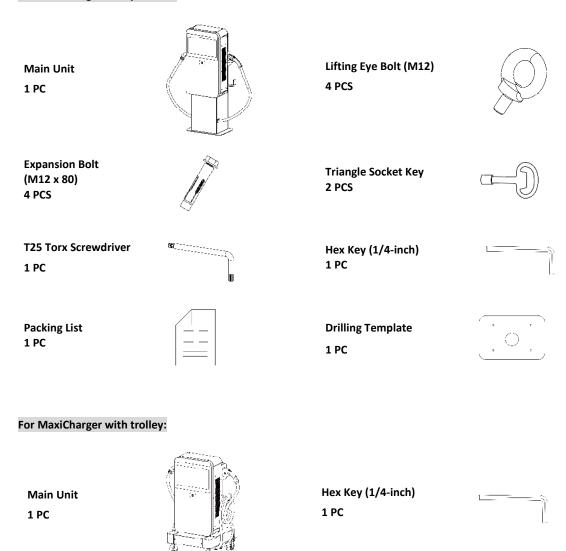
### For trolley-mounting installation:



### For MaxiCharger with pedestal:

**Triangle Socket Key** 

2 PCS



**Packing List** 

1 PC

### 4.3.2 Recommended Tools

- Spirit Level
- Pencil
- Drill
- M12 Wrench
- Brush
- Hammer
- Compressed Air
- Marker
- Crane
- Wire Stripper
- Crimping Tool
- Cable Lug
- Flathead Screwdriver
- Phillips Screwdriver
- 8 mm Socket Wrench
- 10 mm Socket Wrench
- 13 mm Socket Wrench

### ∅ NOTE

The tools mentioned above are not included in the packages. Ensure they are readily available prior to installation.

## **5.** Installation

There are three ways to mount the MaxiCharger:

- On a pedestal
- On a trolley
- MaxiCharger with pedestal

### **General Installation Procedures:**

- 1. Unpack the shipping crate.
- 2. Move the equipment to the installation site.
- 3. Mount the equipment.
- 4. Complete the power supply wiring.
- 5. Connect the MaxiCharger to the Internet.
- 6. Finish installation.

The installation work shall be carried out after a suitable location is chosen.

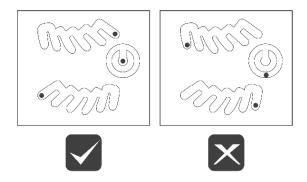
## **A** CAUTION

- Cut off the power supply before opening the MaxiCharger.
- Do not touch the inside components of the MaxiCharger while it is powered on.
- Ensure no voltage is applied while checking the MaxiCharger.
- Operate the MaxiCharger only when its door is closed and locked.

### 5.1 Unpack

1. Check the Shockwatch and tilt and inversion indicators.

Observe the sensors attached to the package for the degree of the tilt and complete overturn and check the Shockwatch. If the sensors demonstrate over 30° of tilt or total overturn, or the Shockwatch displays red, contact Autel customer service and the delivery personnel, and then inspect the product for any damage. **Do not** accept the delivery until the inspection is complete and no damage is found.

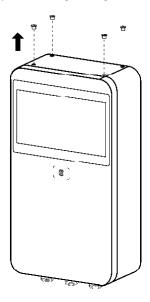


- 2. Remove the outside packaging and interior protection materials in accordance with the "Unpack Wooden Case" instructions on the packages.
- 3. Inspect the MaxiCharger and the parts for damage. If damage is evident or the parts are not consistent with the order, contact your local dealer.
- 4. Ensure that all parts are delivered according to the order.

### 5.2 Move the MaxiCharger

It is recommended to move the MaxiCharger to the installation site using appropriate hoisting equipment (crane, straps, and so on).

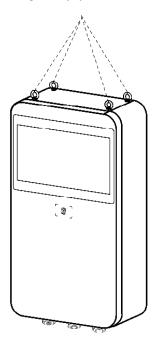
- 1. Remove the equipment from its packaging.
- 2. Remove the four screws at the top of the charger using a flathead screwdriver. Set them aside.



- 3. Install the four M12 lifting eye bolts into the four holes and tighten the bolts.
- 4. Connect the cables of the hoisting equipment to the eye bolts' lifting loops.
- 5. Move the equipment to the installation site.

### **A** CAUTION

Do not tilt over 40 degrees when hoisting the equipment.



### **5.3 Mount the Equipment**

### 5.3.1 Mount on a Pedestal

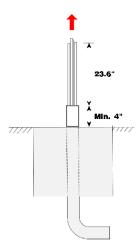
### A

### **IMPORTANT**

- Always check local codes to ensure compliance. The guidelines described here are the minimum requirements. Consult an engineer to ensure that the installation complies with all applicable codes.
- Check the dimensions of the existing concrete surface. To safely mount the equipment, the concrete should be at least 3 inches (80 mm) thick.
- The concrete surface must be perfectly flat and level.

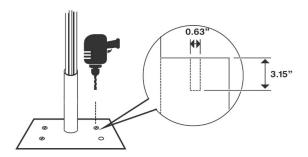
### Step 1

- 1. Trench and excavate a cable tunnel to accommodate the conduit. The outer diameter of the conduit should not exceed 5 inches.
- 2. Feed the conduit and wires to the designated location through the exit opening, leaving conduit stub-up minimum 4 inches (100 mm) and approximately 23.6-inch long (600 mm) wires above the surface.



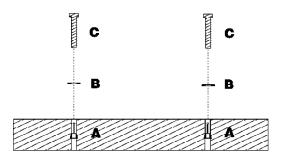
### Step 2

- Place the drilling template on the concrete surface, aligning its central hole with the exit opening. Ensure
  its front side is facing forward.
- 2. Mark the four mounting holes on the concrete surface and remove the drilling template.
- 3. Drill four holes measuring 0.63 inch (16 mm) in diameter and 3.15 inches (80 mm) in depth into the concrete.
- 4. Clean all dust from the holes using a brush and compressed air.



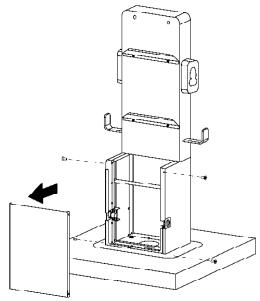
### Step 3

- 1. Tap the four M12 x 80 bolts into the drilled holes.
- 2. After the expansion sleeves (A) are stuck, remove the bolts (C) and flat gaskets (B) using an M12 wrench. Set them aside.

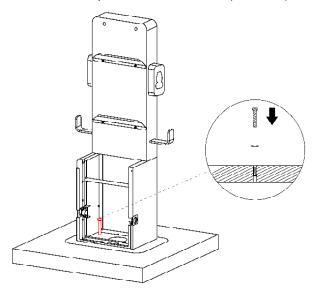


### Step 4

1. Use the T25 Torx screwdriver to unscrew the four M5 x 12 security screws and remove the front cover from the pedestal. **Set them aside**.

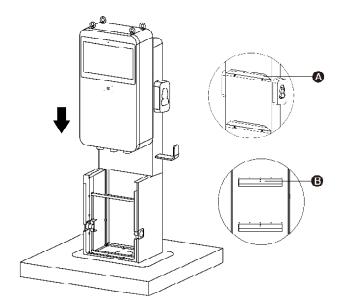


- 2. Mount the pedestal onto the mounting location, aligning with the mounting holes.
- 3. Level the pedestal using a spirit level.
- 4. Reinstall the flat gaskets and bolts. Torque the bolts to 33-41 ft·lb (45-55 N·m) to secure the pedestal.



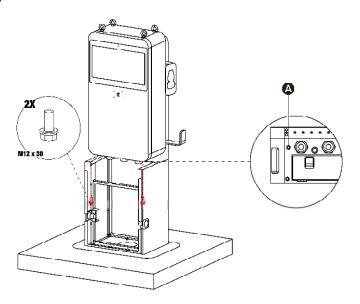
### Step 5

Mount the MaxiCharger onto the pedestal by hoisting. Then hang the grooves (B) on the back of the charger onto the pedestal's protrusions (A). Ensure the charger is securely attached.



### Step 6

Insert two M12 x 30 screws into the bottom of the charger ( $\bf A$ ) and secure the charger to the pedestal using an M12 wrench.



### Step 7

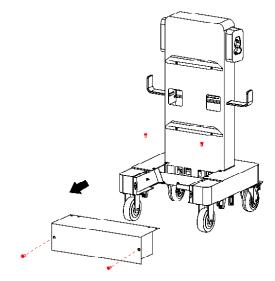
Remove the four lifting eye bolts and reinstall the top screws.

### 5.3.2 Mount the MaxiCharger with Pedestal

For the "MaxiCharger with pedestal" model, follow the steps in Section 5.3.1 (skip Step 5 and 6) to mount the equipment.

### 5.3.3 Mount on a Trolley

1. Loosen the four M5 x 12 screws using a Phillips screwdriver and remove the trolley's front cover. **Set them aside**.

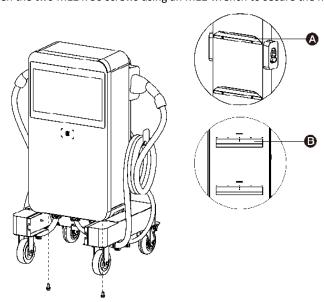


2. Lift the MaxiCharger onto the trolley. Position the groove (B) on the back of the MaxiCharger to fit the protrusion (A) of the trolley. Ensure the MaxiCharger is securely attached.

### **⊘**NOTE

When lifting the MaxiCharger onto the trolley, activate the foot brakes on the rear wheels to prevent the trolley from moving.

3. Insert and tighten the two M12 x 30 screws using an M12 wrench to secure the MaxiCharger.



4. Remove the four lifting eye bolts and reinstall the top screws.

### 5.4 Power Supply Wiring

### **A** WARNING

### **Risk of Electric Shock**

- Only a qualified electrician is allowed to determine the electrical requirements and connect the wires.
- Ensure the power is off before connecting the wires.

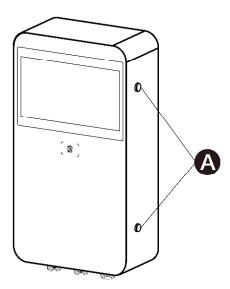
### **MPORTANT**

Before connecting the wires, ensure the following requirements are met:

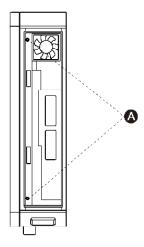
- Electrical input rating must be 480V three-phase in Wye or Delta configuration (Neutral is not required).
- Use 90-degree copper wire only.
- The circuit breaker at the panel must be off.
- The MaxiCharger must be grounded to true earth.
- An insulated grounding conductor must be installed as part of the branch circuit that supplies the MaxiCharger.
- The grounding conductor should be grounded to earth at the service equipment or, when supplied by a separately derived system, at the supply transformer.
- All connections must comply with all local codes and ordinances.

### 5.4.1 Open the Cabinet Door

1. Flip open the lock covers (A) on the right side of the charger. Then push the triangle socket key into the lock and turn it counterclockwise to open the side door. Ensure the triangle of the key matches that of the lock when pushing.

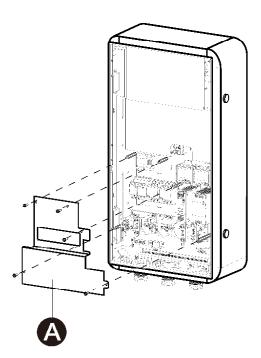


2. Loosen the two M8 hex screws (A) using the hex key and open the cabinet door.



### 5.4.2 Connect the AC Input Cable

Loosen the five M6 x 16 screws using a Phillips screwdriver to remove the galvanic isolation board (A).
 Set them aside.



- 2. Pull the wires from the conduit stub-up and guide them through the AC inlet hole.
- 3. Use the wire stripper to remove correct length of the insulation from the end of the wires. Ensure the stripped length is compatible with the cable lugs.
- 4. Use the crimping tool to attach the cable lugs to the end of the wires.

- 5. Loosen the M6 screw on the PE busbar using a 10 mm socket wrench. Then attach the PE wire to the PE connector (A) and screw the M6 screw to 4.4 ft·lb (6 N·m).
- 6. Loosen the M8 fasteners using a 13 mm socket wrench and attach the wires to the connectors:
  - L1 wire to the connector B.
  - L2 wire to the connector C.
  - L3 wire to the connector D.
- 7. Reinstall the M8 fasteners and tighten them to 4.4-8.9 ft·lb (6 to 12 N·m).
- 8. Reinstall the galvanic isolation board.

### **⊘** NOTE

For the trolley-mounting model, skip Step 3 and 4.

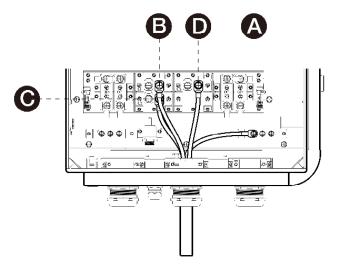


Table 5-1 AC Input Cable Specifications

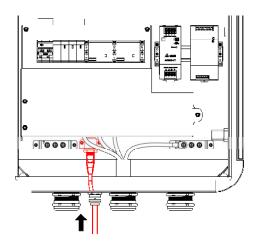
Power Input Voltage	480V		
Input Current	Maximum: 52 A		
input current	Nominal: 50 A		
Wire Gauge	Min. 6 AWG		
wife dauge	Max. 5 AWG		
	● L: 28 ± 2.5		
	● L1: 18 ± 2		
	● D1: 6.2 ± 0.5		
Coble Lug Size (mm)	● d1: 5.8 ± 0.4L1		
Cable Lug Size (mm)	● D2: 9.6 ± 0.6		
	● d2: 8.8 ± 0.6		
	NOTE: L is short for length and D (d) is short for diameter.		

# 5.5 Internet Connection

The MaxiCharger can be connected to the Internet via Ethernet cable, cellular network or Wi-Fi. Choose an appropriate connection method as applicable.

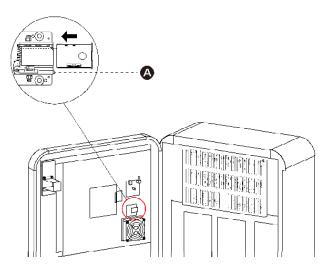
## 5.5.1 Connect the Ethernet Cable

- 1. Loosen the Ethernet cable gland.
- 2. Put the Ethernet cable through the Ethernet cable port at the bottom of the MaxiCharger.
- 3. Plug the Ethernet cable into the RJ45 port.
- 4. Tighten the cable gland.



# 5.5.2 Install the SIM Card

- 1. Press the button (A) and slide the card tray to the right to remove it.
- 2. Place the SIM card into the card tray. Ensure the card is inserted correctly.
- 3. Reinstall the card tray.



# 5.6 Finish Installation

## For Pedestal-mounting:

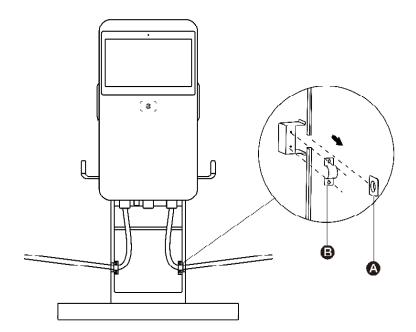
# STEP 1

Close the cabinet door by tightening the two M8 hex screws. Then close the side cover and turn the socket key clockwise to lock it.

# STEP 2

Organize the charging cables as described below:

1. Remove the two rubber rings (A) from the pedestal. Then remove the strain reliefs (B) by unscrewing four M4 screws on both sides of the pedestal using a Phillips screwdriver.



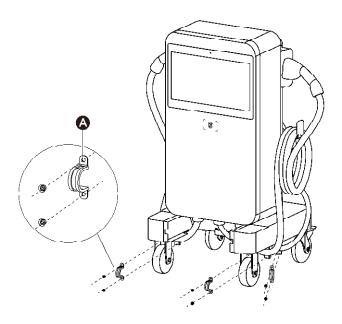
- 2. Use the strain reliefs to secure the charging cables, ensuring that the charging cables are allowed to remain their bending tolerance. Fix the strain reliefs by reinstalling and tightening the four M4 screws to 0.9 ft·lb (1.2 N·m).
- 3. Put the rubber rings onto the charging cables via the openings.
- 4. Drape the cables over the cable holders on both sides of the pedestal and plug the connectors into the holsters.
- 5. Reinstall the pedestal's front cover by inserting the four M5 x 12 security screws. Tighten the screws to 1.5 ft·lb (2 N·m).

# For MaxiCharger with Pedestal:

- 1. Close the cabinet door by tightening the two M8 hex screws. Then close the side cover and turn the socket key clockwise to lock it.
- 2. Reinstall the pedestal's front cover by inserting the four M5 x 12 security screws. Tighten the screws to 1.5 ft·lb (2 N·m).

## For Trolley-mounting:

1. Loosen the M5 nuts using an 8 mm socket wrench and remove the three strain reliefs (A). Then secure the cables with the strain reliefs by reinstalling the M5 nuts.



- 2. Drape the industrial plug cable over the cable holder on the back of the main unit.
- 3. Stretch the charging cables to remove any kinks and drape them over the cable holders. Dock the EV connectors in the holsters.
- 4. Reinstall the four M5 x 12 screws and the trolley's front cover.
- 5. Close the cabinet door by tightening the two M8 hex screws. Then close the side cover and turn the socket key clockwise to lock it.

# 5.7 Upstream Protective Device

The local utility may require an RCD to be installed. The recommended device type is provided below:

Device	Specifications
Upstream residual current device (RCD)	Type A or Type B, with a rated residual operation current of 30 mA.

# 5.8 Prepare for Operation

## For the pedestal-mounting and MaxiCharger with pedestal models:

- Ensure all electrical connections are clean, tight, and free of wire strands and metal shavings.
- Wipe all surfaces with a soft cloth dampened with warm water.
- Turn the external circuit breaker on and verify that the charger is receiving 277 VAC phase to ground and 480 VAC phase to phase, ± 10%. Voltages must be verified by a qualified electrician.
- Turn on the internal circuit breaker.

# NOTE

If the ambient temperature is below -4 °F (-20 °C), it may take 3 to 5 minutes for the touchscreen to display as a preheating process. In extreme cases, the display module will be reset to ensure the normal operation of the equipment.

# For the trolley-mounting and MaxiCharger with trolley models:

# **MPORTANT**

- Do not turn on the circuit breaker to the MaxiCharger until the industrial plug is securely connected.
- Once a charge session ends, cut off the power supply before disconnecting the industrial plug.
- 1. Wipe all surfaces with a soft cloth dampened with warm water.
- 2. Open the cover to the socket.
- 3. Plug the industrial plug into the socket and fully push it. Then screw the bayonet ring clockwise to secure the connection.
- 4. Turn on the circuit breaker.

The MaxiCharger is now ready for operation.

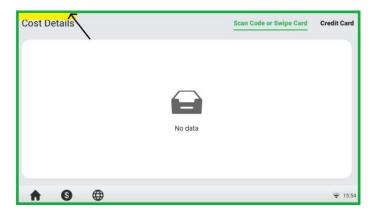
# 5.9 OCPP Settings

Follow the steps below to set the OCPP parameters.

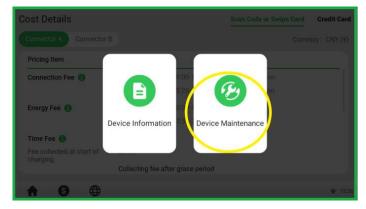
 On the Standby Screen, tap the "currency (\$)" icon on the lower-left corner to enter the Cost Details Screen.



2. On the Cost Details Screen, **double tap** the upper-left corner to enter the next page.



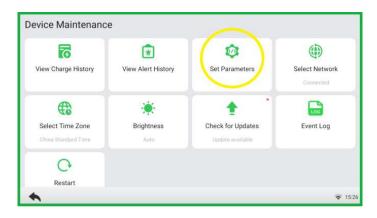
3. Select **Device Maintenance** on the screen.



4. A password prompt will appear. Enter **the last 6 digits of the product's serial number** to continue, which can be found on the product label.



5. On the Device Maintenance Screen, select **Set Parameters**.



6. Set the OCPP parameters accordingly.



# 5.10 Autel Charge Cloud Configuration

To ensure the normal operation of the charger, configuring the Autel charge cloud is necessary. This platform is a one-stop charging management solution intended to address the needs of many use cases including residential, commercial, governmental, car dealers, and fleets. Contact Autel technical support for subscription and obtain the *Autel Charge Cloud Manual* for more details.

If a third-party cloud platform is used, consult their personnel for configuration.

# **6.** Operation

# 6.1 Charge Sessions

General charging procedures:

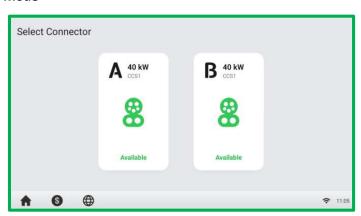
# To charge an EV

- 1. Park an EV with the charging port within reach of the connector.
- 2. Plug in the vehicle.
- 3. Start the charge session.
- 4. Stop the charge session.

# **MARNING**

- Do not cover the vent during charging.
- Do not clean or operate in the EV during charging.

# 6.1.1 Standby Mode



After a connector is successfully connected to your EV, the MaxiCharger can automatically recognize the connector, then the corresponding connector's Authorization Screen will appear.

If no operation is performed for a long time on the Authorization Screen, the Standby Screen will appear. Manually select the appropriate connector on the touchscreen.

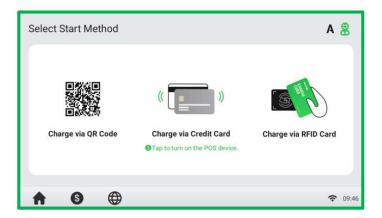
# 6.1.2 Authorization

# **MPORTANT**

- Observe the screen for any abnormality, such as an error message, before starting a charge session. Check the surroundings and the MaxiCharger for any abnormality or damage as well.
- DO NOT operate the MaxiCharger if the screen displays an error message. Contact Autel personnel for support.

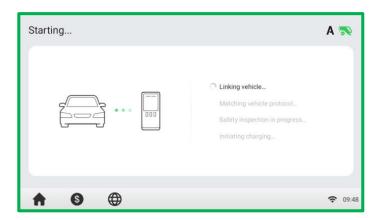
When the Authorization Screen appears, you can use any of the following methods to start a charge session:

- Scan the QR code on the screen
- RFID card
- Plug & charge
- Credit card (optional)



# 6.1.3 Start Charging

The MaxiCharger enters communication with the EV following a successful authorization. The charge session will start automatically after passing safety tests.



# 6.1.4 Charging

Information about the charging duration, volume, cost, and power will appear on the Charging screen. Tap the **Right Arrow** button on the right to view more information about the charging status, including SoC (State of Charge), current, and voltage.



## 6.1.5 Stop Charging

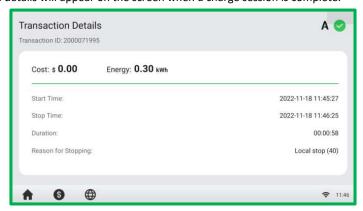
#### > To stop charging

- 1. Unplug the vehicle or tap the **Stop** button on the touchscreen.
- 2. If a session stops unexpectedly, the charger requires another authorization to restart a charge session. Use the same authentication method to begin the charge again:
  - QR Code/Credit Card: Tap the **Stop** button on the Charging Screen of the Autel Charge app.
  - RFID Card: Tap the RFID card on the card reader again to finish charging.

## **⊘** NOTE

The charging session stops automatically when the battery is full.

The transaction details will appear on the screen when a charge session is complete.



# 6.1.6 Finish Charging

Return the connector to the holster on the MaxiCharger.

# **6.2 Charging Errors**

This section depicts several common problems that may arise during a charge session along with possible causes/solutions to resolve them. If the problem persists, contact your local dealer or Autel technical support.

#### 6.2.1 Connector Connection Error

If the connector is not connected to the EV, then the Connector Not Connected screen will appear. Disconnect completely, then plug in the EV and recheck the screen to see if the error message is resolved.

## 6.2.2 Authorization Failure

The Authorization Failure screen appears when there is an error processing the chosen authentication method. The cause and possible solution(s) will display on the screen. Follow the on-screen instructions to resolve the problem, or contact the local dealer or Autel technical support.

#### 6.2.3 Charge Start Failure

The Charge Start Failure screen appears when the charger has failed to pass the initialization process. The cause and possible solution(s) will display on the screen. Follow the on-screen instructions to resolve the problem.

#### 6.2.4 Charging Failure

The Charging Failure screen appears when various errors occur during a charge session. The cause and possible solution(s) will be displayed on the screen. Follow the on-screen instructions to resolve the problem, or contact your local dealer or Autel technical support.

# 6.3 De-energize the MaxiCharger

#### **General Procedure:**

- 1. Set the upstream breaker which provides the power to this MaxiCharger to **OFF** and lock it. Ensure that this breaker stays in the **OFF** position during the procedure.
- 2. Open the cabinet door.
- 3. Measure the AC voltage. Ensure that all the measured voltages are 0 V.
- 4. Measure the DC voltage. Ensure that all the measured voltages are 0 V.
- 5. Close the door.

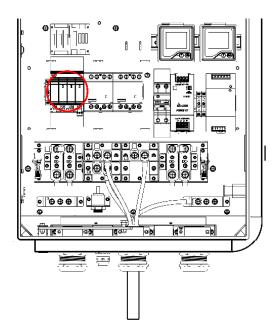
# 6.3.1 Measuring the AC Voltage

Use a voltage tester to measure the AC voltage between the terminals on the surge protection device.

- L1 to L2
- L1 to L3
- L2 to L3

# ∅ NOTE

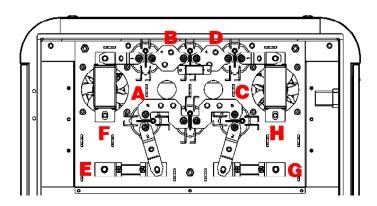
The surge protection device switch shows the indications L1, L2, and L3.



# 6.3.2 Measuring the DC Voltage

Use a voltage tester to measure the DC voltage between the output terminals:

- Power module group output 1- (B) to power module group output 1+ (A)
- Power module group output 2- (D) to power module group output 2+ (C)
- EV charging cable 1 output (F) to EV charging cable 1 output + (E)
- EV charging cable 2 output (H) to EV charging cable 2 output + (G)



# 7. Maintenance

# 7.1 Routine Maintenance

Routine maintenance can keep the MaxiCharger in a safe and stable state.

- Clean the cabinet every quarter, tighten the screws and bolts of key parts, and check whether the wire connection of the connector is burned out. If any abnormality is found, replace the parts in time.
- Clean the air filter and dust filter at least twice a year.
- Test the residual current device once a year.

# **A** WARNING

- Disconnect the power supply to the MaxiCharger during the entire maintenance procedure.
- Ensure unauthorized personnel are kept at a safe distance during maintenance.
- Wear proper personal protective equipment, such as protective clothing, safety gloves, safety shoes, and safety glasses.
- If the safety devices are removed for maintenance, reinstall them after completing the work.

## 7.1.1 Cleaning the Cabinet

The cabinet is powder-coated. The coating must be kept in good condition. When the MaxiCharger is in a corrosion sensitive environment, superficial rust may appear on welding points. Visible rust has no risk to the integrity of the cabinet.

# > To remove rust

- 1. Stop any charging processes and power off the MaxiCharger.
- 2. Remove rough dirt by spraying with low-pressure tap water.
- 3. Apply a neutral or weak alkaline cleaning solution and let it soak.
- 4. Remove dirt by hand with a damp and non-woven nylon cleaning pad.
- 5. Rinse thoroughly with tap water.
- 6. Apply wax or a rust-preventive primer for extra protection if needed.

#### 7.1.2 Residual Current Device Maintenance

The internal residual current circuit breaker (RCCB) should be tested annually for correct functioning. Before testing, disconnect the MaxiCharger with the EV and stop any charging processes.

#### > To test the RCCB

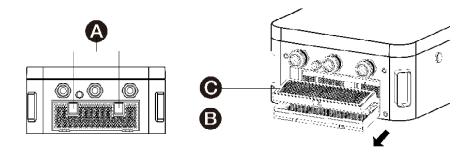
- 1. Open the cabinet door. When the door is open, the MaxiCharger should not be directly exposed to a windy and rainy environment.
- 2. The MaxiCharger must be in the Standby mode. Tapping the touchscreen can wake up the MaxiCharger.
- 3. Locate the RCCB, and press the T button to start test.
  - Pass: The RCCB will trip and restore the **T** button to its original position.
  - Fail: The RCCB does not trip. Please contact Autel technical support. Do not use the MaxiCharger until the repair is completed.
- 4. Close the cabinet door after the test is finished.
- 5. Mark the time when the test is needed to be repeated annually.

# 7.1.3 Cleaning and Replacing the Air Filter

The MaxiCharger is equipped with an air inlet filter at the bottom. Clean the air filter every 3 months (not exceeding 6 months). Replace the air filter once a year.

# > To clean or replace the air inlet filter

- 1. Ensure there is no active charge session and perform lockout-tagout to secure the charger.
- 2. Pop open the two buckles (A) at the bottom of the charger and flip the bezel (B) open.
- 3. Remove the air filter (C).
- Clean the air inlet filter of debris or dust and reinstall the cleaned filter. Or install a new air inlet filter.
- 5. Close the bezel.

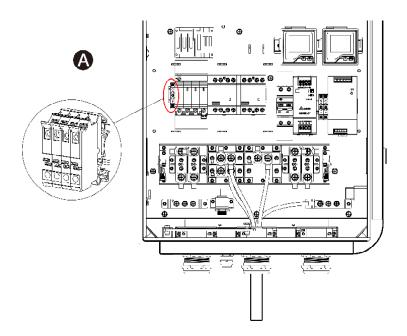


# 7.1.4 Fuse Inspection

The fuses inside the MaxiCharger should be inspected every year. Follow the instructions below to complete the inspections.

#### > To inspect the fuses

- 1. Ensure there is no active charge session and perform lockout-tagout to secure the charger.
- 2. Open the cabinet door and locate the fuse terminal blocks as shown in the diagram below.
- 3. Press the lever (A) and pull out the fuse terminal.
- 4. Check if the fuse is blown or appears broken.
- 5. Follow the procedures above to check all fuses.



# 7.2 Inspection and Maintenance

Routine maintenance is needed when the MaxiCharger is operating in normal condition.

Refer to *Troubleshooting* or contact Autel technical support to resolve any error.

When parts need to be replaced, completely cut off the power supply upstream and inside the equipment before operating.

Regularly conduct a visual inspection of the following:

- Cable and connector: Check for cracks or ruptures.
- Display: Check for damage and cracks. Check whether the touchscreen works.
- Coating of the cabinet: Check for damage, cracks or ruptures.
- Cabinet: Check for rust or damage.

The following special inspections are needed for safe use:

- Check if the MaxiCharger was struck by lightning.
- Check if the MaxiCharger is damaged due to an accident or fire.
- Check the MaxiCharger installation site has been flooded.

# **MARNING**

Stop any charge session and do not connect the power to the MaxiCharger until all inspections are completed.

# 7.3 Remote Maintenance

The MaxiCharger can connect to the Autel cloud platform to monitor parameters in real time. Autel cloud platform provides remote upgrades, diagnosis, and services, and identifies any issue during operation process.

- Daily system self-check.
- Contact Autel technical support to resolve any issue found.

Autel service engineers can check logs, update configurations and programs, and provide remote maintenance services such as remote management, diagnosis, configuration, and upgrade.

# 7.4 Maintenance Schedule

Item	Frequency	Actions
Connector	Every 3 months	Check for cracks or ruptures on the connector.
Input Cable	Every 3 months	Check for cracks or ruptures on the cable.
Air Filter	Annually	Replace the inlet air filter.
Cabinet	Every 3 months	Clean and check for damage.

# 8. Troubleshooting

The table below describes the most common faults when operating the MaxiCharger. Contact Autel technical support if the fault encountered is not in this table.

Error	Error Code	Possible Cause	Solution
CP voltage abnormal	0x2037	It may be caused by signal interference, poor contact or software errors.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Communication error with the entire charging module group	0x3011	There is a problem with the module's address setting.	Power off the MaxiCharger and restart it.
Overvoltage	0x202D	The DC output voltage is above the upper limit of the vehicle or the rated voltage of the MaxiCharger during charging.	Stop the charge session and contact Autel technical support.
Communication error with the power control module	0x200E	The CCU does not receive messages from the ECU and the communication is timed out.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
BMS communication error	0x2007	It may be caused by charging incompatibility.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Cooling fan abnormality	0x304A	Fan aged or damaged.	Power off the MaxiCharger and contact Autel technical support for repair or replacement of the fan.
Charging port electronic locking fault	0x2002	It might be caused by a vehicle- related fault.	Contact the vehicle manufacturer and Autel technical support.
CCU auxiliary power supply shutdown	0x202C	Sever power fault due to aged key components or lines.	Power off the MaxiCharger. Then locate the faulty component or line and contact Autel technical support for its repair or replacement.
Meter communication error	0x0001	Aged meter or line.	Stop the charge session and contact Autel technical support.
Insulation monitoring fault	0x2003	If it appears from time to time, it might be due to the vehicle or software error; if it appears frequently, there may be an aged key component.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
AC contactor stuck	0x3008	AC contactor fault or line aging	Power off the MaxiCharger and contact Autel technical support.

Error	Error Code	Possible Cause	Solution
FPGA fault	0x3010	Controller fault	Stop the charge session, power off the MaxiCharger, and contact Autel technical support.
CCU current sampling and module output current accumulation fault	0x3014	Charging module output or sampling fault	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Power distribution contactor sticking (charging possible)	0x3047	Contactor or sensor fault or line aging	Power off the MaxiCharger immediately and contact Autel technical support.
Communication error on one charging module	0x3051	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Fan fault with one charging module	0x305A	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Inconsistent CCU voltage sampling and the module output voltage	0x305C	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Insulation detection alert	0x2040	If it is a one-time problem, there is may be a falling object, and no operation is required; if it has occurred for several times, the connector cable may be damaged or there are foreign objects in the busbar.	Power off the MaxiCharger immediately and contact Autel technical support.
Charger offline	0x9001	Communication error between gateway and the Autel Charge Cloud	Check the network connection and OCPP configurations.

# **9.** Specifications

# 9.1 Specifications

D.C	A	+	:
טע	Outpu	t Com	ection

Charging Mode	Mode 4	
Output Power	40 kW	
Output Voltage	<ul><li>CCS1: 150 to 950 VDC</li><li>CHAdeMO: 150 to 500 VDC</li></ul>	
Maximum Output Current	<ul><li>CCS1: 133 A</li><li>CHAdeMO: 125 A</li></ul>	
Number of Outputs	<ul> <li>2 x CCS1</li> <li>1 x CCS1 + 1 x CHAdeMO</li> <li>1 x CCS1</li> </ul>	
Peak Efficiency	≥ 96 %	

# **AC Input Connection**

Standard Wiring	4-wire 3-phase (L1, L2, L3, and Earth, no neutral)
Input Voltage	480 VAC + 10 % ~ -15 %
Input Current	<ul><li>Maximum: 52 A</li><li>Nominal: 50 A</li></ul>
Input Frequency	60 Hz
Power Factor (> 50% Nominal Load)	≥ 0.99
Total Harmonic Distortion (> 50% Nominal Load)	≤5%
Energy Metering	Accuracy: 2.5 %

# **General Characteristics**

Enclosure Rating	NEMA 3S, IK10	
Operating Altitude	6561.7 feet (2000 m)	
Operating Temp. Range	-22 to +131 ° F (-30 to +55 ° C)	
Storage Temp. Range	-40 to +158 ° F (-40 to +70 ° C)	
Mounting	Mounting on floor or trolley	
Weight	264.6 lbs. (120 kg)	
Humidity	< 95 % RH (non-condensing)	
Noise Level	< 65 dB @ 1 m/25 ° C/full load/822 V (Vout)	
Network Type	TN-S, TN-C, TN-C-S, TT (External RCD required)	
Protection	Overcurrent, overvoltage, undervoltage, ground fault, over-temperature, short circuit, insulation monitor, surge protection	

# **User Interface**

Display	21.5-inch LCD touchscreen
Cable Length	<ul> <li>Charging cable:</li> <li>18 feet (5.5 m) Standard</li> <li>24.6 feet (7.5 m) Optional</li> <li>Industrial plug: 9.8 feet (3 m)</li> </ul>
Status Indication	LED/LCD/APP
User Interface	<ul><li>Autel Charge App</li><li>Autel Charge Cloud</li></ul>
Connectivity	<ul><li>4G</li><li>Wi-Fi</li><li>Ethernet</li></ul>
Communication Protocols	OCPP 1.6J (Can be upgraded to OCPP 2.0.1 later)
User Authentication	<ul> <li>APP</li> <li>RFID card</li> <li>Credit card (Optional)</li> <li>Plug &amp; Charge</li> </ul>
Wheelchair accessibility	Yes
RFID Reader	<ul> <li>ISO 14443 A + B to part 4 and ISO/IEC 15693</li> <li>Mifare</li> <li>NFC</li> </ul>

# **Software Update**

Software Update	OTA updates via web portal

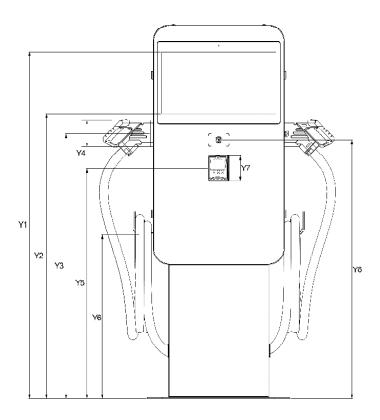
# **Certification and Standards**

Safety and Compliance	UL 2202, UL 2231-1, UL 2231-2, CSA No. 107.1-16, NEC Article 625, ISO 15118 Plug & Charge	
EMC Compliance	FCC 15 Class A	
Certification	UL/cUL	
Warranty	24 months, warranty extension possible	

# 9.2 Installation Specifications

See the tables below for the operable element specifications:

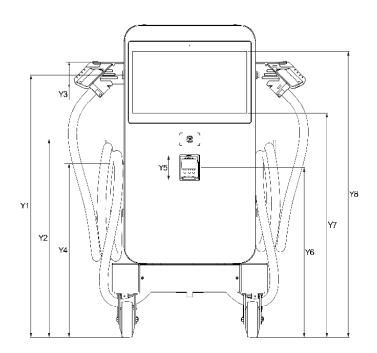
# Pedestal models



Parameter	neter Description		Specification	
Turumeter	Beschpilon	inch	mm	
Y1	Highest user operable element of the touchscreen	57.2	1454	
Y2	Lowest user operable element of the touchscreen	47	1194	
Y3	User operable element of the holster	43.7	1110.5	
Y4	Height of the connector	4.3	109	
Y5	User operable element of the POS	38	965	
Y6	Lowest user operable element of the cable holder	27.1	687.5	
Y7	Height of the POS	4.1	105	

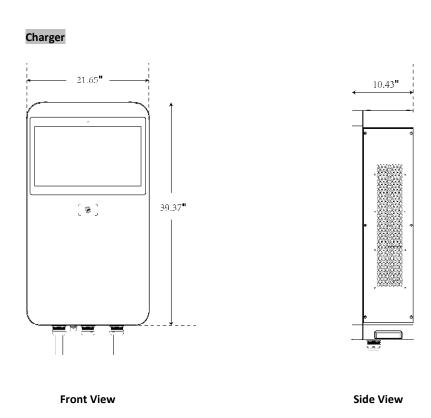
Y8 User operable element of the RFID reader 42.7 1084	Y8	User operable element of the RFID reader	42.7	1084
---	----	--	------	------

# Trolley models

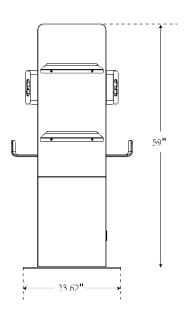


Parameter	Description	Specification	
rarameter		inch	mm
Y1	Highest user operable element of the door lock	43.4	1102
Y2	User operable element of the RFID reader	32.8	833
Y3	Height of the connector	4.3	109
Y4	Lowest user operable element of the cable holder	28.7	729
Y5	Height of the POS	4.1	105
Y6	User operable element of the POS	28	712
Y7	Lowest user operable element of the touchscreen	37	941
Y8	Highest user operable element of the touchscreen	47.3	1201

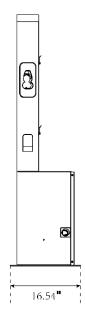
# 9.3 Product Dimensions



# Pedestal

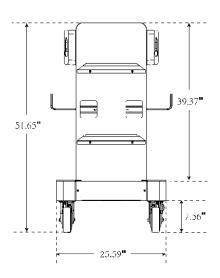


**Front View** 

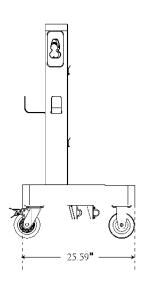


**Side View** 

# Trolley



**Front View** 



**Side View** 





# **NB SERIES - NBi 180 / NBi 360**

# HARDWARE AND INSTALLATION MANUAL



# **NBi180 / NBi360 POWER CABINETS**

— EV CHARGING SOLUTIONS ——

# Hardware and Installation Manual

Edition: January 2025 NBG2MHW03GI Rev. G

# **ABOUT THIS MANUAL**

#### **PURPOSE**

This manual contains important instructions for the installation, configuration and use of the power cabinets:

- NBi180 range: includes the power cabinets NBi60 / NBi90 / NBi120 / NBi150 / NBi180.
- NBi360 range: includes the power cabinets NBi180R / NBi 240R / NBi360R.

From now on, this manual may refer to them with the terms "product" or "power cabinet".

The power cabinet must be connected to any Dispensers / Pantograph solution from Power Electronics. Please consult the specific documentation of all the product included in the project.

Power Electronics reserves the right to modify product features. Any possible updates to the mentioned products will be reflected in subsequent revisions of this manual.

#### TARGET AUDIENCE

This manual is intended for qualified customers who will install, configure and operate the **NBi180 / NBi360** power cabinets.

Only qualified and/or designated technical personnel according to agreements signed with Power Electronics may install and commission the product.

#### **REFERENCE MANUALS**

The following reference documents are available for Power Electronics electric vehicle charging solutions:

- Programming and Software Manual
- Safety Instructions for Operating, Troubleshooting and Maintenance.
- Faults, Warnings and Troubleshooting Manual.



# **NOTICE**

#### WARRANTY DISCLAIMER

The manufacturer is not liable for damages, losses, costs or expenses incurred by any user of the product if such damages, losses, costs or expenses result from a failure to comply with the applicable safety instructions or general instructions or operating instructions given by the manufacturer in any of the documents and manuals of the product, including, but not limited to hardware installation, programming and operation, maintenance instructions, handling, or any other. Any damages, losses, costs or expenses resulting from the improper handling, manipulation, modification or operation of the product will be subject to the company's warranty terms.

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# **REVISIONS CONTROL**

DATE (DD / MM / YYYY)	REVISION	DESCRIPTION
26 / 01 /2024	Α	First edition.
05 / 02 / 2024	В	Included "End of line resistor" subsection in the Communications and auxiliary supplies section in 4.2 Connections - 4.2.2.NBi180 power cabinet.
05 / 03 / 2024	С	Updated the tables in section 1. <i>Technical characteristics</i> to include information on rated input current.
12 / 04 / 2024	D	Minor stylistic adjustments and update of figures to replace the text included in the figures for numbered references and text in auxiliary tables.
		Update of the Warranty Disclaimer notice in the About this manual section.
10 / 05 / 2024	E	Reorganization of the following sections: Handling, transportation and installation; Cable access and connections; Control elements and indicators, which are now grouped into product specific sections: 3. NBi180° and 4. NBi360.
		Addition of new figures with the dimensions of the plates for the AC input and DC output connections of the NBi360 power cabinet in section 4.2.2 Connections.
24 / 10 / 2024	F	Update of the "4x4 combiner with 90kW DC outputs" figure of the DC output section in 4.2.2. Connections of the NBi360 product.
		Addition of new section: 1. Product classification.
28 / 01 / 2025	G	Update of the <u>Technical Characteristics</u> and <u>Standard ratings</u> tables in section 2. Technical characteristics.
257 517 2025	J	Update of the rated input current values in the tables of cable characteristics in the <i>Cable access and connections</i> section of each product: NBi180 (4.2.1) and NBi360 (5.2.1).



The products and technical documentation are periodically updated. Power Electronics reserves the right to modify all or part of the contents of this manual without previous notice. The reproduction or distribution of the present manual is strictly forbidden unless express authorization from Power Electronics.

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# **ACRONYMS**

The terms commonly used in the documentation of Power Electronics' products are listed in the table below.

Please notice this is a general series of terms and it encompasses all our product divisions (industrial, solar, storage, and electric mobility), thus, some of the following expressions may not apply to this particular manual.

ACRONYM	MEANING	
AASS	Auxiliary Services	
AC	Alternating Current	
Al	Analogue Input	
AO	Analogue Output	
BESS	Battery Energy Storage System	
BMS	Battery Manager Solution	
CCID	Charge circuit interrupting device	
CCL	Charge Current Limit.	
ccs	Combined charging system – charging and communications protocol following the standard IEC 61851-23 Annex CC	
CHAdeMO	Charging and communications protocol following the standard IEC 61851-23 Annex AA	
CPU	Central Processing Unit	
DC	Direct Current	
DCL	Discharge Current Limit	
DI	Digital Input	
DSP	Digital Signal Processor	
DO	Digital Output	
EV	Electric Vehicle	
FPGA	Programmable device (Field-Programmable Gate Array)	
FRU	Field Replaceable Unit	
GFDI	Ground Fault Detector Interrupter	
GPRS	General Packet Radio Services, a data transmission system	
HVAC	Heating, Ventilation, and Air Conditioning	
IGBT	Insulated Gate Bipolar Transistor	
IMI	Insulation monitoring device	
IT	Grid system where the power supply is kept isolated and the electrical product system is grounded.	
LOTOTO	Lock Out – Tag Out – Tryout	
MCB	Miniature Circuit Breaker	
MPCS	Multi Power Conversion System	
MID	Measuring Instrument Directive	
MV	Medium Voltage. This term is used to refer to high voltage in general	
O.F.	Optical fiber	
PE	Ground connection	
PI	Proportional and Integral	
POI	Point Of Interconnection	
PPE	Personal Protection Product	
PV	Photovoltaic energy	
RCD	Residual Current Device	

EN

ACRONYM	MEANING
RCM	Residual Current Monitor
RFID	Radio Frequency Identification
SOC	State Of Charge – referred to battery
SOH	State Of Health – referred to battery. It compares the actual state of the battery to its initial conditions. It is measured in percentage
STO	Safe Torque Off
TN	Grid system where the power supply is grounded, and the electrical product system is brought to the same ground through the neutral connector.
TT	Grid system where both the power supply and the electrical devices are connected to the ground via separate connections
UPS	Uninterruptible Power Supply
VSD / VFD	Variable Speed Drive, Variable Frequency Drive. Both terms are used

# **SAFETY SYMBOLS**

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:



#### **WARNING**

Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death.

Be extremely careful and follow the instructions to avoid the risk of electrical shocks.



# CAUTION

Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury. Read the message and follow the instructions carefully.



#### NOTICE

Identifies important measures to take in order to prevent damage product and warranty lost, as well as encouraging good use and environmental practices.

Other symbols used in this manual for safety messages are the following:



Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.



Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.



Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.



# SAFETY INSTRUCTIONS

## **IMPORTANT!**

# **SAVE THIS INSTRUCTIONS**

This manual contains important instructions for the **NBi180** / **NBi360** power cabinets that must be followed during installation and maintenance of the product. Read carefully all documentation before handling the product and pay special attention to safety recommendations to maximize the performance of this product and ensure its safe use and installation.

This document covers the most important and frequent potential causes of damage to the product or personnel. It is the responsibility of the installer to follow the instructions provided in this manual, to follow good electrical practices and to identify all warnings and recommendations before starting up and operating the products.



## **WARNING**

#### FIRST CONSIDERATIONS

#### The operations detailed in this manual must only be performed by qualified personnel.

The condition of qualified personnel referred to in this manual shall be at least the condition that meets the standards, regulations and safety laws applied to the installation and operation of this product.

#### Read and retain the Hardware and Installation Manual for future reference.

Before assembling the product, read all instructions, caution signs and other sections of this manual. Failure to follow these warnings can result in severe electrical shock or death. Pay attention at all times to prevent possible accidents.

In addition to the recommendations in this manual, **local and site-specific safety procedures must be observed**. Additionally, local and national electrical regulations must be followed to avoid personal injury and/or product damage.

The electric vehicle charging system may cause an ELECTRICAL DISCHARGE if the warnings indicated in this manual are not followed.

Make sure the product is completely disconnected from the power supply and grounded before handling or servicing. Otherwise, there is a risk of electric shock. To avoid electrical hazards, disconnect the input supply, ground the product, remove control voltages before performing any tasks, and ensure that busbars are completely discharged. Warning and safety labels must be properly affixed to terminals, cabinets, and control panels in accordance with local regulations.

#### When working on electrical installations, always remember to apply the FIVE GOLDEN RULES:

- 1. Visible shutdown of all live sources.
- 2. Mechanical locking of all cutting elements.
- 3. Verify the absence of voltage by using the appropriate tools for the voltage of the installation.
- 4. Ground and short-circuit all possible voltage sources.
- 5. Delimit and mark the work area.



#### WARNING



The housing must be properly closed, otherwise it may not adequately protect people or property from any abnormal situation inside the product.

**Always follow the instructions in the manual to move and position the product.** The weight of this product can cause serious injuries and even death if not handled correctly.

The exhaust airflow can reach high temperatures during charging sessions, especially when the outdoor temperature and power demand are high.

**Electric shock danger.** The steps to isolate the product must be carefully followed before performing any task or opening any cover of the product. Avoid inappropriate actions that may cause electric shock.

Always wear the appropriate personal protective product (PPE) for each task and work in electrical areas with dry hands. Otherwise, you may suffer an electric shock.

Do not use cables with damaged insulation. Do not subject cables to abrasion, excessive stress, heavy loads or pinching. Otherwise, you may suffer an electric shock.

Do not supply power to a damaged product or with missing parts, even if the installation is complete. Otherwise, you may get an electric shock.

In the event that the product stops due to a loss of power, do not perform any work on it. The autorestart function may be enabled, and you may receive an electric shock.



The product has capacitors. Wait until the capacitors have discharged before performing any maintenance task.

#### USE

Do not use this product for purposes other than charging the electric vehicle via the available modes for this product and defined in this manual.

**Do not disconnect or connect any terminals while the product is running.** Otherwise, you may suffer an electric shock and the product may be damaged.

**Do not use this product if its enclosure or electric vehicle connector(s)** (on both the products and vehicle sides) **are broken, cracked or otherwise damaged.** Otherwise, you may suffer an electric shock.

#### **GROUND CONNECTION**

Prevention of electric shock:

- The chassis of the product must be properly grounded to prevent a possible electrical shock if a leakage current flows through the enclosure. Disconnect all power supplies before proceeding with maintenance operations inside the product.
- Only connect the grounding device to the grounding plate of the product. Do not use the enclosure
  or chassis screws for grounding.
- The protective earth wire must be connected first and last disconnected.

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# **CAUTION**

Install the products, both the power cabinet and the Dispensers, on a solid, level surface in a location where there is no risk of explosion, flooding, or impact damage. Follow the recommendations of this manual on how to build the foundation. Otherwise, there is a risk of malfunction and even permanent damage.

Never clean the surfaces or the inside of the product with abrasive liquids, solvents or cleaning products that could damage it. Water must not be applied with excessive pressure.



Disconnect the input power in case the product gets damaged.

Otherwise, it could result in a secondary accident or a fire.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the product. Otherwise, a fire or an accident could occur.



After the input power is applied or removed, the product will remain hot for a few minutes. Touching internal hot parts could result in skin burns.

#### PERSONAL PROTECTIVE PRODUCT (PPE from now on) REQUIRED

The use of PPE in accordance with standards is required to repair and maintain the product. Follow applicable instructions at the installation site to comply with national and local regulations.

**In the case of tasks with voltage present,** it is mandatory to use an Electric Arc Safety Kit (gloves, clothing and face protection).

A detailed example of the PPE used is shown below. The customer must specify in his safety instructions (hazard statement and work procedure) which PPE is required and when and how they must be used according to his electric arc studies, the characteristics of the site, the products, the installation and the site location.

Power Electronics assumes no liability for damage resulting from improper use of the product or failure to comply with local or national regulations.

Always follow local regulations / NEC Health & Safety standards.

The following table shows an example of commonly used PPE:

PPE	DESCRIPTION
Safety glasses	Eye protection according EN 166 / ANSI Z87.1.
Electric gloves	Gloves with mechanical, dielectric and against arc flash. Class according to voltage. EN 60903; ASTM D120 specifications and NFPA 70E standards.
Safety footwear	S3 class complying with BS EN ISO 20345 / ASTM F2413-11.
Insulation carpet	Isolation carpet according to IEC 61111 / ASTM Class 4. The insulation carpet must be used when there is voltage inside the product or when checking the voltage absence.
Safety kit arc flash	Arc flash personal protective product kit (including arc flash protective face shield & hard hat), fire resistant 40cal/cm².
Padlock set	Padlock and auxiliary elements set to lock out dangerous product.
HI-VIS vest	Fr VIS vest 9cal/cm <sup>2</sup> .
MV stool	Medium Voltage insulation stool.
Rescue pole	Insulated body rescue pole.

#### PPE FOR INSTALLATION









Mechanical gloves

Safety helmet

Safety glasses

#### Additional PPE for commissioning and maintenance tasks









Safety clothes according to NFPA-70E and safety labels

The following table shows the protection class type, depending on the working voltage.

ELECTRI	ELECTRICAL INSULATED GLOVES									
Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )								
00	500	750								
0	1000	1500								
1	7500	11250								
2	17000	25500								
3	26500	39750								
4	36000	54000								

ELECTR	ELECTRICAL SAFETY MATTING									
Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )								
0	1000	1500								
1	7500	11250								
2	17000	25500								
3	26500	39750								
4	36000	54000								



# **NOTICE**

#### PPE must be checked according to the instructions of the manufacturer.

The electrical gloves must have thermal, electric and mechanical protection. If gloves only have dielectric protection, it is mandatory to use under fireproof gloves and over gloves cover.



# **NOTICE**

#### **RECYCLING**

Packaging product must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.

To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic product (SEEA).



Waste of electrical and electronic product (WEEE) must be collected selectively for proper environmental management.

Our products contain electronic boards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic boards, capacitors and other electronic devices).





#### CYBERSECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. Access to the system is restricted to those employees who legitimately need it for reasons of maintenance and/or updating of the system.

It is sole responsibility of the customer for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer must establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

# **TORQUE AND SCREW SIZING**

The following table shows the torque for both mechanical and electrical connections, applicable to all products [1,2]:

SCRE	N SIZE	TORQUE					
METRIC	ENGLISH	ISO 8.8 QUALITY <sup>[a]</sup>					
(mm)	(in.)	(Nm)	(lb-ft)				
M3	1/8	1,3	0.95				
M4	5/32	3	2.21				
M5	3/16	6	4.42				
M6	1/4	8	5.9				
M8	5/16	20	14.75				
M10	7/16	40	29.5				
M12	1/2	60	44.25				
M14	9/16	120	88.5				
M16	5/8	210	154.89				



[a] For other qualities, follow the guidelines of the screw manufacturer.



# **CAUTION**

For all screwing that holds a **particular component** such as a bus, contactor, etc. it will be necessary to **apply the tightening torque indicated by the manufacturer** of the same component.

Screws must be correctly tightened only when necessary, i.e. when the factory marks are not in place. For small screws that do not have marks, the good electrical praxis will determine if it is loose.

<sup>&</sup>lt;sup>1</sup> Power Electronics recommends the use of **Zinc Steel quality 8.8 bolts for internal connections** in general, DC and earth connections included.

<sup>&</sup>lt;sup>2</sup> Power Electronics recommends the use of A2-70 stainless bolts for external connections in general, AC connections included.

# 1. PRODUCT CLASSIFICATION

# 1.1. NBi180 / NBi360 POWER CABINET

CLASSIFICATION CHARACTERISTICS	ТҮРЕ				
Characteristics of power supply input	EV supply equipment connected to AC supply network				
Electric connection method	Permanently connected				
Characteristics of power supply output	DC EV supply equipment				
Normal environmental conditions	Indoor and outdoor use				
Access	Equipment for locations with non-restricted access				
Mounting method	Stationary equipment floor mounted				
Protection against electrical shock	Class I equipment				
Charging modes	Mode 4				

# 2. TECHNICAL CHARACTERISTICS

#### 2.1. **NBi180 POWER CABINET**

	Maximum power [kW]	60 – 180 <sup>[1]</sup>			
DC OUTDUT	Voltage range [V]	150 – 1000 [2]			
DC OUTPUT	Maximum simultaneous charging points	1 – 3 [1]			
	Maximum sequential charging points	4			
	Power [kVA]	64 – 192 [1]			
AG INDUT FOR DO	Voltage [V]	400 (IEC) / 480 (UL) (3ph + N + PE) ± 10 %			
	Power factor	> 0.99			
001101	Frequency [Hz]	50 (IEC) / 60 (IEC & UL)			
	Efficiency	95 %			
	Degree of protection	NEMA 3R   IP54   IK10 (IK08 for ventilation grilles)			
	Operating temperature range [°C / °F]	Standard: -25 to 50 / -13 to 122 Optional: -30 to 50 / -22 to 122			
ENVIROMENTAL RATINGS	Wind conditions [mph]	Up to 140			
	Relative humidity	From 4% to 95%			
	Maximum altitude (above sea level) [m/ft]	Without derating: 2000 / 6561 Max: 3000 / 9842			
STANDBY CONSUMPTION	Standby power consumption [W] [1, 3]	23 - 47 (IEC) / 36 - 80 (UL)			
		Overvoltage (Type 2) (Optional)			
PROTECTIONS		Overcurrent / shortcircuit (Circuit Breakers) [4]			
DC OUTPUT  Voltage range Maximum sim Maximum seq Power [kVA] Voltage [V] Power factor Frequency [H: Efficiency Degree of pro Operating tem Wind condition Relative humi Maximum altit  STANDBY CONSUMPTION  PROTECTIONS  Enclosure / fo Customization		RCD Type A (Optional)			
	Enclosure / foot color	White (RAL 9016) / Grey (RAL 7016)			
	Customization [5]	Enclosure / Foot			
HARDWARE	Antivandalism security	Door security locking system controlled by an exclusi key (also on the foot of the product)			
		Security screws on the ventilation grilles			
OTHERS		Smart Fleet Management (Optional)			
OTHERS		Smart Power Balance (Optional)			
COMMUNICATIONS		Ethernet (10/100) + Wi-Fi			
COMMUNICATIONS		Cellular data: 4G, 3G, GSM			
		IEC 61851-1, IEC 61851-23, IEC 61851-24,			

 $<sup>^1</sup>$  Please, refer to the " $\underline{\rm Standard\ ratings}$ " table for detailed information by product.  $^2$  150 - 500Vdc for CHAdeMO. Maximum power 300Vdc.

 $<sup>^{\</sup>rm 3}$  Consult Power Electronics for further information on standby reactive power.

<sup>&</sup>lt;sup>4</sup> The short circuit current rating at the input of the NBi180 range Power cabinets is 10kA RMS. Current limiting fuses or current limiting circuit breaker must be installed if available fault current is equal to or greater than 10kA at the product input. Please note that the limiting short circuit protection shall operate at half AC cycle maximum (8.3ms). 
<sup>5</sup> Consult Power Electronics for more information.

# **Standard ratings**

	D	C OUTPUT	AC INPUT FOR DC OUTPUT	STANDBY CONSUMPTION  Power consumption [W]			
CODE	Maximum	Maximum simultaneous	Power [kVA]				
	Power [kW]	charging points	rowei [KVA]	IEC	UL		
NBi60	60	1	64	23	36		
NBi90	90	2	96	29	47		
NBi120	120	2	128	35	58		
NBi150	150	3	160	41	69		
NBi180	180	3	192	47	80		

#### 2.2. **NBi360 POWER CABINET**

REFERENCE						
	Maximum power [kW]	180 – 360 <sup>[6]</sup>				
DC OUTPUT  AC INPUT FOR DC OUTPUT  ENVIROMENTAL RATINGS  STANDBY CONSUMPTION  PROTECTIONS  HARDWARE  OTHERS	Number of power modules	6 – 12 [6]				
	Charging dispenser power [kW] [7]	60 / 90 / 120 / 180 / 360				
	Charging pantograph power [kW] [7]	60 / 90 / 120 / 180 / 360				
	Voltage range [V]	150 – 1000 <sup>[8]</sup>				
	Power [kVA]	193 – 384 <sup>[6]</sup>				
A C INDUT FOR DO	Voltage [V]	400 (IEC) / 480 (UL) (3ph + N + PE) ± 10 %				
	Power factor	> 0.99				
DC OUTPUT    Number of power modules	Frequency [Hz]	50 (IEC) / 60 (IEC & UL)				
	Efficiency	95 %				
	Degree of protection	NEMA 3R   IP54   IK10 (IK08 for ventilation grilles)				
	Operating temperature range [°C: / °F]	Standard: -25 to 50 / -13 to 122				
ENVIROMENTAL		Optional: -30 to 50 / -22 to 122				
	Wind conditions [mph]	Up to 140				
	Relative humidity	From 4% to 95%				
	Maximum altitude (above sea level) [m/ft]	Without derating: 2000 / 6561				
		Max: 3000 / 9842				
	Standby power consumption [W] [6, 9]	58 - 94 (IEC) / 92 - 158 (UL)				
		Overtemperature				
DDOTECTIONS		Overvoltage (Type 2)				
AC INPUT FOR DC OUTPUT  ENVIROMENTAL RATINGS  STANDBY CONSUMPTION  PROTECTIONS  HARDWARE  OTHERS		Overcurrent / shortcircuit (Circuit Breakers) (Optional) [10]				
		RCD Type A (Optional) [11]				
	Enclosure / foot color	Grey (RAL 7035) / Grey (RAL 7016)				
	A - Air	Door security locking system controlled by an exclusive key				
	Antivandalism security	Security screws on the ventilation grilles				
		Smart Fleet Management (Optional)				
OTHERS		Smart Power Balance (Optional)				
		E-Stop Button ready [12]				
COMMUNICATIONS		Ethernet (10/100)				
COMMUNICATIONS		Cellular data: 4G, 3G, GSM				
REGULATION		IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2 UL 2202, NEC 625, FCC Part 15 Class A				

 $<sup>^{\</sup>rm 6}$  Please, refer to the " $\underline{\rm Standard\ ratings}$ " table for detailed information by product.

<sup>&</sup>lt;sup>7</sup> The final delivered power depends on the combiner model selected.

<sup>&</sup>lt;sup>8</sup> 150 - 500Vdc for CHAdeMO. Maximum power from 300V.

<sup>&</sup>lt;sup>9</sup> Consult Power Electronics for further information on standby reactive power.

<sup>&</sup>lt;sup>a</sup> Consult Power Electronics for further Information on standary reactive power.

<sup>10</sup> The short circuit current rating at the input of the NBi360 range Power cabinets is 10kA RMS, and 65kA in case of incorporating the optional protection. Current limiting fuses or current limiting circuit breaker must be installed if available fault current is equal to or greater than 10kA/65kA at the product input. Please note that the limiting short circuit protection shall operate at half AC cycle maximum (8.3ms).

<sup>11</sup> This optional is only available for IEC products and always as a package together with the circuit breaker.

<sup>&</sup>lt;sup>12</sup> E-Stop Button Ready only available when the MCB (Circuit Breaker) optional is installed.

# **Standard ratings**

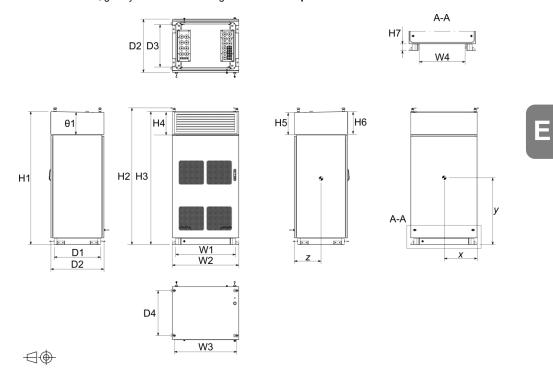
	DC (	OUTPUT	AC INPUT FOR DC OUTPUT	STANDBY CONSUMPTION				
CODE	Maximum Number of		Power [kVA]	Power consumption [W]				
	Power [kW] power modules	Lowel [vvv]	IEC	UL				
NBi180R	180	6	193	58	92			
NBi240R	240	8	256	70	114			
NBi360R	360	12	384	94	158			

# 3. DIMENSIONS AND WEIGHT

3

# 3.1. NBi180 POWER CABINET

The dimensions, gravity center and the weight of the NBi180 power cabinet are detailed in this section.



		GENERAL DIMENSIONS												
	H1	H2	Н3	H4	H5	H6	H7	W1	W2	W3	W4	D1	D2	D3
mm	2001	2056	2001	350	336	350	100	900	1000	940	690	700	800	638
in.	78.78	80.94	78.78	13.78	13.23	13.78	3.94	35.43	39.37	37	27.16	27.55	31.5	25.12

	CENTER OF GRAVITY								
	x	у	z						
mm	495	1005	401						
in.	19.49	39.57	15.79						

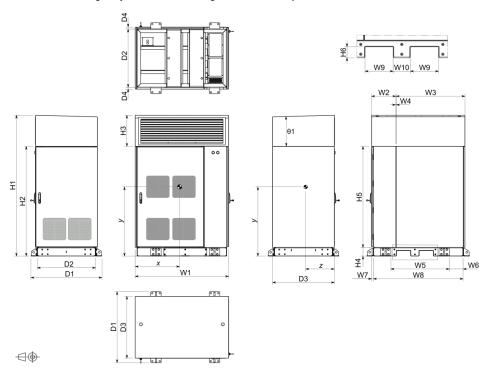
The dimension  $\theta 1$  indicates the degree of inclination of the top of the product, which is  $1^{\circ}$  with respect to the horizontal.

The approximate weight of the NBi180 power cabinet is 500kg (1102lb) [13].

 $<sup>^{\</sup>rm 13}$  For other products of the NBi180 range, consult Power Electronics.

# 3.2. NBi360 POWER CABINET

The dimensions, gravity center and the weight of the  ${\bf NBi360}$  power cabinet are detailed in this section.



		GENERAL DIMENSIONS												
	H1	H2	Н3	H4	H5	Н6	W1	W2	W3	W4	W5	W6	W7	W8
mm	2300	1792	508	140	1652	90	1525	398	1122.5	4.5	955	225	30	1465
in.	90.6	70.6	20	5.51	65	3.5	60	15.7	44.19	0.18	37.60	8.86	1.2	57.68

	W9	W10	D1	D2	D3	D4
mm	230	140	1160	950	1010	30
in.	9.1	5.5	45.67	37.40	39.76	1.18

	CENTER OF GRAVITY				
	x	у	Z		
mm	724	1130	469		
in.	28.5	44.5	18.5		

The dimension  $\theta 1$  indicates the degree of inclination of the top of the product, which is 1.5° with respect to the horizontal.

The approximate weight of the NBi360 power cabinet is 1200kg (2640lb) [14].

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 $<sup>^{\</sup>rm 14}$  For other product of the NBi360 range, consult Power Electronics.

# 4. NBi180 POWER CABINET



# 4.1. HANDLING, TRANSPORTATION AND INSTALLATION



# **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

# 4.1.1. Delivery and storage

Power Electronics **NBi180** range power cabinets are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

# EN

### Standard storage



#### NOTICE

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "<u>Extended Storage</u>" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry
  of animals, excess moisture (both inside and outside the product), exposure to extreme
  temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.

- · Keep the product packed until installation.
- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

# **Extended storage**

If the product is to be stored for an extended period of time (6 months or more) prior installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



# **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 4.1.2. Handling and transportation



# **CAUTION**

**Follow the handling and transportation requirements described here.** Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weight information for the selection of the lifting equipment and machinery.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.



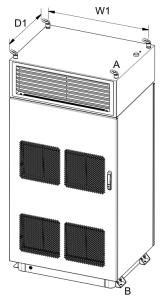
# **CAUTION**

Prior to the unloading operations, ensure that the slings and any other auxiliary equipment involved in the unloading process are in good condition. In case of identifying any type of damage, defect or problem in the lifting equipment, as well as its accessories, these must be replaced with equivalent ones in accordance with the regulations in force in the country of installation. Do not use damaged or defective slings.

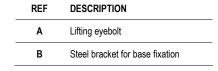
Do not bend the slings or tie knots. Ensure that during the handling of the product the slings are not damaged.

Be aware of the angles of the slings and other lifting equipment used, which may affect the integrity of the product and use special protections if necessary.

After unpackaging the product as described in the "<u>Unpackaging NBi180</u>" section, the product must be lifted using the four eyebolts located in the top of the product (as shown in the following figure). The lifting equipment must be properly secured to the eyebolt and the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts.







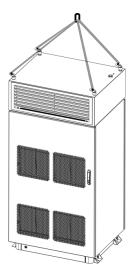




	<b>V</b>	
	W1	D1
mm	940	677
in.	37	26.65



To lift the product, use a suitable lifting system according to the weight of the product and that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the site of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.



# Sea freight and land shipment

For sea freight and land shipment, the product is packed vertically mounted on a wooden crate and fixed to a pallet base with screws.

# Air shipment

In case of air shipment, the product is shipped lying down in a wooden crate and secured to a pallet base with strapping. Externally, the wooden crate is fixed to the pallet base with screws. Please note that after unpacking, the product must be lifted slowly using the four eyebolts located on the top, avoiding sudden movements, jolts or possible impacts, supporting the product on its own base until adopting a vertical position prior to installation.

#### 4.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



# **NOTICE**

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the products will be installed.

Prior to installation, a geotechnical study of the terrain where the products will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

#### Soil

The soil must have the following characteristics:

- The soil must be dry, compacted, stable and homogeneous.
- The soil must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground must not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- Avoid corrosive environments that may affect the proper functioning of the product.

#### Site basis



#### **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, taking into account, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

Power Electronics recommends making a concrete foundation slab to support the product. The support surface for the product must be perfectly level. The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations. The foundation must meet the following characteristics:

- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- It must be thick enough to support the product.
- It is advisable to leave the slab at the same level as the ground to facilitate maintenance works.
- If the slab is above ground level, the maximum height allowed is 200mm (7.87in.).
- It must have trenches wide enough to ensure proper wiring passage.

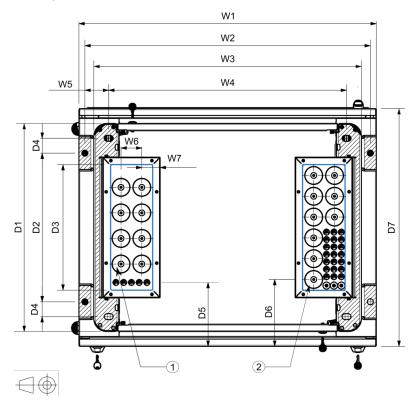


Note that the product must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of each product. For more information on where the anchoring points for each product are located, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer taking into account the characteristics of the selected cable (please refer to the "<u>Cable access and connection</u>" section ), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

The following figures (**bottom-up view**) show the size of the bottom plate (**marked in blue**), which are necessary to determine the dimensions for the trench and foundation slab, in mm and inches.



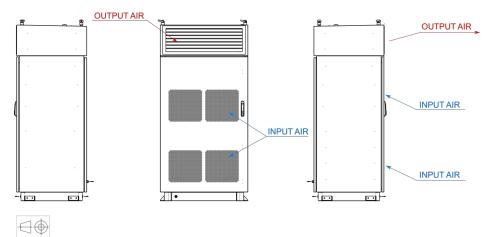
REF	DESCRIPTION
1	AC Input
2	DC Output

#### **GENERAL DIMENSIONS**

	W1	W2	W3	W4	W5	W6	W7	D1	D2	D3	D4	D5	D6	D7
mn	1 1000	960	900	800	80	70	61.5	700	500	422.5	50	215	255	800
in.	39.37	37.80	35.43	31.50	3.15	2.76	2.42	27.56	19.69	16.63	1.97	8.46	8.86	31.50

# 4.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product. The **NBi180 range power cabinets** have a forced air ventilation system. There are four air inlets distributed between the middle and bottom part of the door and one outlet at the top.



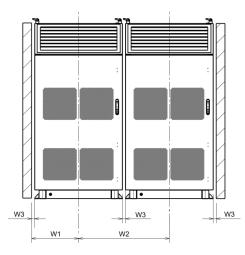


#### 4.1.5. Clearances

Power cabinets can be mounted back to back, against a wall or side by side. When installing the product, keep the indicated clearances for proper inspection, ventilation and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

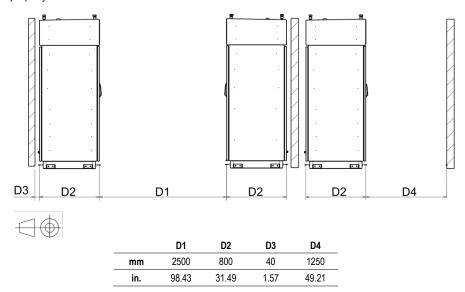
The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation. The following figures show the recommended minimum distances:

#### Side to side clearance:

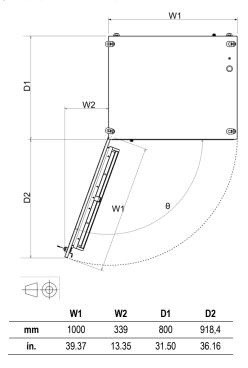


	W1	W2	W3
mm	520	1020	20
in.	20.47	40.16	0.79

**Front clearances:** The product requires free front space to access, operate and open the door properly.



As depicted in the following figure (**top view**), there is an additional space needed to open the door of the product, necessary for proper internal manipulation.



The dimension  $\boldsymbol{\theta}$  indicates the degree of openness of the door, which is  $110^{\circ}.$ 

Please note that, besides the recommended clearances indicated above, the maximum distance between the power cabinet and the dispenser / pantograph solution must also be considered.

# 4.1.6. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



#### NOTICE

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

# Sea freight and land shipment

- 1. Remove the staples from the upper part that secure the cover of the wooden crate.
- 2. Once the top cover has been removed, remove the staples from the lateral wooden panels until the product is exposed.
- 3. Remove the cellaire foam that wraps the product.
- 4. To prepare the product for lifting first remove the four M10 screws, nuts and washers that fix the product to the pallet.

# Air shipment

- 1. Remove the fastening screws that secure the wooden crate to the pallet and then lift the crate upwards until the product is exposed.
- 2. Cut the strapping that secures the product to the pallet.
- 3. Remove the cardboard corner protectors.
- 4. Remove the cellaire foam that wraps the product.

# 4.1.7. Anchoring requirements



# NOTICE

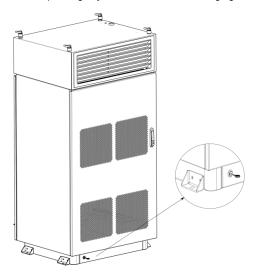
It is responsibility of the customer to correctly dimension the anchoring to the foundation, guaranteeing stability towards horizontal actions.

It is necessary to construct a small vault or pit in the foundation under the gland plates for the routing of the cables. This construction must not interfere with the anchoring of the product.

The product must be anchored to a solid and leveled surface (slab), see slab recommendations at the "Considerations for foundation" section.



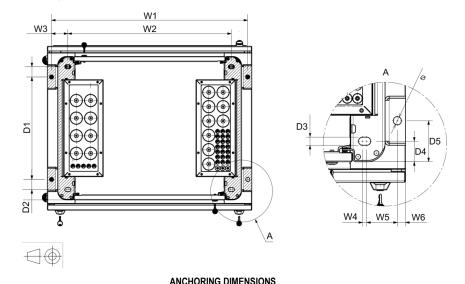
To anchor the product, the installer must access the lower part. For this, the front and rear bezel must be removed by using the corresponding key, as shown in the following figure.



The location and diameter of the anchoring holes of the product are described below.

M16 stainless screws must be used, being accepted both expansive anchor bolts and chemical. Please fasten them by applying the corresponding torque according to the table in section "Torque and Screw sizing" for mechanical connections.

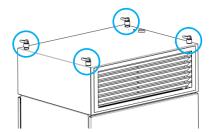
Perform the anchoring of the product using the **internal holes**, with the following dimensions (**bottom- up view**).



	ANOTIONING BIMENGIONG											
	W1	W2	W3	W4	W5	W6	D1	D2	D3	D4	D5	Ø
mm	960	800	80	10	75	20	500	50	20	50	100	20
in.	37.8	31.5	3.15	0.39	2.95	0.79	19.69	1.97	0.79	1.97	3.94	0.79

# Removal of the lifting tools

Once the product has been properly anchored in its installation site, the four lifting eyebolts (marked in blue) located on the top of the product must be unscrewed and removed.



# 4.2. CABLE ACCESS AND CONNECTIONS



#### **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected.

The power and communication cables must enter through the bottom part of the product. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the product. After passing the cable through the cable gland, it must be crimped.



#### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



# **NOTICE**

Refer to the recommended tightening torque for mechanical and electrical connections in the " "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems.

The customer is responsible for choosing and installing the communication cables.

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The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

The product does not require auxiliary power supply input.

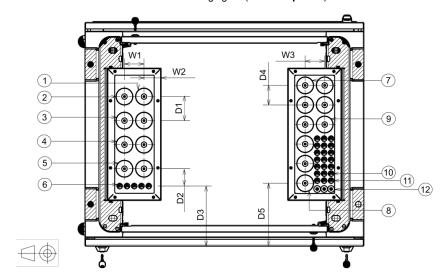
Power, ground, auxiliary and communication cables are not included within the scope of Power Electronics. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser (as applicable).
- Ground cables and terminal lugs to each Dispenser (as applicable).
- Auxiliary power supply cable to each Dispenser (as applicable).
- Control optical fiber to each Dispenser (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

#### 4.2.1. Cable access and cable size

The power and communication cables must enter and exit through the lower part of the power cabinet by using the space shown in the following figure (**bottom-up view**). **To access the lower part**, remove the front and rear bezel, see "Anchoring requirements".

Access dimensions are detailed in the following figure (bottom-up view):



	BOTTOM DIMENSIONS									
	W1	W2	W3	D1	D2	D3	D4	D5		
mm	70	61.5	70	86	62	215	70	255		
in.	2.76	2.42	2.76	3.39	2.44	8.46	2.76	8.86		

	AC INPUT		DC OUPUT
REF	DESCRIPTION	REF	DESCRIPTION
1	L3	7	DC-
2	L2	8	DC+
3	L1	9	DC PE (ground)
4	N	10	DC Communications (O.F.)
5	AC PE (ground)	11	DC Communications (O.F./Eth.)
6	AC Communications (Eth)	12	Aux1

# **AC** input

The AC input power cables must be connected to the left side of the NBi180.

The tables below show the recommended cable size for the product. Installer must dimension the wiring taking into consideration the minimum and maximum diameter, as well as the particularities of the project, in addition to the curvature ratio.

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
Input power supply (L1, L2, L3)	Copper or aluminum 0.6/1kV 90°C. M14 washer terminal. Nema two	2 x 120mm² (2 x 4/0AWG)	M50	27mm	35mm
Ground and neutral (PE, N)	electrical hole possibility. Blade width 32mm maximum.	120mm² (4/0AWG)	(2")	(1.06in.)	(1.38in.)

		NBi60	NBi90	NBi120	NBi150	NBi180
INPUT RATED CURRENT	IEC	94	140	186	232	278
(AT 40°C/104°F) [A]	UL	79	117	155	194	232

### DC output

The DC output power cables must be connected to the right side of the NBi180 through their corresponding cable glands.

#### Cable size:

The DC output cables to the dispensers vary depending on the dispenser connected to the power cabinet, as shown in the following tables

#### • Depot and Slim dispensers:

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
Output power supply (DC+/DC-)	Copper or aluminum 0.6/1kV 90°C. M14 washer terminal. Nema two electrical hole	150mm² (250kcmil)	M50 (2")	27mm (1.06in.)	35mm (1.38in.)
Ground (PE)	possibility. Blade width 32mm maximum.	70mm² (2/0AWG)	M25 (3/4")	8mm (0.31in.)	17mm (0.67in.)

#### Cooled dispenser:

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
Output power supply (DC+/DC-)	Copper or aluminum 0.6/1kV 90°C. M14 washer terminal. Nema two electrical hole	2 x 150mm² (2 x 250kcmil)	M50	27mm	35mm
Ground (PE)	possibility. Blade width 32mm maximum.	150mm² (250kcmil)	(2")	(1.06in.)	(1.38in.)

#### Parallel connection cabinets Master-Slave

Depending on the product to be connected, a different connection must be made:

### a) NBi master + NBi slave + Cooled Dispenser /Pantograph solution

To make the connection with the dispenser, it must be guaranteed that the current arrives though 2x150mm2 wires.

#### b) NBi master + NBi slave 1 + NBi slave 2 + Junction Box + Pantograph solution

To make the connection with the pantograph solution, an intermediate connection box must be installed where the input wires are unified. 2x150mm<sup>2</sup> wires must reach the pantograph solution.

# Communications and auxiliary supply

AC auxiliary supply of the charging points (Aux1)

Note that each Dispenser is protected with a polycarbonate protector on the front panel.

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
Ac auxiliary supply (AUX1)	Copper or aluminum hose cable 0.6/1kV 70°C. 2.5mm <sup>2</sup> tip terminal.	2 x 2.5mm² (2 x 14AWG)	M16	7mm (0.27in.)	10mm (0.39in.)

#### Communications on the AC side

Cable specifications: Ethernet cable cat. 5E UTP with RJ45 connector.

#### Communications on the DC side

For network connections to the Dispensers, there are high-level communications connections from the switch (Ethernet or O.F.) and low-level communications connections from the Combiner board.

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
High level communications (O.F. / Ethernet)	Ethernet: Ethernet cable cat. 5E UTP with RJ45 connector.	N/A	N/A		8mm (0.31in.)
Low level communications (O.F.)	O.F.: Patch cords- (1 x Dispenser) of GOF Multimode Fiber Optic (MM) OM3 50/125um 2 x SC Connectors.	NA / 8x0.22mm²	M12	4mm (0.15in.)	8mm (0.31in.)

#### Parallel connection cabinets Master-Slave

Parallel communication connections between power cabinets are made with CAN bus cables and open-door signal. Communication cables must pass through the corresponding cable glands. The cables required to make the connections are:

-	CABLE	MINIMUM	MAXIMUM
	GLAND	DIAMETER	DIAMETER
Communications between	M12	4mm	8mm
Master-Slave		(0.15in.)	(0.31in.)

#### 4.2.2. Connections



# **WARNING**

Before opening any door, the product must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE.

Otherwise, you may suffer an electric shock.



# **CAUTION**

The doors of the product must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the product, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.





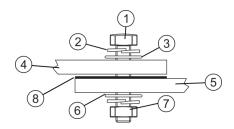
#### NOTICE

Be aware that Power Electronics is not responsible for the input power connection of the product, as well as its installation.

# Considerations for ground and power connections

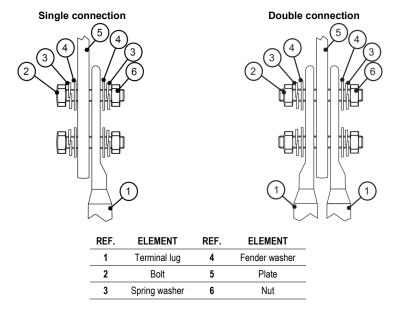
The installer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation. The ground plate is made of tin-plated aluminum. The following recommendations must be taken into account for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum twohole terminal lugs with a maximum width of 45mm (1-3/4").
- Use M14 bolts and nuts and apply the recommended torque according to the quality (See "<u>Torque and screw sizing</u>").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.



REF	DESCRIPTION
1	Screw
2	Spring washer
3	Flat washer
4	Plate
5	Connection terminal
6	Flat washer
7	M14 nut
8	Conductive grease

The following figure shows the correct power input/output connections:



**Note**: If the terminal is a single-hole terminal, it is recommended to connect it to the upper hole in the busbar, so that the contact area is maximized

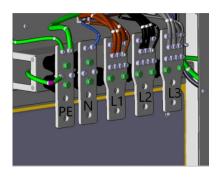
The AC connection is composed of three phases, ground wire and the neutral wire. The DC power connection exit from power cabinet to Dispenser / Pantograph solution is composed of DC+/DC- and ground wire. Both, the power supply input / output and the communication connections input / output must enter through one of the accesses and pass through their corresponding space in the internal cable entry plate to reach the connection panel.

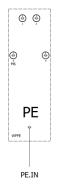
# AC input power and ground connections

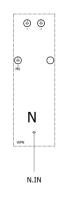
The AC input power cables must be connected to the left side of the NBi180 through their corresponding cable gland.

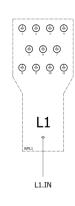
The product is designed so that the cables enter from the lower area through the covers provided for such use. Once the step is done, the sealing of the cable access of the product must be ensured again to avoid problems with dirt, humidity and corrosion.

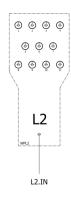
There are 5 busbars prepared for Nema2hole terminals. The busbars are identified from left to right as PE, N, L1, L2 and L3, as shown in the following figures. The plates are separated by a polycarbonate protector to avoid electric arcs and, additionally, they are identified with labels for proper connection in the field.

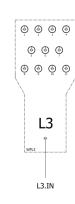








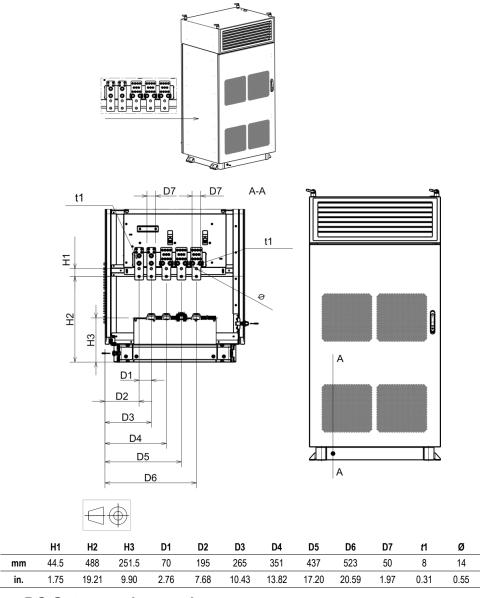




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ELECTRIC LABEL
WPPE
WPN
WPL1
WPL2
WPL3

The following figure shows the detail and dimensions of the AC input plates.



# DC Output and ground

The DC output power cables must be connected to the right side of the NBi180 through their corresponding cable gland.

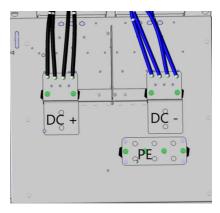
The product has been designed so that the cable exits the power cabinet from the lower area through the covers provided for such use. Once the step is done, the sealing of the cable access of the product must be ensured again to avoid problems with dirt, humidity and corrosion.

There are connections plates prepared for Nema2hole terminals that depend on the type of combiner of the NBi180.

The DC output busbar is located on the left side for the positive and on the right side for the negative. The PE plate is at the bottom of the cabinet. The plates are separated by a polycarbonate protector to avoid electric arcs and, additionally, they are identified with labels for proper connection in the field.

#### Without Combiner.

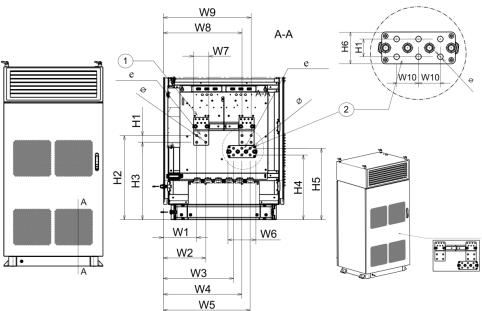
DC connection when there is one Dispenser or Pantograph solution connected:



Without Combiner						
LABEL	ELECTRIC LABEL					
PE	PE					
DC+/-1	WPDC+/-1					

REF	DESCRIPTION
1	DC Output
2	Ground
2	Ground







1	2		H1	H2	Н3	H4	H5	Н6	W1	W2	W3
DC Output	Ground	mm	44.5	556.5	512	428	472.5	80	221	281	465
		in.	1.75	21.9	20.16	16.85	18.60	3.15	8.70	11.06	18.30

		W4	W5	W6	W7	W8	W9	W10	Е	Ø
n	nm	520	575	185	100	521	581	50	5	14
ī	n.	20.47	22.64	7.28	3.94	20.51	22.87	2.17	0.19	0.55

(0)

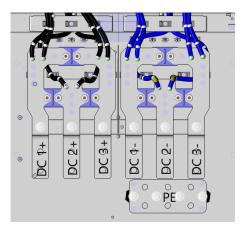
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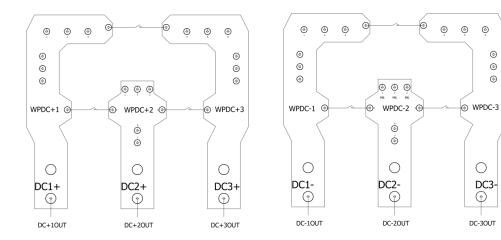
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#### With Combiner.

DC connection when there is more than one Dispenser or Pantograph solution connected:

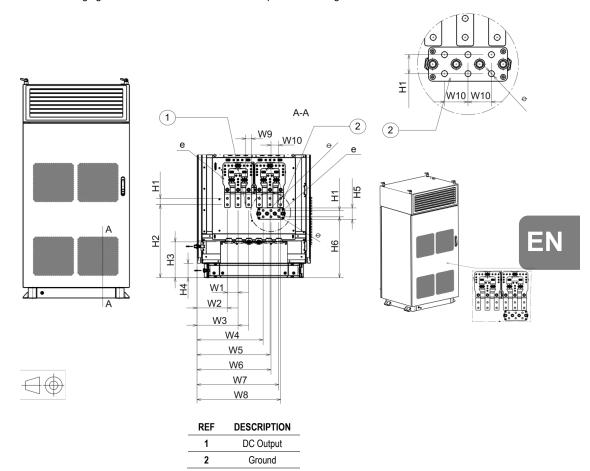




Depending on the type of combiner, different output plates must be used:

2x2 Co	ombiner with 2 outputs	4x4 Combiner with 3 outputs			
LABEL	ELECTRIC LABEL	LABEL	ELECTRIC LABEL		
PE	PE	PE	PE		
DC+/-1	WPDC+/-1	DC+/-1	WPDC+/-1		
DC+/-3	WPDC+/-3	DC+/-2	WPDC+/-2		
		DC+/-3	WPDC+/-3		

The following figure shows the dimensions of the DC plates and the ground busbar.



	H1	H2	Н3	H4	H5	Н6	W1	W2	W3	
mm	44.5	512.7	251.5	100	80	44.5	427.8	75	213.5	
in.	1.75	20.2	9.90	3.94	3.15	1.75	2.95	8.41	11.36	

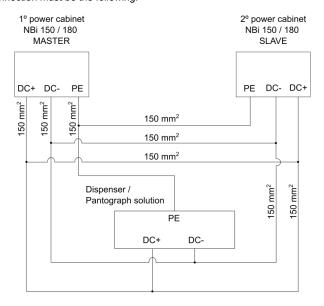
	W4	W5	W6	W7	W8	W9	W10	Ε	Ø
mm	465	513.5	520	575	588.5	40	50	5	14
in.	18.31	20.22	20.47	22.64	23.17	1.57	2.17	0.19	0.55

#### • DC power output connection in parallel to dispenser / pantograph solution.

The power connection diagrams for connecting products in parallel to the dispenser / pantograph solution are shown below.

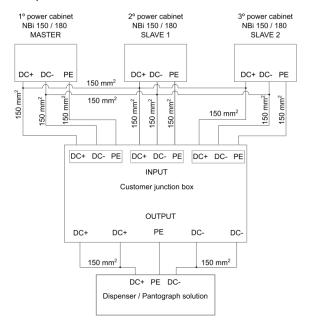
# NBi master - slave and dispenser / pantograph solution.

The connection must be the following:



# NBi master - slave 1 / slave 2 with junction box (customer) and dispenser / pantograph solution.

To make the connection with the dispenser, an intermediate connection box must be installed where the input wires are unified.

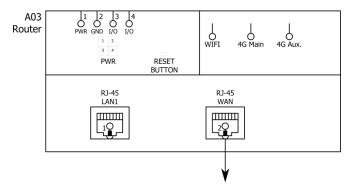


# **Communications and auxiliary supplies**

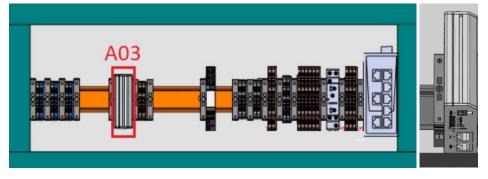
#### • Communications on the AC side

The NBi180 is prepared for the user to make a network connection (WAN port) between the power cabinet and their installation. This connection is on the front panel as long as it is a Master product.

The cable must enter through its corresponding cable gland and must be connected to the A03 router at the RJ45 connector in the WAN port.

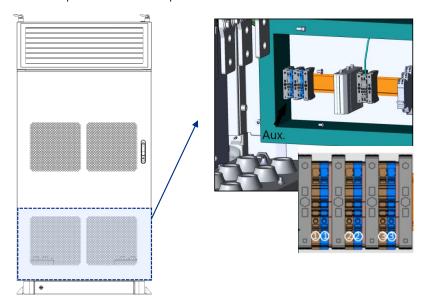






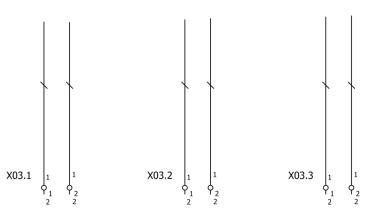
#### • AC auxiliary supply of Dispensers

The NBi180 has a terminal block prepared on the front side panel for the connection of auxiliary services that powers each of the Dispensers.



The connections must be made on terminal block X03.

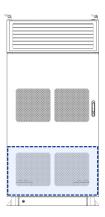
TERMINAL BLOCK	CONNECTION
X03.1	Exterior to charging point 1
X03.2	Exterior to charging point 2
X03.3	Exterior to charging point 3



#### **Communications connections of the Dispensers**

In the power cabinet, the customer must carry out the communications connection. The product includes an Ethernet input connection to connect to the Internet and to be able to perform the configuration through OCPP1.6 or the "Webmanager" portal. The connection can be made on any free ports of the internal Ethernet switch with a RJ45: enter the cable through the corresponding cable gland entry.

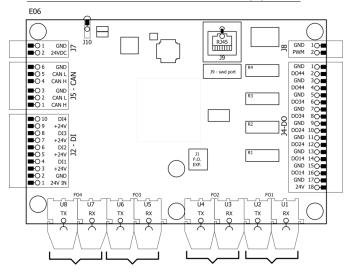
The network connections with the Dispensers must be made in the central panel: the high-level connection from the switch (can be Ethernet or Optical Fiber) and the low-level connection from the Combiner board.



The connection must be made as follows:

#### LOW LEVEL COMMUNICATIONS

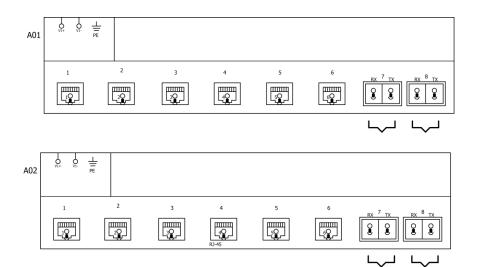
Pinout	Connection
F01 of E06	Direct O.F. connection from outside – charging point 1
F02 of E06	Direct O.F. connection from outside – charging point 2
F03 of E06	Direct O.F. connection from outside – charging point 3
F04 of E06	Direct O.F. connection from outside – charging point 4



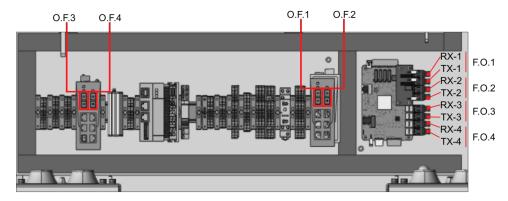
#### HIGH LEVEL COMMUNICATIONS

ETHERNET		OPTICAL FIBER						
Pinout	Connection	Pinout	Connection					
Pin 5 of A01	Charging point 1	Pin 7 of A01	Direct O.F. connection from outside switch charging point 1					
Pin 6 of A01	Charging point 2	Pin 8 of A01	Direct O.F. connection from outside switch charging point 2					
Pin 7 of A01	Charging point 3	Pin 7 of A02	Direct O.F. connection from outside switch charging point 3					
Pin 8 of A01	Charging point 4	Pin 8 of A02	Direct O.F. connection from outside switch charging point 4					

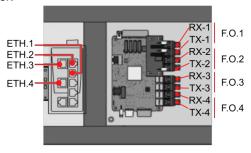




#### OPTICAL FIBER CONNECTION

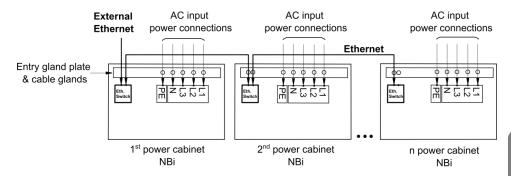


#### ETHERNET CONNECTION



#### • Parallel connection cabinets Master-Slave

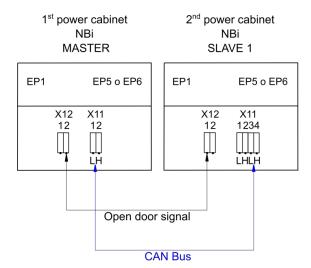
If the project includes more than one power cabinet and the customer requires control of the different power cabinets, the customer must make the Ethernet connections between the different power cabinets, as described in the following figure. The 1st power cabinet is the master.



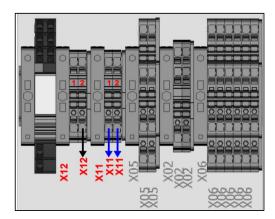
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#### Connection of two cabinets in parallel

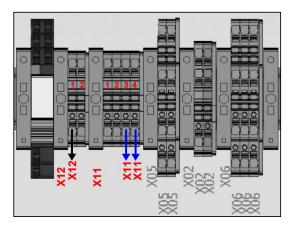
The following figure shows in detail CAN bus cable connections and open door signal. The connections on the terminals depend on if the power cabinet is master or slave. The open door signal connections are connected to terminals X12 and the CAN bus connections are connected to terminals X11. The location of these terminals is on the bottom of the unit, next to the Ethernet switch.



The following figure shows in detail the terminals of the CAN bus connections and the open door signal on master power cabinets:

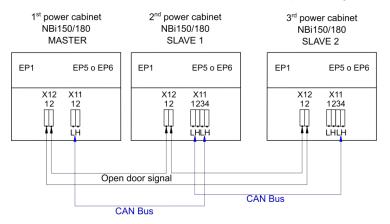


The following figure shows in detail the terminals of the CAN bus connections and the open door signal on the slave power cabinets:

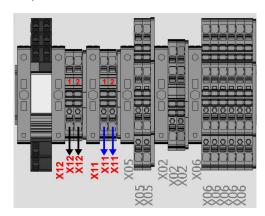


#### Connection of three cabinets in parallel

The detailed schematic of the CAN bus cable connections and the open door signal is as follows.

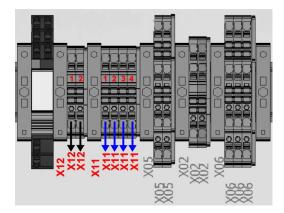


The following figure shows in detail the terminals of the CAN bus connections and the open door signal on master power cabinets:



The following figure shows in detail the terminals of the CAN bus connections and the open door signal on the slave power cabinets:



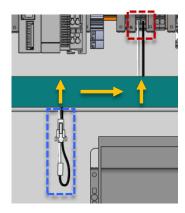


#### End of line resistor

As shown in the following figure, the NBi180 power cabinet is provided with an end-of-line resistor (R1 marked in blue) connected to the X11 terminal block (marked in red) that is connected to the CAN communication of the power module.

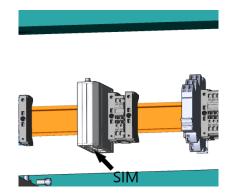
Based on the type of configuration of the product, the resistor must be disconnected and removed from the product according to the following indications.

- Master without connection to a Slave product: the resistor must not be disconnected.
- Master connected to a Slave product: the resistor of the Master product must be disconnected and removed and the resistor of the Slave product must remain connected.
- Slave connected to a second Slave product: the resistor of the first Slave product must be disconnected and removed and the resistor of the second Slave product must remain connected.



# **3G/4G Communications**

Communication via 3G / 4G through the communications antenna is included for Internet access. In this case, insert a SIM card into the commercial router installed in the power cabinet:







Once the SIM has been inserted, it must be configured, and then the system must be reset.

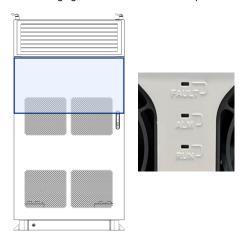
# 4.1. CONTROL ELEMENTS AND INDICATORS

# 4.1.1. Controls

The electric vehicle user interacts with the charging point directly, no control interaction with the power cabinet is required.

# 4.1.2. LED indicators

The product does not include any special external LED indicator. Internally, every power module has three LED indicators. The following figure shows the LEDs in the power module when the door is open:





LED INDICATOR	NORMAL STATE	ABNORMAL STATE	DESCRIPTION
FAULT (red)	Off	On	If ON, it indicates a fault has been triggered in the power module. In that case, the product will run without using this power module.
			If ON, it indicates a warning has been triggered in the power module. In that case, the product will run without using this power module. If this warning disappears, the product will run using this power module again.
ALM (yellow)	Off	On	The normal status of the "ALM" LED is "Off". When the product is in standby (no vehicle charging) the LED will flash until vehicle charging begins. At this point, the LED will no longer be illuminated and will switch to the "Off" state.  If the "ALM" LED is fix or flashing, this indicates an abnormal state.
RUN (green)	On	Off	If ON, it indicates the power module is being energized.

# 5. NBi360 POWER CABINET



# 5.1. HANDLING, TRANSPORTATION AND INSTALLATION



# **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

### 5.1.1. Delivery and storage

Power Electronics **NBi360** range power cabinets are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

# Standard storage



#### NOTICE

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "Extended Storage" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry
  of animals, excess moisture (both inside and outside the product), exposure to extreme
  temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.

- Keep the product packed until installation.
- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

# **Extended storage**

If the product is to be stored for an extended period of time (6 months or more) prior installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



# **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 5.1.2. Handling and transportation



# **CAUTION**

**Follow the handling and transportation requirements described here.** Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weight information for the selection of the lifting equipment and machinery.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

ΕN



# **CAUTION**

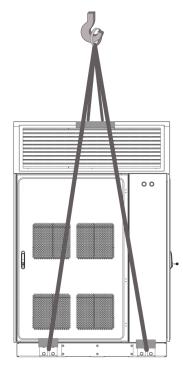
Prior to the unloading operations, ensure that the slings and any other auxiliary equipment involved in the unloading process are in good condition. In case of identifying any type of damage, defect or problem in the lifting equipment, as well as its accessories, these must be replaced with equivalent ones in accordance with the regulations in force in the country of installation. Do not use damaged or defective slings.

Do not bend the slings or tie knots. Ensure that during the handling of the product the slings are not damaged.

Be aware of the angles of the slings and other lifting equipment used, which may affect the integrity of the product and use special protections if necessary.

The **NBi360 power cabinet** has a self-supporting steel base with access for lifting machinery with forks, which makes the product suitable to be handled by a pallet truck or forklift. The steel base is provided with supports for anchoring the product that also serve as lifting points of the power cabinet. To handle and lift the product use a suitable system (including the necessary auxiliary means) according to the weight of the product, the load distribution, center of gravity and the safety regulations and Health and Safety measures applicable at the installation site.

After unpackaging the product as described in the "<u>Unpackaging</u>" section, the product must be lifted with 2,5m (8.2ft) slings and a chain grab. The slings must be knotted at the top of the product using a lifting device that complies with the safety regulations applicable to the site of installation. When using the lifting device, the worker must wear a safety harness. The following figure shows an example of the lifting of the product with slings:



#### 5.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



### **NOTICE**

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the products will be installed.

Prior to installation, a geotechnical study of the terrain where the products will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

# Soil

The soil must have the following characteristics:

- The soil must be dry, compacted, stable and homogeneous.
- The soil must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground must not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- Avoid corrosive environments that may affect the proper functioning of the product.

#### Site basis



#### **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, taking into account, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.



Power Electronics recommends making a concrete foundation slab to support the product. The support surface for the product must be perfectly level. **The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations**. The foundation must meet the following characteristics:

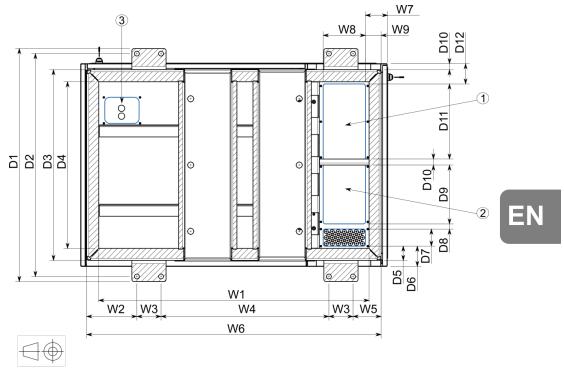
- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- It must be thick enough to support the product.
- It is advisable to leave the slab at the same level as the ground to facilitate maintenance works.
- If the slab is above ground level, the maximum height allowed is 200mm (7.87in.).
- It must have trenches wide enough to ensure proper wiring passage.

Note that the product must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of each product. For more information on where the anchoring points for each product are located, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer taking into account the characteristics of the selected cable (please refer to the "<u>Cable access and connection</u>" section ), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

The following figures (**bottom-up view**) show the size of the bottom plate (**marked in blue**), which are necessary to determine the dimensions for the trench and foundation slab, in mm and inches.



REF	DESCRIPTION
1	AC Input
2	DC Output
3	Bus Plus DC Connection

#### **GENERAL DIMENSIONS**

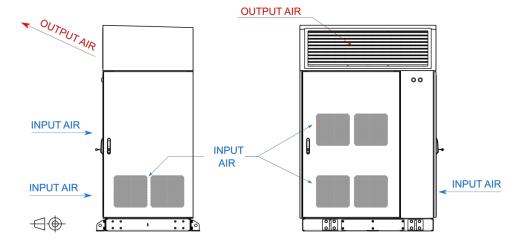
	W1	W2	W3	W4	W5	W6	W7	W8	W9
mm	1345	250	120	835	140	1465	110.5	210	78
in.	52.95	9.84	4.72	32.87	5.51	57.68	4.35	8.3	3.1

### **GENERAL DIMENSIONS**

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
mm	1160	1110	950	830	71	101	85	26	293	30	374	101
in.	45.67	43.70	37.40	32.68	2.80	3.98	3.35	1.02	11.54	1.18	14.72	3.98

# 5.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product. The **NBi360 range power cabinets** have a forced air ventilation system. There are four inlets located in the front and two more in the right lateral door and one outlet at the top of the front.

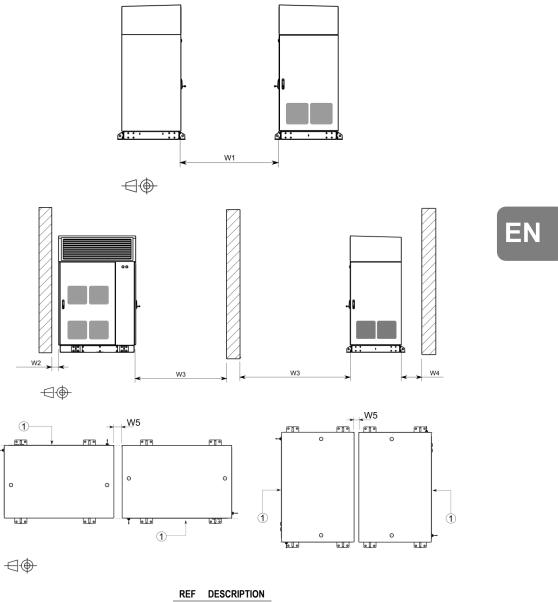


### 5.1.5. Clearances

Power cabinets can be mounted back to back, against a wall or side by side. When installing the product, keep the indicated clearances for proper inspection, ventilation and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

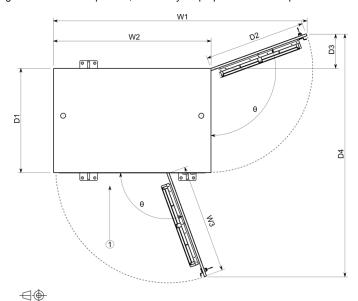
The following figures show the recommended minimum distances:



REF	DESCRIPTION
1	Front

	W1	W2	W3	W4	W5
mm	2500	20	1250	700	20
in.	98.43.	0.79	49.21	27.6	0.79

As depicted in the following figure (**top view**), there is an additional space needed to open the front door and right side door of the product, necessary for proper internal manipulation.



REF	DESCRIPTION
1	Front

	W1	W2	W3	D1	D2	D3	D4
mm	2454	1525	1086	110	1003	331	2348
in.	96.6	60	42.8	39.8	39.5	13	92.4

The dimension  $\theta$  indicates the degree of openness of the door, which is 110°.

Please notice that, besides the recommended clearance distances indicated above, the maximum distance between the power cabinet and the dispenser / Pantograph solution must also be considered.

# 5.1.6. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



# **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

- $1. \ \ \, \text{Remove the shrink film surrounding the package of the product.}$
- 2. Remove the cardboard protections.
- 3. Remove the *cellaire* foam in case of air/land shipment or the VCI bag in case of sea freight that wrap the product.

# 5.1.7. Anchoring requirements



# **NOTICE**

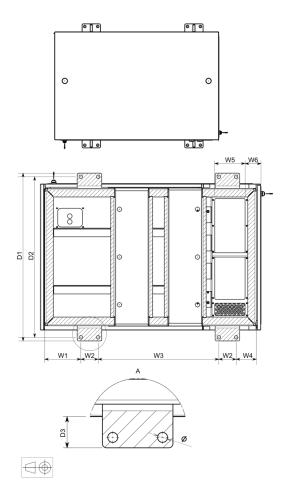
It is responsibility of the customer to correctly dimension the anchoring to the foundation, guaranteeing stability towards horizontal actions.

It is necessary to construct a small vault or pit in the foundation under the gland plates for the routing of the cables. This construction must not interfere with the anchoring of the product.

The product must be anchored to a solid and leveled surface (slab), see slab recommendations at the "Considerations for foundation" section.

To anchor the product, it is necessary to use M20 steel class 8.8 expansion bolts or screws. Please fasten them by applying the corresponding torque according to the table in section "Torque and Screw sizing" for mechanical connections. There are two anchoring options.

#### **OPTION 1**

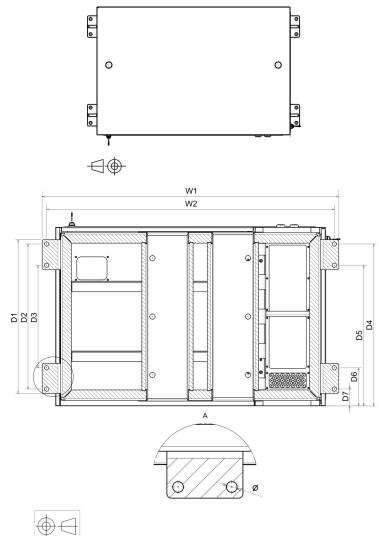


#### **GENERAL DIMENSIONS**

	D1	D2	W1	W2	W3	W4	W5	W6	Ø
mm	1160	1110	250	120	835	140	210	110.5	24
in.	45.67	43.70	9.84	4.72	32.87	5.51	8.3	4.35	0.94

EN

# OPTION 2



$\triangle$	$\overline{}$
$\Psi$	$\Box$

					GENER	AL DIME	NOIONO			
	D1	D2	D3	D4	D5	D6	D7	W1	W2	Ø
mm	870	820	580	915	795	215	95	1675	1625	24
in.	34.25	32.28	22.83	36	31.3	8.46	3.74	65.94	63.97	0.94

### 5.2. CABLE ACCESS AND CONNECTIONS



#### **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected.

The power and communication cables must enter through the bottom part of the product. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the product. After passing the cable through the cable gland, it must be crimped.



### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



#### NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the " "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

The product does not require auxiliary power supply input.

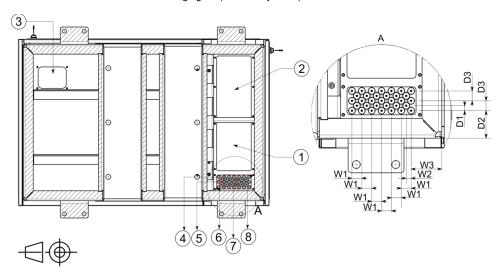
Power, ground, auxiliary and communication cables are not included within the scope of Power Electronics. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser (as applicable).
- Ground cables and terminal lugs to each Dispenser (as applicable).
- Auxiliary power supply cable to each Dispenser (as applicable).
- · Control optical fiber to each Dispenser (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

EN

# 5.2.1. Cable access and cable size

The power and communication cables must enter through the bottom part of the product. Access dimensions are detailed in the following figure (**bottom-up view**):



	BOTTOM DIMENSIONS								
	W1 W2 W3 D1 D2								
mm	30	15	93	15	83.5	30			
in.	1.18	0.59	3.7	0.59	3.29	1.18			

REF	DESCRIPTION	REF	DESCRIPTION
1	DC Output	5	WAN port connection
2	AC Input	6	External user emergency stop connection
3	Bus Plus DC Connection	7	Low Level Communications connection
4	Auxiliary supply Dispensers connections	8	High Level Communications connection



# **CAUTION**

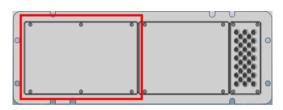
The removable blank plates (marked in red in the following figures) are NOT delivered pre-drilled or pre-marked. The installer is responsible for installing the appropriate elements such as conduits or cable glands ensuring an IP54-Nema 3R degree of protection before inserting the cables.

The installer must install the cables according to the bus plates positions in order to guarantee the correct alignment of the cables.

# **AC** input

Customer must dimension the wiring taking into consideration the minimum and maximum diameter, as well as the particularities of the project, in addition to the curvature ratio.

The AC input blank plate (marked in red) is located as shown in the following figure (bottom up view):



	CABLE SPECIFICATIONS	MAXIMUM SECTION	No. CABLES / POLE	MAX. No. CABLES / POLE	MAXIMUM EXTERNAL DIAMETER	
Input power supply (L1, L2, L3)	Copper or aluminum 0.6/1kV 90°C. M14 washer terminal.  Nema two electrical hole	4 x 300mm² (4 x 500kcmil)	_ 2	4	35mm (1.38in.)	
Ground and neutral (PE, N)	possibility. Blade width 32mm maximum.	4 x 150mm² (4 x 250kcmil)	_		20mm (0.78in.)	

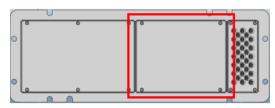


		NBi180R	NBi240R	NBi360R
INPUT RATED CURRENT	IEC	293	385	569
(at 40°C/104°F) [A]	UL	236	313	467

# **DC** output

This section specifies in general terms the cables required for the DC power outputs. Detailed information can be found in the "Connections" section.

The DC output blank plate (marked in red) is located as shown in the following figure (bottom up view):



The cable specifications vary depending on the output power.

### • Less than 120kW:

The following table shows the connection per Dispenser:

	CABLE SPECIFICATIONS	MAXIMUM SECTION	No. CABLES / POLE	MAXIMUM EXTERNAL DIAMETER
Output power (DC+)	Copper or aluminum 0.6/1kV - 90°C. M14 washer	185mm²		28mm
Output power (DC-)	terminal. Nema two electrical hole possibility. Blade	(350kcmil)	1	(1.10in.)
Ground (PE)t	width 32mm maximum.	95mm² (3/0AWG)	_	17mm (0.67in.)

#### Greater than 120kW:

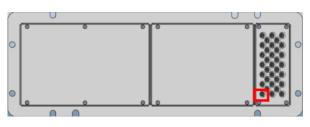
The following table shows the connection per Dispenser:

	CABLE SPECIFICATIONS	MAXIMUM SECTION	No. CABLES / POLE	28mm (1.10in.)				
Output power (DC+)	Copper or aluminum 0.6/1kV - 90°C. M14 washer		2	28mm				
Output power (DC-)	terminal. Nema two electrical hole possibility. Blade	185mm² (350kcmil)	2	(1.10in.)				
Ground (PE)	width 32mm maximum.		1	17mm (0.67in.)				

# Communications and auxiliary supplies

#### External user emergency stop connection

The cable gland that must be used for this connection is marked in the figure below:



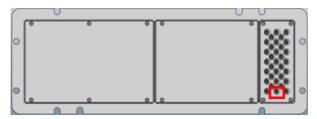
	MAX SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
External emergency	2 x 2.5mm <sup>2</sup> (2 x 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)

#### • Power Electronics staff connection

PE staff is able to connect to the NBi360 via Ethernet connection on a port located on the right side of the door. An Ethernet cat. 5E UTP cable with RJ45 connector must be used.

#### • WAN port connection 4G router

The cable gland that must be used for this connection is marked in the following figure:



Cable specifications: Ethernet cable cat. 5E UTP with RJ45 connector.

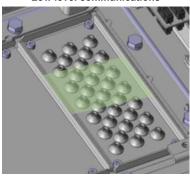
#### • Auxiliary supply Dispenser connections

	CABLE SPECIFICATIONS	MAX SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
Auxiliary supply	Copper or aluminum hose cable 0,6/1kV 70°C. End terminal 2,5mm².	2 x 2.5mm <sup>2</sup> (2 x 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)

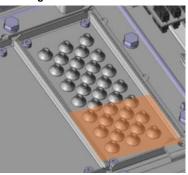
#### • Communications connections

For network connections to the Dispensers, there are high-level connections (Ethernet or O.F.) from the switch and low-level connections (O.F.) from the combiner card to DC Protocols board. The cable glands that must be used for the communications connections are shown in the following figures:

Low level communications



High level communications



The number of cables depends on the Combiner model, which is detailed in the "Connections" section.

	CABLE SPECIFICATIONS	MAXIMUM SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
High level communications (O.F. / Ethernet)	Ethernet: Ethernet cable cat. 5E UTP with RJ45 connector.	N/A		5mm (0.19in.)	9mm (0.35in.)
Low level communications (O.F.)	O.F.: Patch cords- (1 x Dispenser) of GOF Multimode Fiber Optic (MM) OM3 50/125um 2 x SC Connectors.	NA / 8x0.22mm²	M16	5mm (0.19in.)	9mm (0.35in.)

### 5.2.2. Connections



# **WARNING**

Before opening any door, the product must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE.

Otherwise, you may suffer an electric shock.



### **CAUTION**

The doors of the product must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the product, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.



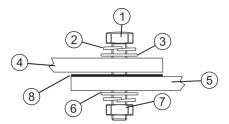
### NOTICE

Be aware that Power Electronics is not responsible for the input power connection of the product, as well as its installation.

# Considerations for ground and power connections

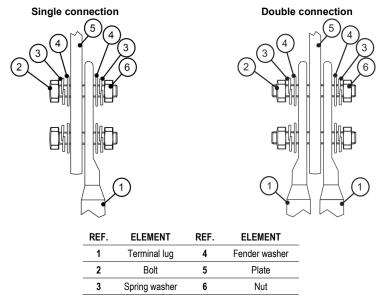
The installer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation. The ground plate is made of tin-plated aluminum. The following recommendations must be taken into account for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum two-hole terminal lugs with a maximum width of 45mm (1-3/4").
- Use M14 bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.



REF	DESCRIPTION
1	Screw
2	Spring washer
3	Flat washer
4	Plate
5	Connection terminal
6	Flat washer
7	M14 nut
8	Conductive grease

The following figure shows the correct power input/output connections:



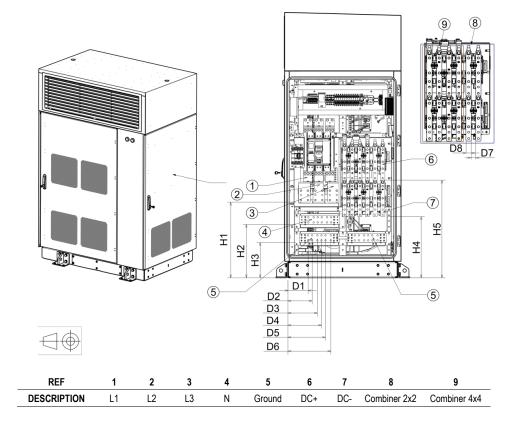
**Note**: If the terminal is a single-hole terminal, it is recommended to connect it to the upper hole in the busbar, so that the contact area is maximized

All the electrical connections of the product are detailed below.

The power connections can be divided into two: input power connections and output power connections. There is a physical limitation to make the connections and the entry of these cables.

If the recommendations in this manual are not followed, the safety of the product and people will be put at risk. It could compromise the IP rating of the cabinet and add difficulty in making the connections. The maximum cable diameters allowed must be respected.

The following figure shows the AC input supply (L1, L2, L3, N), as well as the grounds connections (PE), and the DC output (DC+, DC-)

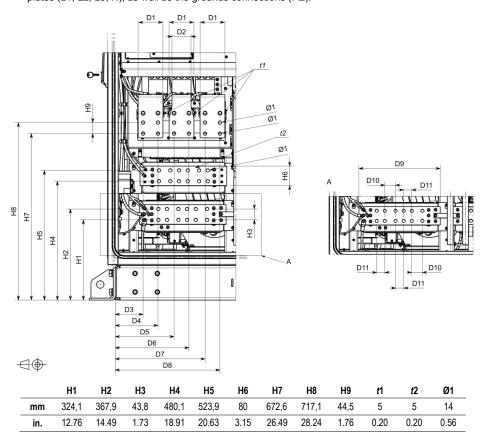


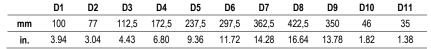
	H1	H2	Н3	H4	H5	D1	D2	D3	D4	D5	D6	D7	D8
mm	655.1	462	306	529	846	174	209	255	290	325	371	36	30
in.	25.79	18.2	12	20.83	33.29	6.85	8.23	10.04	11.42	12.80	14.61	1.41	1.18

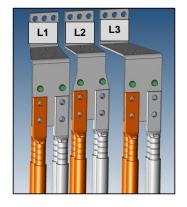
# **AC** input

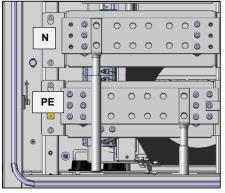
In the AC cabinet the customer must secure the power connections at the input of the product. This connection is made through the incoming busbar and feeds all the product. It comes from the mains of the customer and it is in AC.

The following figure shows the dimensions of the connections that must be performed in the AC input plates (L1, L2, L3, N), as well as the grounds connections (PE).



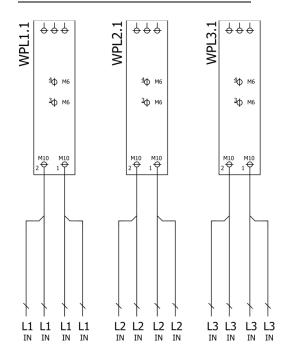




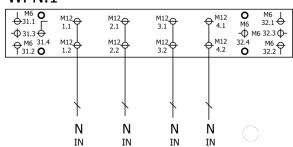




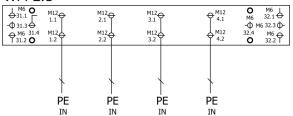
LABEL	ELECTRIC LABEL
PE	WPPE.1
N	WPN.1
L1	WPL1.1
L2	WPL2.1
L3	WPL3.1



# WPN.1

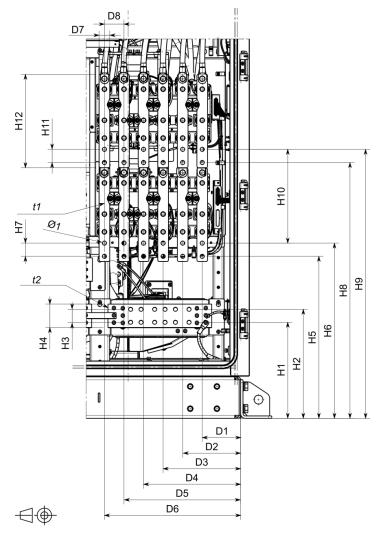






# **DC** output

The following figure shows the dimensions of the connections that must be performed in the DC output plates (DC+, DC-), as well as the grounds connections (PE).



	H1	H2	Н3	H4	H5	Н6	H7	Н8	Н9	H10	H11	H12
mm	324,1	367,9	43,8	80	546,6	591,1	44,5	863,1	907,6	316,5	44,5	315
in.	12.76	14.49	1.73	3.15	21.52	23.28	1.76	34	35.74	12.47	1.76	12.41

	D1	D2	D3	D4	D5	D6	D7	D8	<i>t</i> 1	ť2	Ø1
mm	129,5	195,5	261,5	327,5	393,5	459,5	36	66	8	5	14
in.	5.10	7.70	10.30	12.90	15.50	18.10	1.42	2.60	0.32	0.20	0.56

EN

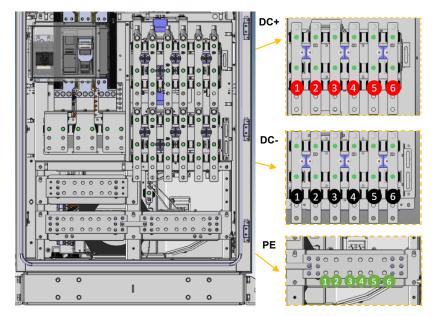
The information provided in this section is standard for 2x2 combiner with 60kW DC outputs and 4x4 combiner with 90kW DC outputs.

The customer must make the connections from the power cabinet to the charging points. One DC+ and DC- conductor must be connected per charging point. Customer must also connect a ground cable from the combiner (PE busbar) to each charging point. Optionally, customer can connect each charging point to an independent ground.

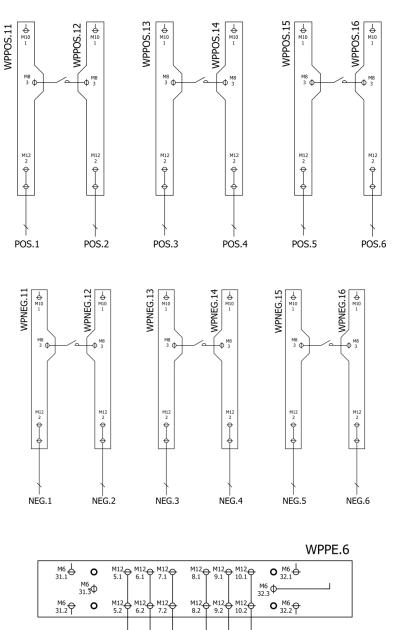
As mentioned above, the cables must be routed through the blind plates and the cable glands on the bottom of the power cabinet.

#### 2x2 combiner with 60kW DC outputs

For the installation of charging points, the combiner cabinet plates are numbered, so that the order of connection of the charging points is from left to right, starting with the numbering in the figure below.



 OUTPUT	ELECTRIC LABEL (DC+ / DC-)	GROUND (PE)
 OUT.1	WPPOS.11 / WPNEG.11	WPPE.6 / PE.1
OUT.2	WPPOS.12 / WPNEG.12	WPPE.6 / PE.2
OUT.3	WPPOS.13 / WPNEG.13	WPPE.6 / PE.3
OUT.4	WPPOS.14 / WPNEG.14	WPPE.6 / PE.4
OUT.5	WPPOS.15 / WPNEG.15	WPPE.6 / PE.5
OUT.6	WPPOS.16 / WPNEG.16	WPPE.6 / PE.6





PE.5

PE.4

PE.2 PE.3

PE.1

There are three parameters that uniquely define the type of combiner used: combiner model, configuration and installed power. The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

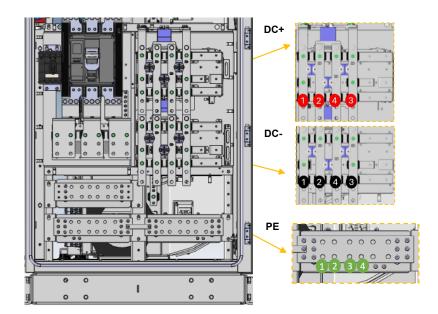
REFERENCE	NBI180R	NBI240R	NBI360R	COMBINER MODEL	CONFIGURATION
Maximum power (kW)	180	240	360	_	
Number of power modules	6	8	12	_	
Static combiner	_	4x60 8x60 (seq)	6x60 12x60 (seq)		E
	-	2x120	3x120	Model 1	G
Dynamic combiner	-	4x120	6x120	-	В

Depending on the different configurations of this combiner model, the combiner DC outputs plates marked in red will not be used. Connections must be made to the terminals marked in green.

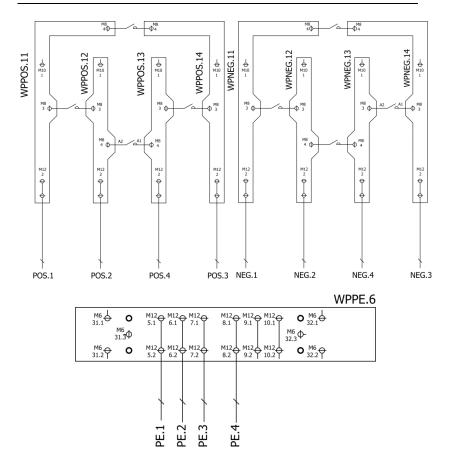
POWER [kW]	CONF.	OUT. 1	OUT. 2	OUT. 3	OUT. 4	OUT. 5	OUT. 6
	В						
240	G						
	E						
	В						
360	G						
	E						

#### • 4x4 combiner with 90kW DC outputs

For the installation of charging points, the combiner cabinet plates are numbered, so that **the order of connection of the charging points is from left to right**, starting with the numbering in the figure below.



	LABEL / OUTPUT	ELECTRIC LABEL	GROUND (PE)
_	OUT.1	WPPOS.11 / WPNEG.11	WPPE.6 / PE.1
	OUT.2	WPPOS.12 / WPNEG.12	WPPE.6 / PE.2
	OUT.3	WPPOS.14 / WPNEG.14	WPPE.6 / PE.3
	OUT.4	WPPOS.13 / WPNEG.13	WPPE.6 / PE.4



There are three parameters that uniquely define the type of combiner used: combiner model, configuration and installed power. The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

REFERENCE	NBI180R	NBI240R	NBI360R		
Maximum power (kW)	180	240	360	COMBINER Model	CONFIGURATION
Number of power modules	6	8	12		
Otatia a sushiman	1x180	-	1x360		С
Static combiner	2x90	-	4x90	Model 4	D
Dynamic combiner	2x180	-	4x360		Α

Depending on the different configurations of this combiner model, the combiner DC outputs plates marked in red must not be used. Connections must be made to the terminals marked in green.

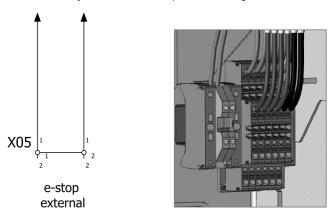
POWER [KW]	CONF.	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4
	С				
180	D				
	Α				
	С				
360	D				
	Α				

# Communications and auxiliary supplies

#### • External user emergency stop connection

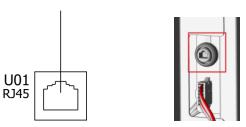
The external emergency stop connection is made on the right-side panel of the AC/DC cabinet. This connection is made on terminal block X05. To enable this function, the user must remove the bridge between the two terminals.

Note: The connection made by the user must be a potential free signal.



#### PE connection

The Ethernet connection allows accessing the parameters of the product through applications commonly used by the back-office team. This use is mainly focused on maintenance and configuration. Connection must be made in the U01 connector in the AC cabinet.



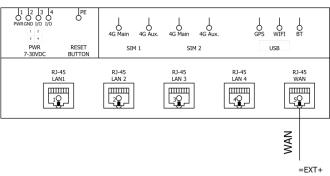
#### • WAN port connection 4G router

The purpose of remote communication is to have access to the product when the product and the computer are connected to the Internet from different communication networks. The product must be connected to the Internet via Ethernet or 4G.

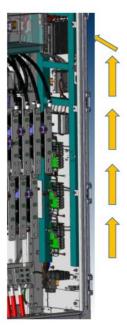
Power Electronics' staff will configure the router during commissioning.

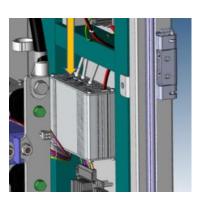
The connection must follow the following path and connect to the A11 router WAN port:

A11



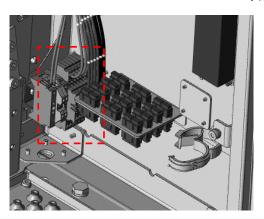






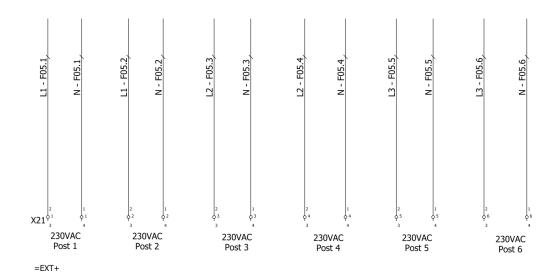
#### • Auxiliary supply Dispensers connections

The figure below shows the location of the connection of the auxiliary power supply.



The number of cable glands and pins that must be used depends on the type of combiner.

The connection must be made on terminal block X21. The wiring must enter the product through the cable glands indicated as AUX.



# 

#### Communications connections

From the power cabinet to the charging points, the user must connect the communication cables. There are two types of communications:

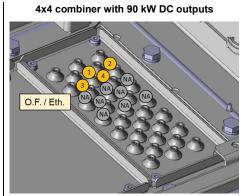
- Low level communications: Communicate the Combiner boards of the NBi360 with the DC Protocols boards of the charging points via optic fiber cables. If the associated Dispensers have a second charging point in sequential mode, it must have another low-level connection to the second DC Protocols board, reaching a maximum of four or twelve low-level communications depending on the type of Combiner.
- High level communications: Connect the power cabinet to the charging points via
  Ethernet or optical fiber. Since there are a maximum of four or twelve charging points
  depending on the type of combiner, there must also be a maximum of four or twelve
  high-level communications.

#### **High level communications**

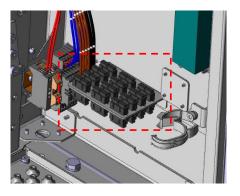
The wiring must enter the product through the cable glands indicated as O.F. / ETH. in the access section.

2x2 combiner with 60 kW DC outputs

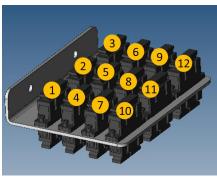
O.F. / Eth.



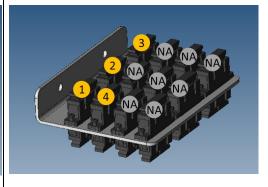
In case of using **optical fiber**, the customer must route the cables to the terminals located on the right side of the cabinet as shown in the following figures.

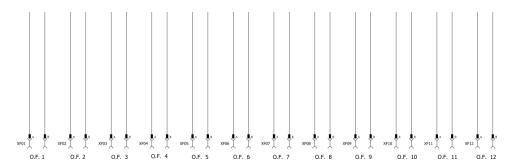


2x2 combiner with 60kW DC outputs

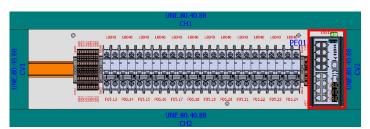


4x4 combiner with 90kW DC outputs



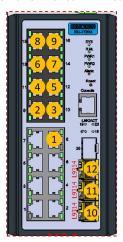


In the case of using **Ethernet**, the customer must route the cables directly to the switches located in the upper part on the front panel of the cabinet.

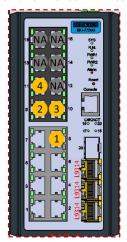


EN

2x2 combiner with 60kW DC outputs

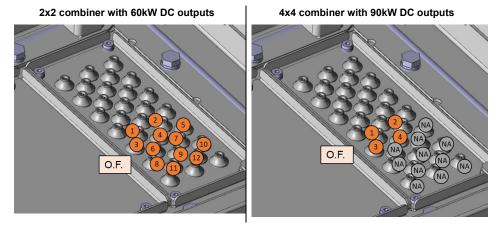


4x4 combiner with 90kW DC outputs



#### Low level communications

The cables must enter the product through the cable glands indicated as O.F. in the access section as shown in the following figures.

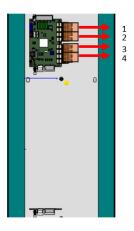


The cables must be routed through the corresponding cable glands (indicated in the figures above) towards the Combiner board located at the top of the cabinet. Note that the connection may vary depending on the type of Combiner:

#### 4x4 combiner with 90kW DC outputs

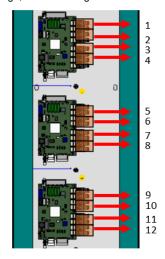
The outputs of the Combiner boards are numbered as four charging points. In this case, there are two possible scenarios (in sequential charge):

- There are four charging points, and each point is a different Dispenser with one charging cable each.
- There are four charging points with less than four Dispensers. An example could be two Dispensers, each with two simultaneous charging cables.



#### 2x2 combiner with 60kW DC outputs

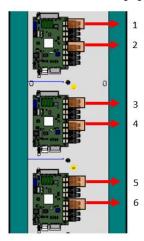
In case of sequential charge, the numbering of the Combiner boards is as follows:



EN

In case of non-sequential charge, the outputs of the Combiner boards are numbered as six charging points. In this case, there are two possible scenarios:

- There are six charging points, and each point is a different Dispenser with one charging cable each.
- There are six charging points with less than six Dispensers. An example could be three Dispensers, each with two simultaneous charging cables (in total six charging points).



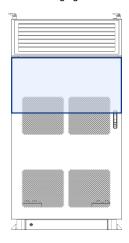
#### 5.3. CONTROL ELEMENTS AND INDICATORS

#### 5.3.1. Controls

The electric vehicle user interacts with the charging point directly, no control interaction with the power cabinet is required.

#### 5.3.2. LED indicators

The product does not include any special external LED indicator. Internally, every power module has three LED indicators. The following figure shows the LEDs in the power module when the door is open:





LED INDICATOR	NORMAL STATE	ABNORMAL STATE	DESCRIPTION
FAULT (red)	Off	On	If ON, it indicates a fault has been triggered in the power module. In that case, the product will run without using this power module.
			If ON, it indicates a warning has been triggered in the power module. In that case, the product will run without using this power module. If this warning disappears, the product will run using this power module again.
ALM (yellow)	Off	On	The normal status of the "ALM" LED is "Off". When the product is in standby (no vehicle charging) the LED will flash until vehicle charging begins. At this point, the LED will no longer be illuminated and will switch to the "Off" state.  If the "ALM" LED is fix or flashing, this indicates an abnormal state.
RUN (green)	On	Off	If ON, it indicates the power module is being energized.

#### 6. COMMISSIONING



#### 6.1. NBi180 & NBi360 POWER CABINETS



#### **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics. Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for starting up the power cabinet and turn it on for the first time.

Visual inspection: unpackage the product and ensure that all components are in good condition and have not suffered any damage in transit.



Disconnect the external power supply before starting with the installation. Open the door of the device and ensure internal protections are deactivated. Block, delimit and signal the work area following the LOTOTO procedure.



Perform the anchoring of the product at its final destination following the anchoring requirements of the product (note that for NBi360 range products there are two anchoring options).

Check the corresponding "Anchoring requirements" section.



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct. Check the "Torque and screw sizing" section and the corresponding "Cable access and connections" section.





If required, make the cable connections to the charging points without voltage, starting by the ground connection. Make sure connections and tightening torque are correct.



Make a continuity test and check all connections are as expected.



Verify the selectivity of the external protections to the product and control parameters. Activate the product 's internal protections.

Provide power to the external power supply and verify boards and power source light up.



Make sure all doors are properly sealed and locked.



If all previous steps are successful: Remove LOTOTO (follow the procedure in reverse order). Provide the external power supply.

Start the product and verify it works correctly.



Configure the communications.

#### 7. MAINTENANCE



#### 7.1. NBi180 & NBi360 POWER CABINETS

In order to perform maintenance tasks properly, the instructions provided in the "Safe stop and start up" section in the Safety Instructions for Operating, Troubleshooting and Maintenance must be followed to shut down the product safely.

#### 7.1.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the *Safety Instructions for Operating, Troubleshooting and Maintenance*.



#### **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations



#### **WARNING**

Before opening any door, be sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before opening any door or handling the product internally. Otherwise, you may get an electric shock.

To carry out maintenance tasks or any activity inside the product, the user must verify that there is no voltage present in the product, as well as carry out the procedure of a safe stop. Always apply the <u>five golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be taken into account. Also, local and national electrical regulations must be followed to avoid personal injury and / or damage to the product .

Failure to comply with safety instructions and electrical codes may void the warranty.



#### 7.1.2. Checklist

The list of tasks detailed below **should be carried out annually**. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	1h and 35min.

	POWER TEST (STATUS 1)	TIME (MIN)	ОК
1	Environmental conditions – visual check.	5	
2	Enclosure state – visual check.	5	
3	Make sure the product is accessed remotely - connection to the PC, if it exists.		
4	4 Ventilation system and absence of vibrations - visual and auditory check. 5		
5	Operation of the differential switch – visual and manual check.	5	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD TEST (STATUS 2)	TIME (MIN)	OK
1	Internal cleaning.	15	
2	Filters – visual check and replacement.	15	
3	Doors condition.	10	
4	4 Cables and conductors – visual and manual check.		
5 External and internal tightening torques – manual check. 10			
6	Control circuit and protections – manual check.	10	



#### **NOTICE**

Please note that the products have external security screws and the doors are locked with an exclusive key, so specialized tools may be required for the tasks described below.

#### 7.1.3. Power test (status 1)

#### 1. Environmental conditions

Verify that the product environment complies with the specifications. Verify that the humidity is adequate.



#### **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains
  in the air susceptible to accumulate on the filters is detected in the area. In this case, it will
  be enough to inspect the products that due to their location have been more exposed, and
  if dirt is detected in them, the inspection will be generalized to the rest of the chargers at
  the plant.



#### 2. Enclosure state

Check the enclosure is in good general state and no traces of corrosion or impacts are present. Check the product anchoring.

#### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

#### 4. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

#### 7.1.4. Dead test (status 2)

#### 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged.

#### 2. Filters

Visual inspection of air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation.

#### 3. Doors condition

Check that each door closes correctly, seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

#### 4. Cables and conductors

Visual inspection of cables and terminals. Check the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

#### 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and **retighten correctively only if necessary**. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

#### 6. Control circuit and protections

Check if overvoltage protectors are operational.

Visually check the fuses to guarantee they are not blown.

Check the good condition of the control cards, as well as its connections.



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#### **NB SERIES - NBSK1440 STATION**

# HARDWARE AND INSTALLATION MANUAL



# **NBSK1440 STATION**

- EV CHARGING SOLUTIONS —

# Hardware and Installation Manual

Edition: May 2024 NBSK1440HW2.0MHW01BI Rev. B NBSK1440 STATION POWER ELECTRONICS

#### ABOUT THIS MANUAL

#### **PURPOSE**

This manual contains important instructions for the installation, configuration and use of the **NBSK1440 Station** range, which includes the stations NBSK480, NBSK1080, NBSK1200, NBSK1320 and NBSK1440.

From now on, this manual may refer to them Station with the term "station" or "product".

Power Electronics reserves the right to modify product features. Any possible updates to the mentioned products will be reflected in subsequent revisions of this manual.

#### **TARGET AUDIENCE**

This manual is intended for qualified customers who will install, configure and operate the low voltage **charging** station NBSK1440.

Only qualified and/or designated technical personnel according to agreements signed with Power Electronics may install and commission the product.

#### **REFERENCE MANUALS**

The following reference documents are available for Power Electronics electric vehicle chargers:

- Programming and Software Manual
- Safety Instructions for Operating, Troubleshooting and Maintenance.
- Faults, Warnings and Troubleshooting Manual.



#### **NOTICE**

#### WARRANTY DISCLAIMER

The manufacturer is not liable for damages, losses, costs or expenses incurred by any user of the product if such damages, losses, costs or expenses result from a failure to comply with the applicable safety instructions, general instructions or operating instructions given by the manufacturer in any of the documents and manuals of the product, including, but not limited to hardware installation, programming and operation, maintenance instructions, handling, or any other. Any damages, losses, costs or expenses resulting from the improper handling, manipulation, modification or operation of the product will be subject to the company's warranty terms. Do not modify the product in any way not authorized by Power Electronics. If you do so, the manufacturer will not assume any liability and the product warranty will be voided.

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#### **REVISIONS CONTROL**

DATE (DD/MM/YYYY)	REVISION	DESCRIPTION
08 / 03 / 2024	Α	First revision.
02 / 05 / 2024	В	Minor style and formatting corrections resulting from the Spanish translation.



The products and technical documentation are periodically updated. Power Electronics reserves the right to modify all or part of the contents of this manual without previous notice. The reproduction or distribution of the present manual is strictly forbidden unless express authorization from Power Electronics.

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# **ACRONYMS**

The terms commonly used in the documentation of Power Electronics' products are listed in the table below.

Please notice this is a general series of terms and it encompasses all our product divisions (industrial, solar, storage, and electric mobility), thus, some of the following expressions may not apply to this particular manual.

ACRONYM	MEANING
AASS	Auxiliary Services
AC	Alternating Current
Al	Analogue Input
AO	Analogue Output
BESS	Battery Energy Storage System
BMS	Battery Manager Solution
CCID	Charge circuit interrupting device
CCL	Charge Current Limit.
CCS	Combined charging system – charging and communications protocol following the standard IEC 61851-23 Annex CC
CHAdeMO	Charging and communications protocol following the standard IEC 61851-23 Annex AA
CPU	Central Processing Unit
DC	Direct Current
DCL	Discharge Current Limit
DI	Digital Input
DSP	Digital Signal Processor
DO	Digital Output
EMS	Energy Management System
EV	Electric Vehicle
FPGA	Programmable device (Field-Programmable Gate Array)
FRU	Field Replaceable Unit
GFDI	Ground Fault Detector Interrupter
GPRS	General Packet Radio Services, a data transmission system
HVAC	Heating, Ventilation, and Air Conditioning
IGBT	Insulated Gate Bipolar Transistor
IMI	Insulation monitoring device
IT	Grid system where the power supply is kept isolated and the electrical equipment system is grounded.
LOTOTO	Lock Out – Tag Out – Tryout
MCB	Miniature Circuit Breaker
MCCB	Moulded Case Circuit Breaker
MPCS	Multi Power Conversion System
MID	Measuring Instrument Directive
MV	Medium Voltage. This term is used to refer to high voltage in general
PE	Ground connection
PI	Proportional and Integral
POI	Point Of Interconnection
PPE	Personal Protection Equipment
PV	Photovoltaic energy



ACRONYM	MEANING
RCD	Residual Current Device
RCM	Residual Current Monitor
RFID	Radio Frequency Identification
SOC	State Of Charge – referred to battery
SOH	State Of Health – referred to battery. It compares the actual state of the battery to its initial conditions. It is measured in percentage
STO	Safe Torque Off
TN	Grid system where the power supply is grounded, and the electrical equipment system is brought to the same ground through the neutral connector.
TT	Grid system where both the power supply and the electrical devices are connected to the ground via separate connections
UPS	Uninterruptible Power Supply
VSD / VFD	Variable Speed Drive, Variable Frequency Drive. Both terms are used

### **SAFETY SYMBOLS**

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

WARNING	Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death.
	Be extremely careful and follow the instructions to avoid the risk of electrical shocks.
CAUTION	Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury.
	Read the message and follow the instructions carefully.
NOTICE	Identifies important measures to take in order to prevent product damage and warranty lost, as well as encouraging good use and environmental practices.

EN

Other symbols used in this manual for safety messages are the following:



Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.



Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.



Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.

NBSK1440 STATION POWER ELECTRONICS

#### SAFETY INSTRUCTIONS

#### **IMPORTANT!**

#### SAVE THESE INSTRUCTIONS

This manual contains important instructions for the **NBSK1440 range station** that must be followed during installation and maintenance of the product. Carefully read all documentation before handling the product and pay special attention to safety recommendations to maximize the performance of this product and ensure its safe use and installation.

It is responsibility of the installer to follow the instructions provided in this manual, to follow good electrical practices and to identify all warnings and recommendations before starting up and operating the station.



#### **WARNING**

#### FIRST CONSIDERATIONS

#### The operations detailed in this manual must only be performed by qualified personnel.

The condition of qualified personnel referred to in this manual shall be at least the condition that meets the standards, regulations and safety laws applied to the installation and operation of this product.

#### Read and retain the Hardware and Installation Manual for future reference.

Before assembling the product, read all instructions, caution signs and other sections of this manual. Failure to follow these warnings can result in severe electrical shock or death. Pay attention at all times to prevent possible accidents.

Make sure that all safety regulations in force at the place where the product is being installed regarding both Medium Voltage and Low Voltage operations are complied with. Otherwise, you may suffer an electric shock.

The electric vehicle charging system may cause an ELECTRICAL DISCHARGE if the warnings indicated in this manual are not followed.

Make sure the station is completely disconnected from the power supply and grounded before handling or servicing. Otherwise, there is a risk of electric shock. To prevent electrical hazards, disconnect the input supply, ground the product, remove control voltages before performing any tasks, and ensure that busbars are completely discharged. Warning and safety labels must be properly affixed to terminals, cabinets and control panels in accordance with local regulations.

#### When working on electrical installations, always remember to apply the FIVE GOLDEN RULES:

- 1. Visible shutdown of all live sources.
- 2. Mechanical locking of all cutting elements.
- 3. Verify the absence of voltage by using the appropriate tools for the voltage of the installation.
- 4. Ground and short-circuit all possible voltage sources.
- 5. Delimit and mark the work area.

POWER ELECTRONICS NBSK1440 STATION



#### WARNING



The housing must be properly closed, otherwise it may not adequately protect people or property from any abnormal situation inside the product.

**Always follow the instructions in the manual to move and position the product.** The weight of this product can cause injuries, serious injuries and even death if not handled correctly.

The exhaust airflow can reach high temperatures during charging sessions, especially when the outdoor temperature and power demand are high.

**Electric shock danger.** The steps to isolate the product must be carefully followed before performing any task or opening any cover of the product. Avoid inappropriate actions that may cause electric shock.

Always wear the appropriate personal protective equipment (PPE) for each task and work in electrical areas with dry hands. Otherwise, you may suffer an electric shock.

Do not use cables with damaged insulation. Do not subject cables to abrasion, excessive stress, heavy loads or pinching. Otherwise, you suffer get an electric shock.

Do not supply power to a damaged product or product with missing parts, even if the installation is complete. Otherwise, you may suffer an electric shock.

In the event that the product stops due to a loss of power, do not do any work on it. The autorestart function may be enabled and you may suffer an electric shock.



The product has capacitors. Wait until the capacitors have discharged before performing any maintenance task.

#### USE

Do not use this product for purposes other than the electric vehicle charging with the modes provided for this product and defined in this manual.

**Do not disconnect or connect any terminals while the product is running.** Otherwise, you may suffer an electric shock and the product may be damaged.

**Do not use this product if its enclosure or electric vehicle connector(s)** (on both the product and vehicle sides) **are broken, cracked or otherwise damaged.** Otherwise, you may suffer an electric shock.

#### **GROUND CONNECTION**

Prevention of electric shock:

- The product chassis must be properly grounded to prevent a possible electrical shock if a leakage current flows through the enclosure. Disconnect all power supplies before proceeding with maintenance operations inside the product.
- Only connect the grounding device to the grounding plate of the product. Do not use the enclosure
  or chassis screws for grounding.
- The protective earth wire must be connected first and last disconnected.

EN

NBSK1440 STATION POWER ELECTRONICS



#### **CAUTION**

Install the product, both the power station and the Dispensers / Pantograph solutions, on a solid, level surface in a location where there is no risk of explosion, flooding or impact damage. Follow the recommendations on how to build the foundation of this manual. Otherwise, there is a risk of malfunction and even permanent damage.

Never clean the surfaces or the inside of the product with abrasive liquids, solvents or cleaning products that could damage it. Water should not be applied under excessive pressure.



**Disconnect the input power in case the product gets damaged.** Otherwise, it could result in a secondary accident or a fire.

Do not allow lint, paper, wood chips, dust, metallic chips or other foreign matter into the product. Otherwise, a fire or an accident could occur.



After the input power is applied or removed, the product will remain hot for a few minutes. Touching internal hot parts could result in skin burns

#### PERSONAL PROTECTIVE EQUIPMENT (PPE from now on) REQUIRED

The use of PPE in accordance with standards is required to repair and maintain the product. Follow applicable instructions at the installation site to comply with national and local regulations.

In the case of tasks with voltage present, it is mandatory to use an Electric Arc Safety Kit (gloves, clothing and face protection).

A detailed example of the PPE used is shown below. The customer must specify in his safety instructions (hazard statement and work procedure) which PPE is required and when and how they should be used according to his electric arc studies, the characteristics of the site, the chargers, the installation and the country.

Power Electronics assumes no liability for damage resulting from improper use of the product or failure to comply with local or national regulations.

Always follow local regulations / NEC Health & Safety standards.

The following table shows an example of commonly used PPE:

PPE	DESCRIPTION
Safety glasses	Eye protection according to EN 166 / ANSI Z87.1.
Electric gloves	Gloves with mechanical, dielectric and against arc flash. Class according to voltage. EN 60903; ASTM D120 specifications and NFPA 70E standards.
Safety footwear	S3 class complying with BS EN ISO 20345 / ASTM F2413-11.
Insulation carpet	Insulation carpet according to IEC 61111 / ASTM Class 4. The insulation carpet must be used when there is voltage inside the charger or when checking the voltage absence.
Safety kit arc flash	Arc flash personal protective equipment kit (including arc flash protective face shield & hard hat), fire resistant 40cal/cm <sup>2</sup> .
Padlock set	Padlock and auxiliary elements set to lock out dangerous equipment.
HI-VIS vest	Fr VIS vest 9cal/cm <sup>2</sup> .
MV stool	Medium Voltage insulation stool.
Rescue pole	Insulated body rescue pole.

#### PPE FOR INSTALLATION









Mechanical gloves

Safety helmet

Safety glasses

#### Additional PPE for commissioning and maintenance tasks









Safety clothes according to NFPA-70E and safety labels

The following table shows the protection class type, depending on the working voltage.

#### **ELECTRICAL INSULATED GLOVES**

Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )	
00	500	750	
0	1000	1500	
1	7500	11250	
2	17000	25500	
3	26500	39750	
4	36000	54000	

#### **ELECTRICAL SAFETY MATTING**

Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )
0	1000	1500
1	7500	11250
2	17000	25500
3	26500	39750
4	36000	54000



#### **NOTICE**

#### PPE must be checked according to the instructions of the manufacturer.

The electrical gloves must have thermal, electric and mechanical protection. If gloves only have dielectric protection, it is mandatory to use under fireproof gloves and over gloves cover.



#### **NOTICE**

#### RECYCLING

Packaging product must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.



To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).

Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management.

Our products contain electronic boards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic boards, capacitors and other electronic devices).

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#### CYBERSECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. Access to the system is restricted to those employees who legitimately need it for reasons of maintenance and/or updating of the system.

It is sole responsibility of the customer for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer must establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

#### **TORQUE AND SCREW SIZING**

The following table shows the torque for both mechanical and electrical connections, applicable to all products [1, 2].

SCREW SIZE		TORQUE		
METRIC	ENGLISH (in.)	ISO 8.8 QUALITY <sup>[a]</sup>		
(mm)		(Nm)	(lb-ft)	
M3	1/8	1,3	0.95	
M4	5/32	3	2.21	
M5	3/16	6	4.42	
M6	1/4	8	5.9	
M8	5/16	20	14.75	
M10	7/16	40	29.5	
M12	1/2	60	44.25	
M14	9/16	120	88.5	
M16	5/8	210	154.89	



[a] For other qualities, follow the guidelines of the screw manufacturer.



#### **CAUTION**

For all screwing that holds a **particular component** such as a bus, contactor, etc. it will be necessary to **apply the tightening torque indicated by the manufacturer** of the same component

Screwing should be tightened correctly only when necessary, i.e. when the factory marks are not in place. For small screws that do not have marks, the good electrical praxis will determine if it is loose.

<sup>&</sup>lt;sup>1</sup> Power Electronics recommends the use of **Zinc Steel quality 8.8 bolts for internal connections** in general, DC and earth connections included.

<sup>&</sup>lt;sup>2</sup> Power Electronics recommends the use of A2-70 stainless bolts for external connections in general, AC connections included.

#### 1. TECHNICAL CHARACTERISTICS

#### 1.1. NBSK1440 range

REFERENCE		VALUES	
	Maximum power [kW]	840 – 1440 🖽	
	Number of power stages	28 – 48 [1]	
DC OUTPUT	Charging dispenser power [kW] [2]	60 / 90 / 120 / 180 / 240 / 360	
	Charging pantograph power [kW] [2]	60 / 90 / 120 / 180 / 240 / 360	
	Voltage range [V] [3]	150 – 1000	
	Voltage [V]	400 IEC / 480 UL (3ph + N + PE) ± 10%	
	Input rated current (at 40°C / 104°F) [A]	IEC: 1319 – 2240 [1] / UL: 1101 – 1868 [1]	
AC INPUT	Power factor	> 0.99	
	Frequency [Hz]	50 (IEC) / 60 (IEC & UL)	
	Efficiency	95%	
	Degree of protection	NEMA 3R   IP54   IK10 (IK08 for ventilation grilles)	
	Operating temperature range [°C/°F]	Standard: -25 to 50 / -13 to 122 Optional: -30 to 50 / -22 to 122	
ENVIRONMENTAL RATINGS	Wind conditions [mph]	Up to 140	
TOTTINGO	Relative humidity	From 4% to 95%	
	Maximum altitude (above sea level) [m / ft]	Without derating: 2000 / 6561 Optional: 3000 / 9842	
STANDBY CONSUMPTION	Standby power consumption [W] [4]	IEC: 224 – 344 <sup>[1]</sup> / UL: 362 – 582 <sup>[1]</sup>	
		Overvoltage (Type 2)	
PROTECTIONS		Overcurrent / shortcircuit (Circuit Breakers) <sup>[5]</sup>	
		Overtemperature	
HARDWARE	Enclosure color	Grey (RAL 7035)	
	Antivandalism security	Security screws on the ventilation grilles	
OTHERS		Smart Power Balance (Optional)	
COMMUNICATIONS		Ethernet (10/100)	
		Cellular data: 4G, 3G, GSM	
REGULATION		IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2, UL 2202, NEC 625, FCC Part 15 Class A	

<sup>&</sup>lt;sup>2</sup> The final delivered power depends on the Combiner model selected. <sup>3</sup> 150 - 500Vdc for CHAdeMO. Maximum power from 300Vdc.

<sup>&</sup>lt;sup>4</sup> Consult Power Electronics for further information on standby reactive power.

<sup>&</sup>lt;sup>5</sup> The short circuit current rating at the input of the NBSK1440 range station is 65kA RMS. Current limiting fuses or current limiting circuit breaker must be installed if available fault current is equal to or greater than 65kA at the product input. Please note that the limiting short circuit protection shall operate at half AC cycle maximum (8.3ms).

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#### **Standard ratings**

DC OUTPUT		AC INPUT		STANDBY CONSUMPTION		
CODE	Number of power stages	Max. Power [kW]	Input rated current (at 40°C / 104°F) [A]		Power consumption on standby [W]	
			IEC	UL	IEC	UL
NBSK840	28	840	1319	1101	224	362
NBSK1080	36	1080	1688	1408	272	450
NBSK1200	40	1200	1872	1561	296	494
NBSK1320	44	1320	2056	1715	320	538
NBSK1440	48	1440	2240	1868	344	582

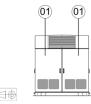
**Note:** For characteristics of the Dispensers / Pantograph solutions and standard configurations, please refer to the corresponding *Hardware and Installation Manual*.

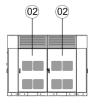


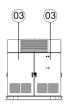
## 2. DIMENSIONS AND WEIGHT

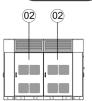
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The NBSK1440 range stations integrate the following elements:



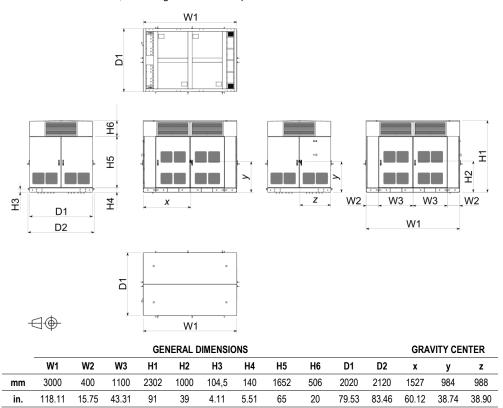






REF	CABINET	DETAIL
01	Combiner cabinet	Access plate for wiring connections:  - DC+ and DC- output to the charging points.  - Control and communication cables to the charging points.  - Ground busbar.
02	AC / DC power modules cabinets	Contains the power modules that transform AC current into DC current. It consists of a total of up to four AC / DC racks of 360kW each one.
03	AC cabinet	Access to AC input connections. Contains the control and communication devices (Ethernet 4G router), autotransformer (UL version), AC circuit breakers, overvoltage protection, auxiliary services protection, customer connections terminals, emergency stop button and voltage presence indicator.

The dimensions and center of gravity of the **NBSK1440 range Station** are shown in the figure below. The total weight of the NBSK1440 station is approximately 4500kg (9921lb). All dimensions of the figures of the product are coded as: W for widths, H for heights and D for depths.



# 3. HANDLING, TRANSPORTATION AND INSTALLATION

3



#### **CAUTION**

**Read carefully the following transportation and installation instructions.** Failure to follow transportation and installation instructions could result in damage to the product or injury to people.

#### 3.1. Delivery and storage

Power Electronics **NBSK1440** range stations are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.



#### Standard storage



#### NOTICE

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "Extended Storage" section and take appropriate measures.

Whenever possible, the product should be unloaded at its place of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to keep it in proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams.
- Store the product away from passageways where the product may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until the moment of installation.
- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.

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 The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

#### Extended storage

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems
  inside the product to prevent moisture from damaging the electronic components, depending on the
  particular conditions of each case.
- A clearance must be left around the product to allow inspections in the different cabinets of the product.
- If periodic inspections of the product are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



#### NOTICE

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

#### 3.2. Handling and transportation



#### **CAUTION**

Follow the handling and transportation requirements described here. Any other method of transport or handling could damage the product.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation during the lifting with machinery must be less than 90°.

Handle the product slowly at ground level avoiding sudden movements and jerking during lifting. To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of the product. Refer to the weight information for selection of the lifting equipment. The operator responsible for the loading and/or unloading operations must be authorized and trained in the use of the lifting equipment.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation. If necessary, use a push pull pole to guide the product during handling.

#### **CAUTION**

Ensure that the site of operation avoids the circulation and presence of operators and vehicles in the proximity of the load. Under no circumstances must the operators position underneath the product or within a radius that could allow the load to fall on the operators. Always follow all the occupational safety standards that apply at the installation site considering the Health and Safety measures according to the applicable regulations in the country of installation.

Prior to the unloading operations, ensure that the slings and any other auxiliary equipment involved in the unloading process are in good condition. In case of identifying any type of damage, defect or problem in the lifting equipment, as well as its accessories, these must be replaced with equivalent ones in accordance with the applicable regulations in the country of installation. Do not use damaged or defective slings.

Avoid direct and prolonged exposure of the slings to the sun. Periodically inspect slings that have been exposed to the sun for signs of discoloration, hardening or any other damage caused by ultraviolet radiation.

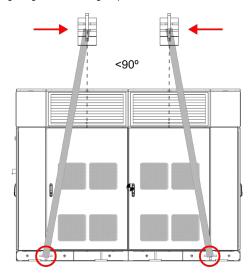
Do not bend the slings or tie knots. Ensure that the length of the slings is exactly the same, that they are equally tensioned and that not damaged during the handling of the product.

The product must be perfectly centered to the lifting system. Be aware of the angles of the slings and other lifting equipment used, which may affect the integrity of the product and use special protections if necessary.

The station has a steel base with shackles designed for lifting the product with slings. The slings must be knotted at the top of the product using a lifting device that complies with the safety regulations applicable at the site of installation. When using the lifting device, the worker must wear a safety harness.

The product must be lifted using a lifting system suitable for the weight of the product that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the site of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.

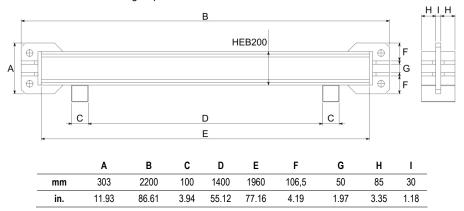
The following figure shows the location of the lifting points on the base (two on each side) and an example of lifting of the product using slings and two single spreader beams:





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The dimensions of each single spreader beams are shown below:



#### 3.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



#### NOTICE

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary, and it is not within the scope of the responsibility of the manufacturer.

#### Soil

The soil must have the following characteristics:

- The soil must be dry, compacted, stable and homogeneous.
- The soil must have hard or medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground must not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- Avoid corrosive environments that may affect the proper functioning of the product.

#### Site basis



#### **NOTICE**

The product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The product is not designed for mobile installations.

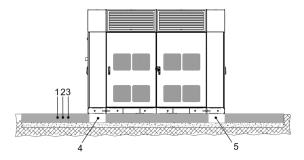
Power Electronics recommends making a concrete foundation slab to support both the power station and the skid of the charging points. The support surface for the products must be perfectly level. **The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations**. The foundation must meet the following characteristics:

- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- It must be thick enough to support the products.

DEFEDENCE

- It must have trenches wide enough to ensure proper wiring passage.
- It is advisable to leave the slab at the same level as the ground to facilitate maintenance works. In this case, the slab size shall be at least 3000 x 2164mm (118.11 x 85.19in.) + 500mm (20in.) on each side of the product.
- If the slab is above ground level, it should be at least 3000 x 2164mm (118.11 x 85.19in.)
- + 1000mm (40in.) on each side of the product, to facilitate maintenance works.

The following figure shows the station once installed on the slab, and also the location of the trenches needed for passing the conductors:



REFERENCE	DESCRIPTION
1	Ground.
2	Lean concrete.
3	Foundation slab.
4, 5	Trenches for cable access: 4: Access for AC low voltage cables and external ground connection. 5: DC cables, ground and communications output to the dispensers / pantographs.

DECCRIPTION

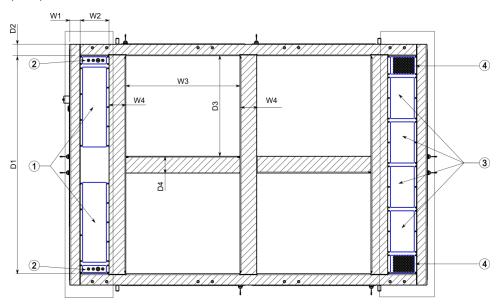


Note that the product must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of each product. For more information on where the anchoring points are located, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer considering the characteristics of the selected cable (please refer to the "<u>Cable access and connections</u>" section ), this choice being the responsibility of the customer and the bottom access of the wiring.

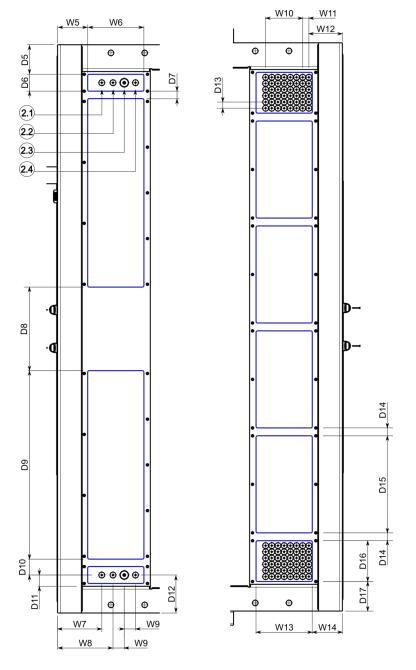
The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between the cables is adequate. The connection terminals must not be over-tightened.

The following figures (**bottom-up view**) show the size of the bottom plates (**marked in blue**), which are necessary to determine the dimensions for the trench and foundation slab, in mm and inches. **Note:** The customer must account for the tolerances in the trenches for cable access. These tolerances are +/- 2cm (0.8in.) in each direction of the trench.



		W1	W2	W3	W4	D1	D2	D3	D4
m	m	87,5	242,5	960	140	1830	95	845	140
in	۱.	3.44	9.55	37.80	5.51	72.05	3.74	33.27	5.51

REF.	DESCRIPTION
01	Input AC cabinet.
02	External station communication and customer output. Output for external emergency stop. 2.1: Ethernet communication reserved for Technical Service. 2.2: AC auxiliary supply connections (L1, L2, L3, N and PE). 2.3: External emergency stop. 2.4: User communications (Single IP connection).
03	Communications and auxiliary supply to the charging points.
04	Output connections to the charging points: DC+, DC-, ground.



AC CABINET	W5	W6	W7	W8	W9	D5	D6	D7	D8	D9	D10	D11	D12
mm	107,3	200	157,25	197,25	40	105	60	26,5	297	670	56,5	40	135
in.	4.22	7.87	6.19	7.77	1.57	4.1	2.36	1.04	11.69	26.38	2.22	1.57	5.32

COMBINER CABINET	W10	W11	W12	W13	W14	D13	D14	D15	D16	D17
mm	132	22	119,3	200	107,3	22	28	345	145	105
in.	5.19	0.87	4.70	7.87	4.22	0.87	1.1	13.59	5.71	4.13

## Maximum distance between the Station and charging points

The customer must consider that the concrete foundation must allow the passage of the power and communication cables through the pipes placed inside the foundation to interconnect the power station with the charging points (Dispensers or Pantograph solutions).

The maximum distance between the station and the charging points must also be considered. This distance must not exceed 80m (262.46ft) when using Ethernet cable for high level communications or 150m (492.13ft) when using optical fiber for high level communications.

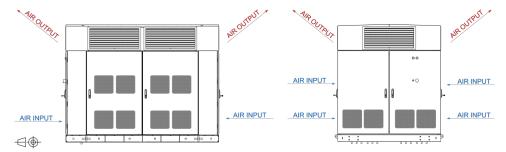
## 3.4. Ventilation system



#### **CAUTION**

Special care must be taken to ensure that there are no external elements near the air inlets and outlets to prevent proper ventilation of the product.

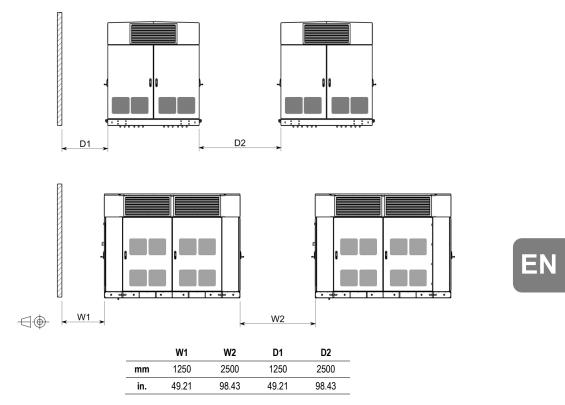
The station is equipped with a forced ventilation system consisting of twenty-four air inlets and six ventilation outlet grilles. The air inlets are distributed as follows: four in the bottom part of the AC Cabinet, eight on each side of the product, and four in the bottom part of the Combiner cabinet. The ventilation outlet grilles are located at the top of the station and are distributed as follows: one in the AC Cabinet, two in each side of the product and one in the Combiner cabinet.



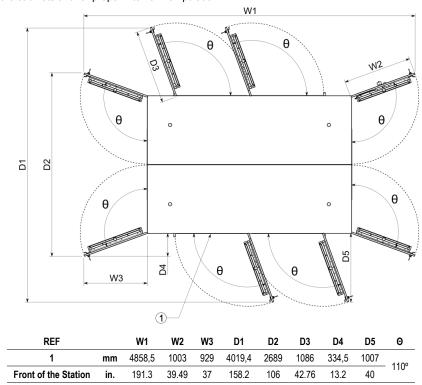
## 3.5. Clearances

When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product is to be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.



As depicted in the following figure (**top view**), there is an additional space needed to open the doors of all the cabinets and for proper internal manipulation.



## 3.6. Unpacking

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



#### **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

- 1. Position the station in a non-definitive location, on a flat and level surface. Avoid resting the station on anything external to the surface.
- Remove the adhesive tape that secures the polypropylene film to the product, located at the bottom of the station.
- 3. Lift and place the station in its final position. This action will remove the polypropylene film from the bottom of the product.
- 4. Remove the shrink film surrounding the station.
- 5. Remove the cardboard corner protections located on the top part of the station
- 6. Remove the "U" shaped carboard corner protections located on the short sides of the station.

## 3.7. Anchoring requirements



## **NOTICE**

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

It is recommended to construct a small vault or pit in the foundation under the cable plates. This construction must not interfere with the anchoring of the product.

**Anchoring must always be done with screws.** They must not be welded to prevent corrosion problems and, specially, power electronics problems.

To anchor the product in concrete slab, it is recommended to use M16 (5/8") stainless steel A4-70 expansion bolts or screws, being accepted both expansive anchor bolts and chemical.

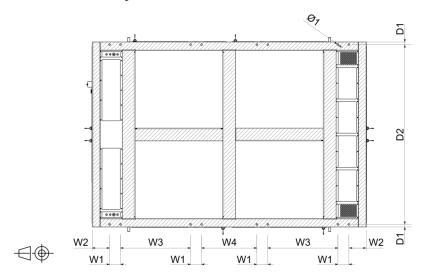
In case of anchoring the product to a metal structure, it is recommended to use M16 (5/8") A4-70 stainless screws.

Please secure the M16 screws with a tightening torque of 110Nm (81.13lb-ft).

Note that the anchoring points of the product will vary according to the seismic zone, please refer to sections "Moderate seismic zone" and "High seismic zone" for more details.

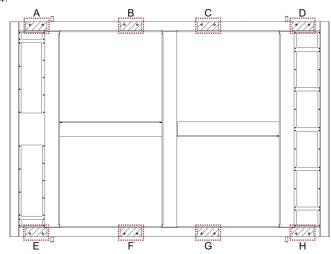
#### Moderate seismic zone

As mentioned above, the anchoring points will vary depending on the seismic risk regardless of whether the product is installed on slab, metallic structure, or pillars. The following figure shows the location and distances between the anchoring holes for **moderate seismic zone**.



	DIMENSIONS								
	W1	W2	W3	W4	D1	D2	Ø1		
mm	120	190	767,5	605	29	1962	20		
in.	4.72	7.48	30.22	23.82	1.14	77.24	0.8		

In case of **installation on pillars**, the load distribution due exclusively to the weight of the station is shown below:

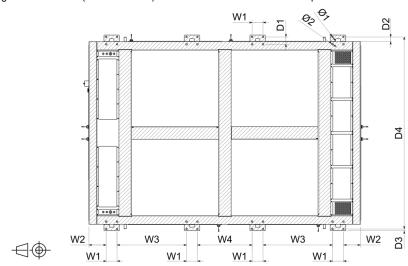


ANCHORING	<b>POINTS</b>	REACTION	IS

	Α	В	С	D	E	F	G	Н
KN	7,4	4,8	5,9	7,1	7,6	4,5	5,9	7,4
lbf	2136	1079	1326	1596	1708	1012	1326	1663

## High seismic zone

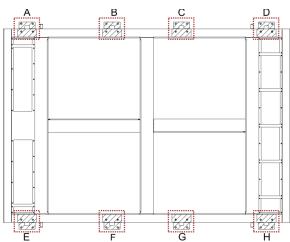
The following figure shows the location and distances between the anchoring holes of the station for **high seismic zone**. In this case, 8 additional brackets attached to each anchoring point are included to ease the installation. When the station is equipped with the additional brackets, **the anchoring must only be performed in the Ø18 anchoring points of the brackets**. This anchor system is suitable for high seismic zones (IEEE693-2018) and for wind conditions until 140mph.



	W1	W2	W3	W4	D1	D2	D3	D4	Ø1	Ø2
mm	120	190	767,5	605	81	52	20	2124	18	20
in.	4.72	7.48	30.22	23.82	3.19	2.05	0.79	83.62	0.71	0.79

**DIMENSIONS** 

In case of **installation on pillars**, the load distribution due exclusively to the weight of the station is shown below:



	ANCHORING POINTS REACTIONS										
	Α	В	С	D	E	F	G	Н			
KN	7,4	4,8	5,9	7,1	7,6	4,5	5,9	7,4			
lbf	2136	1079	1326	1596	1708	1012	1326	1663			

## Removal of the lifting equipment



#### CAUTION

Do not remove the lifting equipment until ensuring that the station is secured, correctly installed and fixed in its final location.

Once the station has been secured, correctly installed and fixed in its final location, the slings that are fixed to the steel base of the product must be removed. Remove the sling and shackle assembly from all the anchoring points located on the steel base of the station.

## Removal of the corrosion protection foams

In case of sea freight, the station is shipped with corrosion protection foams that must be removed just before commissioning the product. The following figure shows an example of the 250x250 mm (9.84x9.84in.) protection foams of the station.





The amount of corrosion protection foams located inside each cabinet of the station is shown in the following table. Please refer to the "<u>Dimensions and weight</u>" section to identify each cabinet of the station.

REF	CABINET	NUMBER OF CORROSSION PROTECTION FOAMS
01	Combiner cabinet	0
02	AC / DC power modules cabinet	4 per side
03	AC cabinet	0

## 4. CABLE ACCESS AND CONNECTIONS

4



#### **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected.

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

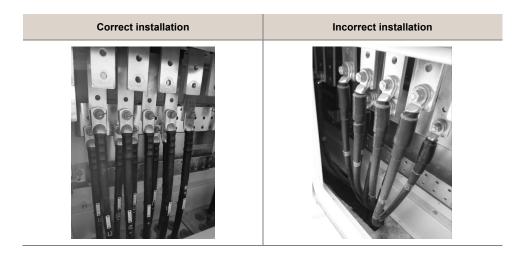
To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.

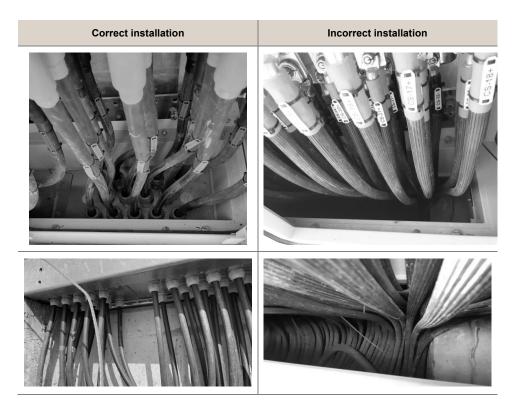


#### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".

The removable gland plates are NOT pre-drilled or pre-marked. The installer is responsible for installing the appropriate glands and cable glands on the plates before inserting the cables. Once this step has been completed, it is important to double check the sealing of the product to avoid dirt and moisture problems. Refer to the images in the following table for proper installation.





EN



## NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the "<u>Torque and screw sizing</u>" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cables of the station and the charging points must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems.

The customer is responsible for choosing and installing the communication cables.

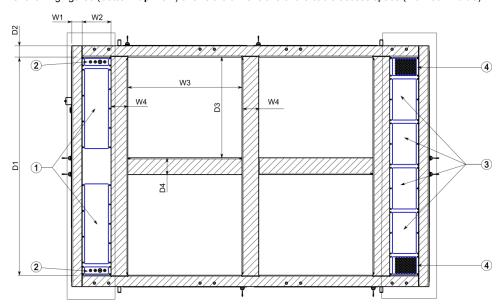
#### MATERIAL WITHIN RESPONSIBILITY OF CUSTOMER:

Power, ground, auxiliary and communication cables are not included in the scope of Power Electronics. The following material is responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or Pantograph solution (as applicable).
- Ground cables and terminal lugs to each Dispenser or Pantograph solution (as applicable).
- Auxiliary power supply cable to each Dispenser or Pantograph solution (as applicable).
- Control optical fiber to each Dispenser or Pantograph solution (as applicable).
- Ethernet cable (CAT5E) with RJ45 terminals OR optional multimode optical fiber to each Dispenser or Pantograph solution (as applicable).

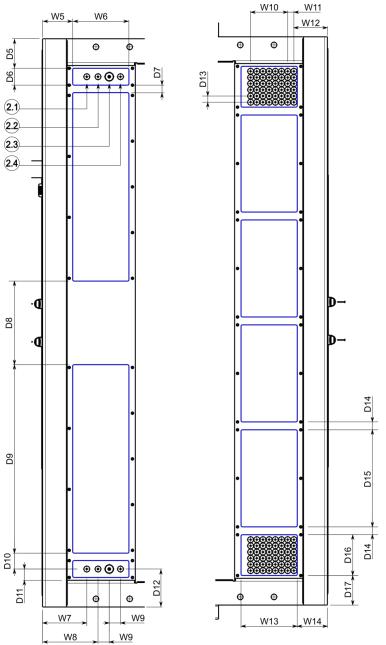
## 4.1. Cable access and cable size

The following figures (bottom-up view) shows the dimensions of the cable access space (marked in blue):



	W1	W2	W3	W4	D1	D2	D3	D4	
mm	87,5	242,5	960	140	1830	95	845	140	_
in.	3.44	9.55	37.80	5.51	72.05	3.74	33.27	5.51	_

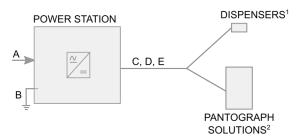
REF.	DESCRIPTION
01	Input AC cabinet.
02	External station communication and customer output. Output for external emergency stop.  2.1: Ethernet communication reserved for Technical Service.  2.2: AC auxiliary supply connections (L1, L2, L3, N and PE).  2.3: External emergency stop.  2.4: User communications (Single IP connection).
03	Communications and auxiliary supply to the charging points.
04	Output connections to the charging points: DC+, DC-, ground.



AC CABINET	W5	W6	W7	W8	W9	D5	D6	D7	D8	D9	D10	D11	D12
mm	107,3	200	157,25	197,25	40	105	60	26,5	297	670	56,5	40	135
in.	4.22	7.87	6.19	7.77	1.57	4.1	2.36	1.04	11.69	26.38	2.22	1.57	5.32

COMBINER CABINET	W10	W11	W12	W13	W14	D13	D14	D15	D16	D17
mm	132	22	119,3	200	107,3	22	28	345	145	105
in.	5.19	0.87	4.70	7.87	4.22	0.87	1.1	13.59	5.71	4.13

The following figure shows a general diagram of the connections that the customer must install.



<sup>&</sup>lt;sup>1</sup> Commercial or industrial, number of dispensers depends on project configuration.

<sup>&</sup>lt;sup>2</sup> If included in the project.

REF.	DESCRIPTION
Α	Low voltage line input L1, L2, L3 and N.
В	Main ground connection.
С	<b>DC connection between power station and dispensers / pantograph cabinet:</b> A supply line per dispenser / pantograph solution.
D	Communications and control connection between power station and dispensers / pantograph cabinet: One Ethernet cable and one optical fiber cable per dispenser / pantograph solution. It is possible to order all connections to be optic fiber, consult with Power Electronics for more information.
Е	Connection of auxiliary services between power station and dispensers / pantograph cabinet (230Vac / 277Vac): A supply line per dispenser / pantograph solution.

The tables below show the recommend cable size. Customer must choose the cables taking into consideration the minimum and maximum diameter, as well as the particularities of the project.

## **AC Cabinet**

		AC CABINET				
CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	Nº MAX POLE WIRE	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX.Ø
AC input (L1, L2, L3)	Use 0.6/1kV copper or aluminum 90°C (194°F)	12 connections per phase	12x300mm <sup>2</sup> per phase	-	-	35mm (1.38in.)
Ground connection (N, PE)	cables with M14 washer terminal. Nema two electrical hole possibility and blade width maximum of 32mm (1.26in.).	24 connections (12 N / 12 PE)	12x150mm² N and PE	-	-	20mm (0.79in.)
AC auxiliary services	Use 0.6/1kV copper 90°C (194°F) cables with 6mm² ferrule terminal.	-	5x6mm²	M25	11mm (0.43in.)	17mm (0.67in.)
External emergency stop	Use 0.6/1kV 70°C (158°F) hose cables with 2,5mm <sup>2</sup> ferrule terminal.	-	2x2,5mm <sup>2</sup>	M16	5mm (0.19in.)	9mm (0.35in.)
Customer communications	Ethernet cable cat 5E UTP with RJ45 connector	-	-	-	-	-

#### Combiner cabinet

#### **COMBINER CABINET**

OUPUT POWER	CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	Nº MAX POLE WIRE	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
<120kW	DC+ and DC-		1 (+) and 1 (-)	185 mm <sup>2</sup>	-	-	28mm (1.10in.)
<12UKVV	PE	Use 0.6/1kV copper 90°C (194°F) cables	1	95mm²	-	-	17mm (0.67in.)
120kW <x<360kw< td=""><td>DC+ and DC-</td><td>with M14 washer terminal. Nema two</td><td>2 (+) and 2 (-)</td><td>185 mm<sup>2</sup></td><td>-</td><td>-</td><td>28mm (1.10in.)</td></x<360kw<>	DC+ and DC-	with M14 washer terminal. Nema two	2 (+) and 2 (-)	185 mm <sup>2</sup>	-	-	28mm (1.10in.)
	PE	electrical hole possibility and blade	1	185 mm <sup>2</sup>	-	-	17mm (0.67in.)
. 0001.144	DC+ and DC-	width maximum of 32mm (1.26in.).	6 (+) and 6 (-)	240mm <sup>2</sup>	-	-	31mm (1.22in.)
>360kW	PE		4	240mm <sup>2</sup>	-	-	31mm (1.22in.)
	Auxiliary power supply to the charging points	Use 0.6/1kV copper 70°C (158°F) cables with 2,5mm² tip terminal.		2x2,5mm <sup>2</sup>	M16	5mm (0.19in.)	9mm (0.35in.
	High Level Communications	Ethernet CAT 5E UTP with RJ45 connector		8x0,22mm <sup>2</sup>	M16	5mm	9mm
•	(ETH / F.O.)	Patch cords (1/DC Control PCB) of GOF	- <b>-</b>	-	IVI IO	(0.19in.)	(0.35in.)
-	Low Level Communications (F.O.)	Multimode Fiber Optic (MM) OM3 50/125um 2 x SC Connectors.	-	-	M16	5mm (0.19in.)	9mm (0.35in.)



#### 4.2. Connections

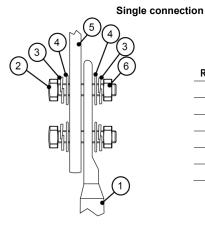
#### 4.2.1. Considerations for ground and power connection

The installer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation. The following recommendations must be considered:

- Before connecting the cables, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Apply conductive paste between the terminals and the plates to improve and protect any electrical
  contact Al Al, Al Cu and Cu Cu exposed outdoors, allowing the reduction of electrical resistance
  and the sealing of the contact parts to avoid corrosion. The working temperature range of this paste
  should be between -40°C and 150 °C (-40°F to 302°F).
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size according
  to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire. As an alternative,
  use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with conductor size according
  to the same NEC requirement. In all cases, cables must have a minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum two-hole terminal lugs with a maximum width of 45mm (1-3/4").

- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

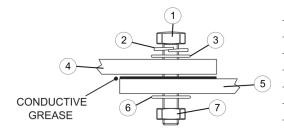
The following figure shows the correct power input/output connections:



REF.	ELEMENT
1	Terminal lug
2	Bolt
3	Spring washer
4	Fender washer
5	Plate
6	Nut

Note: If the terminal is a single-hole terminal, it is recommended to connect it to the upper hole in the busbar, so that the contact area is maximized.

The following figure shows the correct ground connection:



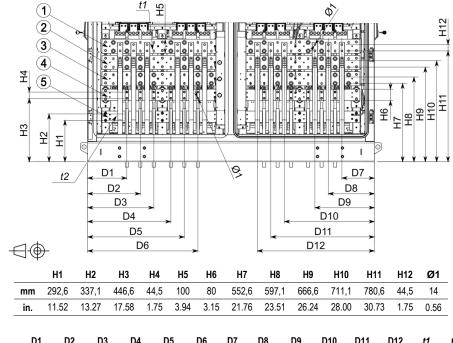
REF.	ELEMENT
1	Screw
2	Spring washer
3	Flat washer
4	Plate
5	Connection terminal
6	Flat washer
7	M12 nut (1/2")

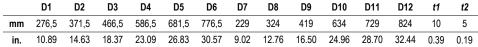
#### 4.2.2. AC Cabinet connections

## AC input power and ground connections

The following figure shows the AC input supply (L1, L2, L3) as well as the main ground connection (PE) to be connected by the customer. AC busbars are 100x100mm (3.94x3.94in.) made of tin-plated aluminum and ground busbars are 80x5mm (3.15x0.19in.) made of tin-plated aluminum. The busbars will be labelled from top to bottom with stickers to ensure correct connection as L1, L2, L3, N and PE. Cables must be routed from beneath the station, through the metallic covers located in the bottom and connected to the input plates. Each cable must be routed in the station only with conduit hubs or fittings rated as 3, 3S, 4, 4X, 6 or 6P<sup>1</sup>.

Once the cables have been routed, the sealing of the product must be ensured again to avoid dirt, humidity and corrosion problems.



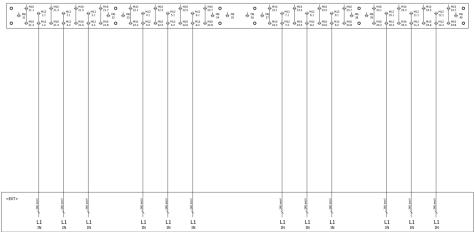




<sup>&</sup>lt;sup>1</sup> Applies for both UL and IEC normative.

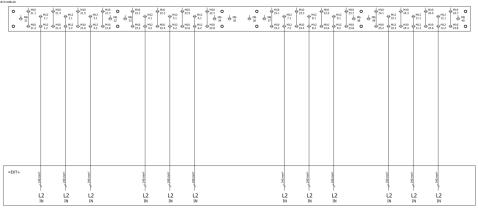
#### The following figure shows the connection diagram of the L1 phase:

WPL1.1



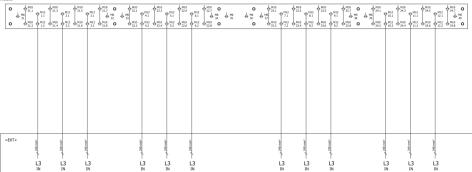
#### The following figure shows the connection diagram of the L2 phase:

WPL2.1



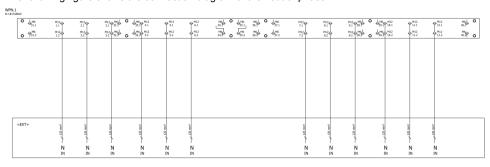
#### The following figure shows the connection diagram of the L3 phase:

WPL3.1

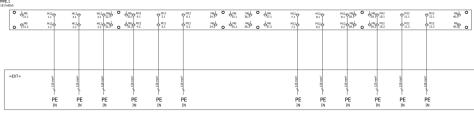


POWER ELECTRONICS NBSK1440 STATION

The following figure shows the connection diagram of the neutral phase:

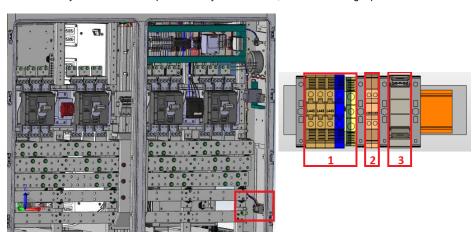


The following figure shows the connection diagram of the ground connection:

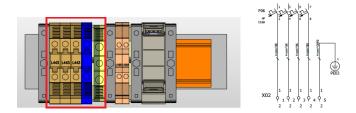


# Communications and auxiliary services

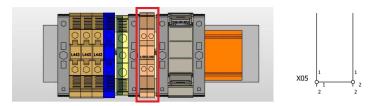
The following figure shows the interior of the AC cabinet where the connections of the communications and auxiliary services must be performed by the customer, on the bottom right part of the AC cabinet.



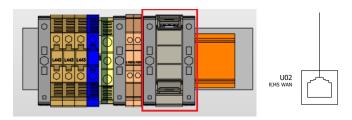
**1. AC Auxiliary supply** (3P + N + PE): If desired, the customer can install a 400Vac connection from the 10kW AC busbar.



**2. External emergency stop**: The external emergency stop connection must be made on the X05 terminal block located in the right side panel of the AC cabinet. To enable this functionality, the customer must remove the comb that bridges the two terminals.



**3. Customer communications**: Ethernet connection to the communications switch of the station for communication with the network of the customer.



## 4.2.3. Combiner Cabinet connections

Note that there are four different combiner models and different configurations and that connections may vary between them. Please read this section first for general information and for further connection details and cable section recommendations, please refer to the *Combiner model* subsection that corresponds with the project. There are three parameters that uniquely define the type of combiner used: the combiner model, the configuration and the installed power. Note that figures included in this section are for illustration purposes only.

## DC output power and ground connections

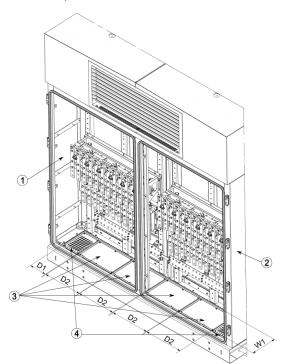


#### **CAUTION**

Installer must install the cables according to the bus plates positions to guarantee the correct alignment of the cables.

The customer must make the DC output power connections from the station to the charging points<sup>2</sup>. One DC+ and one DC- conductor must be connected per charging point. DC busbars are 36x8mm (1.42x 0.315in.) made of tin-plated copper and ground busbars are 80x5mm (3.15x0.19in.) made of tin-plated aluminum. The busbars will be labelled from top to bottom with stickers to ensure correct connection as DC+, DC- and PE. Cables must be routed from beneath the station, through the metal panels located in the bottom and connected to the DC power output plates. The customer must also connect a ground cable from the ground busbar to each charging point. Optionally, the customer can connect each charging point to an independent ground. On the side of the charging point, the customer must also make the corresponding connections. Please refer to the *Hardware and Installation Manual* for detailed instructions.

The following figure shows an example of the combiner cabinet.

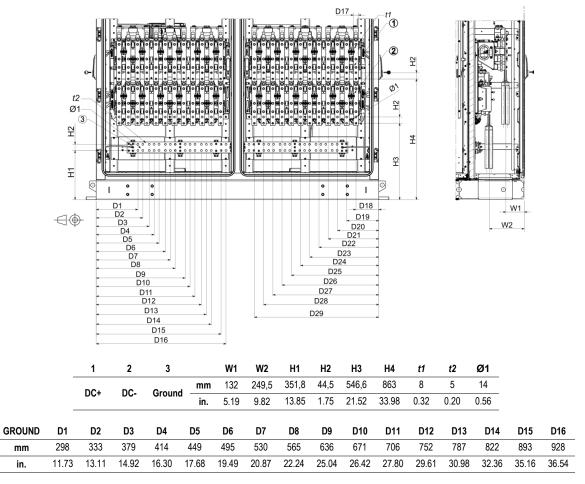


REF	DESCRIPTION
1	Left side panel
2	Right side panel
3	DC+ and DC- output connections cable access
4	Communications and auxiliary supply cable access

	W1	D1	D2
mm	248	168	368
in.	9.76	6.61	14.49

 $<sup>^{\</sup>rm 2}$  The number of connections varies according to the project configuration.



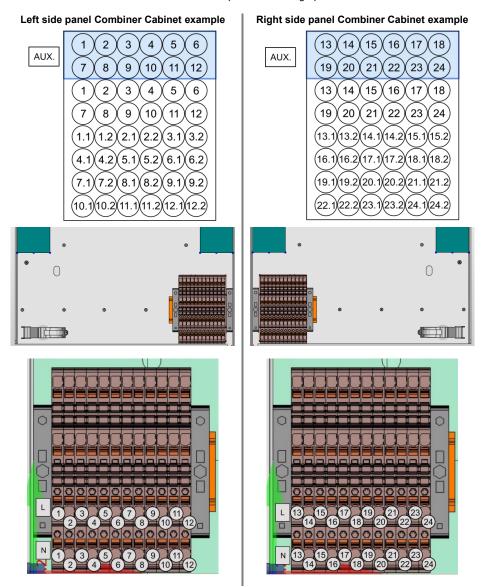


DC +	& DC-	D17	D18	D19	D20	D21	D22	D23	D24	D25	D26	D27	D28	D29
m	ım	36	163,5	229,5	295,5	361,5	427,5	493,5	559,5	625,5	691,5	757,5	823,5	889,5
i	n.	1.42	6.44	9.04	11.63	14.23	16.83	19.43	22.03	24.63	27.22	29.82	32.42	35.02

## Auxiliary power supply to the charging points

The station has a terminal block prepared on the left panel and another terminal block on the right side panel for the auxiliary services connection that will power each of the charging points. Cables must be routed from beneath the station, through the corresponding M16 cable glands indicated as AUX located in the bottom and connected to the corresponding pins of the terminal block, as shown in the following figures.

On the side of the charging point, the customer must also make the corresponding connections. Please refer to the *Hardware and Installation Manual* of the Dispensers / Pantograph solutions for detailed instructions.



EN

## Communications to the charging points

High level and low level communications must be inserted from the bottom of the station, through the corresponding cable glands and must be directed towards the upper side of the Combiner cabinet Connections must be made on both sides, the left panel corresponds to charging points one to twelve, and the right panel corresponds to charging points thirteen to twenty-four.

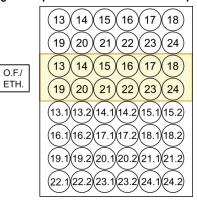
On the side of the charging point, the customer must also make the corresponding connections. Please refer to the Hardware and Installation Manual of the Dispensers / Pantograph solutions for detailed instructions.

#### **High level communications**

The connection of the high level communications depends on the type of switch that has been chosen by the customer: Optical Fiber or Ethernet switch. Cables must be routed from beneath the station through the corresponding cable glands indicated as O.F.  $\!\!/$  ETH., as shown in the following figures.

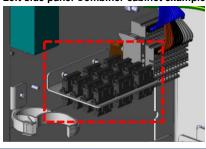
Left side panel Combiner cabinet example Right side panel Combiner cabinet example

8 9 10 12 O.F./ ETH. (2.1)(2.2)(3.1)(3.2) (5.1)(5.2)(6.1)(6.2) 7.2)(8.1)(8.2)(9.1)(9.2) (10.1)(10.2)(11.1)(11.2)(12.1)(12.2)

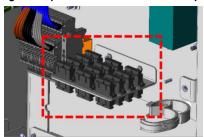


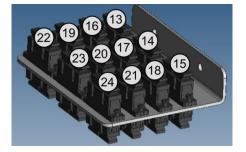
In case of using the optical fiber switch, the customer must route the cables to the metal plates located on the left and right sides of the cabinet as shown in the following figures.

Left side panel Combiner cabinet example



Right side panel Combiner cabinet example

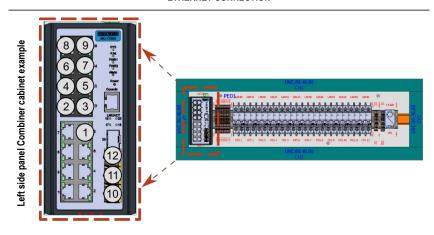




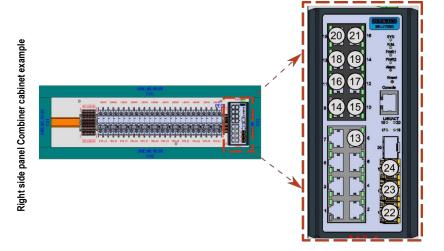
POWER ELECTRONICS NBSK1440 STATION

 In case of using the Ethernet switch, the customer must route the cables directly to the switches located in the upper part of the front panel of the cabinet. The following figures show the switches located on both the left and right side of the panel.

#### ETHERNET CONNECTION



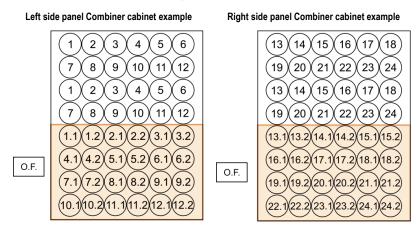




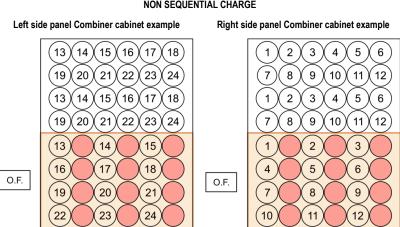
#### Low level communications

Low-level communications must be routed from the Combiner boards in the station to the corresponding DC Protocols boards of the charging points. Note that each connection corresponds to a pair of optical fiber cables (TX and RX), and that, as shown in the following figures, the number of connections depends on the charge type: sequential or non sequential. Optical fiber cables must be routed through the cable glands indicated as O.F., as shown in the following figures.

#### **SEQUENTIAL CHARGE**



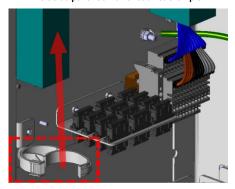
#### **NON SEQUENTIAL CHARGE**



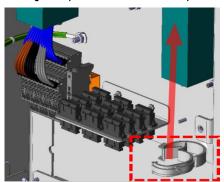
POWER ELECTRONICS NBSK1440 STATION

Inside the Combiner cabinet, the optical fiber cables must be routed through the indicated bracket towards the Combiner boards, as shown in the following figures.

Left side panel Combiner cabinet example



Right side panel Combiner cabinet example



SEQUENTIAL CHARGE (Only available in Model 1 and Model 2)

Left side panel (Model 1)

2.2 2.1 1.2 1.1

4.1 3.2 3.1

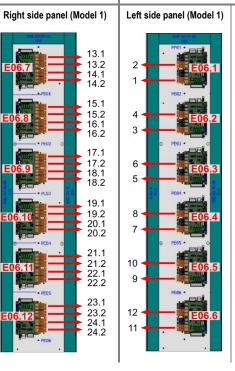
6.2 6.1 5.2 5.1

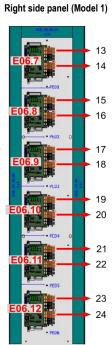
8.2 8.1 7.2 7.1

10.2 10.1 9.2 9.1

12.2 12.1 11.2 11.1

NON SEQUENTIAL CHARGE (Available in Models 1, 2, 3 and 4)





ΕN

#### 4.2.4. Combiner Models

## 4.2.4.1. Combiner Model 1 (2 to 2 / 60kW)

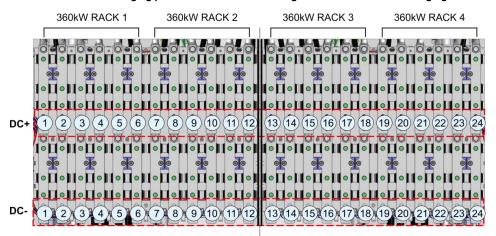
This section details the connections that the customer must make in the combiner cabinet of a station with the 2x2 combiner with 60kW DC outputs. An example for the configuration of the NBSK1440 station (maximum power of 1440kW) with 24 outputs (DC+ / DC-) will be followed throughout this subsection, for more information about different configurations please refer to the tables below and the specific documentation of the project.

## DC output power

The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

		C	OMBINER MOD	DEL 1: 2 to 2 60	kW					
	REFERENCE	NBSK84000	NBSK10800	NBSK12000	NBSK13200	NBSK14400				
М	aximum power (kW)	840	1080	1200	1320	1440				
Nun	Number of power modules			36	40	44	48			
C	CONFIGURATIONS		MAX. NUMBER OF OUTPUTS x MAX. OUTPUT POWER							
STATIC <sup>3</sup>	Simple configurations	Α	14x60 sim 28x60 seq	18x60 sim 36x60 seq	20x60 sim 40x60 seq	22x60 sim 44x60 seq	24x60 sim 48x60 seq			
	Sp.o SS.IIIguiuuoiio	С	7x120 sim	9x120 sim	10x120 sim	11x120 sim	12x120 sim			
DYNAMIC4	Dynamic combiner	I	14x120	18x120	20x120	22x120	24x120			

For the installation of the charging points, the Combiner cabinet plates are numbered, so that **the order** of connection of the charging points must be from left to right as shown in the following figure.



<sup>&</sup>lt;sup>3</sup> Fixed configurations.

<sup>&</sup>lt;sup>4</sup> Option with Smart Power Balance.

Depending on the different configurations of this combiner model, the combiner DC outputs plates marked in red must not be used. Connections must only be made to the terminals marked in green.

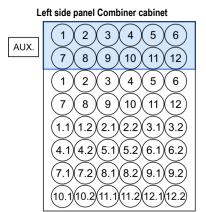
		360kW RACK 1							360kW RACK 2							360kW RACK 3							360kW RACK 4					
POWER [kW]	CONFIGURATION	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4	OUTPUT 5	OUTPUT 6	OUTPUT 7	OUTPUT 8	OUTPUT 9	OUTPUT 10	OUTPUT 11	OUTPUT 12	OUTPUT 13	OUTPUT 14	OUTPUT 15	OUTPUT 16	OUTPUT 17	OUTPUT 18	OUTPUT 19	OUTPUT 20	OUTPUT 21	OUTPUT 22	OUTPUT 23	OUTPUT 24			
1440	A/I																											
	С																											
1320	A/I																											
	С																											
1200	A/I																											
1200	С																											
4000	A/I																											
1080	С																											
940	A/I																											
840	С																											

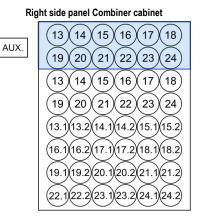
EN

**Note**: If the number of outlets to be installed is less than the maximum number of outlets allowed, the configuration must be balanced between the different racks.

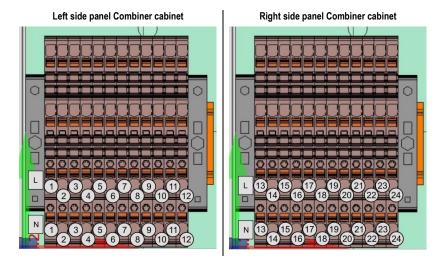
## **Auxiliary services**

The auxiliary services cables must be routed from beneath the station through the corresponding cable glands indicated as AUX., as shown in the following figures.





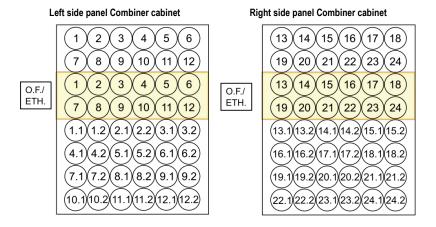
Each cable must be connected to its corresponding pin of the left side or right side terminal block as shown in the following figures:



## **Communications**

#### **High level communications**

Cables must be routed from beneath the station through the corresponding cable glands indicated as O.F. / ETH., as shown in the following figures.



POWER ELECTRONICS NBSK1440 STATION

> In case of using the optical fiber switch, the customer must route the cables to the metal plates located on the left and right sides of the cabinet as shown in the following figures.

Left side panel Combiner cabinet



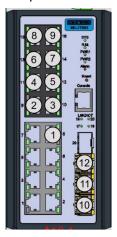


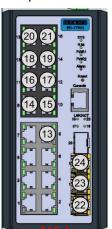
Right side panel Combiner cabinet

In case of using the Ethernet switch, the customer must directly route the cables to the switches in the upper part of the front panels of the cabinet as shown in the following figures:

Left side panel Combiner cabinet Right side panel Combiner cabinet



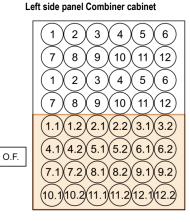




#### Low level communications

Optical fiber cables must enter through the cable glands indicated as O.F. in the following figures.

#### **SEQUENTIAL CHARGE**





Right side panel Combiner cabinet

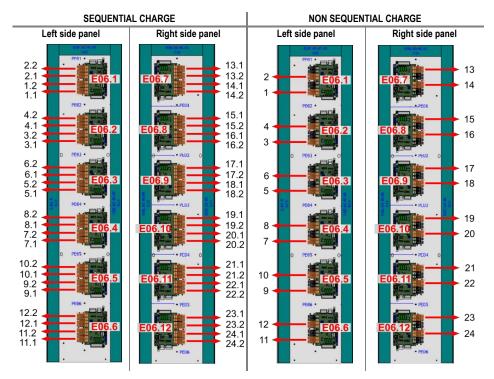


O.F.

#### NON SEQUENTIAL CHARGE

#### Left side panel Combiner cabinet Right side panel Combiner cabinet (16 (17 (15) (18 (17 (21)(22) (23 O.F. O.F.

Inside the Combiner cabinet, the optical fiber cables must be routed through the indicated bracket towards the Combiner boards: as shown in the following figures: E06.1 to E06.6 on the left side panel and E06.7 to E06.12 on the right side panel.



#### 4.2.4.2. Combiner Model 2 (2 to 2 / 90kW)

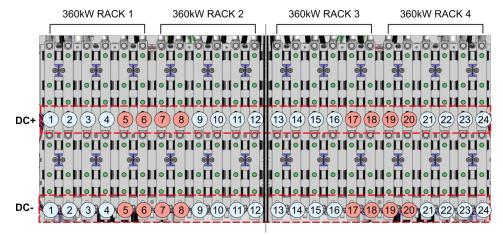
This section details the connections that the customer must make in the combiner cabinet of a station with the 2x2 combiner with 90kW DC outputs. An example for the configuration of the NBSK1440 station (maximum power of 1440kW) with 16 outputs (DC+ / DC-) will be followed throughout this subsection, for more information about different configurations please refer to the tables below and the specific documentation of the project.

#### DC output power

The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

COMBINER MODEL 2: 2 to 2 90kW													
	REFERENCE		NBSK84000	NBSK10800	NBSK12000	NBSK13200	NBSK14400						
М	aximum power (kW)		840	1080	1200	1320	1440						
Num	nber of power modules		28	36	40	44	48						
C	ONFIGURATIONS	MAX. NUMBER OF OUTPUTS x MAX. OUTPUT POWER											
STATIC <sup>5</sup>	Simple configurations	В	-	12x90 sim 24x90 seq	-	-	16x90 sim 32x90 seq						
OTATIO	Simple somiguidations	D	-	6x180 sim	-	-	8x180 sim						
DYNAMIC <sup>6</sup>	Dynamic combiner	J	-	12x180	-	-	16x180						

For the installation of the charging points, the combiner cabinet plates are numbered, so that **the order** of connection of the charging points must be from left to right as shown in the following figure. Note that terminals 5, 6, 7, 8 and 17, 18, 19, 20 must not be used when connecting 16 outputs.





<sup>&</sup>lt;sup>5</sup> Fixed configurations.

<sup>&</sup>lt;sup>6</sup> Option with Smart Power Balance.

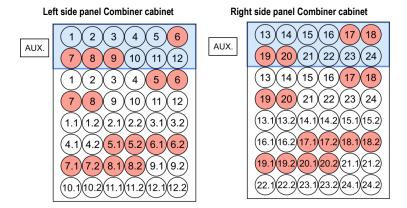
Depending on the different configurations of this combiner model, the combiner DC outputs plates marked in red must not be used. Connections must only be made to the terminals marked in green.

	NO NO	360kW RACK 1						360kW RACK 2						360kW RACK 3						360kW RACK 4					
POWER [kW]	CONFIGURATION	OUTPUT 1	OUTPUT 2	OUTPUT 3	OUTPUT 4	OUTPUT 5	OUTPUT 6	OUTPUT 7	OUTPUT 8	OUTPUT 9	OUTPUT 10	OUTPUT 11	OUTPUT 12	OUTPUT 13	OUTPUT 14	OUTPUT 15	OUTPUT 16	OUTPUT 17	OUTPUT 18	OUTPUT 19	OUTPUT 20	OUTPUT 21	OUTPUT 22	OUTPUT 23	OUTPUT 24
1440	B/J																								
	D																								
1080	B/J																								
	D																								

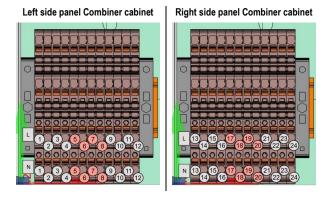
**Note**: If the number of outlets to be installed is less than the maximum number of outlets allowed, the configuration must be balanced between the different racks.

## **Auxiliary services**

The auxiliary services cables must be routed from beneath the station through the corresponding cable glands indicated as AUX., as shown in the following figures. In this example cable glands 5, 6, 7 and 8 on the left side and cable glands 17, 18, 19 and 20 on the right side that must not be used.



Each cable must be connected to its corresponding pin of the left side or right side terminal block as shown in the following figures.



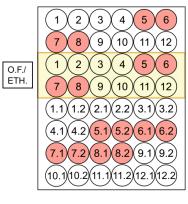
POWER ELECTRONICS NBSK1440 STATION

#### **Communications**

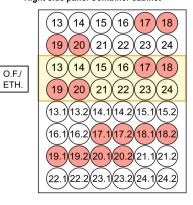
#### **High level communications**

Cables must enter the station through the cable glands indicated as O.F. / ETH., as shown in the following figures. In this example, cable glands 5, 6, 7 and 8 on the left side and cable glands 17, 18, 19 and 20 on the right side must not be used.

Left side panel Combiner cabinet



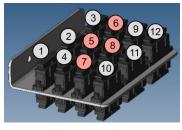
Right side panel Combiner cabinet



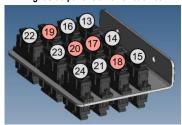
EN

• In case of using the **optical fiber switch**, the customer must route the cables to the metal plates located on the left and right sides of the cabinet as shown in the following figures.

Left side panel Combiner cabinet

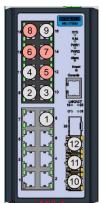


Right side panel Combiner cabinet



• In case of using the **Ethernet switch**, the customer must directly route the cables to the switches in the upper part of the front panels of the cabinet as shown in the following figures.

Left side panel Combiner cabinet Right side panel Combiner cabinet

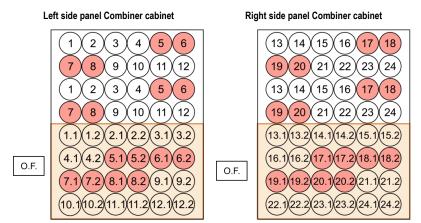




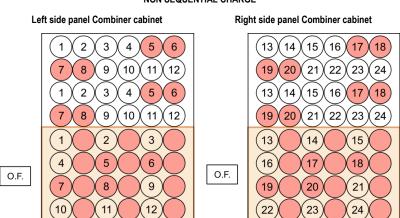
#### **Low level communications**

Optical fiber cables must enter through the cable glands indicated as O.F. in the following figures.

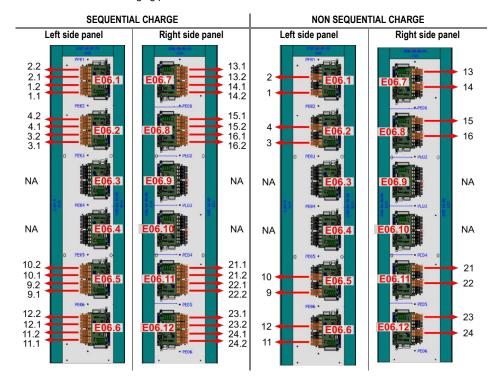
#### SEQUENTIAL CHARGE



#### NON SEQUENTIAL CHARGE



Inside the combiner cabinet, the optical fiber cables must be routed through the indicated bracket towards the Combiner boards as shown in the following figures: E06.1, E06.2, E06.5 and E06.6 on the left side panel and E06.7, E06.8, E06.11 and E06.12 on the right side panel. Note that some of the Combiner boards installed in the product (marked as NA in the following figure) must not be connected to a charging point.



ΕN

#### 4.2.4.3. Combiner Model 3 (4 to 4 / 60kW)

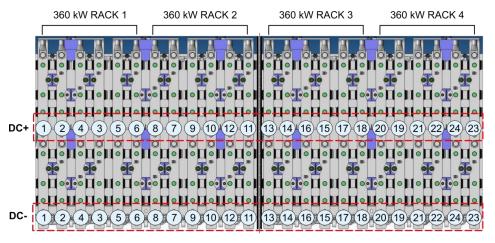
This section details the connections that the customer must make in the combiner cabinet of a station with the 4x4 combiner with 60kW DC outputs. An example for the K configuration of the NBSK1440 station (maximum power of 1440kW) with 24 outputs (DC+ / DC-) will be followed throughout this subsection, for more information about different configurations please refer to the tables below and the specific documentation of the project.

#### DC output power

The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

	COMBINER MODEL 3: 4 to 4 60kW										
	REFERENCE		NBSK84000	NBSK10800	NBSK12000	NBSK13200	NBSK14400	OUTPUT POWER AVAILABLE (kW)			
	Maximum power (kW)		840	1080	1200	1320	1440	,			
Nu	ımber of power modules		28	36	40	44	48	-			
	CONFIGURATIONS		MAX. NUI	MBER OF O	JTPUTS x MA	X. OUTPU	T POWER				
STATIC <sup>7</sup>	Simple configurations	Е	-	-	5x240	-	6x240	-			
DYNAMIC8	Dynamic combiner	K	-	-	20x240	-	24x240	60 / 120 / 180 / 240			

For the installation of the charging points, the combiner cabinet plates are numbered, so that the order of connection must be from left to right as shown in the following figure. Please note that the order of the outputs is not sequential (the order differs respect combiner models 1 and 2).



<sup>&</sup>lt;sup>7</sup> Fixed configurations.

<sup>&</sup>lt;sup>8</sup> Option with Smart Power Balance.

Depending on the different configurations, the combiner DC outputs plates marked in red must not be used. Connections must only be made to the terminals marked green.

	_		360	kW I	RAC	CK 1 360kW RACK 2 360kW RACK 3					360kW RACK 4														
POWER [kW]	CONFIGURATION	OUTPUT 1	OUTPUT 2	OUTPUT 4	OUTPUT 3	OUTPUT 5	OUTPUT 6	OUTPUT 8	OUTPUT 7	OUTPUT 9	OUTPUT 10	OUTPUT 12	OUTPUT 11	OUTPUT 13	OUTPUT 14	OUTPUT 16	OUTPUT 15	OUTPUT 17	OUTPUT 18	OUTPUT 20	OUTPUT 19	OUTPUT 21	OUTPUT 22	OUTPUT 24	OUTPUT 23
1440	E																								
1440	K																								
4000	E																								
1200	K																								

**Note**: If the number of outlets to be installed is less than the maximum number of outlets allowed, the configuration must be balanced between the different racks.

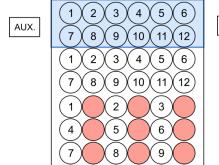


# **Auxiliary services**

The auxiliary services cables must be routed from beneath the station through the corresponding cable glands indicated as AUX., as shown in the following figures.

AUX.

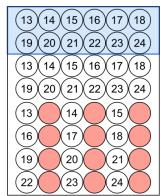




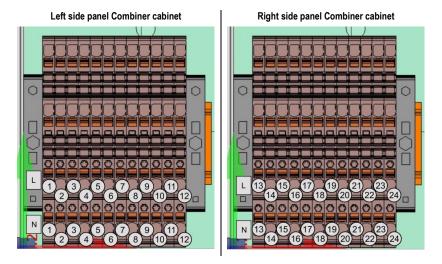
12

10

Right side panel Combiner cabinet



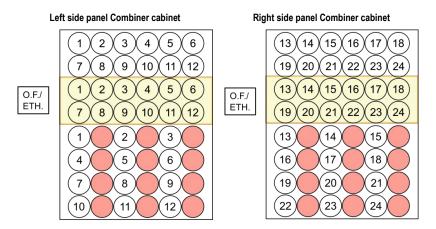
Each cable must be connected to its corresponding pin of the left side or right side terminal block as shown in the following figures.



### **Communications**

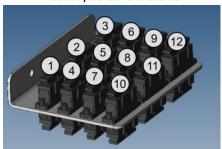
#### **High level communications**

Cables must be routed from beneath the station through the corresponding cable glands indicated as O.F. / ETH., as shown in the following figures.



• In case of using the **optical fiber switch**, the customer must route the cables to the metal plates located on the left and right sides of the cabinet as shown in the following figures.

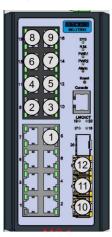
Left side panel Combiner cabinet

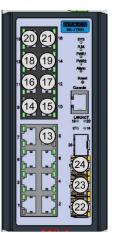




 In case of using the Ethernet switch, the customer must directly route the cables to the switches in the upper part of the front panels of the cabinet as shown in the following figures:

Left side panel Combiner cabinet Right side panel Combiner cabinet

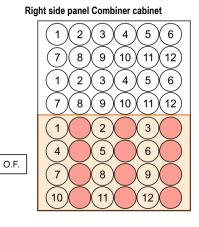




#### Low level communications

Optical fiber cables must enter through the cable glands indicated as O.F. in the following figures. In this example, the cable glands marked in red in the following figures must not be used.

Left side panel Combiner cabinet 7 (23 (17 O.F. 



EN

Inside the combiner cabinet, the optical fiber cables must be routed through the indicated bracket towards the Combiner boards: as shown in the following figures:E06.1, E06.3 and E06.5 on the left side panel and E06.7, E06.9 and E06.11 on the right side panel.

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#### 4.2.4.4. Combiner Model 4 (4 to 4 / 90kW)

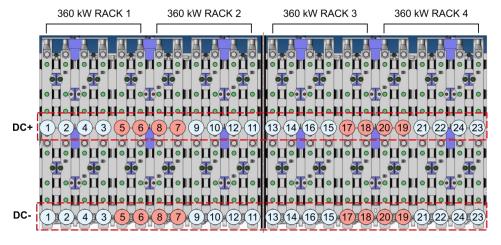
This section details the connections that the customer must make in the combiner cabinet of a station with the 4x4 combiner with 90kW DC outputs. An example for the L configuration of the NBSK1440 station (maximum power of 1440kW) with 16 outputs (DC+ / DC-) will be followed throughout this subsection, for more information about different configurations please refer to the tables below and the specific documentation of the project.

#### DC output power

The following table represents the maximum number of outputs in the combiner and shows the different configurations for each power requirement.

			(	COMBINER MODE	_ 4: 4 to 4 90l	kW		
	REFERENCE		NBSK84000	NBSK10800	NBSK12000	NBSK13200	NBSK14400	OUTPUT POWER AVAILABLE (kW)
Maximum power (kW)			840	1080	1200	1320	1440	
Nun	nber of power modules		28	36	40	44	48	-
C	CONFIGURATIONS		MAX.	NUMBER OF OUTF	PUTS x MAX.	OUTPUT POV	VER	
	Simple configurations	F	-	3x360	-	-	4x360	
STATIC9	Missel configurations	G	-	2x360 + 4x90	-	-	2x360 + 8x90	
	Mixed configurations -		-	2x360+ 2x180	-	-	2x360 + 4x180	
DYNAMIC <sup>10</sup>	Dynamic combiner	L	-	12x360	-	-	16x360	90 / 180 / 270 / 360

For the installation of the charging points, the combiner cabinet plates are numbered, so that the order of connection must be from left to right as shown in the following figures. Please note that the order of the outputs is not sequential (the order differs respect Combiner models 1 and 2) and that terminals 5, 6, 7, 8 and 17, 18, 19, 20 must not be used in this example.



<sup>&</sup>lt;sup>9</sup> Fixed configurations.



<sup>&</sup>lt;sup>10</sup> Option with Smart Power Balance.

Depending on the different configurations, the combiner DC outputs plates marked in red in the following table must not be used. Connections for each configuration must only be made to the terminals marked green.

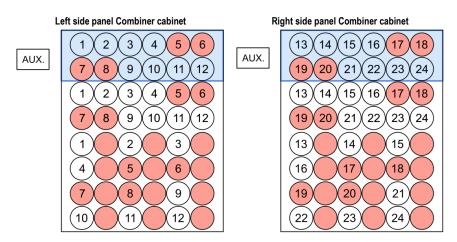
			360	kW I	RAC	K 1			360kW RACK 2					360kW RACK 3				360kW RACK 4							
POWER [kW]	CONFIGURATION	OUTPUT 1	OUTPUT 2	OUTPUT 4	OUTPUT 3	OUTPUT 5	OUTPUT 6	OUTPUT 8	OUTPUT 7	OUTPUT 9	OUTPUT 10	OUTPUT 12	OUTPUT 11	OUTPUT 13	OUTPUT 14	OUTPUT 16	OUTPUT 15	OUTPUT 17	OUTPUT 18	OUTPUT 20	OUTPUT 19	OUTPUT 21	OUTPUT 22	OUTPUT 24	OUTPUT 23
	F																								
4440	G																								
1440	Н																								
	L																								
	F																								
4000	G																								
1200	Н																								
	L																								

Note that for mixed configurations (G and H), the 360kW outputs correspond to terminals 1 and 9, while the remaining terminals correspond to the 90kW (configuration G) or 180kW (configuration H) outputs.

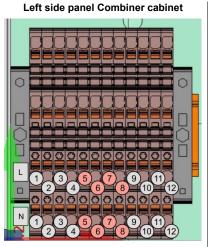
**Note**: If the number of outlets to be installed is less than the maximum number of outlets allowed, the configuration must be balanced between the different racks.

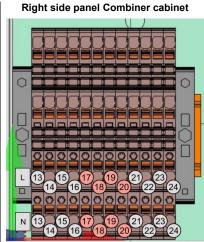
# **Auxiliary services**

The auxiliary services cables must be routed from beneath the station through the corresponding cable glands indicated as AUX., as shown in the following figures. In this example, cable glands 5, 6, 7 and 8 on the left side and cable glands 17, 18, 19 and 20 on the right side must not be used.



Each cable must be connected to its corresponding pin of the left side or right side terminal block as shown in the following figures.



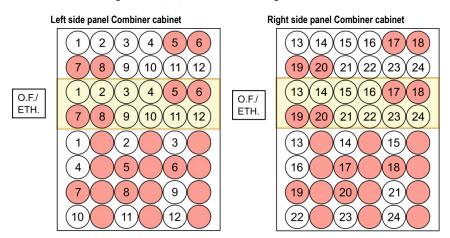


EN

#### **Communications**

#### **High level communications**

Cables must be routed from beneath the station through the corresponding cable glands indicated as O.F. / ETH., as shown in the following figures. In this example, cable glands 5, 6, 7 and 8 on the left side and cable glands 17, 18, 19 and 20 on the right side must not be used.

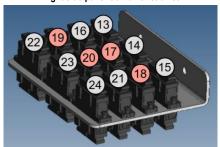


In case of using the optical fiber switch, the customer must route the cables to the metal
plates located on the left and right sides of the cabinet as shown in the following figures. In
this example, the customer must leave terminals 5, 6, 7, 8, 17, 18, 19, and 20 free.

Left side panel Combiner cabinet

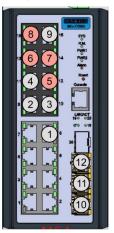


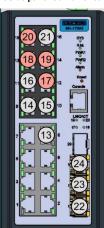
Right side panel Combiner cabinet



 In case of using the Ethernet switch, the customer must directly route the cables to the switches in the upper part of the front panels of the cabinet as shown in the following figures.
 In this example terminals 5, 6, 7, 8, 17, 18, 19 and 20 must be free.

Left side panel Combiner cabinet Right side panel Combiner cabinet





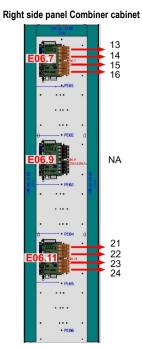
#### Low level communications

Optical fiber cables must enter through the cable glands indicated as O.F. in the following figures. In this example, the cable glands marked in red in the following figures must not be used.

Left side panel Combiner cabinet Right side panel Combiner cabinet (22) (23) <sup>21</sup> (22) O.F. O.F. 

EN

Inside the Combiner cabinet, the optical fiber cables must be routed through the indicated bracket towards the Combiner boards as shown in the following figures:E06.1 and E06.5 on the left side panel; E06.7 and E06.11 on the right side panel. Note that some of the Combiner boards installed in the product (marked as NA in the following figure) must not be connected to a charging point.



# 5. CONTROL ELEMENTS AND INDICATORS





Do not use the emergency stop pushbutton to make regular stops of the station. It must only be used when an emergency occurs. Otherwise, it could shorten the service life of the components and result in damage to the product.

**AC** voltage presence indicators do not allow the avoiding the LOTOTO procedure. Each phase must be measured with a voltmeter to check the absence of voltage.

#### 5.1. Main door

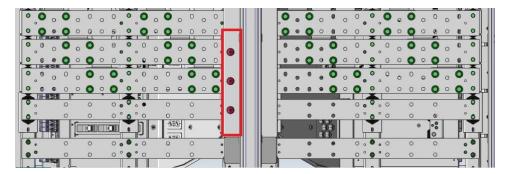
The following control elements and indicators can be found on the main door of the station, corresponding to the AC cabinet:



- Voltage presence indicator: Indicates the presence of voltage when illuminated in white.
- Emergency stop pushbutton: Allows stopping the station in the event of an emergency.
- **4G antennas:** At the top of the right door of the AC cabinet there are two 4G antennas for the communications of the product.

# 5.2. AC busbar

AC voltage presence indicators: Three LEDs located inside the AC cabinet that indicate the
presence of voltage on each phase (L1, L2 and L3) when illuminated in red. Note that it is
possible that any of the LEDs may not be illuminated even if voltage is present. The absence
of voltage must always be checked with a multimeter.





# 6. COMMUNICATIONS



The product can be connected to the internet over the local network using an Ethernet cable or remotely thanks to its 4G router.

Please notice that configuration may vary depending on the options chosen by the customer.



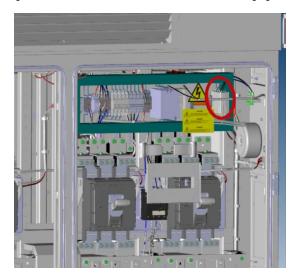
### **WARNING**

Before opening any door, the product must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section. Please use all the indicated PPE.

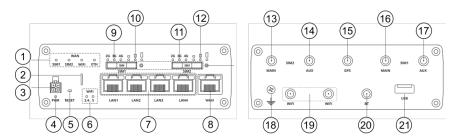
Otherwise, you may suffer an electric shock.

#### 6.1. Remote connection via 4G router

The purpose of remote communication is to have access to the station when the station and the computer are connected to the Internet from different communication networks. The station must be connected to the Internet via Ethernet or 4G. Power Electronics' staff will configure the router during commissioning. The router is installed in the upper right corner of the AC cabinet as shown in the following figure.



The following figures show the front and back view of the router. Each terminal is described in the following table:



REF.	DESCRIPTION
1	WAN type LEDs
2	SIM needle
3	Power socket
4	Power LED
5	Reset button
6	Wi-Fi Band LEDs
7	LAN Ethernet ports
8	WAN Ethernet port
9	Network type LEDs for SIM1
10	Signal strength indication LEDs for SIM1
11	Network type LEDs for SIM2
12	Signal strength indication LEDs for SIM2
13	MAIN antenna connector for SIM2
14	AUX antenna connector for SIM2
15	GNSS antenna connector
16	MAIN antenna connector for SIM1
17	AUX antenna connector for SIM1
18	Grounding screw
19	Wi-Fi antenna connectors
20	Bluetooth antenna connector
21	USB port

# 6.2. Ethernet connection

The Ethernet connection allows accessing the parameters of the product through applications commonly used by the back-office team. This use is mainly focused on maintenance and configuration. Connection will be made by the connector located in the AC cabinet.

EN

# 7. COMMISSIONING





#### **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics. Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for starting up the **NBSK1440 range station** and turning it on for the first time.

Visual inspection: unpackage the product and ensure that all components are in good condition and have not suffered any damage in transit.



Disconnect and insulate the external power supply before starting with the installation.



Perform the anchoring of the product according to the dimensions and clearances given in the technical drawings. Please check the "<u>Anchoring requirements</u>" section.



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections (including communication connections) and tightening torque are correct.

Check the "Torque and screw sizing" and "Cable access and connections" sections.



Make all the connections to the charging points (power supply, auxiliary voltage, ground and communications). Follow the instructions on the corresponding *Hardware and Installation Manual*.

Verify all elements are properly installed.



Verify that the AC input voltage is compatible with the AC voltage range of the product. Verify the selectivity of the external protections to the product and control parameters. Activate the internal protections of the product.



Make sure all doors are properly locked.



Provide power to the external power supply. Use an Ethernet cable to connect a PC to the router of the station and set the available communications remotely.



Ensure the charging points are turned on.



If all previous steps are successful, the station is ready to operate.

Check that the charging points operate correctly.

EN

### 8. MAINTENANCE



In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

#### 8.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the *Safety Instructions for Operating, Troubleshooting and Maintenance*.



### **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged, and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations



#### WARNING

Before opening any door, be sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure. Always apply the <u>five golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

# 8.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	6h and 15min

	POWER REVISION (STATUS 1)	TIME (MINUTES)	OK
1	Environmental conditions – Visual check	15	
2	Enclosure state – Visual check	15	
3	Make sure the product can be accessed remotely - connection to the PC if it exists.	15	
4	Display operation – visual and manual check (dispensers with display).	15	
5	Main temperatures within range - remote check, if it exists.	30	
6	Ventilation system and absence of vibrations - visual and auditory check	15	
7	Charge connector operation - visual and manual check	15	
8	Charge test recommended (optional)	30	
9	Operation of the differential switch - Visual and manual check (optional)	15	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MINUTES)	ОК
1	Internal cleaning	45	
2	Filters - visual check and replacement	45	
3	Doors condition	30	
4	Cables and conductors - visual and manual check	30	
5	External and internal tightening torques - manual check	30	
6	Control circuit and protections - manual check	30	



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# NB SERIES - SLIM / COOLED / DEPOT DISPENSER & PANTOGRAPH SOLUTION

# HARDWARE AND INSTALLATION MANUAL



# SLIM / COOLED / DEPOT DISPENSER & PANTOGRAPH SOLUTION

—— EV CHARGING SOLUTIONS ———

Hardware and Installation Manual

Edition: May 2024 NBG2MHW02Cl Rev. C

### **ABOUT THIS MANUAL**

#### **PURPOSE**

This manual contains important instructions for the installation, configuration and maintenance of the EV charging solutions Slim Dispenser, Cooled Dispenser, Depot Dispenser and Pantograph Solution: Top Down (TD) and Bottom Up (BU).

From now on, this manual may refer to them with the terms, "Dispenser", "charger" or "product".

Power Electronics reserves the right to modify product features. Any possible updates to the mentioned products will be reflected in subsequent revisions of this manual.

#### **TARGET AUDIENCE**

This manual is intended for qualified customers who will install, configure and operate the EV charging solutions: Slim Dispenser / Cooled Dispenser / Depot Dispenser / Pantograph Solution (TD and BU).

Only qualified and/or designated technical personnel according to agreements signed with Power Electronics may install and commission the charger.

#### REFERENCE MANUALS

The following reference documents are available for Power Electronics electric vehicle charging solutions:

- Programming and Software Manual
- Safety Instructions for Operating, Troubleshooting and Maintenance.
- Faults, Warnings and Troubleshooting Manual.



# NOTICE

#### WARRANTY DISCLAIMER

The manufacturer is not liable for damages, losses, costs or expenses incurred by any user of the product if such damages, losses, costs or expenses result from a failure to comply with the applicable safety instructions or general instructions or operating instructions given by the manufacturer in any of the documents and manuals of the product, including, but not limited to hardware installation, programming and operation, maintenance instructions, handling, or any other. Any damages, losses, costs or expenses resulting from the improper handling, manipulation, modification or operation of the product will be subject to the company's warranty terms.

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#### **REVISIONS CONTROL**

DATE (DD/MM/YYYY)	REVISION	DESCRIPTION
26 / 01 / 2024	Α	First edition.
13 / 02 / 2024	В	Corrected the order of the figures showing the connection of the high-level communications of the Depot Dispenser in the <i>Communications connection</i> section in <i>4.2 Connections</i> .
		Update of the Warranty Disclaimer notice in the About this manual section.
22 / 05 / 2024	С	Reorganization of the following sections: Handling, transportation and installation; Cable access and connections; Control elements and indicators; and Accessories which are now grouped into product specific sections: 3. Slim Dispenser, 4. Cooled Dispenser, 5 Depot Dispenser, 6. TD Pantograph Solution and 7 BU Pantograph Solution.
		Update of the compatible pantograph models in sections: <i>Technical characteristics (1.3 and 1.4), Cable access and cable size (6.2.1 and 7.2.1), Connections (6.2.2 and 7.2.2).</i>



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The products and technical documentation are periodically updated. Power Electronics reserves the right to modify all or part of the contents of this manual without previous notice. The reproduction or distribution of the present manual is strictly forbidden, unless express authorization from Power Electronics.

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# **ACRONYMS**

The terms commonly used in the documentation of Power Electronics' products are listed in the table below.

Please notice this is a general series of terms and it encompasses all our product divisions (industrial, solar, storage, and electric mobility), thus, some of the following expressions may not apply to this particular manual.

ACRONYM	MEANING
AASS	Auxiliary Services
AC	Alternating Current
Al	Analogue Input
AO	Analogue Output
BESS	Battery Energy Storage System
BMS	Battery Manager Solution
CCID	Charge circuit interrupting device
CCL	Charge Current Limit.
CCS	Combined charging system – charging and communications protocol following the standard IEC 61851-23 Annex CC
CHAdeMO	Charging and communications protocol following the standard IEC 61851-23 Annex AA
CPU	Central Processing Unit
DC	Direct Current
DCL	Discharge Current Limit
DI	Digital Input
DSP	Digital Signal Processor
DO	Digital Output
EMS	Energy Management System
EV	Electric Vehicle
FPGA	Programmable device (Field-Programmable Gate Array)
FRU	Field Replaceable Unit
GFDI	Ground Fault Detector Interrupter
GPRS	General Packet Radio Services, a data transmission system
HVAC	Heating, Ventilation, and Air Conditioning
IGBT	Insulated Gate Bipolar Transistor
IMI	Insulation monitoring device
IT	Grid system where the power supply is kept isolated and the electrical equipment system is grounded.
LOTOTO	Lock Out – Tag Out – Tryout
MCB	Miniature Circuit Breaker
MCCB	Moulded Case Circuit Braker
MPCS	Multi Power Conversion System
MID	Measuring Instrument Directive
MV	Medium Voltage. This term is used to refer to high voltage in general
PE	Ground connection
PI	Proportional and Integral
POI	Point Of Interconnection
PPE	Personal Protection Equipment
PV	Photovoltaic energy
RCD	Residual Current Device
RCM	Residual Current Monitor
COIVI	Nosituai Outfort Worldon

#### POWER ELECTRONICS SLIM / COOLED / DEPOT DISPENSER & PANTOGRAPH SOLUTION

ACRONYM	MEANING
RFID	Radio Frequency Identification
SOC	State Of Charge – referred to battery
SOH	State Of Health – referred to battery. It compares the actual state of the battery to its initial conditions. It is measured in percentage
STO	Safe Torque Off
TN	Grid system where the power supply is grounded, and the electrical equipment system is brought to the same ground through the neutral connector.
TT	Grid system where both the power supply and the electrical devices are connected to the ground via separate connections
UPS	Uninterruptible Power Supply
VSD / VFD	Variable Speed Drive, Variable Frequency Drive. Both terms are used



# **SAFETY SYMBOLS**

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

WARNING	Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death.  Be extremely careful and follow the instructions to avoid the risk of electrical shocks.
CAUTION	Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury.  Read the message and follow the instructions carefully.
NOTICE	Identifies important measures to take in order to prevent product damage and warranty lost, as well as encouraging good use and environmental practices.

Other symbols used in this manual for safety messages are the following:



Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.



Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.



Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.

### SAFETY INSTRUCTIONS

#### **IMPORTANT!**

#### SAVE THESE INSTRUCTIONS

This manual contains important instructions for the EV charging solutions **Slim Dispenser, Cooled Dispenser, Depot Dispenser and the Pantograph Solution** that must be followed during installation and maintenance of the product. Carefully read all documentation before handling the product and pay special attention to safety recommendations to maximize the performance of this product and ensure its safe use and installation

This document covers the most important and frequent potential causes of damage to the product or personnel. It is the responsibility of the installer to follow the instructions provided in this manual, follow good electrical practices and to identify all warnings and recommendations before starting up and operating the electric vehicle chargers.





#### WARNING

#### FIRST CONSIDERATIONS

#### The operations detailed in this manual must only be performed by qualified personnel.

The condition of qualified personnel referred to in this manual must be at least the condition that meets the standards, regulations and safety laws applied to the installation and operation of this product.

#### Read and retain the Hardware and Installation Manual for future reference.

Before assembling the product, read all instructions, caution signs and other sections of this manual. Failure to follow these warnings can result in severe electrical shock or death. Pay attention at all times to prevent possible accidents.

In addition to the recommendations in this manual, **local and site-specific safety procedures must be observed**. Additionally, local and national electrical regulations must be followed to avoid personal injury and/or product damage.

The electric vehicle charging system may cause an ELECTRICAL DISCHARGE if the warnings indicated in this manual are not followed.

Make sure the product is completely disconnected from the power supply and grounded before handling or servicing. Otherwise, there is a risk of electric shock. To avoid electrical hazards, disconnect the input supply, ground the product, remove control voltages before performing any tasks, and ensure that busbars are completely discharged. Warning and safety labels must be properly affixed to terminals, cabinets, and control panels in accordance with local regulations.

#### When working on electrical installations, always remember to apply the FIVE GOLDEN RULES:

- 1. Visible shutdown of all live sources.
- 2. Mechanical locking of all cutting elements.
- 3. Verify the absence of voltage by using the appropriate tools for the voltage of the installation.
- 4. Ground and short-circuit all possible voltage sources.
- 5. Delimit and mark the work area.



#### WARNING



The housing must be properly closed, otherwise it may not adequately protect people or property from any abnormal situation inside the product.

**Always follow the instructions in the manual to move and position the product.** The weight of this product can cause injuries, serious injuries and even death if not handled correctly.

The exhaust airflow can reach high temperatures during charging sessions, especially when the outdoor temperature and power demand are high.

**Electric shock danger.** The steps to isolate the product must be carefully followed before performing any task or opening any cover of the product. Avoid inappropriate actions that may cause electric shock.

Always wear the appropriate personal protective equipment (PPE) for each task and work in electrical areas with dry hands. Otherwise, you may suffer an electric shock.

Do not use cables with damaged insulation. Do not subject cables to abrasion, excessive stress, heavy loads or pinching. Otherwise, you may suffer an electric shock.

Do not supply power to a damaged product or with missing parts, even if the installation is complete. Otherwise, you may suffer an electric shock.

In the event that the product stops due to a loss of power, do not perform any work on it. The autorestart function may be enabled, and you may suffer an electric shock.



The product has capacitors. Wait until the capacitors have discharged before performing any maintenance task.

#### USE

Do not use these products for purposes other than charging the electric vehicle via the available modes for this product and defined in this manual.

**Do not disconnect or connect any terminals while the product is running.** Otherwise, you may suffer an electric shock and the product may be damaged.

**Do not use this product if its enclosure or electric vehicle connector(s)** (on both the product and vehicle sides) **are broken, cracked or otherwise damaged.** Otherwise, you may suffer an electric shock.

#### **GROUND CONNECTION**

Prevention of electric shock:

- The product chassis must be properly grounded to prevent a possible electrical shock if a leakage current flows through the enclosure. Disconnect all power supplies before proceeding with maintenance operations inside the product.
- Only connect the grounding device to the grounding plate of the product. Do not use the enclosure
  or chassis screws for grounding.
- The protective earth wire must be connected first and last disconnected.



#### **CAUTION**

Install the product, both the power station and the dispenser, on a solid, level surface in a location where there is no risk of explosion, flooding, or impact damage. Follow the recommendations on how to build the foundation of this manual. Otherwise, there is a risk of malfunction and even permanent damage.

Never clean the surfaces or the inside of the product with abrasive liquids, solvents or cleaning products that could damage it. Water must not be applied with excessive pressure.



Disconnect the input power in case the product gets damaged.

Otherwise, it could result in a secondary accident or a fire.

Do not allow lint, paper, wood chips, dust, metallic chips, or other foreign matter into the product. Otherwise, a fire or an accident could occur.



After the input power is applied or removed, the product will remain hot for a few minutes. Touching internal hot parts could result in skin burns

# EN

#### IMPORTANT RECOMMENDATIONS FOR CHARGING ELECTRIC VEHICLES:



#### CAUTION

Always follow the charging instructions described by the electric vehicle manufacturer.

This product should be monitored when used near children.

Do not handle the vehicle or product during the charging process (washing of the vehicle, intervention in the vehicle engine compartment, handling of the charger, etc.).

Do not modify or interfere with the electrical installation while charging the vehicle. Failure to do so could result in electric shock.

Do not charge the vehicle in the event of water, signs of corrosion or foreign matter on the charger cable connector or vehicle charging socket. Otherwise, there is a risk of fire and electric shock.

Do not attempt to touch the terminals of the charging station connector cable or the vehicle charger socket, nor insert objects into them. Failure to do so could result in electric shock.

Do not attempt to disassemble, repair, alter or modify the charging connector or any part of the charger. The connector is not a user-serviceable device. Contact Power Electronics.

Always be careful with the cables and connectors of the charger: treat them carefully, do not crush them, immerse them in water, pull them out, or hit them, etc.

Follow the instructions given by the vehicle manufacturer regarding the suitability of charging the vehicle when you or the vehicle are exposed to intense rain, heavy electrical storm, or other severe weather.

The head of the connectors must always be inserted in the holders of the charger when not charging. Leaving the contacts of the connectors unprotected may result in future malfunction.

Where applicable, the charging cable management system must be retracted after each charge. Failure to do so may result in early attrition.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE from now on) REQUIRED

The use of PPE in accordance with standards is required to repair and maintain the product. Follow applicable instructions at the installation site to comply with national and local regulations.

**In the case of tasks with voltage present,** it is mandatory to use an Electric Arc Safety Kit (gloves, clothing and face protection).

A detailed example of the PPE used is shown below. The customer must specify in his safety instructions (hazard statement and work procedure) which PPE is required and when and how they should be used according to his electric arc studies, the characteristics of the site, the chargers, the installation and the country.

Power Electronics assumes no liability for damage resulting from improper use of the product or failure to comply with local or national regulations.

Always follow local regulations / NEC Health & Safety standards.

The following table shows an example of commonly used PPE:

ITEM	DESCRIPTION
Safety glasses	Eye protection according to EN 166 / ANSI Z87.1.
Electric gloves	Gloves with mechanical, dielectric and against arc flash. Class according to voltage. EN 60903; ASTM D120 specifications and NFPA 70E standards.
Safety footwear	S3 class complying with BS EN ISO 20345 / ASTM F2413-11.
Insulation carpet	Insulation carpet according to IEC 61111 / ASTM Class 4.  The insulation carpet must be used when there is voltage inside the charger or when checking the voltage absence.
Safety kit arc flash	Arc flash personal protective equipment kit (including arc flash protective face shield & hard hat), fire resistant 40cal/cm².
Padlock set	Padlock and auxiliary elements set to lock out dangerous equipment.
HI-VIS vest	Fr VIS vest 9cal/cm <sup>2</sup> .
MV stool	Medium Voltage insulation stool.
Rescue pole	Insulated body rescue pole.

#### PPE FOR INSTALLATION









Additional PPE for commissioning and maintenance tasks









Safety clothes according to NFPA-70E and safety labels

The following table shows the protection class type, depending on the working voltage.

ELECTRICAL	. INSULATI	ED GLOVES
------------	------------	-----------

ELECTRICAL INSULATED GLOVES								
Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )						
00	500	750						
0	1000	1500						
1	7500	11250						
2	17000	25500						
3	26500	39750						
4	36000	54000						

**ELECTRICAL SAFETY MATTING** 

Class AC (V <sub>AC</sub> ) DC (V <sub>DC</sub> ) 0 1000 1500 1 7500 11250 2 17000 25500			
1 7500 11250	Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )
	0	1000	1500
2 17000 25500	1	7500	11250
	2	17000	25500
3 26500 39750	3	26500	39750
4 36000 54000	4	36000	54000



#### NOTICE

PPE must be checked according to the instructions of the manufacturer.

The electrical gloves must have thermal, electric and mechanical protection. If gloves only have dielectric protection, it is mandatory to use under fireproof gloves and over gloves cover.



#### **NOTICE**

#### RECYCLING

Product packaging must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.

To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).



Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management.

Our products contain electronic boards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic boards, capacitors and other electronic devices).



#### NOTICE

#### CYBERSECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. Access to the system is restricted to those employees who legitimately need it for reasons of maintenance and/or updating of the system.

It is sole responsibility of the customer for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer must establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.



# **TORQUE AND SCREW SIZING**

The following table shows the torque for both mechanical and electrical connections, applicable to all products [1, 2]:

SCREV	N SIZE	TORQUE					
METRIC	ENGLISH	NGLISH ISO 8.8 QUALITY[a]					
(mm)	(in.)	(Nm)	(lb-ft)				
M3	1/8	1,3	0.95				
M4	5/32	3	2.21				
M5	3/16	6	4.42				
M6	1/4	8	5.9				
M8	5/16	20	14.75				
M10	7/16	40	29.5				
M12	1/2	60	44.25				
M14	9/16	120	88.5				
M16	5/8	210	154.89				

[a] For other qualities, follow the guidelines of the screws manufacturer.



## **CAUTION**

For all screwing that hold a **particular component** such as a bus, contactor, etc. it will be necessary to **apply the tightening torque indicated by the manufacturer** of the same component.

Screwing must be correctly tightened only when necessary, i.e. when the factory marks are not in place. For small screws that do not have marks, the good electrical praxis will determine if it is loose.

<sup>&</sup>lt;sup>1</sup> Power Electronics recommends the use of **Zinc Steel quality 8.8 bolts for internal connections** in general, DC and earth connections included.

<sup>&</sup>lt;sup>2</sup> Power Electronics recommends the use of A2-70 stainless bolts for external connections in general, AC connections included.

# 1. TECHNICAL CHARACTERISTICS



## 1.1. SLIM & COOLED DISPENSER

REFERENCE			VALUES			
	Maximum continuous current CCS [A]	200 / 250 / 300 / 500 [1]				
	Peak current CCS [A] [2]	500				
DC OUTPUT	Maximum current CHAdeMO [A]	125				
	Voltage range [V] [3]		150 – 1000			
	Available connectors	CCS-1, CCS-2, CHAdeMO				
	Degree of protection	NEMA	A 3R   IP54   IK10 (IK08 for ventilation grilles)			
	0	Standard	-25 to 50 / -13 to 122			
FNVIDONMENTAL	Operating temperature range [°C / °F]	Optional -30 to 50 / -22 to 122				
ENVIRONMENTAL RATINGS	Wind conditions [mph]		Up to 140			
	Relative humidity		From 4% to 95%			
	Maximum altitude (above sea level) [m / ft]		Without derating: 2000 / 6561			
	iviaximum aititude (above sea levei) [m/ it]	Max: 3000 / 9842				
STANDBY	Standby power consumption [W] [4]	Slim Dispenser: 50 (IEC) / 53 (UL)				
CONSUMPTION	Standby power consumption [w] 141	Cooled Dispenser: 57 (IEC) / 60 (UL)				
PROTECTIONS	DC Charge	Insulation monitor				
	Interface	Standard -	10" Touchscreen			
		Otanaara	E-stop pushbutton			
		Optional Payment terminal (POS)				
	RFID reader	ISO14443 A/B, MIFARE, Calypso, ISO18092, ISO15693 and more				
	Energy measurement -	Standard	Internal Energy Measurement			
		Optional	DC meter for DC output			
HARDWARE	_	Standard	5 / 16.4			
HARDWARE	Cable length [m / ft]	Optional -	7,6 / 25			
		Ориона	6,1 / 20 [5]			
	Enclosure / Foot / Glass color	Wh	nite (RAL 9016) / Grey (RAL 7016) / Black			
	Customization [6]		Enclosure / Foot / Glass / Logo			
	A attendable and a linear and a	Door secu	rity locking system controlled by an exclusive key (also on the foot of the charger)			
	Antivandalism security -	Security screws on the connector holders and the charging cable clamps				
COMMUNICATIONS	Charge protocols	IS	O 15118, CHAdeMO 1.1 and DIN 70121			
COMMUNICATIONS	Communication protocols		OCPP 1.6J and API Rest [6]			
REGULATION			-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2; IL 2202, NEC 625, FCC Part 15 Class A			

<sup>&</sup>lt;sup>1</sup> Slim Dispenser available with 200 / 250 / 300A connector. Standard Cooled dispenser available with one 500A output. Consult with Power Electronics for availability.

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<sup>&</sup>lt;sup>2</sup> Consult with Power Electronics for more information about the connector overload capability.

<sup>&</sup>lt;sup>3</sup> 150 – 500Vdc for CHAdeMO. Maximum power from 300Vdc.

<sup>&</sup>lt;sup>4</sup> Consult Power Electronics for further information on standby reactive power.

<sup>&</sup>lt;sup>5</sup> This charging cable length is only available for the Slim Dispenser.

<sup>&</sup>lt;sup>6</sup> Consult with Power Electronics for further information.

# 1.2. DEPOT DISPENSER

REFERENCE			VALUES		
	Maximum continuous current CCS [A]		200 / 250 / 300		
DC OUTPUT	Peak current CCS [A] [1]	500			
	Voltage range [V]		150 – 1000		
	Available connectors		CCS-1 and CCS-2		
	Degree of protection	NEMA 3F	R   IP54   IK10 (IK08 for ventilation grilles)		
	Operating temperature range [°C / °F]	Standard	-25 to 50 / -13 to 122		
	Operating temperature range [*C / *F]	Optional	-30 to 50 / -22 to 122		
ENVIRONMENTAL RATINGS	Wind conditions [mph]		Up to 140		
	Relative humidity		From 4 % to 95 %		
	Maximum altitude (above and level) [m. /fil	Without derating: 2000 / 6561			
	Maximum altitude (above sea level) [m / ft]	Max: 3000 / 9842			
STANDBY CONSUMPTION	Standby power consumption [W] [2]	29 (IEC) / 28 (UL)			
PROTECTIONS	DC Charge	Insulation monitor			
		Status LED indicator			
	Interface	E-stop pushbutton			
		Stop charging button			
HARDWARE	Cable langth [m / ft]	5,5 / 18			
HARDWARE	Cable length [m / ft]	7,6 / 25			
	Enclosure / pedestal color	W	hite (RAL 9016) / Grey (RAL 7016)		
	Antivandaliam acqueity	Door security	locking system controlled by an exclusive key		
	Antivandalism security	Secu	urity screws on the connector holders		
COMMUNICATIONS	Charge protocols		ISO 15118 and DIN 70121		
COMMUNICATIONS	Communication protocols		OCPP 1.6J and API Rest [3]		
REGULATION	IEC 61851-23, IEC 61851-24, IEC 61851-21-2 202, NEC 625, FCC Part 15 Class A				

<sup>&</sup>lt;sup>1</sup> Consult Power Electronics for more information about the connector overload capability.
<sup>2</sup> Consult Power Electronics for further information on standby reactive power.
<sup>3</sup> Consult with Power Electronics for further information.

# 1.3. TOP DOWN (TD) PANTOGRAPH SOLUTION

## 1.3.1. TD - Power box & Button box

	REFERENCE	VALUES			
	Max continuous current [A]	500			
	Max peak current [A] [1]	600			
DC OUTPUT	Voltage range [V]	150 -1000			
	Pantograph compatible models [2]	Schunk: SLS201.102, SLS201.106. Stemmann: Fb206.11			
	Protection rating	NEMA 3R   IP54   IK10 (IK08 ventilation grilles)			
ENVIRONMENTAL RATINGS	Operation temperature range [°C / °F]	-30 to 50 / -22 to 122			
	Relative humidity	4% to 95%			
	Maximum altitude (above and level) [no / ft]	Without derating: 2000 / 6561			
	Maximum altitude (above sea level) [m / ft]	Max: 3000 / 9842			
	Power Box & Pantograph [3] [m / ft]	10m / 33ft			
MAX DISTANCES INSTALLATION	Power Box & NBi Power Cabinet / NB Station [m / ft]	100m / 328ft (Optional: 150m / 492ft with Optical fiber)			
	Button box & Power Box [m / ft]	100m / 328ft			
		LED indicator			
	Button box	Emergency Stop Button			
HARDWARE		Stop charging button			
	Enclosure	Grey (RAL 7035)			
	Optional	RFID antenna, Wi-Fi antenna			
COMMUNICATIONS	Charge protocols	OppCharge, OCPP 1.6J			
COMMUNICATIONS	Communication protocols	Ethernet (10/100) / Optional: Optical fiber			
REGULATIONS		IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2 UL 2202, FCC PART 15 Class A			



Limited by pantograph.
 Consult with Power Electronics for further information.
 Consult with Power electronics for other distance.

# 1.4. BOTTOM UP (BU) PANTOGRAPH SOLUTION

## 1.4.1. Power box & Button box

	REFERENCE	VALUES		
	Max continuous current [A]	500		
	Max peak current [A] [1]	600		
DC OUTPUT	Voltage Range [V]	150 -1000		
	Pantograph compatible models [2]	Schunk: SLS201.102, SLS201.106. Stemmann: Fb206.11		
	Protection rating	NEMA 3R   IP54   IK10 (IK08 ventilation grilles)		
ENVIRONMENTAL RATINGS	Operation Temperature Range [°C / °F]	-30 to 50 / -22 to 122		
	Relative Humidity	4% to 95%		
	Maying a philoda (abaya ana laya) [na / ft]	Without derating: 2000 / 6561		
	Maximum altitude (above sea level) [m / ft]	Max: 3000 / 9842		
	Power Box & Pantograph [3] [m / ft]	10m / 33ft		
MAX DISTANCES INSTALLATION	Power Box & NBi Power Cabinet / NB Station [m / ft]	100m / 328ft (Optional: 150m / 492ft with Optical fiber)		
	Button box & Power Box [m / ft]	100m / 328ft		
		LED indicator		
	Button box	Emergency Stop Button		
HARDWARE		Stop charging button		
	Enclosure	Grey (RAL 7035)		
	Optional	RFID antenna, Wi-Fi antenna		
COMMUNICATIONS	Charge protocols	OppCharge, OCPP 1.6J		
	Communication protocols	Ethernet (10/100) / Optional: Optical fiber		
REGULATIONS		IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2 UL 2202, FCC PART 15 Class A		

## 1.4.2. Control box

	REFERENCE	VALUES			
	Protection rating	NEMA 3R   IP54   IK10 (IK08 ventilation grilles)			
	Operation Temperature Range [°C / °F]	-30 to 50 / -22 to 122			
ENVIRONMENTAL RATINGS	Relative Humidity	4% to 95%			
101111100	Manifestory allifests (-bases and less) For (61)	Without derating: 2000 / 6561			
	Maximum altitude (above sea level) [m / ft]	Max: 3000 / 9842			
MAX DISTANCES INSTALLATION	Control box and Pantograph [m / ft]	10m / 33ft			
	Control box and NBi Power Cabinet/ NB Station [m / ft]	100m / 328ft			
HADDWADE	Pantograph compatible models [2]	Schunk SLS 102 and Schunk SLS 103			
HARDWARE	Enclosure	Grey (RAL 7035)			
COMMUNICATIONS	Charge protocols	ISO 15118, OCPP 1.6J			
COMMUNICATIONS	Communication protocols	Ethernet (10 / 100) + Optical fiber			
REGULATIONS		IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2			

Limited by pantograph.
 Consult with Power Electronics for further information.
 Consult with Power electronics for other distance.

# 2. DIMENSIONS AND WEIGHT

2



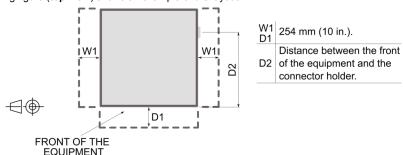
## **NOTICE**

ADA regulation (ANSI A117-1 2009) specifies that user operable parts must be located at a height no greater than 1220mm (48in.), provided that the project design allocates the necessary clear access space in front of the charger (when applicable) and to each side of the Dispenser, where the edge of the access space is not greater than 254mm (10in.) from the Dispenser. Therefore, the maximum curb height for any Dispenser anchored to the ground must be less than 200mm (7.9in.).

If the layout of the access space includes an obstruction or the edge of the access space is greater than 254mm (10in.) from the necessary accessible side or front, then the maximum high-reach distance to the operable components may require to be reduced to 1170mm (46in.) or less. It is the responsibility of the installer to consult with local authorities on the applicable regulation details and to provide a clear floor space in front and to each side of the Dispenser, and curb height, so that maximum horizontal and vertical reach distances follow the current absolute limits.



The following figure (top view) shows an example of the layout:



**Note:** Front access to the connector handle can be achieved if the maximum reach is maintained to be less than 609,6mm (24in.) and height is less than 1168,4mm (46in.) although the manufacturer still recommends the installer to leave proper access to the side of the charger.

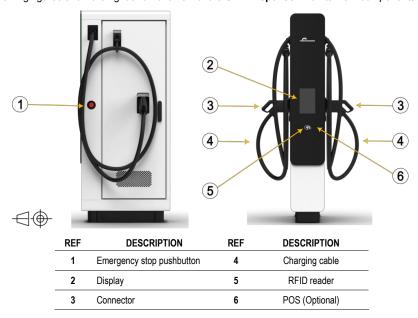
In case of having selected the optional payment terminal, please consider the dimensions indicated in the section "Payment terminal" regarding accessibility: refer to section  $\underline{3.6.1}$  for Slim Dispenser or to section  $\underline{4.6.1}$  for Cooled Dispenser.

Consider these general rules of height and obstruction when installing the holsters of the Depot Dispenser in a wall. The body of the wall Depot Dispenser and the Pantograph boxes do not have to follow any of the ADA regulation guidelines.

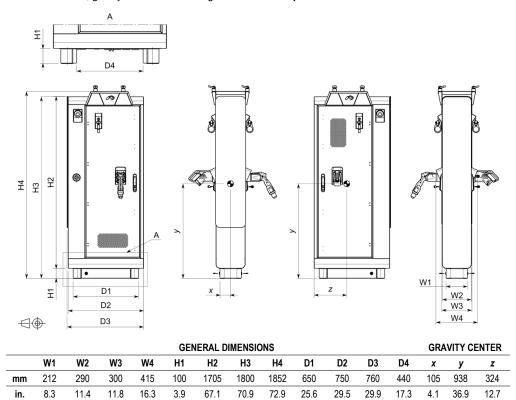
All dimensions of the figures are coded as: W for widths, H for heights and D for depths.

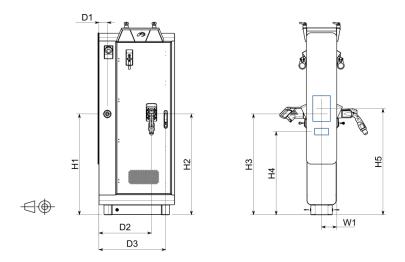
## 2.1. SLIM DISPENSER

The following figures show the right and front view of the **Slim Dispenser** with its main components:



The dimensions, gravity center and the weight of the **Slim Dispenser** are detailed in this section.





ACCESIBLE ELEMENTS									
	W1	H1	H2	Н3	H4	H5	D1	D2	D3
mm	150	1000	1000,5	1016,5	825	1052	83,5	520	662
in.	5.9	39.4	39.4	40	32.5	41.4	3.3	20.5	26.1

The approximate weight of the **Slim Dispenser** charger with two 300A CCS-1 7,6m (25ft) charging cables is 240kg (528lb). The approximate weight of each available charging cable is detailed in the following table.

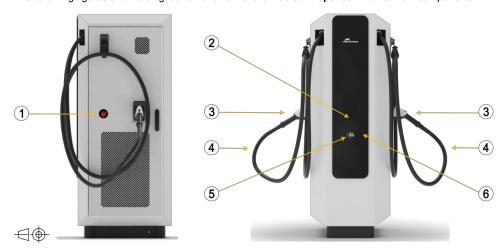
CCS1					CCS2					CHADEMO				
Amperage	Α	2	00		300		20	200 250			300		125 <sup>[1]</sup>	
l ammth	m	5	7,6	5	6,1	7,6	5	7,6	5	7,6	5	7,6	5	7,6
Length	ft	16.4	25	16.4	20	25	16.4	25	16.4	25	16.4	25	16.4	25
Max.	m	4,6	7,2	4,6	5,7	7,2	4,6	7,2	4,6	7,2	4,6	7,2	4,6	7,2
Effective length	ft	15.1	23.7	15.1	18.7	23.7	15.1	23.7	15.1	23.7	15.1	23.7	15.1	23.7
NA/-:	kg	14	19,2	22,42	26,05	31	10,5	14,7	14,6	20.5	21	29	6,2 (9.7)	9,9 (13.5)
Weight	lb	30.86	42.33	49.43	57.43	68.34	23.2	32.4	32.2	45.2	46.3	63.9	13.7 (21.4)	21.8 (29.8)

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<sup>[1]</sup> This columns indicate the values for the IEC version of the product, the values in parentheses are applicable to the UL version.

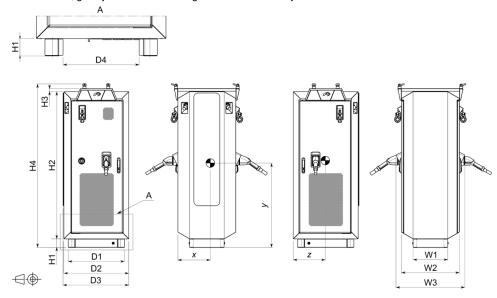
# 2.2. COOLED DISPENSER

The following figures show the right and front view of the **Cooled Dispenser** with its main components:

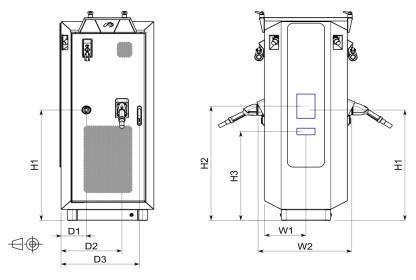


REF	DESCRIPTION	REF	DESCRIPTION
1	Emergency stop pushbutton	4	Charging cable
2	Display	5	RFID reader
3	Connector	6	POS (Optional)

The dimensions, gravity center and the weight of the **Cooled Dispenser** are detailed in this section.



	GENERAL DIMENSIONS											GRA	VIIY CEN	IIER
	W1	W2	W3	H1	H2	Н3	H4	D1	D2	D3	D4	x	У	z
mm	400	670	795	100	1700	35	1890	650	750	760	440	375	976	370
in.	15.75	26.38	31.30	4	67	1.38	74.41	25.59	29.53	29.92	17.32	14.76	38.43	14.57



			ACCES	IBLE ELI	EMENTS			
	W1	W2	H1	H2	Н3	D1	D2	D3
mm	335	670	1000	1034	805	205	492	633,5
in.	13.19	26.38	39.37	40.71	31.69	8.07	19.37	24.94

The approximate weight of the **Cooled Dispenser** with two 500A 7,6m (25ft) charging cables is 350kg (772lb).

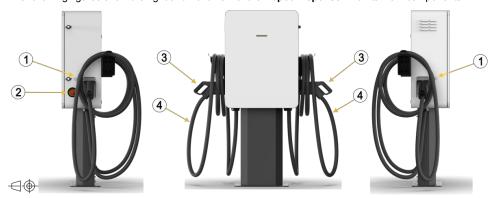
The approximate weight of each available charging cable is detailed in the following table.

		CCS1		CC	S2
Amperage	Α	50	500		00
Lamadh	m	5	7,6	5	7,6
Length	ft	16.4	25	16.4	25
May Effective length	m	4,6	7,2	4,6	7,2
Max. Effective length	ft	15.1	23.7	15.1	23.7
Mainh	kg	11,7	15,4	9,8	12,9
Weight	lb	25.7	34.1	21.6	28.5



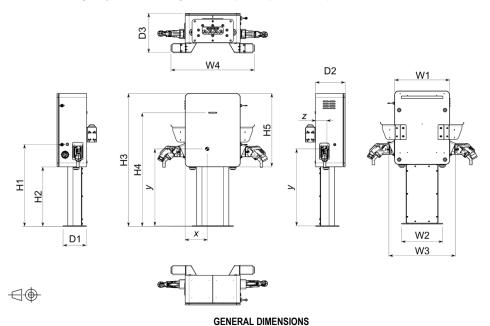
# 2.3. DEPOT DISPENSER

The following figures show the right and front view of the **Depot Dispenser** with its main components:



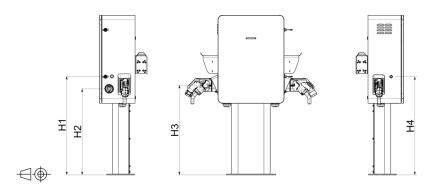
REF	DESCRIPTION	REF	DESCRIPTION
1	Stop charge button	3	Connector
2	Emergency stop pushbutton	4	Charging cable

The dimensions, gravity center and weight of the **Depot Dispenser with pedestal** are detailed in this section.



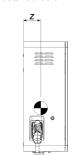
	W1	W2	W3	W4	H1	H2	Н3	H4	H5	D1	D2	D3
mm	600	450	725,1	910,1	895	650	1450	1240	800	255	323	430,5
in.	23.62	17.72	28.55	35.8	35.24	25.59	57.09	48.82	31.50	10.04	12.72	16.9

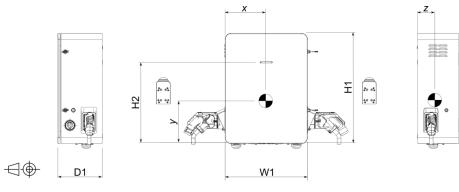
GRAVITY CENTER								
x	у	z						
240	839,2	125						
9.45	33	4.92						



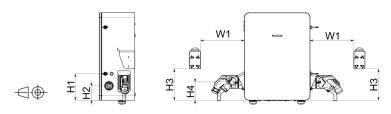
	ACCESIBLE ELEMENTS										
	H1 H2 H3 H4										
mm	895	782	815	892							
in.	35.24	30.79	32.09	35.12							

The dimensions, gravity center and weight of the **Depot Dispenser without pedestal** are detailed below





	GE	NEKAL I	JIMENSI	GRAVITY CENTER				
	W1	H1	H2	D1	X	у	z	
mm	600	800	590	323	295,8	303,6	125	
in.	23.6	31.50	23.23	12.72	11.64	12	4.92	



	ACCESIBLE ELEMENTS										
	W1 <sup>[1]</sup> H1 H2 H3 H4										
mm	400	242	132	287	168						
in.	15.7	9.5	5.2	11.3	6.6						



<sup>&</sup>lt;sup>1</sup> Note that W1 is a recommended distance for the connector holder in order to have enough space for the charging cable to be rolled.

The approximate weight of the Depot Dispenser with pedestal and two 300A 7,6m (25ft) charging cables is 116kg (255.2lb).

The approximate weight of each available charging cable is detailed in the following table.

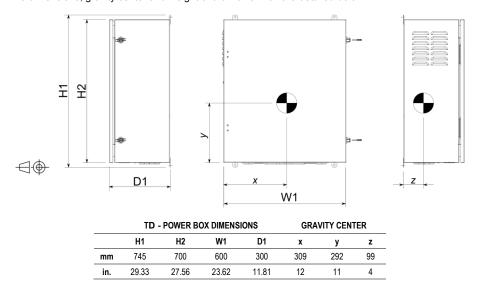
			ccs	<b>31</b>				CC	S2		
Amperage	Α	200	)	30	00	20	0	2	50	30	0
Lamouth	m	5,5	7,6	5,5	7,6	5,5	7,6	5,5	7,6	5,5	7,6
Length	ft	18	25	18	25	18	25	18	25	18	25
Max. Effective	m	5,5	7,2	5,5	7,2	5,5	7,2	5,5	7,2	5,5	7,2
length	ft	18	23.7	18	23.7	18	23.7	18	23.7	18	23.7
Weight	kg	13	19,2	20,77	31	9.63	14,7	15,7	20.5	19,4	29
	lb	28.6620	42.33	45.79	68.34	21.23	32.4	34.6	45.2	42,77	63.9

# 2.4. TD PANTOGRAPH SOLUTION

The **Top Down (TD) Pantograph Solution** is composed of a Power box and a Button box.

#### **2.4.1. Power box**

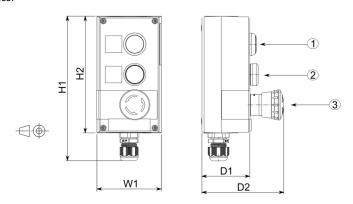
The dimensions, gravity center and weight of the Power Box are detailed below.



The approximate weight of the Power box of the TD Pantograph Solution is 50kg (110lb).

#### 2.4.2. Button box

Along with the Power box shown above, the TD Pantograph Solution has a Button box with the following characteristics.



	•	TD - BUTT	ON BOX	DIMENSIO	BUTTON IDENTIFICATION				
	W1	H1	H2	W2	W3	1	2	2	
mm	85	190,7	154	63,2	108,2	Status	Mode	Emergency	
in.	3.3	7.51	6.1	2.49	4.26	light	button	stop button	

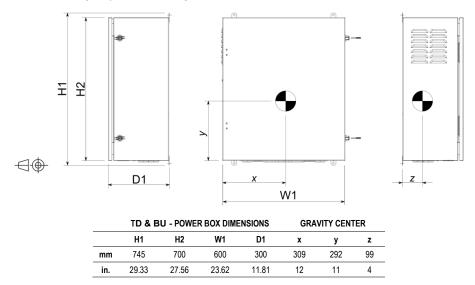
The approximate weight of the Button box of the TD Pantograph Solution is 1kg (2.20lb).

# 2.5. BU PANTOGRAPH SOLUTION

The Bottom Up (BU) Pantograph Solution is composed of a Power box, Control box and a Button box.

#### **2.5.1. Power box**

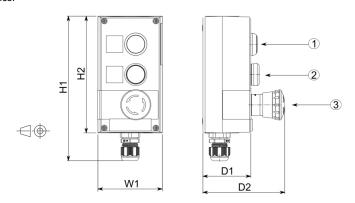
The dimensions, gravity center and weight of the *Power Box* are detailed below.



The approximate weight of the *Power box* of the **BU Pantograph Solution** is 50kg (110lb).

#### 2.5.2. Button box

Along with the Power box shown above, the **BU Pantograph Solution** has a *Button box* with the following characteristics.

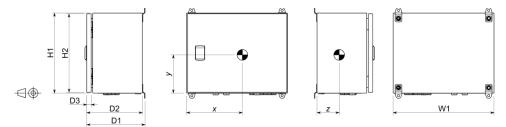


	TD	& BU - Bl	JTTON B	OX DIMEN	BUTTON IDENTIFICATION			
	W1	H1	H2	W2	W3	1	2	2
mm	85	190,7	154	63,2	108,2	Status	Mode	Emergency
in.	3.3	7.51	6.1	2.49	4.26	light	button	stop button

The approximate weight of the *Button box* of the *BU Pantograph Solution* is 1kg (2.20lb).

#### 2.5.3. Control box

Along with the Power box and Button box described above, the **BU Pantograph Solution** has a *Control box* with the following dimensions, gravity center and weight.



		GRAVITY CENTER							
	W1	H1	H2	D1	D2	D3	X	У	z
mm	380	300	294	220	210	16,5	210	143	83
in.	14.96	11.81	11.57	8.65	8.26	0.65	8	6	3



The approximate weight of the *Control box* of the **BU Pantograph Solution** is 10kg (22lb).

# 3. SLIM DISPENSER

## 3.1. HANDLING, TRANSPORTATION AND INSTALLATION



#### **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

### 3.1.1. Delivery and storage

Power Electronics **Slim Dispensers** are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

#### Standard storage



#### **NOTICE**

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "<u>Extended storage</u>" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until installation.

- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

### **Extended storage**

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



#### **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 3.1.2. Handling and transportation



#### **CAUTION**

Follow the handling and transportation requirements described here. Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported fixed to the pallet and protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weights table for selection of the lifting equipment and machinery.

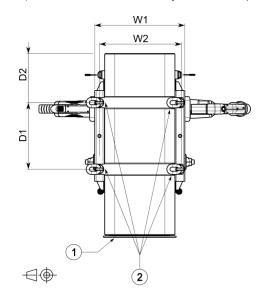
Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

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The packed product is ready to be transported by truck and handled by a pallet truck or forklift considering the weight, load distribution and center of gravity of the product.

After unpackaging the product as described in the "<u>Unpackaging</u>" subsection, the product must be lifted using the four eyebolts located in the top of the product (as shown in the following figure). The lifting equipment must be properly secured to the eyebolt and the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts.

The figure below ( $top\ view$ ) shows the location of the four eyebolts on the top of the Slim Dispenser.



	RE	F		SLI	ENSIO	NS	
_	1	2		W1	W2	D1	D2
	Front diaplay	Lifting points	mm	339	372	203	275
	Front display	Lifting points	in.	13.4	14.6	8	10.8

To lift the product, use a suitable lifting system according to the weight of the product and that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the site of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.

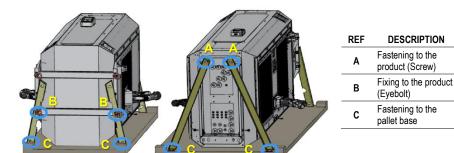


### Sea freight and land shipment

For sea freight and land shipment, the product is packed vertically mounted on a wooden crate and fixed to a pallet base with screws.

### Air shipment

In case of air shipment, the product is shipped lying down in a wooden crate and fixed to a pallet base with four steel brackets with screws as shown in the following figures included for illustration purposes only, (top side on the left and bottom side on the right). Externally, the wooden crate is fixed to the pallet with screws.



EN

After unpackaging, the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts, supporting it on its own base until adopting a vertical position. Once the product is in vertical position, it must be lifted using a suitable lifting system according to the weight table and that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the place of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.

#### 3.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



#### **NOTICE**

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

#### Soil

The soil must have the following characteristics:

- It must be dry, compacted, stable and homogeneous.
- It must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground does not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- It must not be a direct place of passage so that the charging cables do not interrupt the movement of pedestrians or traffic.
- Avoid corrosive environments that may affect the proper functioning of the product.

#### Site basis



#### **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

Power Electronics recommends making a concrete foundation slab to support the product. The support surface for the product must be perfectly level. The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations. The foundation must meet the following characteristics:

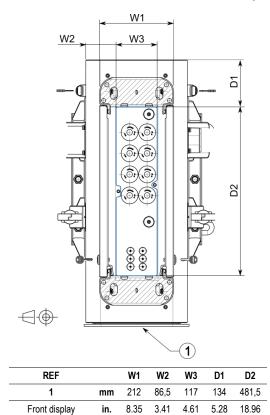
- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- · It must be thick enough to support the product.
- It must have trenches wide enough to ensure proper wiring passage.

Note that the charger must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of the product. For more information on the location of the anchoring points, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer considering the characteristics of the selected cable (please refer to the "Cable access and connection" section), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

The following figure (bottom-up view) shows the size of the bottom plate (marked in blue), which is necessary to determine the dimensions for the trench and foundation slab, in mm and inches.



8.35

in.

3.41

4.61

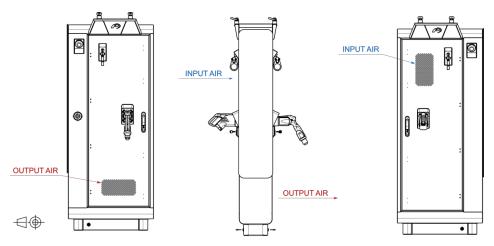
5.28

Front display



#### 3.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product. The **Slim Dispenser** has a forced ventilation system with a cool air inlet located on the left side of the product (**front view**) and one hot air outlet on the right side.



#### NBDCDTG005A

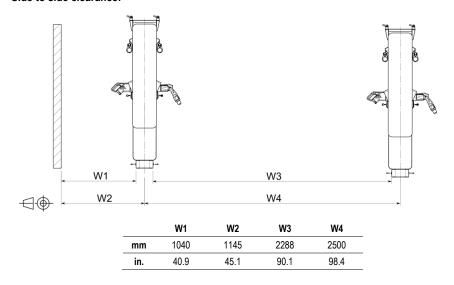
#### 3.1.5. Clearances

When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

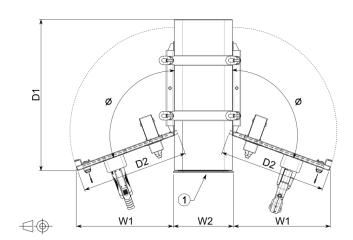
In addition, when installing a **Slim Dispenser**, the maximum distance between the between the NBi Power cabinet / NB Station and the dispenser must be considered. This distance cannot exceed 80m (262.46ft) when using Ethernet communication or 150m (492.13ft) when using optical fiber communication.

#### Side to side clearance:



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**Front side clearance:** As depicted in the following figure (**top view**), there is an additional space needed to open the charger doors, necessary for proper internal manipulation. Although this is the minimum clearance between chargers, the distance between parking spaces to be able to maneuver between two cars must also be considered, as well as the maximum range of the charging cable.



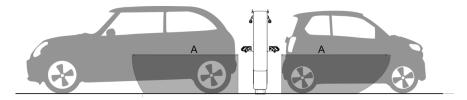
REF		W1	W2	D1	D2	Ø
1	mm 484 splay in. 19.1		300	751	533	· 110°
Front display			11.8	29.6	21	110

Rear side clearance: It is necessary to leave a rear clearance of 50mm (1.97in).

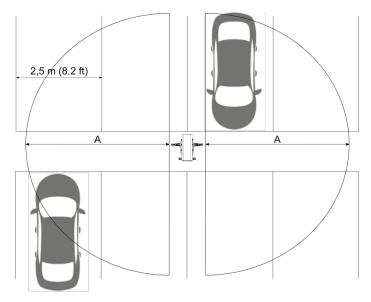
### 3.1.6. Charging cable maneuverability

To ensure the adequate maneuverability of the charging cable, when installing the product, note that the maximum effective charging cable length (**A** in the following figures) is indicated in in the charging cable length and weight tables in the "<u>Dimensions and weight</u>" section.

The following figure (**front view**) shows an example of the cable range area in a parking lot where cars are parked next to the product:



The figure below (**top view**) shows the cable range area in a parking lot where cars are parked in front of the product. Note that the distance A varies depending on the charging cable chosen.



#### 3.1.7. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



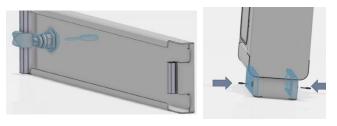
#### **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

Please note that the figures included in this section are for illustration purposes only.

### Sea freight and land shipment

- 1. Remove the staples from the upper part that secure the cover of the wooden crate and remove the top cover.
- 2. Once the top cover has been removed, remove the staples from the lateral wooden panels and remove the panels until the product is exposed.
- 3. Remove the foam blocks that immobilize the product.
- 4. Remove the cellaire foam that wraps the product.
- 5. To prepare the product for lifting, open the base locking covers with the key, as shown in the following figures used for illustration purposes only.





6. Remove the four M10 screws, nuts and washers that secure the bottom of the product to the pallet before starting the lifting operation.

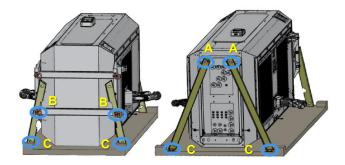




7. Once the product has been anchored, and only prior the commissioning of the product, remove the film that protects the charging cables and the *cellaire* foam or bubble wrap that protects the connectors of the charging cables.

#### Air shipment

- 1. Remove the M5 lag screws with cruciform head that secure the wooden crate to the pallet base.
- 2. Lift the crate upwards until the product is exposed. Remove the *cellaire* foam and the film that wrap the product to be able to access the steel brackets.
- 3. Remove the steel brackets from the top side. Access the upper part of the product and remove the two M10 screws, nuts and washers that fix the product to the base pallet (C in the left figure below). Then unscrew the two superior M16 eyebolts (B in the left figure below) to remove the steel brackets. Beware the possible risk of overturning of the product.



- 4. Reattach the two M16 lifting eyebolts previously removed to prepare the product for lifting.
- 5. Remove the steel brackets from the bottom side. Remove the four M10 screws, nuts and washers that fix the steel brackets to the base of the product (A and C in the right figure above).
- 6. Remove the cellaire foam that wraps the product.
- 7. Once the product has been anchored, and only prior the commissioning of the product, remove the *cellaire* foam or bubble wrap that protects the connectors of the charging cables and the film that protects the charging cables.

# 3.1.8. Anchoring requirements

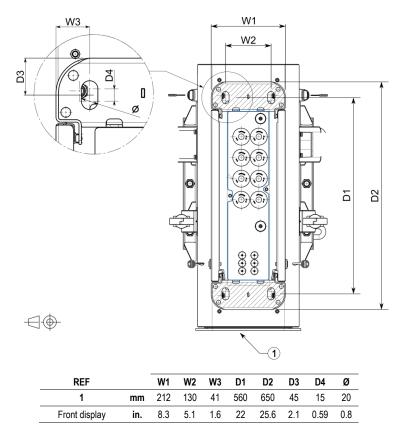


# **NOTICE**

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

It is recommended to construct a small vault or pit in the foundation under the gland plates. This construction must not interfere with the anchoring of the product.

To anchor the **Slim Dispenser** it is recommended to use **M16 stainless steel A4-70 screws expansion bolts or screws**. The location and diameter of the anchor holes of the charger is shown in the following figure (bottom-up view), along with the size of the base plate (marked in blue) needed to determine the dimensions of the trench. Apply the recommended tightening torque and to ensure proper fixation **install all anchors**. This anchor system is suitable for high seismic zones (IEEE693-2018) and for wind conditions until 140mph.



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# Removal of the lifting tools



#### **CAUTION**

Do not remove the lifting equipment until ensuring that the station is secured, correctly installed and fixed in its final location.

Under no circumstances should the operator position underneath the product or within a radius that could allow the load to fall on the operator. Always follow all the occupational safety standards that apply at the installation site considering the Health and Safety measures according to the regulations in force in that country.



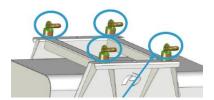
# **NOTICE**

To prevent harm to the sealing rubber of the product, only use the designated tool to unfasten the screws and avoid touching the rubber seal to not compromise the IP protection of the product.

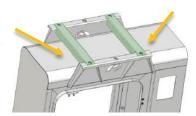
Once the product has been properly anchored and secured in its installation site, the lifting tools located on the top of the product must be removed by following the steps below. Note that the figures shown in this section are for illustration purposes only.

1. Open the two side doors of the charger using the door handles.

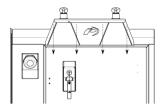
2. Unscrew the four M16 eyebolts from the top of the product.



3. Remove the two steel brackets marked in green in the following figure.



4. Use a size 4 Allen key to unscrew the four M6 screws on each side of the charger to remove the lifting tool of each side.



5. Close the doors again using the handles.

## 3.2. CABLE ACCESS AND CONNECTIONS



#### WARNING

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.



## **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



## **NOTICE**

Refer to the recommended tightening torque for mechanical and electrical connections in the "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

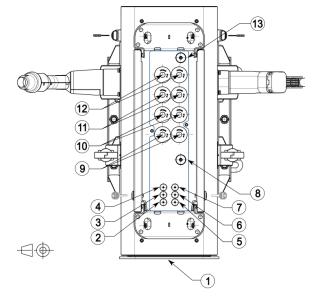
The charger does not require auxiliary power supply input.

Power, ground, auxiliary and communication cables are not included within Power Electronics' scope. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Ground cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Auxiliary power supply cable to each Dispenser or pantograph (as applicable).
- Control optical fiber to each Dispenser or pantograph (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

#### 3.2.1. Cable access and cable size

The following figure (bottom-up view) shows the cable access space (marked in blue):

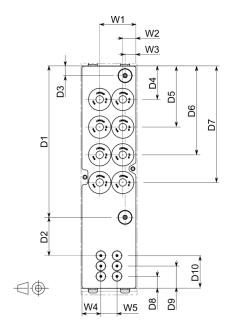


REF	DESCRIPTION				
1	Front display				
2	Optical fiber 2 (Low level communications)				
3	Ethernet / Optical fiber (High level communications)				
4	Auxiliary output connection				
5	Optical fiber 1 (Low level communications)				
6	Auxiliary services				
7	Spare				
8	Ground connection 1				
9	DC1+ input connection				
10	DC1- input connection				
11	DC2- input connection				
12	DC2+ input connection				
13	Ground connection 2				

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Connections vary depending on the number of charging points (one to four), the number of connectors (one or two) and the type of charge selected (simultaneous or sequential). The details of each option are shown below:

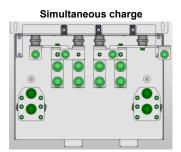
	No. OF CONNECTORS	1	1	2	2	2
	CHARGE TYPE	-	<b>S</b> equential	<b>S</b> equential	Sequential	Simultaneous
	CONNECTION	-	Daisy chain	Daisy chain (+1 chargers)	-	-
REF	DESCRIPTION					
1	Front display					
2	Optical fiber 2 (Low level communications)	-	-	Yes	Yes	Yes
3	Ethernet / Optical fiber (high level communications)	Yes	Yes	Yes	Yes	Yes
4	Auxiliary output connection	-	Yes	Yes	-	-
5	Optical fiber 1 (Low level communications)	Yes	Yes	Yes	Yes	Yes
6	Auxiliary services	Yes	Yes	Yes	Yes	Yes
7	Spare	-	-	-	-	-
8	Ground connection 1	Yes	Yes	Yes	Yes	Yes
9	DC1+ input connection	Yes	Yes	Yes	Yes	Yes
10	DC1- input connection	Yes	Yes	Yes	Yes	Yes
11	DC2- input connection	-	Yes	Yes	-	Yes
12	DC2+ input connection	-	Yes	Yes	-	Yes
13	Ground connection 2	-	Yes	Yes	-	Yes

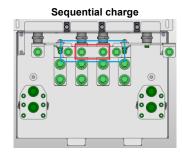


#### GENERAL DIMENSIONS

	W1	W2	W3	W4	W5	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
mm	78,5	28,5	23,5	41	35	328	83	21	72,5	132,5	192,5	252,5	26	48	71
in.	3.1	1.1	0.9	1.6	1.4	12.1	3.3	0.8	2.8	5.2	7.6	10	1.0	1.9	2.8

Charging can be simultaneous or sequential (Daisy Chain). If it is sequential, a busbar (marked in blue) is added between the DC+ plates and another busbar (marked in red) is added between the DC- plates.





CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
DC input	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two	150mm <sup>2</sup> (250AWG)	M40	19mm (0.75in)	28mm (1.10in)
Ground	electrical hole possibility and blade width maximum of 32mm.	70mm <sup>2</sup> (1/0AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Auxiliary Services	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm² tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
High level	Ethernet CAT 5E UTP cable with RJ45 connector	-		5mm	9mm
Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	M16		(0.35in.)
Low level communications	OM3 50/125um 2xSC Connectors per charging		M16	5mm (0.19in.)	9mm (0.35in.)

# EN

#### 3.2.2. Connections



### **WARNING**

Before opening any door, the charger must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE. Otherwise, you may suffer an electric shock.



#### **CAUTION**

The charger doors must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the charger, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.

# **NOTICE**

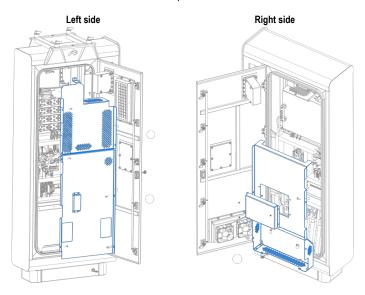
To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland.

The power cables and RJ45 connector must be inserted into the product without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the product.

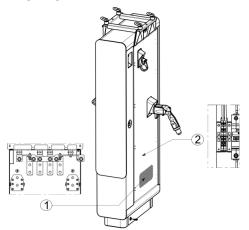
Please note that the figures shown in this section are for illustration purposes only. For other panels, please refer to the electrical diagrams.

This section details the input and output connections that must be performed in the product. There are several factors that can influence the choice of cable, including the distance between the Dispenser and the NBi Power cabinet / NB Station / Standalone NB240 range charger, the maximum input current and the installation mode.

Note that the products are provided with polycarbonate protectors that must be removed to complete the connections described in this section. First, open the doors of the product with the exclusive key and then remove the M6 screws to release the protectors and save the screws to put the polycarbonate protectors back in place once the connections have been completed.



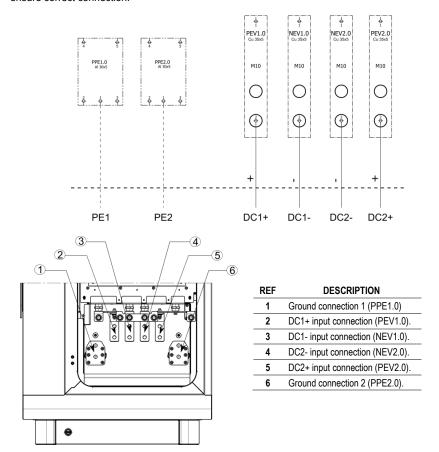
# DC input power connections



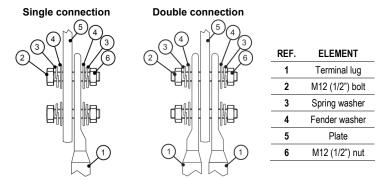
REF	DESCRIPTION
1	DC input & Grounds
2	Auxiliary Services

Insert each cable to their respective cable gland, crimp the terminals and connect each of the cables to the corresponding plate as shown in the following figures. The plates are identified with stickers to ensure correct connection.

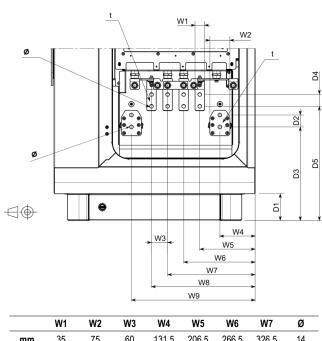




Depending on the installed power, connections can be single or double.



**Note:** If the terminal is a single-hole terminal, it is recommended to connect it to the upper hole in the busbar, so that the contact area is maximized.



	• • • •			• • • •				_
mm	35	75	60	131,5	206,5	266,5	326,5	14
in.	1.4	2.95	2.4	5.18	8.13	10.5	12.85	0.56
	W8	W9	D1	D2	D3	D4	D5	t
mm	386,5	461,5	100	44,5	349	44,5	426	5
in.	15.22	18.17	3.94	1.75	13.74	1.75	16.77	0.2

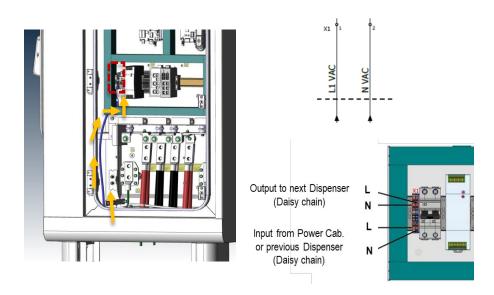
#### **Considerations for ground connection**

The ground plates are made of tin-plated aluminum. The following recommendations must be considered for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

## **Auxiliary power supply connection**

The auxiliary power supply connection comes from the output of the power unit (NB Station, NBi Power Cabinet, Standalone NB240 or the previous Dispenser in case of daisy chain configuration) and must be connected through the corresponding cable gland of the **Slim Dispenser** to the X1 terminal block located in the right side panel of the **Slim Dispenser**, as shown in the following figures.





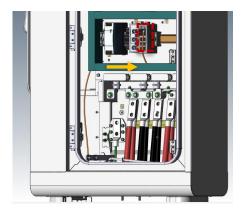
## **Communications Connection**

The **Slim Dispenser** has two types of communications that come from the power unit: high-level communications and low-level communications.

#### **High level communications**

The connection of the high level communications depends on the type of switch that has been chosen by the customer: Optical Fiber or Ethernet.

 Optical Fiber: The cables must be routed from the corresponding cable gland and connected to the optical fiber port 7 (RX and TX) of the A11 Ethernet-O.F. adapter, as shown in the figure below.

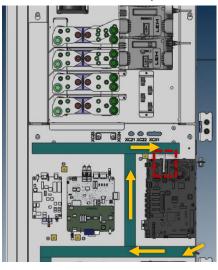


Ethernet: The cable must be routed from the corresponding cable gland and connected to
the WAN port J13 of the All in One board (E01). As shown in the following figures, the cable
must be routed from the right side of the product to the left side in order to be connected to
the All in One board.



Right side of the Slim Dispenser



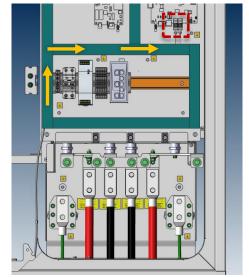


#### Left side of the Slim Dispenser

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#### **Low level communications**

Low-level communications must be connected from the Combiner board of the power unit to each DC Protocols board of the Slim Dispenser. It is required to connect a pair of fiber optic cables (TX and RX) per each charging cable installed in the Dispenser: The first pair (F.O. 1; TX & RX), must be routed from the corresponding cable gland to the U1 (RX) and U2 (TX) connectors in the DC Protocols board (E04) on the right panel and the second pair (F.O. 2; TX and RX), if necessary, to the U1 (RX) and U2 (TX) connectors in the DC Protocols board (E02) on the left side panel, as shown in the following figures.



F.O.1 pair (RX & TX) [Right panel of the Slim Dispenser]

F.O.2 pair (RX & TX) [from the right side to the left side panel of the Slim Dispenser]

#### 3.3. CONTROL ELEMENTS AND INDICATORS

The electric vehicle user interacts with the charger through a third-party mobile application, a touch screen (Display) and other optional extras.

The charger has different forms of payment: by mobile application, by RFID card or optionally via a POS terminal. The development and maintenance of the mobile application are beyond the reach of Power Electronics, but the interoperability of the product with the application selected by the client is guaranteed, prior validation by Power Electronics.

The following control elements and indicators can be found in each Slim Dispenser:

- RFID card reader: Allows the user to be identified by an RFID card.
- **Touch screen:** Allows selecting some characteristics of the charger and the charging options, ending the session, as well as displaying the charging status or fault messages.
- Emergency stop push-button: The Dispenser has an emergency stop push-button in the right side, with the exact location shown in the figure below. In case of activating the emergency stop push-button, before manually resetting the push-button it must be verified that the reason for the hazard or emergency has been resolved.







## **NOTICE**

Do not use the emergency stop pushbutton to perform regular stops on the charger. It must only be used when an emergency occurs. Otherwise, longevity of the main components could be shortened and result in product damage. In addition to being an unrecommended abrupt stop, it would not actively unload the buses.

## 3.4. COMMISSIONING



## **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for starting up the **Slim / Cooled / Depot Dispenser** and turning it on for the first time.

Visual inspection: Unpackage the product and ensure that all components are in good condition and have not suffered any damage during transit.



Disconnect and isolate the external power supply (DC and auxiliary) before starting the installation.

Check the absence of voltage and open the disconnector at the power unit.

Block, delimit and signal the work area following the LOTOTO procedure.



Perform the anchoring of the product according to the dimensions and clearances given in the technical drawings. Please check the "Anchoring requirements" section.



Open the door of the charger, open its disconnector to isolate the auxiliary supply (230V<sub>AC</sub> or 277V<sub>AC</sub>). Ensure all internal protections are deactivated (if applicable).



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct.

Check the "Torque and screw sizing" and the "Cable access and connections" sections.



Make a continuity test and check all connections are as expected.



Verify the selectivity of the external protections to the product and control parameters.

Activate the internal protections of the product (if applicable).



Remove LOTOTO using proper PPE. Close the auxiliary supply disconnector.



Make sure doors at the product are properly sealed and locked.



Provide the auxiliary power supply (230V $_{AC}$  or 277V $_{AC}$ ) from the power unit. Verify that the status LED lights up. Configure the communications.



Close the disconnector at the power unit.



If all previous steps are successful, start the product and verify it charges correctly.

EN

#### 3.5. MAINTENANCE

In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

#### 3.5.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the Safety Instructions for Operating, Troubleshooting and Maintenance.



#### **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations.



#### **WARNING**

Before opening any door, make sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure, described in the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Always apply the <u>five golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

Failure to comply with safety instructions and electrical codes may void the warranty.

## 3.5.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	1h and 50min

	POWER REVISION (STATUS 1)	TIME (MIN.)	ок
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the product can be accessed remotely – Connection to the PC if it exists	5	
4	Operation of the display – Visual and manual check.	5	
5	Ventilation system and absence of vibrations – Visual and auditory check	5	
6	Charge connector operation – Visual and manual check	5	
7	Charge test – Recommended (Optional)	10	
8	Operation of the residual current circuit breaker – Visual and manual check	5	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MIN.)	ОК
1	Internal cleaning	15	
2	Filters – Visual check and replacement	15	
3	Doors condition	10	
4	Cables and conductors – Visual and manual check	10	
5	External and internal tightening torques – Manual check	10	
6	Control circuits – Manual check	5	



# **NOTICE**

Please note that the chargers have external security screws and the doors are locked with an exclusive key, so specialized tools may be required for the tasks described below.

ΕN

## 3.5.3. Power revision (Status 1)

#### 1. Environmental conditions

Verify that the environment of the product complies with the operating temperature, relative humidity and maximum altitude above sea level ranges defined in the technical data sheet.



## **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains in
  the air susceptible to accumulate on the filters is detected in the area. In this case, it will be
  enough to inspect the products that due to their location have been more exposed, and if dirt
  is detected in them, the inspection will be generalized to the rest of the chargers at the plant.

## 2. Enclosure state

Check that the enclosure is in good general state and no traces of corrosion or impacts are present. Check the anchoring of the product.

#### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

## 4. Display operation

Check if the operation of the display is correct: Check the good condition of the screen, cleanliness, deterioration or signs of any damage (impacts or breakage). Verify that the touch screen works on its entire surface. Check that the lighting is correct and verify the interaction with the menu is smooth.

#### 5. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

## 6. Charge connector operation

Check the condition of the charging cables and charging connectors, check that they are in good condition and have no impacts, cuts or other marks. Check the condition and operation of the cable management system.

## 7. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine. If the charge test is performed, it is responsibility of the customer to ensure the presence of an electric vehicle to perform the charging procedure with each type of connector and the costs derived from it must be assumed by the customer.

## 8. Operation of the residual current circuit breaker (Optional)

Check the correct operation of the residual current circuit breaker using the test button enabled for this purpose on the protection itself. Open the product without voltage, then energize it without any load, carry out the test and finally close the door. May wear the PPE needed for this task.

## 3.5.4. Dead revision (Status 2)

## 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

#### 2. Filters

Visual inspection of the air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

# EN

#### 3. Doors condition

Check that each door closes correctly, and that seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

#### 4. Cables and conductors

Visual inspection of the cables and terminals. Check that the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

## 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and retighten correctively only if necessary. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

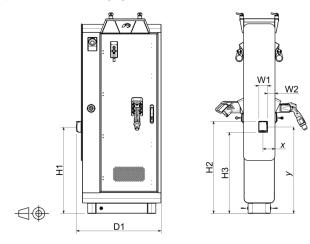
## 6. Control circuit

Check the good conditions of the control boards, as well as their connections. Visually check the switches.

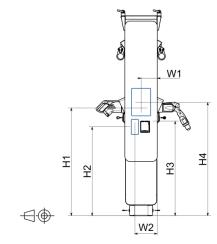
## 3.6. ACCESSORIES

## 3.6.1. Payment terminal

Optionally, the **Slim Dispensers** can include a payment terminal (POS: Point of Sale) that allows the EV user to pay the charging session via credit / debit card. The dimensions of each available model are detailed, for each product, in the following figures and tables:



		H1	H2	Н3	W1	W2	D1	X	у
NAYAX IEC		821	878	772	84	72	807	115	822
PAYTER IEC	mm	825	877	774	82	71	770	113	825
NAYAX UL	in.	32.3	34.6	30.4	3.3	2.8	31.8	4.5	32.4



ACCESIBLE ELEMENTS

		H1	H2 (RFID)	H3 (POS)	H4 (Display)	W1	W2
NAYAX & PAYTER (IEC)	mm	1000	825	878	1052	150	208
NAYAX (UL)	in.	39.4	32.5	34.6	41.4	5.9	8.2

# 4. COOLED DISPENSER



## 4.1. HANDLING, TRANSPORTATION AND INSTALLATION



## **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

## 4.1.1. Delivery and storage

Power Electronics **Cooled Dispensers** are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

# EN

#### Standard storage



## **NOTICE**

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "Extended Storage" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until installation.

- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

## **Extended storage**

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



#### **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

#### 4.1.2. Handling and transportation



## **CAUTION**

Follow the handling and transportation requirements described here. Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported fixed to the pallet and protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

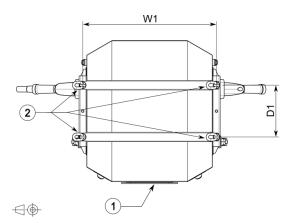
Lifting equipment must be selected according to the lifting system of each product. Refer to the weights table for selection of the lifting equipment and machinery.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

The packed product is ready to be transported by truck and handled by a pallet truck or forklift considering the weight, load distribution and center of gravity of the product.

After unpackaging the product as described in the "<u>Unpackaging</u>" subsection, the product must be lifted using the four eyebolts located in the top of the product (as shown in the following figure). The lifting equipment must be properly secured to the eyebolt and the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts.

The figure below (top view) shows the location of the four eyebolts on the top of the Cooled Dispenser.



REF	DESCRIPTION
1	Front display
2	Lifting points

	COOLED- DIMENSIONS					
_	W1	D1				
mm	713	275				
in.	28.07	10.83				

EN

To lift the product, use a suitable lifting system according to the weight of the product and that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the site of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.

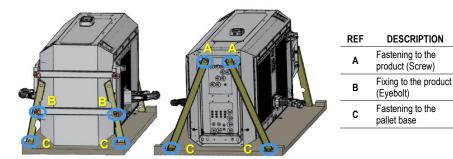


## Sea freight and land shipment

For sea freight and land shipment, the product is packed vertically mounted on a wooden crate and fixed to a pallet base with screws.

## Air shipment

In case of air shipment, the product is shipped lying down in a wooden crate and fixed to a pallet base with four steel brackets with screws as shown in the following figures included for illustration purposes only, (top side on the left and bottom side on the right). Externally, the wooden crate is fixed to the pallet with screws.



After unpackaging, the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts, supporting it on its own base until adopting a vertical position. Once the product is in vertical position, it must be lifted using a suitable lifting system according to the weight table and that complies with the occupational safety standards, as well as the Health and Safety regulations applicable at the place of installation. The necessary auxiliary means must also be considered according to the applicable regulations of the country of installation.

#### 4.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



#### NOTICE

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

#### Soil

The soil must have the following characteristics:

- It must be dry, compacted, stable and homogeneous.
- It must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground does not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- It must not be a direct place of passage so that the charging cables do not interrupt the movement of pedestrians or traffic.
- Avoid corrosive environments that may affect the proper functioning of the product.

#### Site basis



#### **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

Power Electronics recommends making a concrete foundation slab to support the product. The support surface for the product must be perfectly level. The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations. The foundation must meet the following characteristics:

- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- It must be thick enough to support the product.
- It must have trenches wide enough to ensure proper wiring passage.

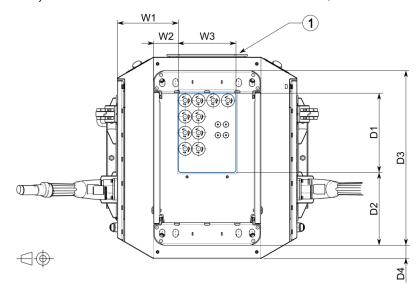


Note that the charger must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of the product. For more information on the location of the anchoring points, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer considering the characteristics of the selected cable (please refer to the "<u>Cable access and connection</u>" section), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

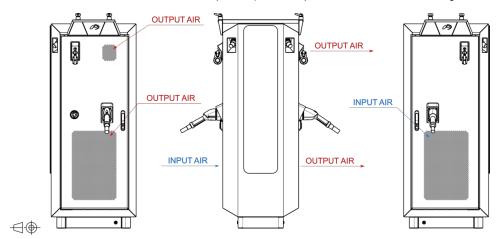
The following figure (**bottom-up view**) shows the size of the bottom plate (**marked in blue**), which is necessary to determine the dimensions for the trench and foundation slab, in mm and inches.



REF		W1	W2	W3	D1	D2	D3	D4
1	mm	227,5	92,5	215	295	271	650	50
Front display	in.	8.96	3.64	8.46	12	11	25.59	1.97

## 4.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product. The **Cooled Dispenser** has a forced ventilation system with a cool air inlet located on the left side of the product (**front view**) and two hot air outlets on the right side.





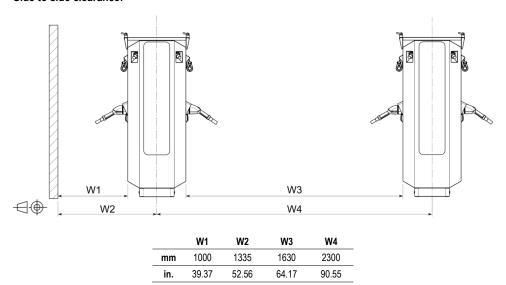
## 4.1.5. Clearances

When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

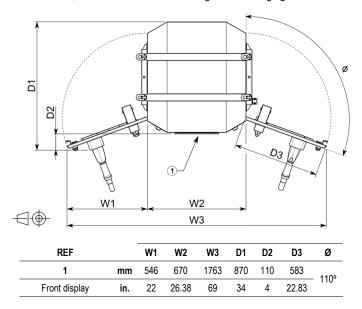
The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

In addition, when installing a **Cooled Dispenser**, the maximum distance between the NBi Power cabinet / NB Station and the dispenser must be considered. This distance cannot exceed 80m (262.46ft) when using Ethernet communication or 150m (492.13ft) when using optical fiber communication.

#### Side to side clearance:



**Front side clearance:** As depicted in the following figure (**top view**), there is an additional space needed to open the charger doors, necessary for proper internal manipulation. Although this is the minimum clearance between chargers, the distance between parking spaces to be able to maneuver between two cars must also be considered, as well as the maximum range of the charging cable.

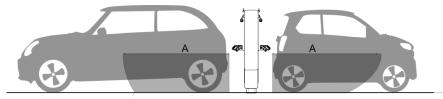


Rear side clearance: It is necessary to leave a rear clearance of 10mm (0.39in).

## 4.1.6. Charging cable maneuverability

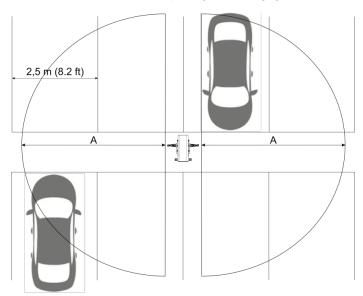
To ensure the adequate maneuverability of the charging cable, when installing the product, note that the maximum effective charging cable length (**A** in the following figures) is indicated in in the charging cable length and weight tables in the "<u>Dimensions and weight</u>" section.

The following figure (**front view**) shows an example of the cable range area in a parking lot where cars are parked next to the product:



The figure below (**top view**) shows the cable range area in a parking lot where cars are parked in front of the product. Note that the distance A varies depending on the charging cable chosen.





## 4.1.7. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



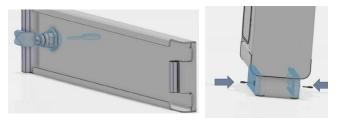
## **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

Please note that the figures included in this section are for illustration purposes only.

## Sea freight and land shipment

- 1. Remove the staples from the upper part that secure the cover of the wooden crate and remove the top cover.
- 2. Once the top cover has been removed, remove the staples from the lateral wooden panels and remove the panels until the product is exposed.
- 3. Remove the foam blocks that immobilize the product.
- 4. Remove the cellaire foam that wraps the product.
- 5. To prepare the product for lifting, open the base locking covers with the key, as shown in the following figures used for illustration purposes only.



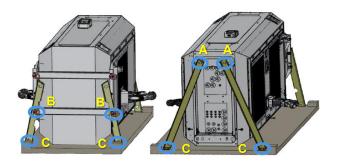
6. Remove the four M10 screws, nuts and washers that secure the bottom of the product to the pallet before starting the lifting operation.



7. Once the product has been anchored, and only prior the commissioning of the product, remove the film that protects the charging cables and the *cellaire* foam or bubble wrap that protects the connectors of the charging cables.

## Air shipment

- 1. Remove the M5 lag screws with cruciform head that secure the wooden crate to the pallet base.
- 2. Lift the crate upwards until the product is exposed. Remove the *cellaire* foam and the film that wrap the product to be able to access the steel brackets.
- 3. Remove the steel brackets from the top side. Access the upper part of the product and remove the two M10 screws, nuts and washers that fix the product to the base pallet (C in the left figure below). Then unscrew the two superior M16 eyebolts (B in the left figure below) to remove the steel brackets. Beware the possible risk of overturning of the product.



- 4. Reattach the two M16 lifting eyebolts previously removed to prepare the product for lifting.
- Remove the steel brackets from the bottom side: Remove the four M10 screws, nuts and washers that fix the steel brackets to the base of the product (A and C in the right figure above) to remove the two steel brackets.
- 6. Remove the cardboard protection and foam that protects the glass of the charger.
- 7. Remove the cellaire foam that wraps the product.
- 8. Once the product has been anchored, and only prior the commissioning of the product: remove the film that secures the charging cables to the charger, the film that protects the charging cables and the *cellaire* foam or bubble wrap that protects the connectors of the charging cables.

## 4.1.8. Anchoring requirements



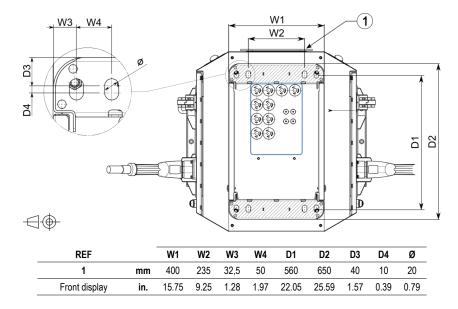
## **NOTICE**

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

It is recommended to construct a small vault or pit in the foundation under the gland plates. This construction must not interfere with the anchoring of the product.

To anchor the **Cooled Dispenser** it is recommended to use **M16 stainless steel A4-70 screws expansion bolts or screws**. The location and diameter of the anchor holes of the charger is shown in the following figure (**bottom-up view**), along with the size of the base plate (**marked in blue**) needed to determine the dimensions of the trench. Apply the recommended tightening torque and to ensure proper fixation install **all eight anchors**. This anchor system is suitable for high seismic zones (IEEE693-2018) and for wind conditions until 140mph.





## Removal of the lifting tools



## **CAUTION**

Do not remove the lifting equipment until ensuring that the station is secured, correctly installed and fixed in its final location.

Under no circumstances should the operator position underneath the product or within a radius that could allow the load to fall on the operator. Always follow all the occupational safety standards that apply at the installation site considering the Health and Safety measures according to the regulations in force in that country.

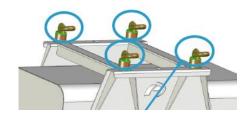


## NOTICE

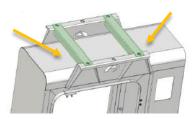
To prevent harm to the sealing rubber of the product, only use the designated tool to unfasten the screws and avoid touching the rubber seal to not compromise the IP protection of the product.

Once the product has been properly anchored and secured in its installation site, the lifting tools located on the top of the product must be removed by following the steps below. Note that the figures shown in this section are for illustration purposes only.

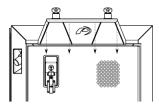
- 1. Open the two side doors of the charger using the door handles.
- 2. Unscrew the four M16 eyebolts from the top of the product.



3. Remove the two steel brackets marked in green in the following figure.



4. Use a size 4 Allen key to unscrew the four M6 screws on each side of the charger to remove the lifting tool of each side.



5. Close the doors again using the handles.

## 4.2. CABLE ACCESS AND CONNECTIONS



## **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.



## **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



#### NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.





The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

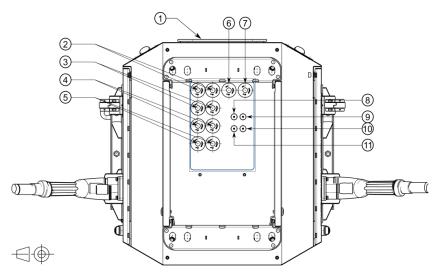
The charger does not require auxiliary power supply input.

Power, ground, auxiliary and communication cables are not included within Power Electronics' scope. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or Pantograph Solution (as applicable).
- Ground cables and terminal lugs to each Dispenser or Pantograph Solution (as applicable).
- Auxiliary power supply cable to each Dispenser or Pantograph Solution (as applicable).
- Control optical fiber to each Dispenser or Pantograph Solution (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

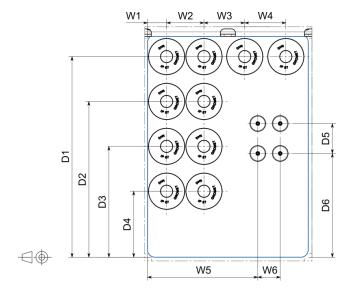
#### 4.2.1. Cable access and cable size

The following figure (bottom-up view) shows the cable access space (marked in blue):



REF	DESCRIPTION	REF	DESCRIPTION
1	Front display	7	Ground connection 1.
2	DC2- input connection.	8	Auxiliary services.
3	DC2+ input connection.	9	Ethernet / optical fiber (High level communications).
4	DC1+ input connection	10	Optical fiber 2 (Low level communications).
5	DC1- input connection.	11	Optical fiber 1 (Low level communications).
6	Ground connection 2.		





GENERAL DIMENSIONS												
	W1	W2	W3	W4	W5	W6	D1	D2	D3	D4	D5	D6
nm	25,5	50	54,5	55	147,5	30	268,25	208,25	148,25	88,25	40	138,75
in.	1.0	1.97	2.15	2.17	5.81	1.18	10.56	8.20	5.84	3.47	1.57	5.46

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
DC input	Use 0.6/1kV copper or aluminum 90°C (194°F)	2 x 150mm <sup>2</sup>		19mm	28mm
Ground	electrical hole possibility and blade width maximum of 32mm.	(2 x 250AWG)	M40	(0.75in)	(1.10in)
Auxiliary Services	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm² tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
High level	Ethernet CAT 5E UTP with RJ45 connector	-		5mm	9mm
Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	M16	(0.19in.)	(0.35in.)
Low level communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors per charging cable	-	M16	5mm (0.19in.)-	9mm (0.35in.)

## 4.2.2. Connections



## **WARNING**

Before opening any door, the charger must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE. Otherwise, you may suffer an electric shock.



## **CAUTION**

The charger doors must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the charger, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.



## **NOTICE**

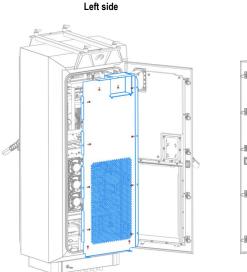
To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland.

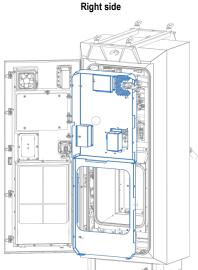
The power cables and RJ45 connector must be inserted into the product without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the product.

Please note that the figures shown in this section are for illustration purposes only. For other panels, please refer to the electrical diagrams.

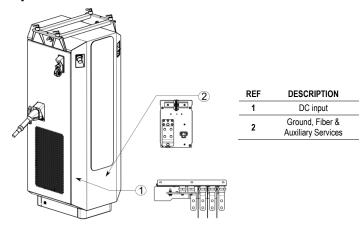
This section details the input and output connections that must be performed in the product. There are several factors that can influence the choice of cable, including the distance between the Dispenser and the NBi Power cabinet / NB Station / Standalone NB240 range charger, the maximum input current and the installation mode.

Note that the products are provided with polycarbonate protectors that must be removed to complete the connections described in this section. First, open the doors of the product with the exclusive key and then remove the M6 screws to release the protectors and save the screws to put the polycarbonate protectors back in place once the connections have been completed.



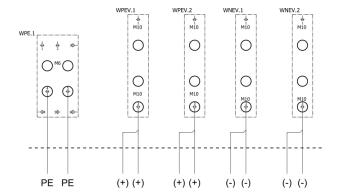


# DC input power connections

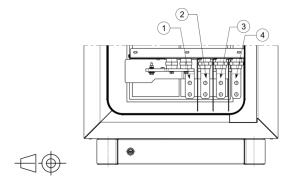


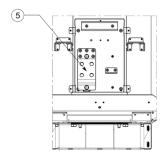
Insert each cable to their respective cable gland, crimp the terminals and connect each of the cables to the corresponding plate as shown in the following figures. The DC input connections must be double (two connections per each input, one on the front and one on the back). The plates are identified with stickers to ensure correct connection.

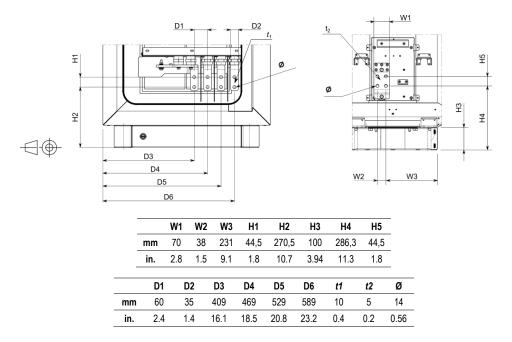




REF	DESCRIPTION
1	DC1- (WNEV.1)
2	DC1+ (WPEV.1)
3	DC2+ (WPEV.2)
4	DC2- (WNEV.2)
5	Ground connection PE1 & PE2 (WPE.1)







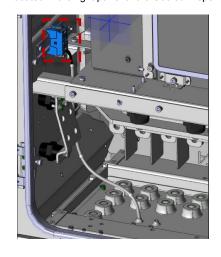
#### **Considerations for ground connection**

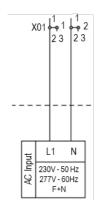
The ground plates are made of tin-plated aluminum. The following recommendations must be considered for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "<u>Torque and screw sizing</u>").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

## **Auxiliary power supply connection**

The auxiliary power supply connection comes from the output of the power unit (NB Station, NBi Power Cabinet, Standalone NB240 or the previous Dispenser in case of daisy chain configuration) and must be connected through the corresponding cable gland of the Cooled Dispenser to the X1 terminal block located in the right panel of the Cooled Dispenser, as shown in the following figures.







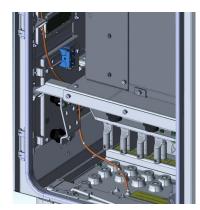
## **Communications connection**

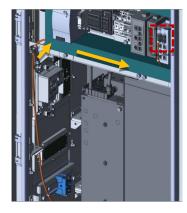
The **Cooled Dispenser** has two types of communications that come from the power unit: high-level communications and low-level communications.

#### **High level communications**

The connection of the high level communications depends on the type of switch that has been chosen by the customer:

 Optical Fiber: The cables must be routed from the corresponding cable gland and connected to the optical fiber port 7 (RX and TX) of the A11 Ethernet-O.F. adapter, as shown in the figures below.





 Ethernet: The cable must be routed from the corresponding cable gland and connected to the WAN port J13 of the All in One board (E01), as shown in the figures below.

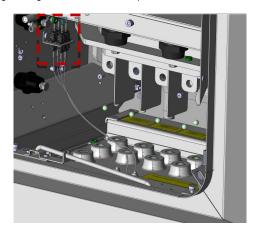




#### Low level communications

Low-level communications must be connected from the Combiner board of the power unit to the DC Protocols board of the **Cooled Dispenser**. In this product, the customer is only responsible to connect a pair of fiber optic cables (TX and RX) per each charging cable installed in the Dispenser to the fiber optic adapters (XC50 and XC51), since connection from these adapters to the corresponding DC Protocols board is factory pre-installed.

As shown in the following figure, the first pair (F.O. 1; TX & RX) must be routed from the corresponding cable gland to the XC50 adapter and the second pair (F.O. 2; TX & RX), if necessary, must be routed from the corresponding cable gland to the XC51 adapter.



#### 4.3. CONTROL ELEMENTS AND INDICATORS

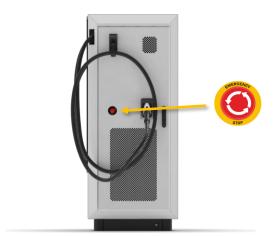
The electric vehicle user interacts with the charger through a third-party mobile application, a touch screen (Display) and other optional extras.

The charger has different forms of payment: by mobile application, by RFID card or optionally via a POS terminal. The development and maintenance of the mobile application are beyond the reach of Power Electronics, but the interoperability of the product with the application selected by the client is guaranteed, prior validation by Power Electronics.

The following control elements and indicators can be found in each Cooled Dispenser:

- RFID card reader: Allows the user to be identified by an RFID card.
- **Touch screen:** Allows selecting some characteristics of the charger and the charging options, ending the session, as well as displaying the charging status or fault messages.
- Emergency stop push-button: The Dispenser has an emergency stop push-button in the right side, with the exact location shown in the figure below. In case of activating the emergency stop push-button, before manually resetting the push-button it must be verified that the reason for the hazard or emergency has been resolved.







#### **NOTICE**

Do not use the emergency stop pushbutton to perform regular stops on the charger. It must only be used when an emergency occurs.

Otherwise, longevity of the main components could be shortened and result in product damage. In addition to being an unrecommended abrupt stop, it would not actively unload the buses.

## 4.4. COMMISSIONING



## **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

For commissioning and maintenance situations in a Cooled Dispenser, when starting up the product at very low temperature conditions (from -30°C to -20°C approx. / from -22°F to -4°F), it is required to wait at least 25 minutes to allow the heating of the refrigeration unit to increase the temperature of the product and the product to be ready to charge vehicles.

The following steps describe the process for starting up the **Cooled Dispenser** and turning it on for the first time.

Visual inspection: Unpackage the product and ensure that all components are in good condition and have not suffered any damage during transit.



Disconnect and isolate the external power supply (DC and auxiliary) before starting the installation.

Check the absence of voltage and open the disconnector at the power unit.

Block, delimit and signal the work area following the LOTOTO procedure.



Perform the anchoring of the product according to the dimensions and clearances given in the technical drawings. Please check the "Anchoring requirements" section.



Open the door of the charger, open its disconnector to isolate the auxiliary supply (230V<sub>AC</sub> or 277V<sub>AC</sub>). Ensure all internal protections are deactivated (if applicable).



Make the cable access and connections without voltage, starting by the ground connection. Make sure connections and tightening torque are correct.

Check the "Torque and screw sizing" and the "Cable access and connections" sections.



Make a continuity test and check all connections are as expected.



Verify the selectivity of the external protections to the product and control parameters. Activate the internal protections of the product (if applicable).



Remove LOTOTO using proper PPE. Close the auxiliary supply disconnector.



Make sure doors at the product are properly sealed and locked.



Provide the auxiliary power supply (230  $V_{\text{AC}}$  or 277  $V_{\text{AC}})$  from the power cabinet. Verify that the status LED lights up. Configure the communications.



Close the disconnector at the power unit.



If all previous steps are successful, start the product and verify it charges correctly.

#### 4.5. MAINTENANCE

In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

#### 4.5.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the Safety Instructions for Operating, Troubleshooting and Maintenance.



#### **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations.



#### **WARNING**

Before opening any door, make sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure, described in the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Always apply the <u>five golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

Failure to comply with safety instructions and electrical codes may void the warranty.

# 4.5.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	2h and 5min

	POWER REVISION (STATUS 1)	TIME (MIN.)	ОК
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the product can be accessed remotely – Connection to the PC if it exists	5	
4	Operation of the display – visual and manual check.	5	
5	Ventilation system and absence of vibrations – Visual and auditory check	5	
6	Charge connector operation – Visual and manual check	5	
7	Charge test – Recommended (Optional)	10	
8	Operation of the residual current circuit breaker – Visual and manual check	5	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MIN.)	OK
1	Internal cleaning	15	
2	Filters – Visual check and replacement	15	
3	Doors condition	10	
4	Cables and conductors – Visual and manual check	10	
5	External and internal tightening torques – Manual check	10	
6	Control circuits – Manual check	5	
7	Refrigeration unit	15	



# **NOTICE**

Please note that the chargers have external security screws and the doors are locked with an exclusive key, so specialized tools may be required for the tasks described below.

ΕN

### 4.5.3. Power revision (Status 1)

#### 1. Environmental conditions

Verify that the environment of the product complies with the operating temperature, relative humidity and maximum altitude above sea level ranges defined in the technical data sheet.



# **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains in
  the air susceptible to accumulate on the filters is detected in the area. In this case, it will be
  enough to inspect the products that due to their location have been more exposed, and if dirt
  is detected in them, the inspection will be generalized to the rest of the chargers at the plant.

### 2. Enclosure state

Check that the enclosure is in good general state and no traces of corrosion or impacts are present. Check the anchoring of the product.

### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

## 4. Display operation

Check if the operation of the display is correct: Check the good condition of the screen, cleanliness, deterioration or signs of any damage (impacts or breakage). Verify that the touch screen works on its entire surface. Check that the lighting is correct and verify the interaction with the menu is smooth.

### 5. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

### 6. Charge connector operation

Check the condition of the charging cables and charging connectors, check that they are in good condition and have no impacts, cuts or other marks. Check the condition and operation of the cable management system.

## 7. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine. If the charge test is performed, it is responsibility of the customer to ensure the presence of an electric vehicle to perform the charging procedure with each type of connector and the costs derived from it must be assumed by the customer.

### 8. Operation of the residual current circuit breaker

Check the correct operation of the residual current circuit breaker using the test button enabled for this purpose on the protection itself. Open the product without voltage, then energize it without any load, carry out the test and finally close the door. May wear the PPE needed for this task.

# 4.5.4. Dead revision (Status 2)

### 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

### 2. Filters

Visual inspection of the air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

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### 3. Doors condition

Check that each door closes correctly, and that seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

### 4. Cables and conductors

Visual inspection of the cables and terminals. Check that the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

# 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and retighten correctively only if necessary. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

## 6. Control circuits

Check the good conditions of the control boards, as well as their connections. Visually check the switches.

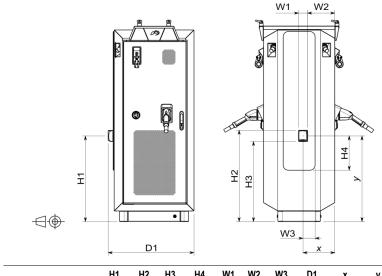
# 7. Refrigeration unit

Visual inspection of the refrigeration unit for defects or damage. Check the refrigeration unit for secure fastening. Check the level of the coolant and, if required, refill the coolant. Check the fittings of the pipes.

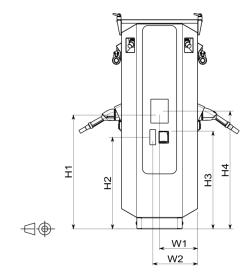
# 4.6. ACCESSORIES

# 4.6.1. Payment terminal

Optionally, the **Cooled Dispensers** can include a payment terminal (POS: Point of Sale) that allows the EV user to pay the charging session via credit / debit card. The dimensions of each available model are detailed, for each product, in the following figures and tables:



		H1	H2	Н3	H4	W1	W2	W3	D1	X	У			
NAYAX (IEC)		805	858	753	322	84	256	113	807	- 298	805			
PAYTER (IEC)	mm	000	857	755	322	82	257	113	113	113	113	770	230	000
NAYAX (UL)	in.	31.69	34	30	12.68	3	10	4.45	31.77	11.73	31.69			



### **ACCESIBLE ELEMENTS**

		H1	H2 (RFID)	H3 (POS)	H4 (Display)	W1	W2
NAYAX & PAYTER (IEC)	mm	1000	805	858	1034	335	394.5
NAYAX (UL)	in.	39.37	31.69	34	40.71	13.19	15.53

# 5. DEPOT DISPENSER

5

# 5.1. HANDLING, TRANSPORTATION AND INSTALLATION



# **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

# 5.1.1. Delivery and storage

Power Electronics **Depot Dispensers** are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

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# Standard storage



# **NOTICE**

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "Extended Storage" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until installation.

- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

# **Extended storage**

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



## **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 5.1.2. Handling and transportation



# **CAUTION**

**Follow the handling and transportation requirements described here.** Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported fixed to the pallet and protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weights table for selection of the lifting equipment and machinery.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

The product is packed horizontally and the parts are individually wrapped in *cellaire* foam and protected with corner protectors. Internally, the parts are secured strapped to the pallet and externally the box is strapped and shrink-wrapped. The packed product is ready to be transported by truck and handled by a pallet truck or forklift considering the weight, load distribution and center of gravity of the product.

In order to be installed, the product must be unpackaged as described in the "Unpackaging" section.

### 5.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



### NOTICE

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

### Soil

The soil must have the following characteristics:

- It must be dry, compacted, stable and homogeneous.
- It must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground does not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- It must not be a direct place of passage so that the charging cables do not interrupt the movement of pedestrians or traffic.
- Avoid corrosive environments that may affect the proper functioning of the product.

When **wall mounting** the **Depot Dispenser**, the mounting surface must be sufficiently resistant to safely withstand the weight of the charger and resist any stress caused by adverse environmental factors, such as climate or seismic activity. These factors must be considered in accordance with specific regulations and characteristics of the installation location.

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### Site basis



# **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

Power Electronics recommends making a concrete foundation slab to support the charger. The support surface for the product must be perfectly level. The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations. The foundation must meet the following characteristics:

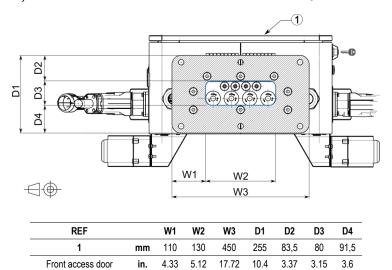
- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing must be appropriate for the weight of the product and the characteristics of the soil.
- · It must be thick enough to support the product.
- It must have trenches wide enough to ensure proper wiring passage.

Note that the charger must be anchored to the foundation slab/metallic structure, therefore it is necessary to consider the location of the anchoring points of the product. For more information on the location of the anchoring points, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the dimensions of the trench must be calculated by the customer considering the characteristics of the selected cable (please refer to the "<u>Cable access and connection</u>" section), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

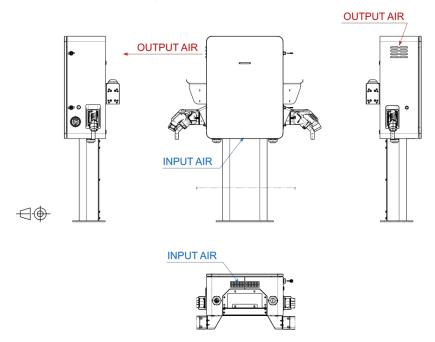
The following figure (**bottom-up view**) shows the size of the bottom plate (**marked in blue**), which is necessary to determine the dimensions for the trench and foundation slab, in mm and inches.



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# 5.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product. The **Depot Dispenser** has a forced ventilation system with one hot air outlet on the left side of the product (**front view**) and one cool air inlet located at the bottom.



### 5.1.5. Clearances

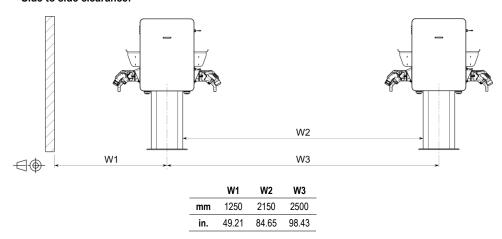
When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

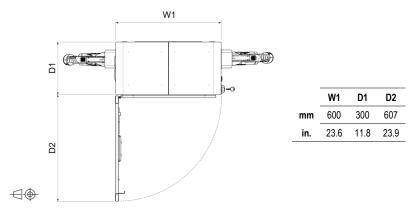
In addition, when installing a **Depot Dispenser**, the maximum distance between the electrical cabinet / station and the dispenser must be considered. This distance cannot exceed 80m (262.46ft) when using Ethernet communication or 150m (492.13ft) when using optical fiber communication.

The **Depot Dispenser** must be mounted on a wall or on the ground using its pedestal. For proper inspection, ventilation and handling it is important to leave the indicated clearances.

#### Side to side clearance:



**Front side clearance:** As depicted in the following figure (**top view**), there is an additional space needed to open the charger front door, necessary for proper internal manipulation. Although this is the minimum clearance between chargers, the distance between parking spaces to be able to maneuver between two cars must also be considered, as well as the maximum range of the charging cable.

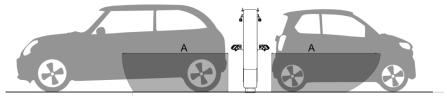


**Rear side clearance:** When installed with the pedestal, it requires 400mm (15.7in) to allow the access and work on the rear cover for connections.

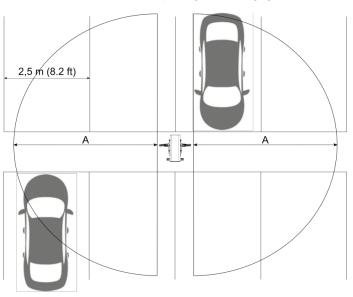
# 5.1.6. Charging cable maneuverability

To ensure the adequate maneuverability of the charging cable, when installing the product, note that the maximum effective charging cable length (**A** in the following figures) is indicated in in the charging cable length and weight tables in the "<u>Dimensions and weight</u>" section.

The following figure (**front view**) shows an example of the cable range area in a parking lot where cars are parked next to the product:



The figure below (**top view**) shows the cable range area in a parking lot where cars are parked in front of the product. Note that the distance A varies depending on the charging cable chosen.





# 5.1.7. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



# **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

- 1. Remove the shrink film surrounding the packaging.
- 2. Cut the strapping around the package.
- 3. Remove the cardboard band and cardboard cover.
- 4. Cut the straps that secure the pedestal and upper elements to the pallet through the cardboard base.
- 5. Position the pedestal, as well the rest of the components items on top of the product, in an alternative temporary storage location, so that the rest of the contents can be handled safely.
- 6. Cut the straps that secure the product to the pallet through the cardboard base.
- 7. Remove the cardboard corner protectors.
- 8. Remove the cellaire foam that wraps the product.

# 5.1.8. Anchoring requirements



# **NOTICE**

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

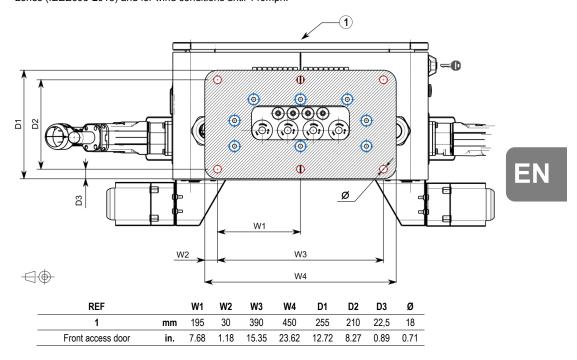
It is recommended to construct a small vault or pit in the foundation under the pedestal. This construction must not interfere with the anchoring of the product.

#### Ground fixation

Note that before assembling the charger to the pedestal it is necessary to make the wiring connections described in the "Cable access and connections" section.

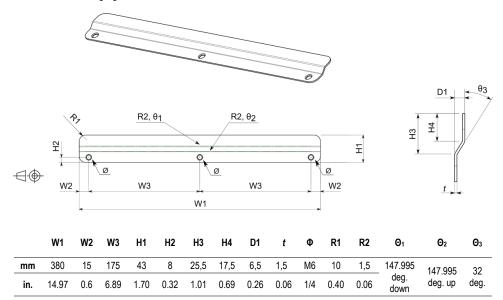
To assemble the Depot Dispenser on the pedestal, it is necessary to screw the **eight quality galvanized countersunk screws** marked in blue in the following picture (**bottom-up view**) and apply the recommended tightening torque.

The following figure also shows the location of the **6 anchorage** holes (marked in red) in the pedestal (**bottom-up view**). To anchor the charger, it is recommended to use **six M16 (1/2") stainless steel A4-70 expansion bolts or screws for high load solicitations**. Please, secure them applying the recommended torque for mechanical connections. This anchor system is suitable for high seismic zones (IEEE693-2018) and for wind conditions until 140mph.

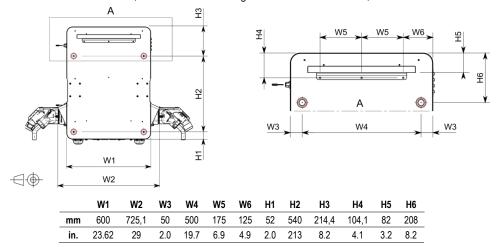


### Wall fixation

The customer must install the fixing bracket on the wall using **three M6 (1/4") A4-70 countersunk screws** and introduce it on the rear side of the charger. The dimensions of the fixing bracket are shown in the following figure:



Then, it is necessary to remove the four caps located in the back of the product and fix the charger to the wall by using **four M6 (1/4") A4-70 stainless steel screws** and apply the recommended tightening torque (it is advisable to use expansion anchors for high load solicitations). The figure below shows the **rear view** of the cabinet, the location of the fixing bracket and marked in red, the four anchor holes.



# 5.2. CABLE ACCESS AND CONNECTIONS



# **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.



## **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".

# NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

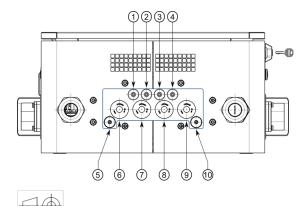
The charger does not require auxiliary power supply input.

Power, ground, auxiliary and communication cables are not included within Power Electronics' scope. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Ground cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Auxiliary power supply cable to each Dispenser or pantograph (as applicable).
- Control optical fiber to each Dispenser or pantograph (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

### 5.2.1. Cable access and cable size

The following figure (bottom-up view) shows the cable access space (marked in blue):

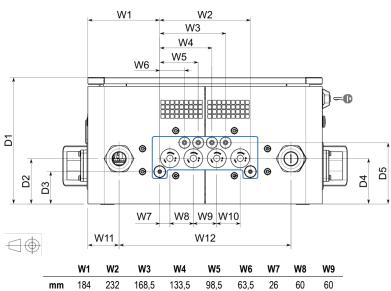


REF	DESCRIPTION
1	Optical fiber 1
2	Auxiliary services
3	Ethernet / Optical fiber (High level communications)
4	Optical fiber 2
5	Ground connection 1
6	DC1+ input connection
7	DC1- input connection
8	DC2- input connection
9	DC2+ input connection
10	Ground connection 2



Connections vary depending on the number of charging points (one to four), the number of connectors (one or two) and the type of charge selected (simultaneous or sequential). The details of each option are shown below:

	No. OF CONNECTORS	1	1	2	2	2
	CHARGE TYPE	-	<b>S</b> equential	<b>S</b> equential	Sequential	Simultaneous
	CONNECTION	-	Daisy chain (+1 chargers)	Daisy chain (+1 chargers)	-	-
REF	DESCRIPTION					
1	Optical fiber 1.	Yes	Yes	Yes	Yes	Yes
2	Auxiliary services.	Yes	Yes	Yes	Yes	Yes
3	Ethernet / optical fiber (High level communications).	Yes	Yes	Yes	Yes	Yes
4	Optical fiber 2.		Yes	Yes	Yes	Yes
5	Ground connection 1.	Yes	Yes	Yes	Yes	Yes
6	DC1+ input connection	Yes	Yes	Yes	Yes	Yes
7	DC1- input connection.	Yes	Yes	Yes	Yes	Yes
8	DC2- input connection.		Yes (Output)	Yes (Output)		Yes
9	DC2+ input connection.		Yes (Output)	Yes (Output)		Yes
10	Ground connection 2.		Yes	Yes		Yes



mm	184	232	168,5	133,5	98,5	63,5	26	60	60
in.	7.2	9.1	6.7	5.3	3.9	2.5	1.0	2.36	2.36

	W10	W11	W12	D1	D2	D3	D4	D5	
mm	60	80	440	323	115,3	82,5	116,5	156,5	
in.	2.4	3.1	17.32	12.72	4.5	3.25	4.6	6.2	_

Charging can be simultaneous or sequential (Daisy Chain). If it is sequential, a busbar is added between the DC+ plates and another busbar between the DC- plates.

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
DC input	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two electrical hole	150mm <sup>2</sup> (250AWG)	M40	19mm (0.75in)	28mm (1.10in)
Ground	possibility and blade width maximum of 32mm.	70mm <sup>2</sup> (1/0AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Auxiliary Services	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm $^2$ tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
High level	Ethernet CAT 5E UTP with RJ45 connector	-	M16	5mm	9mm
Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	M16	(0.19in.)	(0.35in.)
Low level communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors per charging cable	-	M16	5mm (0.19in.)	9mm (0.35in.)

### 5.2.2. Connections



### **WARNING**

Before opening any door, the charger must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE. Otherwise, you may suffer an electric shock.



# **CAUTION**

The charger doors must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the charger, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.



# **NOTICE**

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland.

The power cables and RJ45 connector must be inserted into the product without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the product.

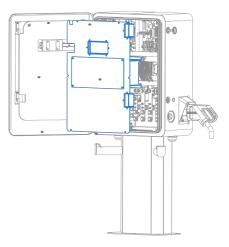
The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

Please note that the figures shown in this section are for illustration purposes only. For other panels, please refer to the electrical diagrams.

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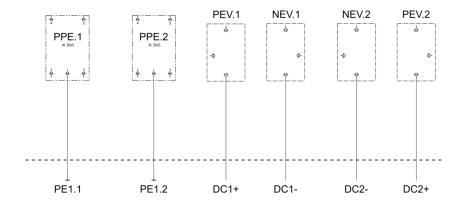
This section details the input and output connections that must be performed in the product. There are several factors that can influence the choice of cable, including the distance between the Dispenser and the NBi Power cabinet / NB Station / Standalone NB240 range charger, the maximum input current and the installation mode.

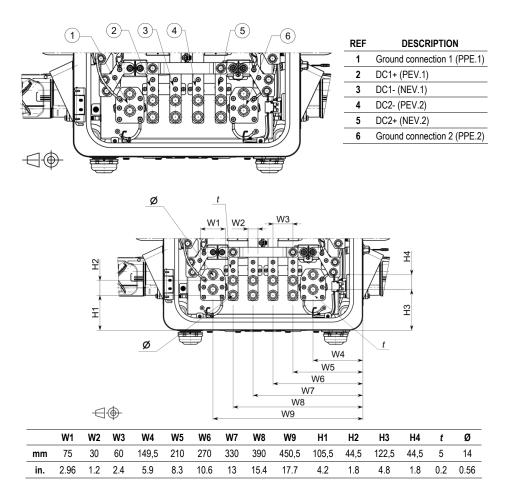
Note that the products are provided with polycarbonate protectors that must be removed to complete the connections described in this section. First, open the front door of the product with the exclusive key and then remove the M6 screws to release the protectors and save the screws to put the polycarbonate protectors back in place once the connections have been completed.



# DC input power connections

Insert each cable to their respective cable gland, crimp the terminals and connect each of the cables to the corresponding plate as shown in the following figures. The plates are identified with stickers to ensure correct connection.





### **Considerations for ground connection**

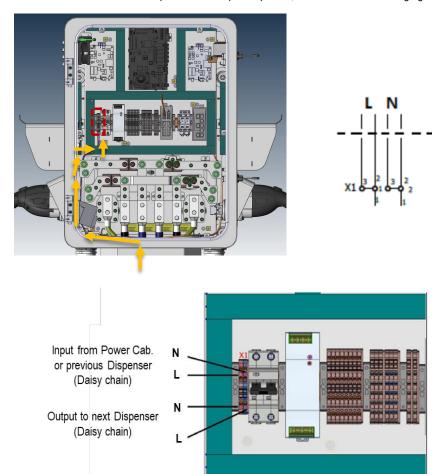
The ground plates are made of tin-plated aluminum. The following recommendations must be considered for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

EN

# **Auxiliary power supply connection**

The auxiliary power supply connection comes from the output of the power equipment (NB Station, NBi Power Cabinet, Standalone NB240 or the previous Dispenser in case of daisy chain configuration) and must be connected through the corresponding cable gland of the Depot Dispenser to the X1 terminal block located in the front panel of the Depot Dispenser, as shown in the following figures.



### **Communications Connection**

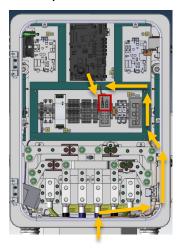
The **Depot Dispenser** has two types of communications that come from the power equipment: high-level communications and low-level communications.

#### **High level communications**

The connection of the high level communications depends on the type of switch that has been chosen by the customer: Optical Fiber or Ethernet.

- Optical Fiber: The cables must be routed from the corresponding cable gland and connected to the optical fiber port (7; RX and TX) of the Ethernet-O.F. adapter (A11) as shown in the left figure below.
- Ethernet: The cable must be routed from the corresponding cable gland and connected to the WAN port (J13) of the All in One board (E01), as shown in the right figure below.

**Optical Fiber Switch** 



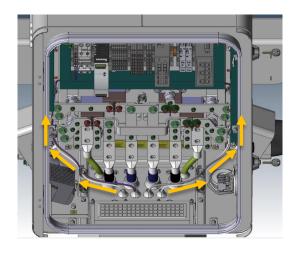
**Ethernet Switch** 



#### **Low level communications**

Low-level communications must be connected from the Combiner board of the power equipment to the DC Protocols board of the Depot Dispenser. It is required to connect a pair of fiber optic cables (TX and RX) per each charging cable installed in the Dispenser: The first pair (F.O. 1; TX & RX) must be routed from the corresponding cable gland to the U1 (RX) and U2 (TX) connectors in the DC Protocols board (E02) on the left panel and the second pair (F.O. 2; TX & RX), if necessary, must be routed from the corresponding cable gland to the U1 (RX) and U2 (TX) connectors in the DC Protocols board (E04) on the right panel.

EN



F.O.1 pair (RX & TX) [Left panel]



F.O.2 pair (RX & TX) [Right panel]



# 5.3. CONTROL ELEMENTS AND INDICATORS

The electric vehicle user interacts with the charger through a third-party mobile application that allows paying for the charging session. The development and maintenance of the mobile application are beyond the reach of Power Electronics, but the interoperability of the product with the application selected by the client is guaranteed, prior validation by Power Electronics.

The Depot Dispenser has one or two led indicators, depending on the number of connectors (one per connector). They are located on the front door and show the charger status using the following color code:



Depot Dispenser with one connector



Depot Dispenser with two connectors

LED	STATUS	DESCRIPTION
White (blinking)	Charging	The charger is being used by a user in a charging session.
Blue	The charger has been reserved by a user through a mobile application.  Reserved charger in this status can only be used by the user who has made reservation.	
Green	Available	The charger is available to carry out a charging session.
Red	Fault	There is some fault activated.
Off Not Available The charger is not available to carry out a charging session.		The charger is not available to carry out a charging session.

**Note:** The user can only start a charging session if the status indicator is green or if the user has made a reservation and the status indicator is blue.

The **Depot Dispenser** has an emergency stop push-button in the right side, with the exact location shown in the figure below. In case of activating the emergency stop push-button, before manually resetting the push-button it must be verified that the reason for the hazard or emergency has been resolved.







# NOTICE

Do not use the emergency stop pushbutton to perform regular stops on the charger. It must only be used when an emergency occurs. Otherwise, longevity of the main components could be shortened and result in product damage. In addition to being an unrecommended abrupt stop, it would not actively unload the buses.

### 5.4. COMMISSIONING



# **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for starting up the **Slim / Cooled / Depot Dispenser** and turning it on for the first time.

Visual inspection: Unpackage the product and ensure that all components are in good condition and have not suffered any damage during transit.



Disconnect the external power supply (DC and auxiliary) before starting the installation. Check the absence of voltage and open the disconnector at the power cabinet.

Block, delimit and signal the work area following the LOTOTO procedure.



Perform the anchoring of the product according to the dimensions and clearances given in the technical drawings. Please check the "Anchoring requirements" section.



Open the door of the charger, open its disconnector to isolate the auxiliary supply (230V<sub>AC</sub> or 277V<sub>AC</sub>). Ensure all internal protections are deactivated (if applicable).



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct.

Check the "Torque and screw sizing" and "Cable access and connections" sections.



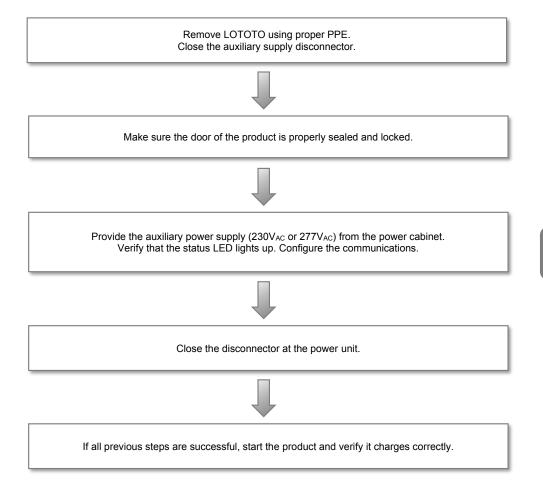
Make a continuity test and check all connections are as expected.



Verify the selectivity of the external protections to the product and control parameters.

Activate the internal protections of the product (if applicable).





# **5.5. MAINTENANCE**

In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

### 5.5.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the *Safety Instructions for Operating, Troubleshooting and Maintenance*.



# **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations.

EN



# **WARNING**

Before opening any door, make sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure, described in the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Always apply the <u>five</u> golden rules to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

Failure to comply with safety instructions and electrical codes may void the warranty.

### 5.5.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	1h and 45min

	POWER REVISION (STATUS 1)	TIME (MIN.)	OK
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the product can be accessed remotely – Connection to the PC if it exists	5	
4	Ventilation system and absence of vibrations – Visual and auditory check	5	
5	Charge connector operation – Visual and manual check	5	
6	Charge test – Recommended (Optional)	10	
7	Operation of the residual current circuit breaker – Visual and manual check	5	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MIN.)	ОК
1	Internal cleaning	15	
2	Filters – Visual check and replacement	15	
3	Door condition	10	
4	Cables and conductors – Visual and manual check	10	
5	External and internal tightening torques – Manual check	10	
6	Control circuits – Manual check	5	



### **NOTICE**

Please note that the chargers have external security screws and the doors are locked with an exclusive key, so specialized tools may be required for the tasks described below.

# 5.5.3. Power revision (Status 1)

#### 1. Environmental conditions

Verify that the environment of the product complies with the operating temperature, relative humidity and maximum altitude above sea level ranges defined in the technical data sheet.



### **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains in
  the air susceptible to accumulate on the filters is detected in the area. In this case, it will be
  enough to inspect the products that due to their location have been more exposed, and if dirt
  is detected in them, the inspection will be generalized to the rest of the chargers at the plant.

### 2. Enclosure state

Check that the enclosure is in good general state and no traces of corrosion or impacts are present. Check the anchoring of the product.

### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

## 4. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

# 5. Charge connector operation

Check the condition of the charging cables and charging connectors, check that they are in good condition and have no impacts, cuts or other marks. Check the condition and operation of the cable management system.

### 6. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine. If the charge test is performed, it is responsibility of the customer to ensure the presence of an electric vehicle to perform the charging procedure with each type of connector and the costs derived from it must be assumed by the customer.

EN

### 7. Operation of the residual current circuit breaker

Check the correct operation of the residual current circuit breaker using the test button enabled for this purpose on the protection itself. Open the product without voltage, then energize it without any load, carry out the test and finally close the door. May wear the PPE needed for this task.

# 5.5.4. Dead revision (Status 2)

# 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

### 2. Filters

Visual inspection of the air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

#### 3. Doors condition

Check that each door closes correctly, and that seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

### 4. Cables and conductors

Visual inspection of the cables and terminals. Check that the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

# 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and retighten correctively only if necessary. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

## 6. Control circuits

Check the good conditions of the control boards, as well as their connections. Visually check the switches.

# 6. TD PANTOGRAPH SOLUTION

6

# 6.1. HANDLING, TRANSPORTATION AND INSTALLATION



# **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

# 6.1.1. Delivery and storage

Power Electronics **Top Down (TD) Pantograph solutions** are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

# EN

### Standard storage



# **NOTICE**

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "Extended Storage" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until installation.

- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

# **Extended storage**

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



# **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 6.1.2. Handling and transportation



# **CAUTION**

Follow the handling and transportation requirements described here. Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported fixed to the pallet and protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weights table for selection of the lifting equipment and machinery.

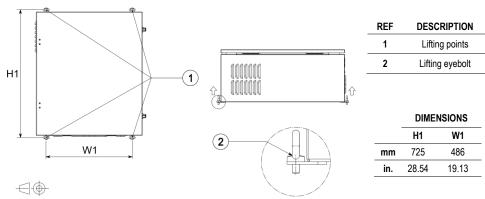
Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

The product is packed horizontally and the parts are individually wrapped in *cellaire* foam and protected with corner protectors. Internally, the parts are secured strapped to the pallet and externally the box is strapped and shrink-wrapped. The packed product is ready to be transported by truck and handled by a pallet truck or forklift considering the weight, load distribution and center of gravity of the product.

In order to be installed, the product must be unpackaged as described in the "Unpackaging" section.

### **Power Box**

For lifting only, the product is provided with four hoisting eyebolts, the figure below shows the location of the hoisting eyebolts. It is recommended to use four M8 eyebolts for hoisting, only in horizontal position. After unpackaging and once the product has been properly secured to the lifting equipment using the four eyebolts, the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts.



### 6.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



# NOTICE

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.



#### Soil

The soil must have the following characteristics:

- It must be dry, compacted, stable and homogeneous.
- It must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground does not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- Avoid corrosive environments that may affect the proper functioning of the product.

When wall mounting the Pantograph Solution, the mounting surface must be sufficiently resistant to safely withstand the weight of the charger and resist any stress caused by adverse environmental factors, such as climate or seismic activity. These factors must be considered in accordance with specific regulations and characteristics of the installation location.

#### Site basis



# **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

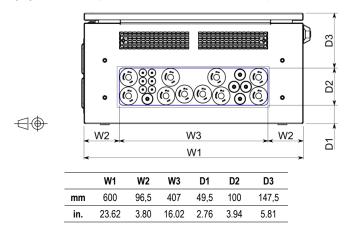
The location of the anchoring points of the product must be considered. For more information on the location of the anchoring points, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the customer must consider the characteristics of the selected cable (please refer to the "Cable access and connection" section), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

# **Power Box**

The following figure (bottom-up view) shows the size of the bottom plate (marked in blue).

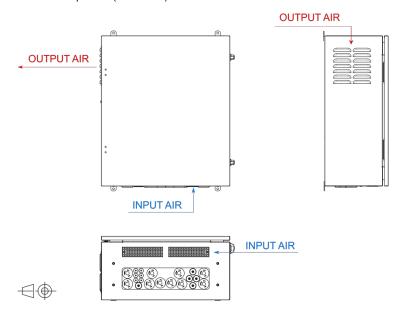


# 6.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product.

### **Power Box**

The Power box of the TD Pantograph Solution has a forced ventilation system with one hot air outlet on the left side of the product (front view) and one cool air inlet located at the bottom.



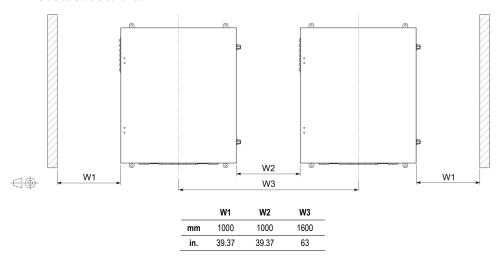
### 6.1.5. Clearances

When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

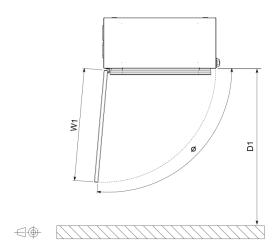
# **Power Box**

#### Side to side clearance:



The distance between the power unit and the Pantograph Solution cannot exceed 10m (32.8ft), which is the maximum length of the cables that connect both products to each other.

**Front side clearance:** As depicted in the following figure (**top view**), there is an additional space needed to assure the security of the product and to open the door of the Power box.



	W1	D1	Ø
mm	600	800	- 95°
in.	23.62	31.5	95

# 6.1.6. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



# **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

- 1. Remove the shrink film surrounding the packaging.
- 2. Cut the strapping around the package.
- 3. Remove the cardboard band and cardboard cover.
- 4. Cut the straps that secure the upper elements to the pallet through the cardboard base.
- 5. Position the items on top of the product, in an alternative temporary storage location, so that the rest of the contents can be handled safely.
- 6. Cut the straps that secure the product to the pallet through the cardboard base.
- 7. Remove the cardboard corner protectors.
- 8. Remove the cellaire foam that wraps the product.

# 6.1.7. Anchoring requirements



# NOTICE

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

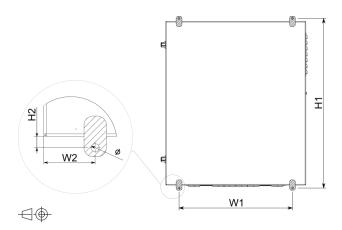
To anchor the products apply the recommended tightening torque and to ensure proper fixation install **all anchors**.

#### **Power Box & Button box**

To anchor the Power box, it is recommended to use four M8 stainless steel 8.8 screws, fasten them by applying the recommended torque for mechanical connections as specified by the manufacturer. If installation on pedestal is required, it is the responsibility of the client to design the pedestal.

The holes must be drilled according to the dimensions of the following figure. Ensure that the product is correctly leveled, then fix the rear of the Power box to the wall with four screws. See the anchoring points in the following figure (**rear view**).

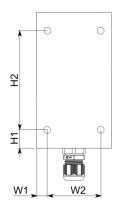




	POWER BOX					
	H1 H2 W1 W2 (					
mm	725	12,5	486	57	9	
in.	28.54	0.49	19.13	2.24	0.35	

To anchor the external Button box, it is recommended to use four M4 stainless steel 8.8 screws, fasten them by applying the recommended torque for mechanical connections as specified by the manufacturer.

The holes must be drilled according to the dimensions of the figure. Check that the box is correctly leveled, then fix the rear of the box to the wall with four screws. See the anchoring points in the following figure (rear view).



	<b>BUTTON BOX</b>			
	W1	H1	H2	
mm	7	71	15,5	123
in.	0.28	2.79	0.61	4.84

#### 6.2. CABLE ACCESS AND CONNECTIONS



# **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.



#### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



#### NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

The charger does not require auxiliary power supply input.

Power, ground, auxiliary and communication cables are not included within Power Electronics' scope. The following material is within responsibility of the customer:

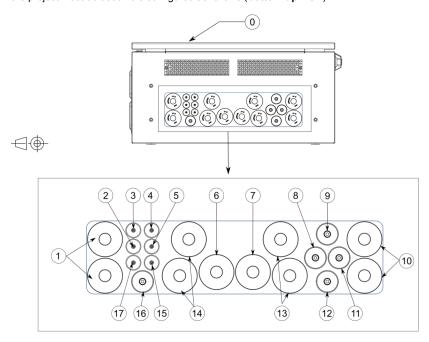
- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Ground cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Auxiliary power supply cable to each Dispenser or pantograph (as applicable).
- Control optical fiber to each Dispenser or pantograph (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

EN

# 6.2.1. Cable access and cable size

# **Power box**

The following figures show the standard cable entry plate. Only the amount of cable glands needed for the project must be used. It is configured as follows (**bottom-up view**).

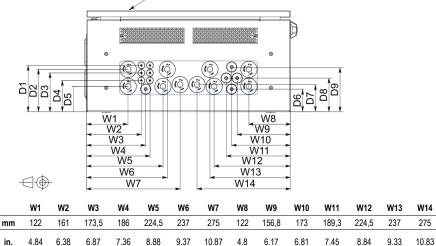


REF.	DESCRIPTION	REF.	DESCRIPTION
0	Front access door	9	Control pilot
1	DC+ from NBi power cabinet or NB Station	10	DC- to pantograph
2	Ethernet / Optical fiber connection	11	Actuator control (Pantograph signals)
3	Wi-Fi Antenna connection. (Optional)	12	Signals from external Button box
4	RFID Ethernet network (Optional)	13	DC- from NBi power cabinet or NB Station
5	Power to RFID (Optional)	14	DC+ to pantograph
6	PE from NBi power cabinet or NB Station	15	Spare
7	PE to pantograph	16	Auxiliary services power input
8	Control supply 24Vdc pantograph	17	Optical fiber connection

REF

Front access

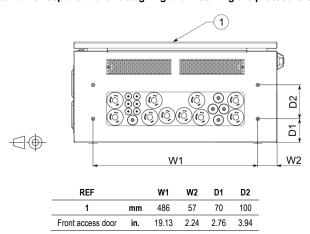
door



0

		D1	D2	D3	D4	D5	D6	D7	D8	D9
n	nm	136,5	124,5	114	91,5	74,5	66,5	79,5	99	139,5
i	n.	5.37	4.9	4.49	3.6	2.93	2.62	3.13	3.9	5.49

Four inserted nuts are prepared to allow the installation of a protective cover for the power cables. This protection must be installed using four M6 screws. The location of these screws is shown below (bottom-up view). The customer is responsible for designing and installing the protective cover.



CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
DC input	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two	4 x 185mm <sup>2</sup> (4 x 350AWG)	M40		
Ground	<ul> <li>electrical hole possibility and maximum blade width of 32mm.</li> </ul>	1 x 185mm <sup>2</sup> (1 x 350AWG)	M40	19mm	28mm
DC output to pantograph	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two	4 x 185mm <sup>2</sup> (4 x 350AWG)	M40	(0.75in)	(1.10in)
Ground to pantograph	electrical hole possibility and maximum blade width of 32mm.	1 x 185mm <sup>2</sup> (1 x 350AWG)	M40		
Auxiliary Services	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm <sup>2</sup> tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M25	11mm (0.43in.)	17mm (0.67in.)

EN

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
High level	Ethernet CAT 5E UTP with RJ45 connector	-			
Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	<sup>—</sup> M16	5mm (0.19in.)	9mm (0.35in.)
Low level communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	M16		

# Interconnections of the TD Power box

CONNECTION	PANTOGRAPH MODEL	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
Power supply	SLS201.102 Fb206.11	Use 0.6/1kV copper or aluminum 70°C (158°F) cables	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Fower suppry	SLS201.106	with 2,5mm <sup>2</sup> tip terminal.	3G 2,5mm <sup>2</sup> (3G 14AWG)	IVIZO	9mm (0.35in.)	16mm (0.63in.)
Heating busbar	Fb206.11	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 1,5mm² tip terminal.	3G 1,5mm <sup>2</sup> (3G 14AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
Control signal	SLS201.102	Use 300/500V copper or aluminum 70°C (158°F) cables	10 x 0,75mm <sup>2</sup> (10 x	M25	11mm (0.43in.)	17mm (0.67in.)
Control signal	SLS201.106	with 0,75mm² tip terminal.	18AWG)	IVIZO	9mm (0.35in.)	16mm (0.63in.)
Control vilot	SLS201.102	Use 300/500V braided and	2 x 2,5mm <sup>2</sup>	M25	11mm (0.43in.)	17mm (0.67in.)
Control pilot	SLS201.106	<ul> <li>shielded copper 70°C (158°F) cables with 2,5mm² tip terminal.</li> </ul>	(2 x 14AWG)	IVIZO	9mm (0.35in.)	16mm (0.63in.)
RFID (Optional)	SLS201.102	Use 300/500V copper 70°C (158°F) cables with 0,75mm² tip terminal.	2 x 0,75mm <sup>2</sup> (2 x 18AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
External signals	SLS201.102 Fb206.11	Use 300/500V copper or aluminum 70°C (158°F) cables		M25	11mm (0.43in.)	17mm (0.67in.)
of the Button box	SLS201.106	with 0,75mm² tip terminal.	(10 x 18AWG)	IVIZU	9mm (0.35in.)	16mm (0.63in.)

PANTOGRAPH SOLUTION WIRING DIAGRAM NBPTD CONTROL BOX (1xRJ45) (24 VDC) 32 A (SCTX/Rx F.O.)
MEDIA CONVERTER
(SC Rx/Tx to RJ45) EXT BUTTON BOX -X06 EXT BUTTON BOX -X06 POWER TO RFID ALL-IN-ONE PCB DC+ PE / GNDo-AUX PWR IN -X01 (L.N KM1-2.P DC- KM1-2.N DC-(2xSC) (2xSC) GLAND PLATE ΦΦ (D) (D) (12) (16) (17) (3) (2) (9) 6 (5) (13) (4) (1) WIFI RFID ANTENNA FROM NBI POWER CABINET OR NBi STATION COMBINER (8) (10) (11) (7) PE + + - -PANTOGRAPH SLS 201.106 HARTING CP SLS 201.102 PLUG BOX

The following figure shows the interconnections between the **TD Pantograph Solution**.



#### 6.2.2. Connections



Fb206.11-MAN

#### **WARNING**

Before opening any door, the charger must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE. Otherwise, you may suffer an electric shock.



# **CAUTION**

The doors of the product must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the charger, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.

# **NOTICE**

To guarantee proper insulation, it is very important the cable diameter is within the tolerable range of the cable gland.

The power cables and RJ45 connector must be inserted into the product without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the product.

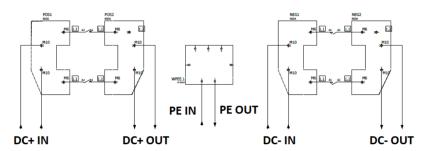
Please note that the figures shown in this section are for illustration purposes only. For other panels, please refer to the electrical diagrams.

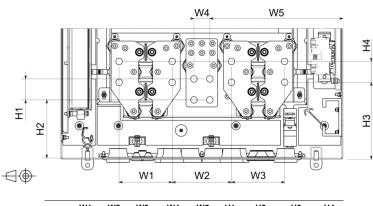
This section details the input and output connections that must be performed in each product. There are several factors that can influence the choice of cable, including the distance between the distribution board and the charger, the maximum input current and the installation mode.

# DC input power connections

#### Power box

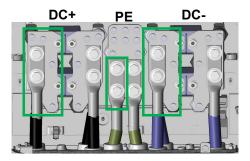
Insert each cable to their respective cable gland, crimp the terminals and connect each of the cables to the corresponding plate as shown in the following figures. The DC input connections must be double (two connections per each input, one on the front and one on the back). The plates are identified with stickers to ensure correct connection.





	W1	W2	W3	W4	W5	H1	H2	Н3	H4
mm	113	126	113	33,75	283	44,5	123,5	163,75	44,5
in.	4.45	4.96	4.45	1.330	11	1.75	4.86	6.45	1.75

The DC input power connections (DC+/DC-, PE, marked in green) must be directly connected to the M10 Nema 2-hole lug as shown in the following figure.

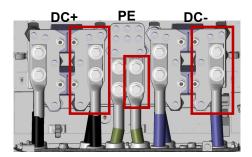


# DC output power connection

#### Power box

The DC output power connections (DC+/DC-, PE, marked in red) must be directly connected to the M10 Nema 2-hole lug as shown in the following figure. The DC output connections must be double (two connections per each input, one on the front and one on the back).





#### Considerations for ground connection

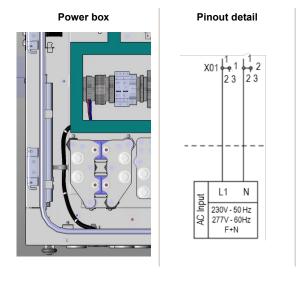
The ground plates are made of tin-plated aluminum. The following recommendations must be considered for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

# **Auxiliary power supply connection**

#### Power box

The auxiliary power supply connection comes from the output of the power equipment (NB Station or NBi Power Cabinet) and must be routed from the corresponding cable gland and connected the to the X01 terminal block located in the front panel, as shown in the following figures.



# **Communications connection**

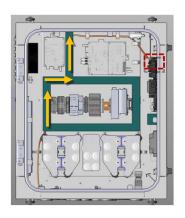
#### Power box

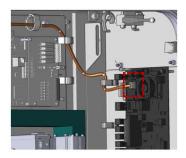
The Power box of the TD Pantograph Solution has two types of communications that come from the power equipment: high-level communications and low-level communications.

#### High level communications (TD Power box)

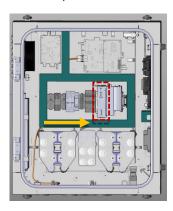
The connection of the high level communications depends on the type of switch that has been chosen by the customer: Optical Fiber or Ethernet.

 Ethernet: As shown in the following figures, the cable must be routed from the corresponding cable gland and connected to the WAN port J13 of the All in One board (E01). Note that the All in One board is located in the right side panel of the TD Power box.



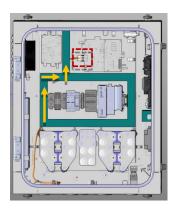


 Optical Fiber: As shown in the following figures, the cable must be routed from the corresponding cable gland and connected to the optical fiber port 7 of A09 the Ethernet-O.F. adapter, located in the front panel.



#### Low level communications (TD Power box)

Low-level communications of the TD Power box of the Pantograph Solution must be connected from the Combiner board of the power equipment to each DC Protocols board of the TD Power box. It is required to connect a pair of fiber optic cables (TX and RX) that must be routed from the corresponding cable gland to the U1 (RX) and U2 (TX) connectors in the DC Protocols board (E02) in the front panel, as shown in the following figure.

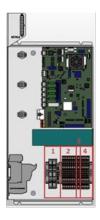


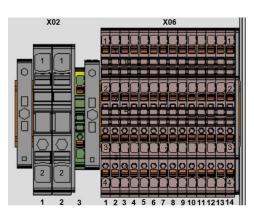
EN

# Interconnections

#### Power box

The TD Power box has several terminal blocks in the right side panel where the interconnections must be performed: power supply of the Pantograph (1), signals of the Pantograph (2), panel of the emergency stop pushbutton (3) and the control pilot (4), as shown in the left figure below. The right figure shows the terminal block distribution.





The following tables detail the pinout of the interconnection for each available Pantograph model.

TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT	CONNECTION	DESCRIPTION
Vaa.	1	2	+24Vdc	· 24Vdc Motor
X02	2	2	-0Vdc	24VUC IVIOLOT
	4	3	+24Vdc	
	1	4	-0Vdc	•
	2	3	Feedback_Waiting	•
	2	4	-0Vdc	Ocatacl of the Death accept
	4	3	Ascend	Control of the Pantograph
	4	4	Feedback_Ascend	•
	-	3	Descend	•
	5	4	Feedback_Descend	•
	8	3	СР	Control Pilot
	8	4	Ground_CP	Control Pliot
Voc.	0	3	+24Vdc	DEID
X06	9	4	-0Vdc	RFID
	40	3		
	10	4	- E-STOP	
	11	3	E-510P	
	11	4	-	
	40	3	044/04	D. # D
	12	4	Start / Stop	Button Box
	42	3	Red	•
	13	4	Green	•
	14	3	Blue	•
	14	4	-0Vdc	•

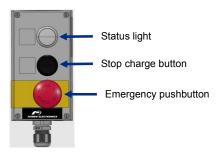
E	N

TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT	CONNECTION	DESCRIPTION
	1	2	+24Vdc	
X02	2	2	-0Vdc	24Vdc Motor
	3	3	Ground	
	1	3	+24Vdc	_
	I	4	-0Vdc	
	3	3	Error	
	3	4	Feedback_Error	<ul> <li>Control of the Pantograph</li> </ul>
	4	3	Ascend	Control of the Pantograph
	4	4	Feedback_Ascend	
	-	3	Descend	
	5	4	Feedback_Descend	
	8	3	CP	Control Pilot
	0	4	Ground_CP	Control Pilot
X06	9	3	+24Vdc	RFID
A00	9	4	-0Vdc	KFID
	10	3	_	
	10	4		
	11	3	- E-STOP	
	11	4		
	12	3	- Start / Stop	Button Box
	12	4	- Start / Stop	DULLOIT DOX
	13	3	Red	
	13	4	Green	-
	14	3	Blue	-
	14	4	-0Vdc	:

TERMINAL LOCK		RAPH MODEL: STEMN CONNECTION POINT	CONNECTION	DESCRIPTION	
TERMINAL LUCK				DESCRIPTION	
	1	3	L – 230Vac		
X01	2	3	N – 230Vac	Plate heating	
	3	Ground plate	Ground		
	1	2	+24Vdc		
X02	2	2	-0Vdc	24Vdc Motor	
	3	3	Ground		
	1	3	+24Vdc		
	ı	4	-0Vdc		
	4	3	Ascend	Control of the Pantograp	
	4	4	Feedback_Ascend	. Control of the Fantograp	
	5	3	Descend		
	5	4	Feedback_Descend	•	
	8	3	CP	Control Pilot	
	0	4	Ground_CP	Control Pilot	
	•	3	+24Vdc	DEID	
Vac	9	4	-0Vdc	RFID	
X06	40	3			
	10	4			
•	44	3	E-STOP		
	11	4	•		
	40	3	0		
	12	4	Start / Stop	Button Box	
	40	3	Red	•	
	13	4	Green	-	
		3	Blue	•	
	14	4	-0Vdc	•	

# 6.3. CONTROL ELEMENTS AND INDICATORS

The following control elements and indicators can be found in the Button box of the TD Pantograph Solution:



- Status light: Shows the status of the product using a color code.
- Start / Stop button: Allows stopping the charge.
- Emergency Stop pushbutton: Allows stopping the Pantograph in case of an emergency

The possible status and colors of the status light indicator are described in the following table:

STATUS	LED	DESCRIPTION
Charging	Green	The communication between the vehicle and the pantograph is correctly working. The product is charging.
Failure	Red	There is some failure activated or the product is not available.
Available	Off	The charger is in stand-by (no vehicle charging). The pantograph is ready to start the charging process.

# 6.4. COMMISSIONING



# **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for installing the **TD Pantograph Solution** and using it for the first time.

Visual inspection: unpackage the equipment and ensure that all components are in good conditions and have not suffered any damage in transit.



Disconnect the external power supply (DC and auxiliary power supply 230 Vac) before starting with the installation.

Check the absence of voltage and open the disconnector at the NB Station or power cabinet.



Perform the anchoring of the equipment according to the dimensions and clearances given in the technical drawings. Please check the "Anchoring requirements" section.



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct.

Check the "Torque and screw sizing" and the "Cable access and connections" sections.

EN



Verify the selectivity of the external protections to the equipment and control parameters. Provide power to the external power supply and verify boards and power source light up.



Configure the communications (if required).



Make sure all doors are properly sealed and locked.



If all previous steps are successful, provide voltage and start the charger.

#### 6.5. MAINTENANCE

In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

#### 6.5.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the *Safety Instructions for Operating, Troubleshooting and Maintenance*.



# **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations.



#### **WARNING**

Before opening any door, make sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure, described in the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Always apply the <u>five</u> golden rules to ensure that there are no dangerous tensions.



# **WARNING**

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

Failure to comply with safety instructions and electrical codes may void the warranty.

#### 6.5.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	1h and 35min

	POWER REVISION (STATUS 1)	TIME (MIN.)	ОК
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the product can be accessed remotely - Connection to the PC if it exists	5	
4	Ventilation system and absence of vibrations - Visual and auditory check	5	
5	Charge test – Recommended (Optional)	10	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MIN.)	ОК
1	Internal cleaning	15	
2	Filters - Visual check and replacement	15	
3	Doors condition	10	
4	Cables and conductors - Visual and manual check	10	
5	External and internal tightening torques - Manual check	10	
6	Control circuits - Manual check	5	

# 6.5.3. Power revision (Status 1)

#### 1. Environmental conditions

Verify that the environment of the product complies with the operating temperature, relative humidity and maximum altitude above sea level ranges defined in the technical data sheet.



# **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains in
  the air susceptible to accumulate on the filters is detected in the area. In this case, it will be
  enough to inspect the products that due to their location have been more exposed, and if dirt
  is detected in them, the inspection will be generalized to the rest of the chargers at the plant

# 2. Enclosure state

Check that the enclosure is in good general state and no traces of corrosion or impacts are present. Check the anchoring of the product.

#### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

#### 4. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

#### 5. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine. If the charge test is performed, it is responsibility of the customer to ensure the presence of an electric vehicle to perform the charging procedure and the costs derived from it must be assumed by the customer.

# 6.5.4. Dead revision (Status 2)

#### 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

#### 2. Filters

Visual inspection of the air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

#### 3. Doors condition

Check that each door closes correctly, and that seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

#### 4. Cables and conductors

Visual inspection of the cables and terminals. Check that the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

# 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and retighten correctively only if necessary. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

#### 6. Control circuits

Check the good conditions of the control boards, as well as their connections. Visually check the switches.

# 7. BU PANTOGRAPH SOLUTION



# 7.1. HANDLING, TRANSPORTATION AND INSTALLATION



# **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the product or injury to persons.

# 7.1.1. Delivery and storage

Power Electronics **Bottom Up (BU) Pantograph solutions** are carefully tested and packed for shipment. Upon receipt, inspect the product. In the event of damage to the product during transportation, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57 / US +1-415-874-3688), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

#### Standard storage



# **NOTICE**

Standard storage is defined as the period of time from the arrival of the product at its location until commissioning occurs. It is assumed that this time period is less than 6 months. This time period may vary depending on weather conditions at the site.

It is the responsibility of the customer to decide whether to install the product within the standard period of time. Otherwise, the customer must consult the "<u>Extended storage</u>" section and take appropriate measures.

Whenever possible, the product should be unloaded at the site of installation and operation.

If it is necessary to store the product, it must be kept in its original packaging and the following rules must be followed to ensure proper condition until installation:

- Store the product indoors, in a location protected against harmful elements such as the entry of animals, excess moisture (both inside and outside the product), exposure to extreme temperatures, direct sunlight, contact with chemicals and corrosive gases, among others.
- Store the product on a flat and level surface. Never rest the product on wooden beams
- Store product away from passageways where it may get damaged
- Keep the elements that cover the product on during storage.
- Keep the product packed until installation.

- The product must be stored in a temperature range between -25°C and +50°C (-13°F and 122°F) without causing any damage to its components.
- The product must be stored in a relative humidity range between 4% and 95% without condensation, without causing any damage to its components.

# **Extended storage**

If the product is stored for an extended period of time (6 months or more) before installation or for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section:

- The product must be protected under shelter, by external protection or by a method adapted to local climatic conditions in order to prevent condensation and moisture inside the product.
- Consult Power Electronics regarding the need to include corrosion inhibition and protection systems inside the product to prevent moisture from damaging the electronic components, depending on the particular conditions of each case.
- A clearance must be left around the product to allow inspections.
- If periodic product inspections are required, access to the interior of the product for such inspections must be agreed with Power Electronics.



# **NOTICE**

Tasks shown above are standard and do not apply to all weather conditions. In extreme weather conditions, it is responsibility of the customer to adjust these requirements for each specific case, as well as the maximum storage time for those conditions.

# 7.1.2. Handling and transportation



# **CAUTION**

**Follow the handling and transportation requirements described here.** Any other method of transport or handling could damage the unit or void the warranty.

During transportation and handling, the products must not be exposed to moisture, overturned, inverted, inclined or impacted.

The product can only be transported fixed to the pallet and protected with its packaging. Additional material for transport and handling will not be provided by Power electronics.

The angle of elevation of the products that require to be lifted by machinery must be less than 90°.

**Avoid sudden movements and jerking during lifting.** To prevent shocks when unloading the product, pause before placing the product on the floor and lower the product slowly until completely supported.

Lifting equipment must be selected according to the lifting system of each product. Refer to the weights table for selection of the lifting equipment and machinery.

Ensure the stability of the product in handling operations, as well as the occupational safety standards that apply at the installation site, considering the Health and Safety measures, and evaluate the necessary auxiliary means according to the applicable regulations in the country of installation.

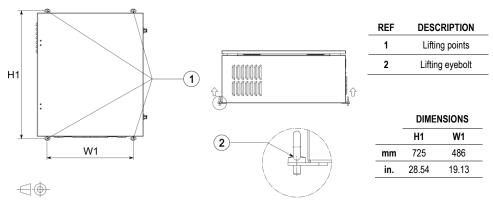
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The product is packed horizontally and the parts are individually wrapped in *cellaire* foam and protected with corner protectors. Internally, the parts are secured strapped to the pallet and externally the box is strapped and shrink-wrapped. The packed product is ready to be transported by truck and handled by a pallet truck or forklift considering the weight, load distribution and center of gravity of the product.

In order to be installed, the product must be unpackaged as described in the "Unpackaging" section.

#### **Power Box**

For lifting only, the product is provided with four hoisting eyebolts, the image below shows the location of the hoisting eyebolts. It is recommended to use four M8 eyebolts for hoisting, only in horizontal position. After unpackaging and once the product has been properly secured to the lifting equipment using the four eyebolts, the product must be lifted slowly, avoiding sudden movements, jolts or possible impacts.



#### **Control Box**

The Control Box of the Bottom Up Pantograph Solution is ready to be handled manually without need of any auxiliary tools for unloading.

#### 7.1.3. Considerations for foundation

When deciding the location of the product and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



#### **NOTICE**

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

Prior to installation, a geotechnical study of the terrain where the product will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is responsibility of the customer to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the responsibility of the manufacturer.

#### Soil

The soil must have the following characteristics:

- It must be dry, compacted, stable and homogeneous.
- It must have hard to medium harshness characteristics.
- The calculation of the maximum permissible pressure on the ground must comply with local and national standards, as well as with any other requirements regarding natural disasters (hurricanes, earthquakes, etc.) that may apply to the place of installation.
- Do not install on floodplains, neither in places where objects can fall on.
- The land must be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground does not exceed the level of the foundation.
- Soil compaction degree of 98% or above.
- Maximum land unevenness of 0.25%.
- Avoid corrosive environments that may affect the proper functioning of the product.

When wall mounting the Pantograph Solution, the mounting surface must be sufficiently resistant to safely withstand the weight of the charger and resist any stress caused by adverse environmental factors, such as climate or seismic activity. These factors must be considered in accordance with specific regulations and characteristics of the installation location.

#### Site basis



# **NOTICE**

Each product must be anchored to a foundation that guarantees its stability towards vertical and horizontal actions. It is responsibility of the customer to design and build the foundation to guarantee stability of each product, considering, if applicable, the specific regulations of the country of installation regarding variables such as snow, wind or seismic activity.

The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the floor height of the user.

The products are not designed for mobile installations.

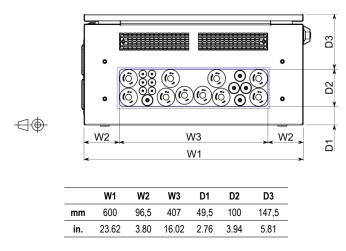
The location of the anchoring points of the product must be considered. For more information on the location of the anchoring points, please see section "Anchoring requirements".

For proper electrical installation, it is very important to meet the cable curvature radius. For this purpose, the customer must consider the characteristics of the selected cable (please refer to the "Cable access and connection" section), this choice being the responsibility of the customer and the bottom access of the wiring.

The customer must consider that it is recommended that the cables enter the product perpendicularly and must verify that the separation between them is adequate. The connection terminals must not be over-tightened.

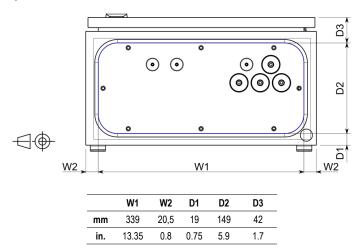
# **Power Box**

The following figure (bottom-up view) shows the dimensions of the bottom gland plate (marked in blue) of the Power Box.



# **Control Box**

The following figure (**bottom-up view**) shows the dimensions of the bottom gland plate (**marked in blue**) of the Control Box.

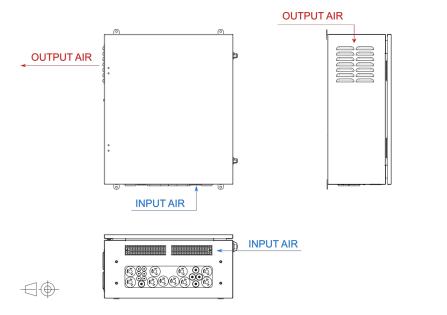


# 7.1.4. Ventilation system

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the product.

#### **Power Box**

The Power box of the BU Pantograph Solutions ha a forced ventilation system with one hot air outlet on the left side of the product (front view) and one cool air inlet located at the bottom.



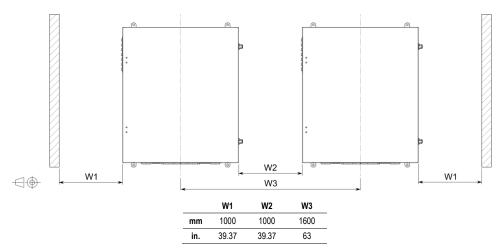
# 7.1.5. Clearances

When installing the product, keep the indicated clearances for proper inspection and correct handling. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The clearances given in this section must not replace in any way the mandatory regulations of the country in which the product will be installed.

The clearances shown are minimum safety distances. Depending on the location, installation and environmental conditions, clearances may change to have adequate ventilation.

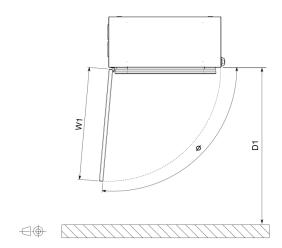
# **Power Box**

Side to side clearance:



The distance between the power unit and the Pantograph Solution cannot exceed 10m (32.8ft), which is the maximum length of the cables that connect both products to each other.

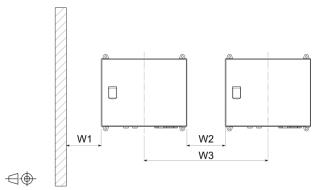
**Front side clearance:** As depicted in the following figure (**top view**), there is an additional space needed to assure the security of the product and to open the door of the Power box.



	W1	D1	Ø
mm	600	800	- 95°
in.	23.62	31.5	- 30

#### **Control Box**

Side to side clearance:



	W1	W2	W3
mm	100	100	480
in.	3.94	3.94	18.90

Front side clearance: It is necessary to leave a front side clearance of 500mm (19.69in) to ensure the security of the product and to open the door of the Control box.

# 7.1.6. Unpackaging

When unpackaging, carefully remove the packaging (do not use sharp tools). After removing the packaging, check the materials inside. In case of receiving spare parts with the product, please separate the spare parts and store them in a safe place according to the storage guidelines.



# **NOTICE**

Waste disposal is responsibility of the customer, and it is not within the scope of Power Electronics.

- 1. Remove the shrink film surrounding the packaging.
- 2. Cut the strapping around the package.
- 3. Remove the cardboard band and cardboard cover.
- 4. Cut the straps that secure the pedestal and upper elements to the pallet through the cardboard base.
- 5. Position the pedestal, as well the rest of the components items on top of the product, in an alternative temporary storage location, so that the rest of the contents can be handled safely.
- 6. Cut the straps that secure the product to the pallet through the cardboard base.
- 7. Remove the cardboard corner protectors.
- 8. Remove the cellaire foam that wraps the product.



# 7.1.7. Anchoring requirements



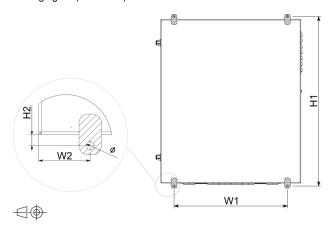
# NOTICE

It is responsibility of the customer to correctly dimension the anchoring of the product to the foundation, guaranteeing stability towards horizontal actions.

#### **Power Box & Button box**

To anchor the Power Box, it is recommended to use four M8 stainless steel 8.8 screws, fasten them by applying the recommended torque for mechanical connections as specified by the manufacturer. If installation on pedestal is required, it is the responsibility of the client to design the pedestal.

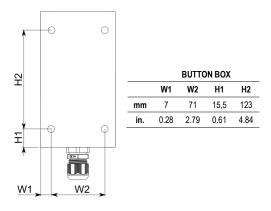
The holes must be drilled according to the dimensions of the following figure. Ensure that the product is correctly leveled, then fix the rear of the Power box to the wall with four screws. See the anchoring points in the following figure (**rear view**).



	POWER BOX								
	H1	H2	W1	W2	Ø				
mm	725	12,5	486	57	9				
in.	28.54	0.49	19.13	2.24	0.35				

To anchor the external Button box, it is recommended to use **four M4 stainless steel 8.8 screws**, fasten them by applying the recommended torque for mechanical connections as specified by the manufacturer.

The holes must be drilled according to the dimensions of the figure. Check that the box is correctly leveled, then fix the rear of the box to the wall with four screws. See the anchoring points in the following figure (rear view).

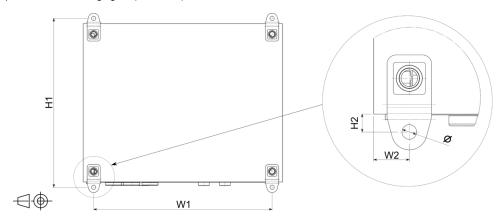




# **Control Box**

To anchor the Control Box, it is recommended to use four M8 stainless steel 8.8 screws, fasten them by applying the recommended torque for mechanical connections as specified by the manufacturer.

The holes must be drilled according to the dimensions of the following figure. Ensure that the product is correctly leveled, then fix the rear of the Control box to the wall with four screws. See the anchoring points in the following figure (**rear view**).



	CONTROL BOX						
	W1	W2	H1	H2	Ø		
mm	340	20	320	10	8,2		
in.	13.39	0.79	12.60	0.39	0.32		

#### 7.2. CABLE ACCESS AND CONNECTIONS



# **WARNING**

During the connection, you must ensure the proper cable installation in the terminals of the product so that there are no voltage parts accessible in this wiring and the polarity is respected

The power and communication cables must enter through the bottom part of the charger. Use only the amount of cable glands needed for the project. The plate is labeled so that cables go directly to their plates, avoiding excessive crossings and twists.

To guarantee proper insulation, it is very important that the cable diameter is within the tolerable range of the cable gland. The cables must be inserted to their respective cable gland without crimping the terminal, otherwise they will not be able to pass through all the expected spaces and forcing them could affect the sealing of the charger. After passing the cable through the cable gland, it must be crimped.



#### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "Considerations for foundation".



#### NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the "Torque and screw sizing" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The cable terminals must be single / standard crimp barrel length to avoid clearance problems. The installer must consider the bending radius of the input power connections.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

The charger does not require auxiliary power supply input.

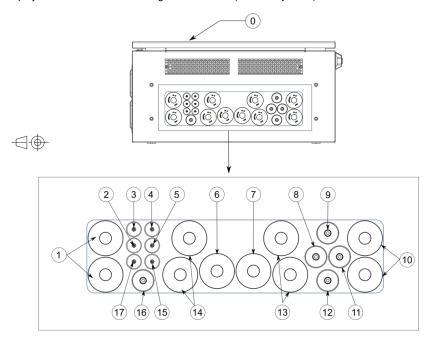
Power, ground, auxiliary and communication cables are not included within Power Electronics' scope. The following material is within responsibility of the customer:

- AC input power cables and terminal lugs (as applicable).
- Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Ground cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Auxiliary power supply cable to each Dispenser or pantograph (as applicable).
- Control optical fiber to each Dispenser or pantograph (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

# 7.2.1. Cable access and cable size

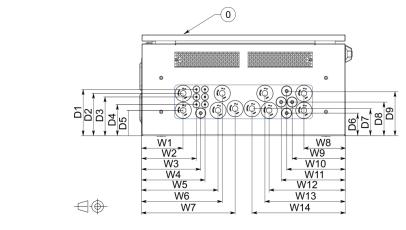
# **Power box**

The following figures show the standard cable entry plate. Only the amount of cable glands needed for the project must be used. It is configured as follows (bottom-up view).



REF.	DESCRIPTION	REF.	DESCRIPTION
0	Front access door	9	Signals from external Button Box
1	DC+ from NBi power cabinet or NB Station	10	DC- to pantograph
2	-	11	Output of the contactors signals
3	-	12	Output power supply to the BU Control Box
4	-	13	DC- from NBi power cabinet or NB Station
5	-	14	DC+ to pantograph
6	PE from NBi power cabinet or NB Station	15	Ethernet / Optical fiber connection
7	PE to pantograph	16	Auxiliary services power input
8	-	17	-

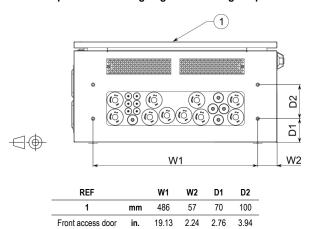




REF		W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13	W14
0	mm	122	161	173,5	186	224,5	237	275	122	156,8	173	189,3	224,5	237	275
Front access door	in.	4.84	6.38	6.87	7.36	8.88	9.37	10.87	4.8	6.17	6.81	7.45	8.84	9.33	10.83

	D1	D2	D3	D4	D5	D6	D7	D8	D9
mm	136,5	124,5	114	91,5	74,5	66,5	79,5	99	139,5
in.	5.37	4.9	4.49	3.6	2.93	2.62	3.13	3.9	5.49

Four inserted nuts are prepared to allow the installation of a protective cover for the power cables. This protection must be installed using four M6 screws. The location of these screws is shown below (bottom-up view). The customer is responsible for designing and installing the protective cover.



CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
DC input	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two	4 x 185mm <sup>2</sup> (4 x 350AWG)	M40		
Ground	electrical hole possibility and maximum blade width of 32mm.	1 x 185mm <sup>2</sup> (1 x 350AWG)	M40	19mm	28mm
DC output to pantograph	Use 0.6/1kV copper or aluminum 90°C (194°F) cables with M14 washer terminal. NEMA two	4 x 185mm <sup>2</sup> (4 x 350AWG)	M40	(0.75in)	(1.10in)
Ground to pantograph	electrical hole possibility and maximum blade width of 32mm.	1 x 185mm <sup>2</sup> (1 x 350AWG)	M40		
Auxiliary Services	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm² tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M25	11mm (0.43in.)	17mm (0.67in.)

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
High level	Ethernet CAT 5E UTP with RJ45 connector	-	140	5mm	9mm
Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	— M16	(0.19in.)	(0.35in.)

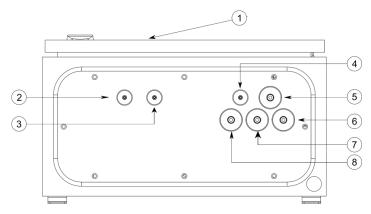
# Interconnections of the BU Power Box

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
Control signal	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 1mm² tip terminal.	6 x 1mm <sup>2</sup> (6 x 18AWG)	M25		
External signals	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 1mm² tip terminal.	8 x 1mm <sup>2</sup> (8 x 18AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Output power supply to the BU control box	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm² tip terminal.	3G 2,5mm <sup>2</sup> (3G 14AWG)	M25		

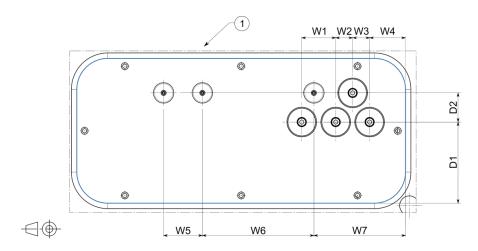
# **Control box**

The following figures show the standard cable entry plate. Only the amount of cable glands needed for the project must be used. It is configured as follows (bottom-up view).





	DESCRIPTION			
1 Front acces	s door.			
2 Ethernet cor	nection.			
3 Optical fiber	connection.			
4 Optional sto	p button			
5 Control pilot				
6 Interconnec	ion of the contactors.			
7 Auxiliary ser	vices power input (from BU Power Box).			
8 Voltage mea	surement of the pantograph.			



REF		W1	W2	W3	W4	W5	W6	W7	D1	D2
1	mm	35	17,5	17,5	37	40	115	94,5	83,5	30
Front access door	in.	1.38	0.69	0.69	1.46	1.58	4.53	3.73	3.29	1.19

CONNECTION	CABLE SPECIFICATION / RECOMMENDATION	MAX. SECTION	CABLE GLAND	MIN. Ø	MAX. Ø
AC input Auxiliary Services (from BU Power box)	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 2,5mm² tip terminal.	3G 2,5mm <sup>2</sup> (3G 14AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
High level Communications	Ethernet CAT 5E UTP with RJ45 connector	-		5mm	9mm
Low level Communications	Use two (RX and TX) GOF Multimode Fiber Optic OM3, 50/125um 2xSC Connectors	-	M16	(0.19in.)	(0.35in.)
Interconnection of the contactors	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 1mm² tip terminal.	6 x 1mm <sup>2</sup> (6 x 18AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Interconnection of the Control pilot	Use 0.6/1kV braided and shielded copper 70°C (158°F) cables with 2,5mm² tip terminal.	2 x 2,5mm <sup>2</sup> (2 x 14AWG)	M25	11mm (0.43in.)	17mm (0.67in.)
Interconnection of the Optional stop button	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 1mm² tip terminal.	2 x 1mm <sup>2</sup> (2 x 18AWG)	M16	5mm (0.19in.)	9mm (0.35in.)
Voltage measurement of the pantograph	Use 0.6/1kV copper or aluminum 70°C (158°F) cables with 4mm² tip terminal. In the pantograph, it is recommended to connect with a M10 washer terminal.	4 x 1mm <sup>2</sup> (4 x 18AWG)	M25	11mm (0.43in.)	17mm (0.67in.)

#### 7.2.2. Connections



#### WARNING

Before opening any door, the charger must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "Safety instructions" section and the Safety Instructions for Operating, Troubleshooting and Maintenance. Please use all the indicated PPE. Otherwise, you may suffer an electric shock.



# **CAUTION**

The charger doors must be properly closed after installation, maintenance or troubleshooting operations. To ensure complete closure of the doors and to guarantee the sealing of the charger, it is necessary to ensure that the door handle always reaches the left limit (clockwise) before returning the handle to its center position.



# **NOTICE**

To guarantee proper insulation, it is very important the cable diameter is within the tolerable range of the cable gland.

The power cables and RJ45 connector must be inserted into the product without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the product.

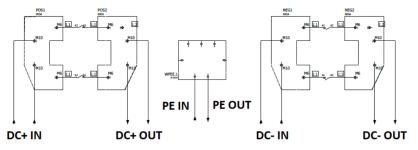
Please note that the figures shown in this section are for illustration purposes only. For other panels, please refer to the electrical diagrams.

This section details the input and output connections that must be performed in each product. There are several factors that can influence the choice of cable, including the distance between the distribution board and the charger, the maximum input current and the installation mode.

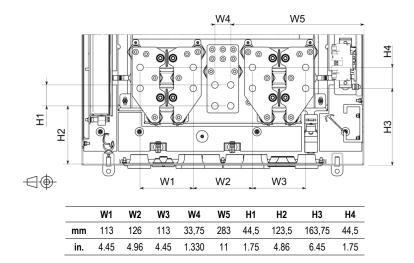
#### DC input power connections

# Power box

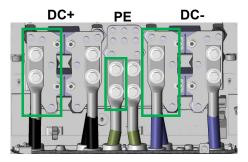
Insert each cable to their respective cable gland, crimp the terminals and connect each of the cables to the corresponding plate as shown in the following figures. The DC input connections must be double (two connections per each input, one on the front and one on the back). The plates are identified with stickers to ensure correct connection.



EN



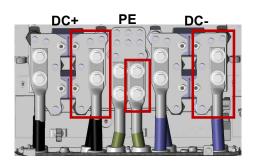
The DC input power connections (DC+/DC-, PE, marked in green) must be directly connected to the M10 Nema 2-hole lug as shown in the following figure.



# DC output power connection

#### **Power Box**

The DC output power connections (DC+/DC-, PE, marked in red) must be directly connected to the M10 Nema 2-hole lug as shown in the following figure. The DC output connections must be double (two connections per each input, one on the front and one on the back).



#### Considerations for ground connection

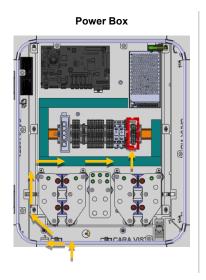
The ground plates are made of tin-plated aluminum. The following recommendations must be considered for the correct ground connection:

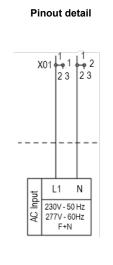
- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- Use copper, aluminum or copper-clad aluminum 75°C (167°F) cables with conductor size
  according to the National Electrical Code, ANSI/NFPA 70 for this temperature rating of wire.
  As an alternative, use copper, aluminum or copper-clad aluminum 90°C (194°F) cables with
  conductor size according to the same NEC requirement. In all cases, cables must have a
  minimum rated voltage of 1000V.
- It is recommended to use Ø14mm (0-1/2") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M12 (1/2") bolts and nuts and apply the recommended torque according to the quality (See "Torque and screw sizing").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.

# **Auxiliary power supply connection**

#### **Power Box**

The auxiliary power supply connection comes from the output of the power unit (NB Station or NBi Power Cabinet) and must be routed from the corresponding cable gland and connected the to the X01 terminal block located in the front panel, as shown in the following figures.





ΕN

#### **Communications Connection**

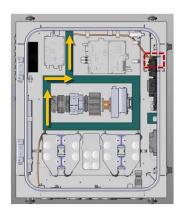
#### **Power Box**

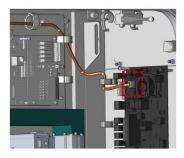
The Power Box of the BU Pantograph Solution only has high-level communications that come from the power unit.

#### High level communications (BU Power box)

The connection of the high level communications depends on the type of switch that has been chosen by the customer: Optical Fiber or Ethernet.

Ethernet: The cable must be routed from the corresponding cable gland and connected to
the WAN port J13 of the All in One board (E01). Note that the All in One board is located in
the front panel of the BU Power Box. The following figures, shown for illustration purposes
only, correspond to the TD Power Box.





Optical Fiber: The cable must be routed from the corresponding cable gland and connected
to the optical fiber port 7 of the A09 Ethernet-O.F. adapter, as shown in the following figures.
 Note that the Ethernet – OF adapter is located in the front panel of the BU Power box.



### **Control Box**

The Control Box of the BU Pantograph Solution has two types of communications that come from the power equipment: high-level communications and low-level communications.

### **High level communications**

High-level communications of the BU Control Box must be connected from the BU Power Box through the corresponding cable gland and connected to the Ethernet port (J9) of the DC Protocols board (E02) located in the front panel.

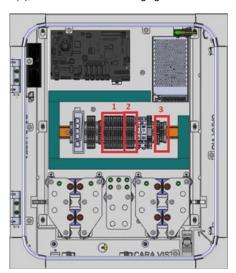
#### Low level communications

Low-level communications must be connected from the BU Power box to the DC Protocols board (E02) of the Control box. The optical cable pair of cables (TX & RX) must be routed from the corresponding cable gland to the U1 (RX) and U2 (TX) connectors in the DC Protocols board on the front panel.

# Interconnections

### **Power Box**

The Power Box has terminal blocks in the front panel in which the interconnections must be made: with the signals from the contactors (1), with the panel of the emergency stop pushbutton (2) and the power supply to the Control Box (3), as shown in the following figure.



EN

The following tables detail the pinout of each interconnection.

### Interconnection with the contactors

ORIGIN – BU POWER BOX			DESTINATION – BU CONTROL BOX			
TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT	TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT	
	9	2	X08	1	3	
		1			4	
V04	1	1		X08	2	3
X04	3	1			2	4
•	5	2		2	3	
•	8	2		3	4	

#### Interconnection with the external signals of the BU Button box

ORIGIN – BU POWER BOX			DESTINATION – BU BUTTON BOX			
TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT	ELEMENT	ITEM	CONNECTION POINT	
	4	3		S10	11	
	1	4	E-STOP		12	
	2	3	BUTTON		21	
X05		4			22	
VOS	3	3		LED H1	X1: RED	
		4	LED		X2: GREEN	
	4	3	LED		X3: BLUE	
	4	4			X4: GND	

### Interconnection for the output power supply to the BU Control box

ORIGIN – BU POWER BOX			DESTINATION – BU BUTTON BOX		
TERMINAL BLOCK	CONNECTION POINT		ELEMENT	ITEM	CONNECTION POINT
	2	3		2	2
X01	3	2	X07	3	2
	4	2		1	2

# **Control box**

The BU Control box has several terminal blocks on the front panel where different interconnections must be performed: contactors (X08 terminal block), control pilot (X10 terminal block) and optional stop button (X11 terminal block where the customer can optionally install a stop pushbutton). Additionally to the interconnection of the signals of the contactors, described in the previous section, the interconnections of the BU Control box must comply with the following tables:

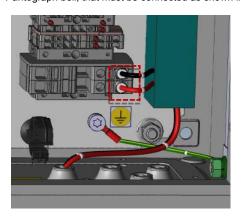
## Interconnection with the control pilot

0	DESTINATION			
TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION POINT		
X10	1	2	CONTROL PILOT	
AIU	2	2		

### Interconnection with the optional stop button

0	DESTINATION		
TERMINAL Block	TERMINAL NUMBER	CONNECTION POINT	
X11	1	2	CONTROL PILOT
AII	2	2	

Additionally, the BU Control box has a terminal block (X06) prepared for measuring the voltage of the Pantograph bell, that must be connected as shown in the following figures.

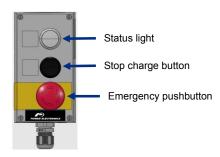


TERMINAL BLOCK	TERMINAL NUMBER	CONNECTION	CONNECTION
X06	1	2	V+
7,00	2	2	V-



# 7.3. CONTROL ELEMENTS AND INDICATORS

The following control elements and indicators can be found in the *Button box* of the **Pantograph Solution**:



- Emergency Stop pushbutton: Allows stopping the Pantograph in case of an emergency.
- Start / Stop button: Allows stopping the charge.
- Status light: Shows the charger status using a color code.

Possible status and colors of the indicator are described in the following table:

STATUS	LED	DESCRIPTION
Charging	Green	The communication between the vehicle and the pantograph is correctly working. The product is charging.
Failure	Red	There is some failure activated or the product is not available.
Available	Off	The charger is in stand-by (no vehicle charging). The pantograph is ready to start the charging process.

# 7.4. COMMISSIONING



# **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the product and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for installing the Pantograph Solution and using it for the first time.

Visual inspection: unpackage the equipment and ensure that all components are in good conditions and have not suffered any damage in transit.



Disconnect the external power supply (DC and auxiliary power supply 230 Vac) before starting with the installation. Check the absence of voltage and open the disconnector at the NB Station or the NBi power cabinet.



Perform the anchoring of the equipment according to the dimensions and clearances given in the technical drawings. Please check the "Anchoring requirements" section.



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct.

Check the "Torque and screw sizing" and the "Cable access and connections" sections.



Verify the selectivity of the external protections to the equipment and control parameters. Provide power to the external power supply and verify boards and power source light up.

Configure the communications (if required).



Make sure all doors are properly sealed and locked.



If all previous steps are successful, provide voltage and start the charger.

# 7.5. MAINTENANCE

In order to perform maintenance tasks properly, the instructions provided in the *Safety Instructions for Operating, Troubleshooting and Maintenance* must be followed to shut down the product safely.

### 7.5.1. Product statuses

Before starting any maintenance task, it is mandatory to consult the possible statuses of the product detailed in the *Safety Instructions for Operating, Troubleshooting and Maintenance*.



### CAUTION

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the product may get damaged and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations.



### **WARNING**

Before opening any door, make sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before handling the product internally. Otherwise, you may suffer an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the product, as well as carry out the safe stop procedure, described in the corresponding Safety Instructions for Operating, Troubleshooting and Maintenance. Always apply the <u>five</u> <u>golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be considered. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the product.

Failure to comply with safety instructions and electrical codes may void the warranty.

EN

### 7.5.2. Checklist

The list of tasks detailed below should be carried out annually. The duration of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	1h and 35min

	POWER REVISION (STATUS 1)	TIME (MIN.)	ОК
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the product can be accessed remotely – Connection to the PC if it exists	5	
4	Ventilation system and absence of vibrations – Visual and auditory check	5	
5	Charge test – Recommended (optional)	10	

The following tasks must be performed with the product completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MIN.)	ОК
1	Internal cleaning	15	
2	Filters – Visual check and replacement	15	
3	Doors condition	10	
4	Cables and conductors – Visual and manual check	10	
5	External and internal tightening torques – Manual check	10	
6	Control circuits – Manual check	5	

# 7.5.3. Power revision (Status 1)

### 1. Environmental conditions

Verify that the environment of the product complies with the operating temperature, relative humidity and maximum altitude above sea level ranges defined in the technical data sheet.



### **CAUTION**

This task must be carried out annually. However, it must be done more frequently if climate conditions require so. The review criteria are the following:

- Whenever pruning, mowing, grazing or similar tasks are carried out in the vicinity of the charger, which may produce the presence of plant or animal debris suspended in the air.
- When, due to human activities, climatic or biological reasons, the presence of solid remains in
  the air susceptible to accumulate on the filters is detected in the area. In this case, it will be
  enough to inspect the products that due to their location have been more exposed, and if dirt
  is detected in them, the inspection will be generalized to the rest of the chargers at the plant.

### 2. Enclosure state

Check that the enclosure is in good general state and no traces of corrosion or impacts are present. Check the anchoring of the product.

### 3. Remote access

Verify that the product can be accessed remotely. If it exists, verify the connection with a PC.

# 4. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

# 5. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine. If the charge test is performed, it is responsibility of the customer to ensure the presence of an electric vehicle to perform the charging procedure with each type of connector and the costs derived from it must be assumed by the customer.



# 7.5.4. Dead revision (Status 2)

# 1. Internal cleaning

Check that the product does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may get damaged. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

### 2. Filters

Visual inspection of the air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation. This task must be carried out annually. However, it must be done more frequently if climate conditions require so.

### 3. Doors condition

Check that each door closes correctly, and that seals and closures are in good conditions. Check hinges, gaskets, closures and doors.

### 4. Cables and conductors

Visual inspection of the cables and terminals. Check that the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

# 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and retighten correctively only if necessary. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the product, check the torque and retighten.

### 6. Control circuits

Check the good conditions of the control boards, as well as their connections. Visually check the switches.



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Installation and Operation Manual
MaxiCharger DC Fast (UL)

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# 1. Using This Manual

This manual describes the installation and use of the MaxiCharger DC Fast 120kW (DF120) and MaxiCharger DC Fast 240kW (DF240). Prior to installation, read through this manual to become familiar with the instructions of this MaxiCharger to ensure a successful installation and smooth operations.

### 1.1 Conventions

The following conventions are used.

### 1.1.1 Bold Text

Bold text is used to highlight selectable items such as buttons and menu options.

#### 1.1.2 Illustrations

Illustrations used in this manual are only examples; the actual product(s) or screens may vary.

### 1.1.3 Hyperlink

Hyperlinks or links that take you to other related articles, procedures, and illustrations are available in electronic documents. Blue underlined colored text indicates a selectable hyperlink.

### 1.1.4 Notes and Important Messages

#### **Notes**

A NOTE provides helpful information such as additional explanations, tips, and comments.

#### **Important**

**IMPORTANT** indicates a situation which, if not avoided, may result in damage to the test equipment or vehicle.

### 1.1.5 Procedures

An arrow icon indicates a procedure.

#### > To charge an EV

- 1. Park an EV with the charging port within reach of the connector.
- 2. Plug in the vehicle. Avoid any extensive stretch of the charging cable.
- 3. Start the charging session.
- 4. Stop the charging session.

# 1.1.6 Revision History

Version	Date	Descriptions
V1	2022.05.10	Initial version
V2	2023.04.12	Complete manual overhaul

# 1.2 Terminology

Term	Definition
AC	Alternating current
ccs	Combined Charging System, a standard charging method for electric vehicles
сси	Charging Control Unit: a control unit used to communicate with the BMS (Battery Management System) and control the power delivery to the EV
CHAdeMO	Abbreviation of CHArge de MOve, a standard charging method for electric vehicles
DC	Direct current
EV	Electric vehicle
ОСРР	Open charge point protocol, open standard for communication with charge stations
RCBO	Residual current breaker with overload
RCD	Residual current device; a device that breaks an electrical circuit when it detects a current leakage
RFID	Radio-frequency identification; a method of charging authentication
SPD	Surge protection device, a device intended to protect electrical devices from voltage spikes in AC circuits
тси	Transaction Control Unit; intelligent hardware to handle the human-machine interface, metering, transaction, and communication with back office

# 2. Safety

The safety messages herein cover situations of which Autel is aware. Autel cannot know, evaluate or advise you as to all of the possible hazards. You must be certain that any condition or service procedure encountered does not jeopardize your personal safety.

# **A** DANGER

Indicates an imminently hazardous situation with a high risk level which, if the danger is not avoided, will cause death or serious injury.

# **MARNING**

Indicates a potentially hazardous situation with moderate risk level which, if the warning is not obeyed, can cause death or serious injury.

# **A** CAUTION

Indicates a potentially hazardous situation with a medium risk level which, if the caution is not obeyed, may cause minor or moderate injury or damage to the equipment.

- Preview the standard operating procedures and ensure that local building and electrical codes are reviewed before installing the MaxiCharger.
- Read the manual before installing or using the MaxiCharger.
- Do not use the MaxiCharger if the cabinet, power cord or charging cable are frayed, have broken insulation or shows any other signs of damage.
- Do not install or use the MaxiCharger if the enclosure is broken, cracked, open, or has any other indication of damage.
- The information provided in this manual in no way exempts the user of responsibility to follow all applicable codes or safety standards.
- This document provides instructions for the MaxiCharger and should not be used for any other product.
   Before installation or use of this equipment, review this manual carefully and consult with a licensed contractor, licensed electrician or trained installation expert to ensure compliance with local building codes and safety standards.

### 2.1 Safety Warnings

- Ensure there is no voltage on the AC input cables during the complete installation procedure.
- Keep unqualified personnel at a safe distance during installation.
- All electrical wires used in the installation must comply with National Electric Code (NEC) to meet the rated current and voltage demand.
- Ensure the load capacity of the grid is in accordance with the MaxiCharger.
- Ensure the MaxiCharger is connected to a grounded, metal, permanent wiring system. Otherwise, an
  equipment-grounding conductor must be run with the circuit conductors and connected to the
  equipment grounding terminal or lead on the product.
- Ensure the connections to the MaxiCharger comply with all applicable local rules.
- Ensure the wiring inside the MaxiCharger is protected from external factors. The cabinet doors should open and close freely without obstructing the wiring.

- Ensure there is no damage to the gasket that may cause water intrusion.
- Protect the MaxiCharger with safety devices and measures that the local rules specify.
- Installation personnel must have the correct protective equipment such as protective clothing, safety gloves, safety shoes, and safety glasses.

# 2.2 Owner Responsibilities

The owner runs the MaxiCharger for commercial or business use or has authorized a third party to use it. The owner should protect the user, other employees or third parties when the MaxiCharger is in use. The owner bears the responsibilities as follows:

- Know and obey the local codes and ordinances.
- Ensure all employees and third parties are qualified to operate the MaxiCharger.
- Ensure the MaxiCharger has installed the protective devices.
- Ensure all the protective devices are installed after installation or maintenance.
- Ensure the space around the MaxiCharger is sufficient to carry out installation or maintenance work.
- Ensure there is a plan in place in case of an emergency.
- Ensure there are no safety hazards on the site.
- Have a site operator available who undertakes the safe operation of the MaxiCharger and all the coordination of work if the owner takes no part in the work.
- Ensure the installation engineer follows the local codes and ordinances, the installation instructions, as well as the specifications of the MaxiCharger.

## 2.3 Installation Engineer Qualifications

- Fully understands the equipment and its safe installation procedures.
- Qualified according to local regulations to carry out the installation work.
- Able to follow all the local regulations and this manual to complete the installation of the MaxiCharger.

### 2.4 Usage Instructions

Do not operate the MaxiCharger and immediately contact the manufacturer if any of the following situation arises:

- Damage on the enclosure, charging cable or connector
- Lightning has struck the MaxiCharger
- Fire or flames at or near the MaxiCharger
- Any sign of water damage on the MaxiCharger

# 2.5 Signs on the MaxiCharger

Symbol	Risk Description
$\triangle$	General risk
4	Hazardous voltage that gives risk of electrocution
A	Waste from electrical and electronic equipment
	Hot surface that gives risk of burn injuries

# 2.6 Disposal Instructions

Potential hazardous substances of the MaxiCharger can have a negative impact on the environment and human health if the waste is not handled properly. Dispose any waste as needed to protect the environment and promote the reuse and recycling of the materials.

# 2.7 Cyber Security

### **⊘** NOTE

This section is applicable to the Ethernet and Wi-Fi connection.

The MaxiCharger can use a network interface for connection and information and data communication. The owner bears the responsibility of a secure connection between the MaxiCharger and the owner's network or any other networks.

Appropriate measures shall be taken by the owner to shield the MaxiCharger, the network, the system, and the interface from any security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. These measures may include firewall building, authentication methods, data encryption, and anti-virus programs installation, etc.

Autel is not liable for damages and/or losses pertaining to the security breaches described above.

# 3. General Introduction

This MaxiCharger is designed to charge an electric vehicle (hereinafter called EV). The MaxiCharger provides you with safe, reliable, fast, and smart charging solutions.

#### **Intended Use**

This MaxiCharger is intended for the DC charging of EVs. It is intended for both indoor and outdoor use.

- Fleet
- Highway
- Commercial Parking
- Others

# **A** DANGER

- The equipment must be operated as described in this manual or other related documents released by Autel. Failure to comply may result in human injury and/or damage to the property.
- Use the equipment only as intended.

### ⊘ NOTE

The images and illustrations depicted in this manual may differ slightly from the actual product.

# **3.1** Product Descriptions

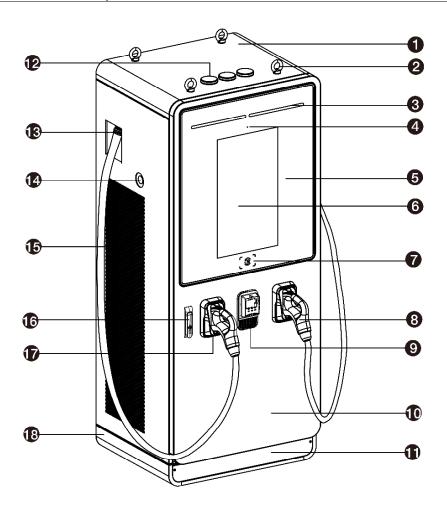


Table 3-1 Product Descriptions (Outside)

No.	Parameter
1	Main Cabinet
2	Spare Ring — equipment movement, loading and unloading
3	Indicator — displays the current status of the MaxiCharger. See <i>Table 3-2 Indicator Descriptions</i> for details.
4	Ambient Light Sensor
5	Tempered Glass — protects indicator and touchscreen
6	Touchscreen
7	RFID Card Reader
8	Connector
9	POS (Optional)
10	Front Door
11	Front/Rear Base Cover — remove them before using a forklift to move the cabinet
12	Antenna
13	Waterproof Cable Fixing Connector — for the extended charge cable
14	Emergency Stop Button
15	Vent
16	Handle Lock
17	Holster
18	Base

# NOTE

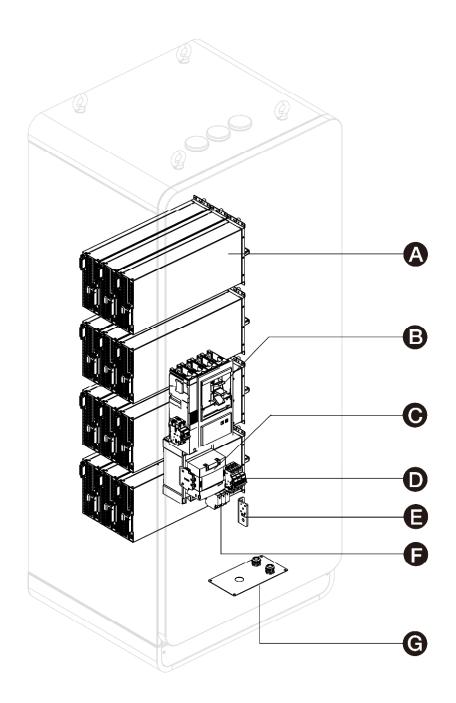
Autel can deliver the MaxiCharger with different payment terminals. The available options vary depending on the region of the installation. Consult Autel's customer service to obtain more information about the different payment options.

**Table 3-2 Indicator Descriptions** 

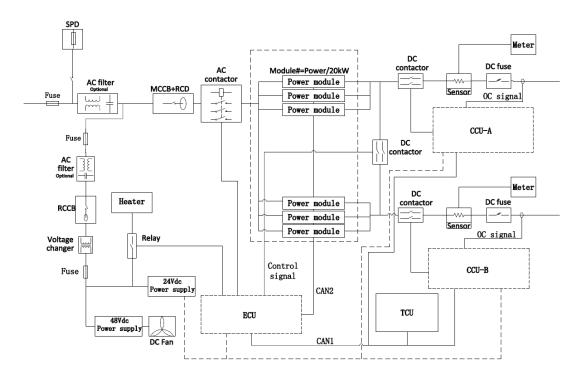
Charging Status	Color	Description
Standby Mode	Solid Green	A connector is available.
EV Connected	Solid White	An EV is connected to the MaxiCharger.
Charging	Illuminating Green in Turn	Indicates the charging progress.
Charging Completed	Flashing Green	An EV is fully charged or has stopped charging.
Reservation	Flashing White	The MaxiCharger is reserved.
Error	Solid Red	An error has occurred.

Table 3-3 Product Descriptions (Inside)

No.	Parameter
A	Charging Module — varies depending on power output
В	Main Breaker — connects/disconnects the charging module
С	AC Input Fuse
D	Auxiliary AC Fuse
E	PE Busbar — connects the PE cable
F	RCD Breaker
G	Cable Gland Plate



# 3.2 Working Principle



# 3.3 Local Service Portal

The Local Service Portal is a service tool provided by Autel that provides information pertaining to the equipment. This service tool configures key parameters for commissioning, enables on-site diagnostics. For the operation procedures, refer to *Local Service Portal Operations*.

**Table 3-4 Parameter Descriptions** 

Parameter	Example ("*" indicates variables)
Charger ID	DG1120B1********
OCPP IP	*******
OCPP-URL address	******
Port number	***
OCPP encryption method	***
Country code	US
Network selection	auto/Wi-Fi/4g
Supplier	Autel
Control board SN	C06G120********

Parameter	Example ("*" indicates variables)
MAC address	ba:9f:aa:8c:**:**
Password	000000
Connection ID	0: Connectors 1 and 2 initialization
Charger configuration model	120:120kW
MGR IP	********
MGR URL	*****
MGR PORT	***
MGR SEC	https
MGR ENABLE	1: Enable
http API address	temporarily useless
Running environment	1: China /3: Europe /4: UK /5: USA
Payment method	1: QR code 2: NFC module 3: QR code and NFC module 4: Credit card 5: QR code and credit card 6: NFC module and credit card 7: All
Http test switch	1: Production environment
Device Model	Maxi US *******
Rated Power	120kW
Rated Voltage	950V
Maximum current	200A
Set Current	200A
Max Power	120kW

# 3.4 Cloud Service Portal

Different cloud-based tools are provided to commission, monitor, and troubleshoot the MaxiCharger. For more information, contact Autel support.

# 4. Preparation

#### General installation procedure:

- 1. Ensure the installation site is ready and you have all the parts and tools described in the sections below.
- 2. Install the MaxiCharger as described in Chapter 5.
- 3. Energize the MaxiCharger and verify it is fully operational as described in *Chapter 6*.

# 4.1 Installation Site Design

An installation site design is prerequisite for determining conduit and wiring requirements from the panel to the proposed parking spaces, as well as for measuring cellular signal strength and identifying suitable locations for any necessary cellular signal booster equipment.

### **IMPORTANT**

Always check local codes or consult an engineer to ensure the site is prepared in accordance with all applicable regulations. Local authorities might not permit a unit to operate if it is not installed to code.

#### General installation site design procedure:

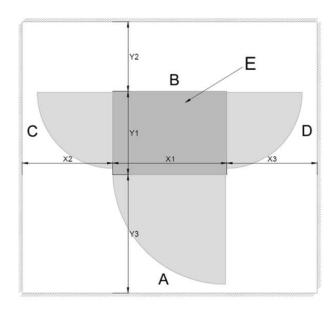
- 1. Select a suitable site. Refer to 4.1.1.
- 2. Complete the electrical design. Refer to 4.1.2.
- 3. Prepare the cables, including the AC input wire, PE wire, and Ethernet cable (if no cellular network is available).

# **⊘**NOTE

- The cables enter the cabinet from the bottom.
- Ensure the maximum opening of the cabinet inlet can sufficiently fit all cables.
- 4. Ensure that the cable slack is sufficient to guide the cables into the cabinet.
- 5. Prepare the foundation for the cabinet. Refer to 4.1.3.

### 4.1.1 Location Requirements

• The MaxiCharger requires an installation space of 95 x 81 inches (2420 x 1950 mm, for DF120) or 103 x 81 inches (2620 x 2050 mm, for DF240) in order to ensure the normal operation and airflow around the MaxiCharger. The space is calculated as follows:



- A. Front side of the MaxiCharger
- B. Rear side of the MaxiCharger
- C. Left side of the MaxiCharger
- D. Right side of the MaxiCharger
- E. Cabinet

Table 4-1 Space Requirements for DF120

Parameter	S	pecification
Parameter	in	mm
X1	32.3	820
X2	31.5	800
Х3	31.5	800
Y1	23.6	600
Y2	19.7	500
Y3	33.5	850

Table 4-2 Space Requirements for DF240

Parameter	Specification	
raiailletei	in	mm
X1	32.3	820
X2	35.4	900
Х3	35.4	900
Y1	27.6	700
Y2	19.7	500
Y3	33.5	850

- Ensure the charger's installation location can sufficiently reach the parked EV with the chosen charging cable length. The standard length of a charging cable is 4-meter, but 6- or 7.5-meter cables are also available.
- Ensure that the site complies with the relevant usability standards, such as ADA and DIN 18040:
  - Limit the curb heights.
  - Take into account the limited reach of a wheelchair user.
- Determine appropriate ground anchoring locations where concrete exists or can be installed (no asphalt surfaces).
- Consider locations where stations can be easily added in the future.
- Determine optimum conduit layout to minimize linear conduit costs to multiple parking spaces. If possible, avoid or minimize trenching requirements.
- Evaluate existing electrical infrastructure to determine if the existing utility service and electrical panel
  capacity is sufficient. Identify costs for any necessary upgrades and/or a new dedicated electrical panel.
  A certified electrician or project engineer is highly recommended when it comes to evaluating available
  capacity and identifying required upgrades.
- If a dedicated EV electrical panel is required, choose a panel location in close proximity to the existing electrical supply.
- Measure cellular signal strength to ensure adequate cellular coverage at the installation site. Cellular repeaters may be required for underground or enclosed parking structures to ensure adequate signal strength.
- Avoid locations under trees where sap, pollen or leaves may fall on the MaxiCharger increasing the station's maintenance requirements.
- Perpendicular parking stalls are recommended to allow a vehicle to enter front-first or rear-first, accommodating the various charging port locations on different EV's.

### 

While Autel tests the MaxiCharger with a majority of upcoming vehicles, we cannot guarantee the port locations of future vehicles and cannot warrant the configurations proposed will work for all vehicles.

- Choose adjacent parking spaces in an area with adequate lighting.
- Consider how easily drivers can find the stations they need to access.
- Check local requirements for accessibility and pathway width, sometimes called "path of travel", to
  ensure station placement does not restrict sidewalk use.

### () IMPORTANT

Place each MaxiCharger centered at the head of its parking space, with the touchscreen facing the vehicle. This placement maximizes cable reach for the varied charge port locations on different EVs.

Pull-through parking (gas station model) is not recommended.

### 4.1.2 Electrical Design

The MaxiCharger requires underground wiring. The conduit and wire size are based on the length of runs from the electrical panel to the installation site. The wiring must be run through the conduit or ducting, or armored cable must be used to comply with local electrical codes. Consult the national and local codes or a service engineer for the quality, grade, and size of the conduit or cable.

### MPORTANT

As a continuous load device, the electrical branch circuits to the MaxiCharger must be sized at 125% of the load on each leg of a 3-phase panel for North America installations, in accordance with National Electric Code requirements. For other regions, refer to local code.

#### 4.1.2.1 Use of RCD

The use of RCD is not recommended as RCDs can cause a nuisance trip during transient conditions such as power restoration, line surge or line dips.

To reduce the risk of electric shock, the MaxiCharger provides the following protective measures:

- Galvanic isolation between the AC input and DC output so that current does not flow to earth.
- The output isolation monitor interrupter (IMI). As UL2231-1 requires, the MaxiCharger has the IMI installed, which is evaluated during operation as part of certification testing.

However, the use of RCD is unavoidable on the MaxiCharger. Adjust the following settings to minimize nuisance trips:

Type: A, F or B (the latter two are preferred)

Trip threshold: 100 mA

Trip delay: 100 ms

### 4.1.2.2 Grounding Requirements

The MaxiCharger must be connected to a grounded, metal, and permanent wiring system. A ground service neutral conductor must be run with circuit conductors and connected to an equipment-grounding terminal on the MaxiCharger.

# **IMPORTANT**

Ensure a grounding conductor complies with local codes and is properly grounded to earth at the MaxiCharger.

### 4.1.2.3 Wiring Requirements

The AC terminal blocks on the MaxiCharger accept a maximum wire size of 250 Kcmil solid or stranded wires. If you plan to use a larger gauge wire to accommodate a long run, reduce the wire size at the local external disconnect.

Refer to *Technical Specifications* of the MaxiCharger to ensure that the service wiring at the installation location supports the MaxiCharger power requirements:

- Neutral conductors as required by region (a Neutral connection is not required for the MaxiCharger operation)
- AC conductors (L1, L2, and L3) and ground should refer to the specifications in 9.6.

# 4.1.3 Preparing the Foundation

#### **General Procedures:**

- 1. Select a suitable base to install the cabinet on.
- 2. Embed the cables in the ground with a cable conduit.
- 3. Prepare the foundation.

### 4.1.3.1 Preparing the Foundation

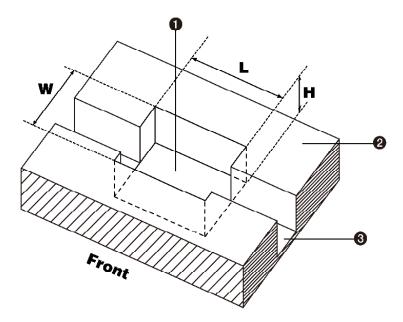
- 1. Dig a hole according to the foundation dimensions. The recommended dimensions of the hole are:
  - For DF120: 32 x 25 x 20 inches (820 x 640 x 500 mm) (L x W x H)
  - For DF240: 32 x 29 x 20 inches (820 x 740 x 500 mm) (L x W x H)

See Figure 4-1 Digging a Hole.

2. Trench and excavate an opening to accommodate the wiring conduit.

### **IMPORTANT**

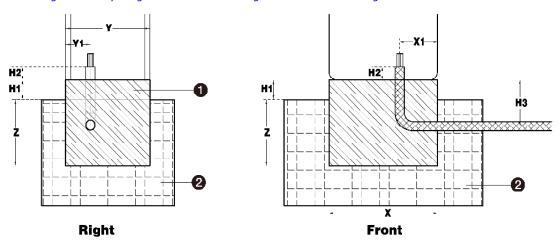
The outer diameter of conduit must not exceed the sizes specified in *Table 4-4 Foundation Specifications 2*. Conduit stub-ups should not be higher than 2.4 inches (60 mm) above the surface of the foundation.



- 1. Foundation Size
- 2. Surface
- 3. Cable Tunnel

Figure 4-1 Digging a Hole

- 3. Run the conduit to the designated location.
- 4. Pour the concrete into the hole and wait until the concrete has hardened. Verify that the foundation should be 5.9 inches (150 mm) higher than the surface. The concrete should be at a rated minimum of 2500 PSI.
- 5. Feed the AC input cables and the Ethernet cable (if available) out of the marked area (C). Ensure a length of at least 2 ft. (61 cm) is available above the foundation to allow wiring to reach the AC terminals. See *Figure 4-2 Preparing the Foundation* and *Figure 4-3 Foundation Diagram*.



- 1. Foundation
- 2. Land

Figure 4-2 Preparing the Foundation

Table 4-3 Foundation Specifications 1

	Specifications			
Parameter	DF120		DF240	
	in	mm	in	mm
x	32.3	820	32.3	820
Υ	25.2	640	29.1	740
Z	19.7	500	19.7	500
X1	10.8	275	11.2	285
Y1	7.5	190	5.9	151
H1	5.9	150	5.9	150
H2	3.9	100	3.9	100
Н3	13.8	350	13.8	350

6. Place the drilling template on the concrete surface, aligning with the marked area (C). Mark the four mounting holes (D) and remove the drilling template. Drill into the holes with depth over 4.3 inches (110 mm) and 4/5 inch (20 mm) in diameter. Clean any debris.

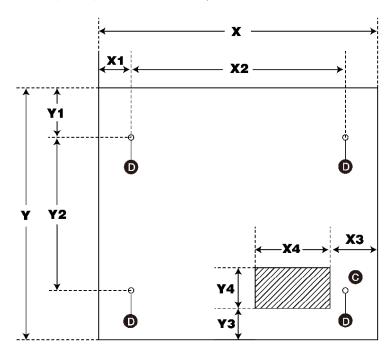


Figure 4-3 Foundation Diagram

**Table 4-4 Foundation Specifications 2** 

Parameter	Specifications				
	DF120		DF240		
	in	mm	in	mm	
х	32.3	820	32.3	820	
Υ	25.2	640	29.1	740	
X1	3.7	95	3.7	95	
X2	24.8	630	24.8	630	
х3	5.5	140	5.5	140	
X4	8.7	220	8.7	220	
Y1	3.7	94.3	5.7	144.3	
Y2	17.7	450	17.7	450	
Y3	5.2	131	3.6	91.5	
Y4	4.7	120	4.7	120	

- 7. Embed four M16 expansion bolts into the holes, leaving 2.4 inches (60 mm) above the ground.
- 8. Cut the wires to the correct length.

### ∅ NOTE

- Since bell ends may interfere with station placement, no bell ends should be left on the conduit after all wires are pulled.
- Depth of conduit may vary depending on the site. The diagram above does not specify the conduit depth, as long as the stub-ups are vertical and placed correctly.
- Fill the foundation with gravel to prevent rodents from entering the MaxiCharger.

# 4.2 Unpacking

- 1. Check the tilt and inversion indicators and Shockwatch.
  - Observe the sensors attached to the package for the degree of the tilt and complete overturn. If the sensors demonstrate over 30° of tilt or total overturn, refuse the delivery.
  - If the Shockwatch displays red, contact Autel customer service and the delivery personnel, and then
    inspect the product for any damage. Do not accept the delivery until the inspection is complete and
    no damage is found.

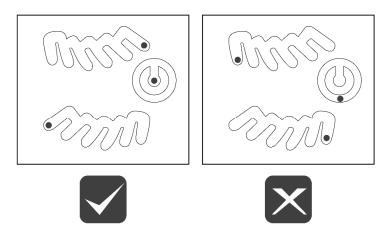


Figure 4-4 Tilt and Inversion Indicators

- 2. Remove the outside packaging and interior protection materials using appropriate tools.
- 3. Inspect the MaxiCharger and the parts for installation for damage. If you find damage or the parts are not consistent with the order, contact your local dealer.
- 4. Ensure that all parts are delivered according to the order.

# 4.3 Packing List

# 4.3.1 Packing List for DF120

MaxiCharger 1 PC	Expansion Bolt (M16 x 150) 4 PCS	
Bolt (M10 x 30) 7 PCS	Flat Gasket (Size 10) 10 PCS	
Hex Nut (M10) 7 PCS	Screw (M4 x 10) 24 PCS	
Bolt (M8 x 25) 2 PCS	Eye Bolt (M16) 4 PCS	
Cabinet Door Key 2 PCS	Drilling Template 1 PC	
Packing List 1 PC		

# 4.3.2 Packing List for DF240

MaxiCharger 1 PC	Expansion Bolt (M16 x 150) 4 PCS	
Bolt (M10 x 35) 7 PCS	Flat Gasket (Size 10) 14 PCS	
Hex Nut (M10) 7 PCS	Spring Washer (Size 10) 7 PCS	
Bolt (M8 x 25) 2 PCS	Screw (M4 x 10) 48 PCS	
Cabinet Door Key 2 PCS	Eye Bolt (M16) 4 PCS	
Packing List 1 PC	Drilling Template 1 PC	• •

#### 4.4 Recommended Tools

The following tools are recommended when installing the MaxiCharger. Ensure you have these tools readily available prior to installation.

- Multimeter
- Spirit Level
- Tape Measure
- Brush
- Cellular Signal Detection Device
- Wire Stripper
- Cable Lug
- Crimping Plier
- Power Drill
- 16 mm Drill Bit
- PH2 Screwdriver
- Monkey Wrench
- Hex Wrench

#### ⊘ NOTE

- The tools mentioned above are not part of the delivery. Ensure the professional personnel have all the listed tools for installation.
- This tool list does not necessarily include all the tools required.

# 5. Installation

#### 5.1 Before Installing

Prior to installation, check the following:

- The installation site is prepared.
- The appropriate service wiring, circuit protection, and metering is in place at the installation site.
- A grounding conductor that complies with local codes is properly grounded to earth.
- The cellular coverage at the installation site should be consistently strong when choosing to communicate over cellular network for the MaxiCharger. Use a cellular signal detection device to ensure the signal is above -90 dBm. If the signal is below -90 dBm, install repeaters to boost the strength of the cellular signals. Repeaters are often required when installing the MaxiCharger in an underground environment such as an underground garage or enclosed parking space.
- There is enough space available around the installation site to accommodate using a forklift or other lifting equipment, to unpack, and to allow people to work around freely.
- All the parts and tools are available.
- Ensure all the details are followed in this installation procedure.

#### **IMPORTANT**

A supplement surge protection breaker must be installed at the service panel if the installation area experiences frequent thunderstorms.

#### **General Installation Procedure:**

- Take into consideration of the center of gravity of the MaxiCharger when moving the equipment. Refer to 5.2.
- 2. Move the cabinet to the installation site. Refer to 5.3.
- 3. Install the cabinet. Refer to 5.4.
- 4. Complete the electrical wiring. Refer to 5.5.
- 5. Install the charging module. Refer to 5.6.

# 5.2 Center of Gravity

Please see the figure below for the center of gravity when installing the MaxiCharger.

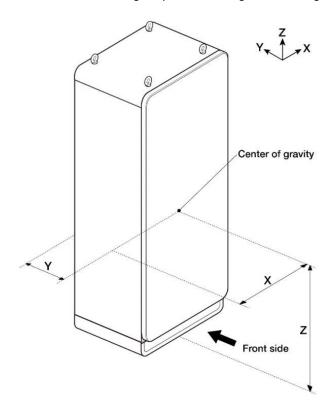


Figure 5-1 Center of Gravity

Parameter	Specifications				
	DF120		DF240		
	in	mm	in	mm	
Х	15.8	400	15.8	400	
Υ	13.0	330	11.8	300	
Z	33.1	840	33.1	840	

#### 5.3 Moving the Cabinet to the Site

There are two ways to move the cabinet to the construction site:

- Hoist
- Forklift

#### **MARNING**

#### Risk of pinching or crushing. Heavy Equipment.

- Ensure that the hoisting equipment or forklift truck can lift the cabinet safely.
- Obey the safety instructions that apply to the hoisting equipment or forklift truck.
- Take into account the dimensions, mass, and center of gravity of the MaxiCharger.

#### **A** CAUTION

- DO NOT drop the cabinet or subject it to strong impact.
- DO NOT exceed a tilting angle of 30°.
- Ensure that there is no dynamic force on the hoisting points.

#### 5.3.1 Hoisting the Cabinet

#### > To hoist the cabinet

- 1. Install the four M16 eye bolts to the four lifting holes (A).
- 2. Connect the cables of the hoisting equipment to the eye bolts with lifting loops.
- 3. Move the cabinet to the construction site.

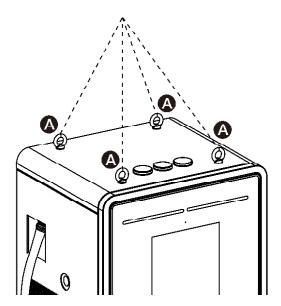


Figure 5-2 Hoisting the Cabinet

## 5.3.2 Forklifting the Cabinet

#### > To forklift the cabinet

- 1. Ensure the forks (A) of the forklift truck in the gaps go through the gaps in the side of the pallet.
- 2. Move the cabinet to the construction site.

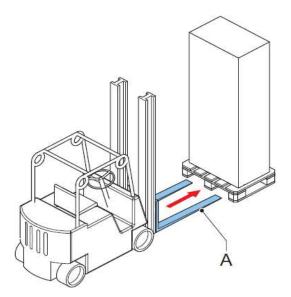


Figure 5-3 Transporting the Cabinet by Forklift

#### 5.4 Installing the Cabinet

 Remove the front and rear base covers (A) using a screwdriver. Reinstall them after all the installation work is completed.

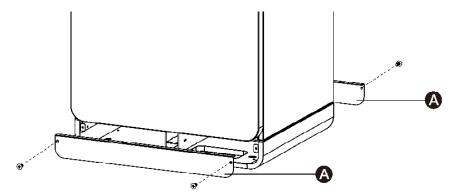


Figure 5-4 Removing the Base Covers

2. Open the front door of the MaxiCharger.



#### Hazardous voltage

Ensure that only qualified personnel have access to the door key.

- > To open the front door
  - 1) Use the door key to unlock the front door.
  - 2) Open the front door.
  - 3) If necessary, open the left or right door after opening the front door.
- 3. Remove the three M6 screws and the galvanic isolation board (A) from the cabinet. (Reinstall the board after the commissioning work is completed.)

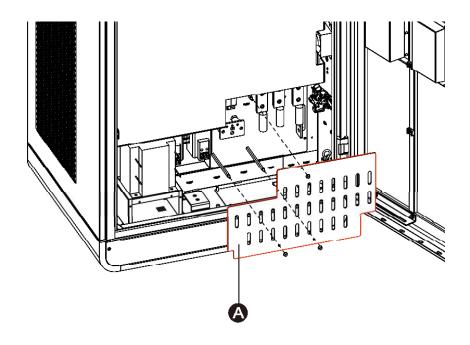


Figure 5-5 Removing the Galvanic Isolation Board

4. Loosen the four fasteners (A) on the cable gland plate, remove the plate, and close the door.

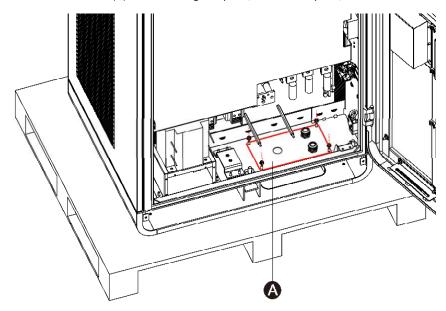


Figure 5-6 Loosening the Fasteners

5. Remove the cabinet from the pallet by removing the four hex nuts (**D**), spring washers (**E**), flat gaskets (**F1**), expansion bolts (**G**), and flat gaskets (**F2**).

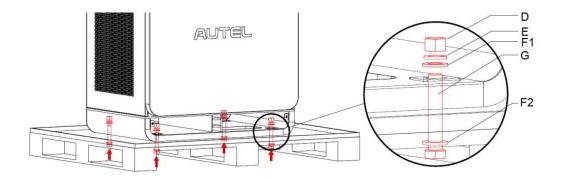


Figure 5-7 Removing the Cabinet from the Pallet

- 6. Hoist the cabinet. If the cabinet has not been hoisted before, refer to 5.3.1 for hoisting instructions.
- 7. Carefully move the cabinet at 20 inches (500 mm) above the foundation. Put the service wiring through the AC inlet hole.
- 8. Carefully lower the cabinet on the foundation. Ensure that the cabinet is aligned with the installation holes.
- 9. Tighten the bolts to 103.26 ft·lb (140 N·m).

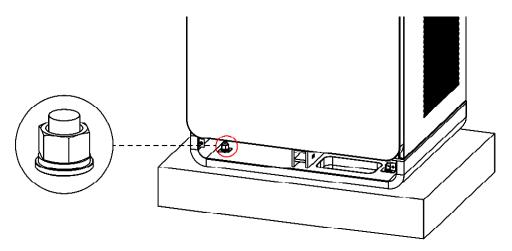


Figure 5-8 Tightening the Bolts

10. Remove the M16 eye bolts on the top of the cabinet and seal the holes.

#### 5.5 Electrical Wiring

#### 5.5.1 Preparing for the Electrical Wiring

- 1. Reinstall the cable gland plate.
- 2. Guide the service wiring (A) and the Ethernet cable (C) through the cable gland plate as per the diagram below. Reinstall and tighten the four fasteners to secure the cable gland plate.

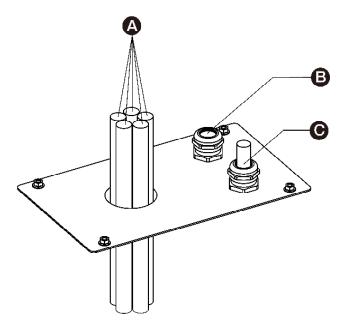


Figure 5-9 Guiding the Cables through the Cable Gland Plate

#### ∅ NOTE

Install a spare Ethernet cable through cable gland (B) only as needed.



Ensure the cable gland is closed and sealed if the Ethernet cable is not used.

#### 5.5.2 Connecting the PE Wire

- 1. Cut the PE wire (C) of the power cable to the correct length to reach the PE busbar (A).
- 2. Use the wire stripper to remove 0.8 in (20 mm) of the insulation from the end of the PE wire. Ensure the stripped length is compatible with the cable lug (**B**).
- 3. Use the crimping tool to attach the cable lug to the end of the wire.
- 4. Use the fasteners to attach the PE wire to the PE busbar.
- 5. Tighten the fasteners to  $15.12 \pm 1.84$  ft·lb ( $20.5 \pm 2.5$  N·m).

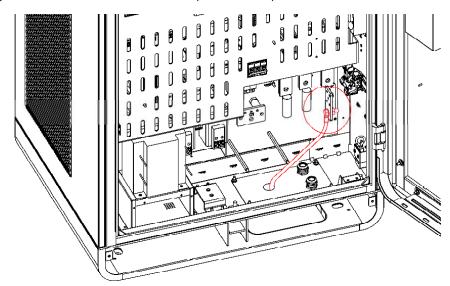


Figure 5-10 Connecting the PE Wire (1)

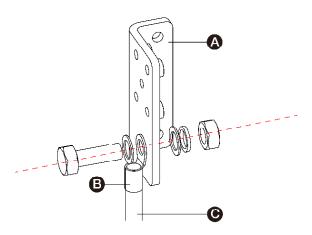


Figure 5-11 Connecting the PE Wire (2)

#### ⊘ NOTE

From left to right, the fasteners (B) are assembled in order of one M10 x 35 bolt, two #10 flat gaskets, one #10 spring washer, and one M10 hex nut. (See the diagram above.)

#### 5.5.3 Grounding the Enclosure

- 1. Connect the earth conductor to the pin of the enclosure.
- 2. Connect the earth conductor to the earth electrode.

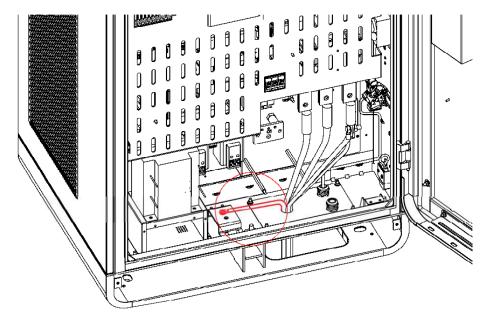


Figure 5-12 Grounding the Enclosure

#### 5.5.4 Connecting the AC Input Wires

- 1. Cut the wires L1, L2, and L3 to the correct length to reach the connectors on the AC fuse.
- 2. Use the wire stripper to remove 0.8 in (20 mm) of the insulation from the end of the wires. Ensure the stripped length is compatible with the cable lugs (A).
- 3. Use the crimping tool to attach the cable lugs to the end of the wires.
- 4. Use the fasteners (B) to attach the wires to the connectors:
  - L1 wire to the connector A.
  - L2 wire to the connector B.
  - L3 wire to the connector C.
- 5. Tighten the fasteners to 15.12  $\pm$  1.84 ft·lb (20.5  $\pm$  2.5 N·m).

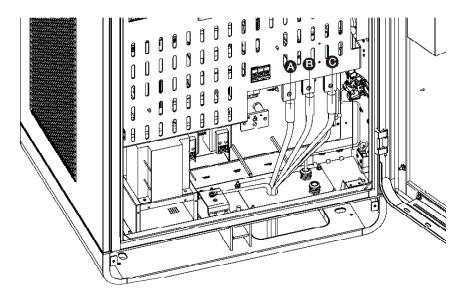


Figure 5-13 Connecting the AC Input Wires (1)

6. Use duct seal to seal the conduit opening as needed.

#### **IMPORTANT**

The conduit opening must be sealed to protect the wiring from the environment.

If needed, connect two AC input wires of the same type to each connector as shown below:

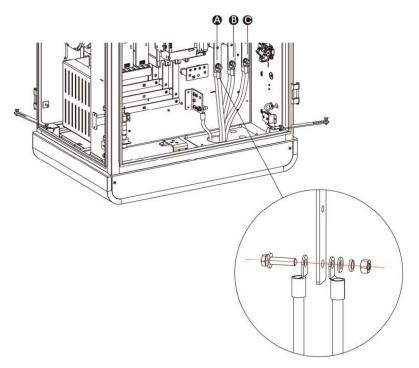


Figure 5-14 Connecting the AC Input Wires (2)

## 5.5.5 Connecting to the Internet

The MaxiCharger can be connected to the Internet via the Ethernet cable, cellular network or Wi-Fi.

#### 5.5.5.1 Connecting the Ethernet Cable

Plug the Ethernet cable into the RJ45 port.

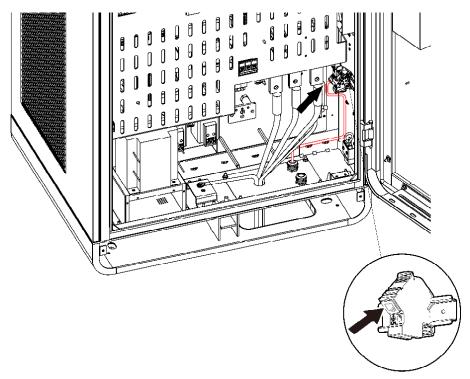


Figure 5-15 Connecting the Ethernet Cable

#### 5.5.5.2 Installing the SIM Card

- 1. Press the button (A) to release the SIM card tray.
- 2. Insert the SIM card into the tray. Ensure the card is placed correctly.
- 3. Push the card tray into the slot.

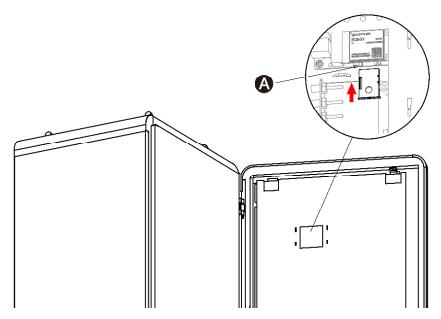


Figure 5-16 Installing the SIM Card

# 5.6 Installing the Charging Module

1. Slowly push the module into the slot.

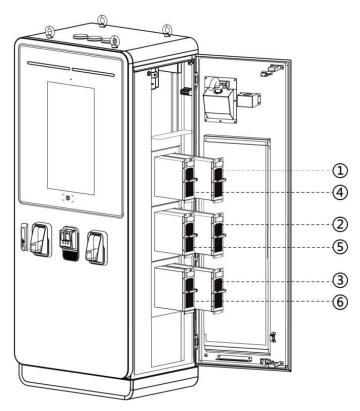


Figure 5-17 Installing the Charging Module (for DF120)

Table 5-1 Charging Module Installation Specifications

Model	Rated Power	Number of Modules	Location
<b>DF120</b> (UF60A3001)	60 kW	3 PCS	1, 2, 4
<b>DF120</b> (UF80A3001)	80 kW	4 PCS	1, 2, 4, 5
<b>DF120</b> (UF100A3001)	100 kW	5 PCS	1, 2, 3, 4, 5
<b>DF120</b> (UF120A3001)	120 kW	6 PCS	1, 2, 3, 4, 5, 6

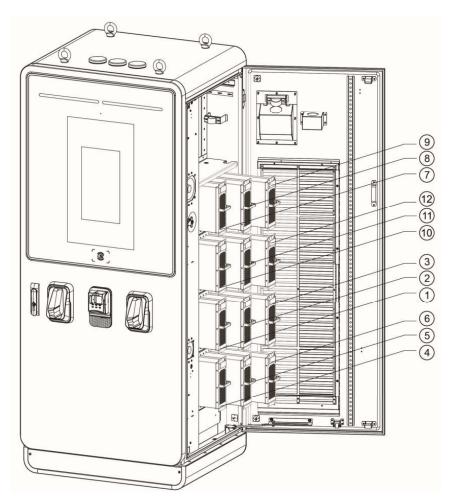


Figure 5-18 Installing the Charging Module (for DF240)

Table 5-2 Charging Module Installation Specifications

Model	Rated Power	Number of Modules	Location
DF240 (UF140A4001/UF140A3001)	140 kW	7 PCS	1, 2, 3, 4, 7, 8, 9
DF240 (UF160A4001/UF160A3001)	160 kW	8 PCS	1, 2, 3, 4, 7, 8, 9, 10
DF240 (UF180A4001/UF180A3001)	180 kW	9 PCS	1, 2, 3, 4, 5, 7, 8, 9, 10
DF240 (UF200A4001/UF200A3001)	200 kW	10 PCS	1, 2, 3, 4, 5, 7, 8, 9, 10, 11
DF240 (UF220A4001/UF220A3001)	220 kW	11 PCS	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
DF240 (UF240A4001/UF240A3001)	240 kW	12 PCS	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

#### 

The above illustrations are for reference only. Install the charging modules based on the location number.

2. Install and torque the M4 x 10 screws to 10.6 lb·in (1.2 N·m) to secure the module.

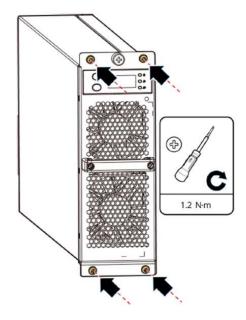


Figure 5-19 Tightening the Screws

- 3. After the installation is completed, set the hardware address. For details, contact manufacturer certified installation engineer.
- 4. Seal the cable holes of the cabinet and close the doors.
- > To close the doors
  - 1) If the left or right door is open, close it through the opening of the front door.
  - 2) Close the front door.
  - 3) Use the door key to lock the front door.

#### 5.7 Preparing for Commissioning

## A DANGER

#### Hazardous voltage

Only a service engineer from the manufacturer is qualified to commission the MaxiCharger.

- 1. Ensure that the site complies with these requirements:
  - The MaxiCharger is installed as instructed in this manual.
  - The grid can support the AC input power.
  - Internet access, cellular network or Ethernet connection is available.
  - EVs compatible with every connector of the MaxiCharger must be available for commissioning work
  - A site operator or owner is present to receive instructions from the service engineer of the manufacturer.
- 2. Ensure that the information below is available:
  - Site name
  - Address of the MaxiCharger
  - Longitude and latitude of the MaxiCharger. If there are more than one MaxiCharger on one location, the coordinates should be slightly different (at least 0.0001 degree) so that not all the equipment are at the same location on the map.
  - Photo of the surroundings of the MaxiCharger
  - Specification of the external fuse at the electrical panel
  - Date of installation completion
  - Contact information of the contact person on site
  - Special remarks

# **6.** Operation

#### 6.1 Before Use

- Ensure that the MaxiCharger is installed according to the instructions in this manual.
- Make an emergency plan that instructs people what to do in case of an emergency.
- Provide the instructions for emergency stop and charge session to the user.
- The manufacturer or a trained technician should perform the commissioning work. Contact the manufacturer when the MaxiCharger is ready for commissioning.
- The space around the MaxiCharger shall not be blocked by snow or other objects.
- Ensure that the maintenance work has been carried out on the MaxiCharger.
- If the MaxiCharger is de-energized for more than four hours, activate the internal heater to remove condensation from the cabinet.

#### 6.2 Powering Up the MaxiCharger

- 1. Ensure that the upstream breaker stays in the OFF position and locked during the procedure.
- 2. Tighten the screws and bolts of key parts and ensure the cabinet is clean inside to prevent the electronic components from being damaged by dust or particles.
- 3. Use the multimeter to check the circuit connections among L1, L2, L3, and PE. If short circuit occurs, contact Autel technical support.
- 4. Ensure that the RCCB and MCCB stay in the **OFF** position.
- 5. Contact Autel technical support to turn on the upstream breaker, then use a voltage tester to measure the voltage of AC power input between the terminals on the surge protection device switch. Ensure that all the measured voltages are in accordance with local regulations.
- 6. Set the main breakers to the ON position.
- 7. Set the RCCB to the ON position and check the indicators on CCU, ECU, TCU, and the screen display.
  - If any indicator of CCU, ECU or TCU is off or the screen display is abnormal, please contact Autel technical support.
  - If all indicators and the screen display normal, go to next step.
- 8. Set the MCCB to the **ON** position and connect to the main circuit. Close the doors of the cabinet. The MaxiCharger is now ready for use.

#### 6.3 Emergency Situations

If there is an emergency, push the **emergency stop** button. Then the MaxiCharger will stop all charge sessions and the touchscreen will display the following message:



Figure 6-1 Fault Message Screen

Reset the MaxiCharger after an emergency (making sure that the situation is safe again first): Turn the emergency button clockwise to release it. The MaxiCharger will start, the message will disappear from the touchscreen, and the MaxiCharger will resume normal operation.

#### 6.4 Charge Sessions

#### General charging procedure

#### To charge an EV

- 1. Park an EV with the charging port within reach of the connector.
- 2. Plug in the vehicle.
- 3. Start the charge session.
- 4. Stop the charge session.

#### 6.4.1 Standby Screen

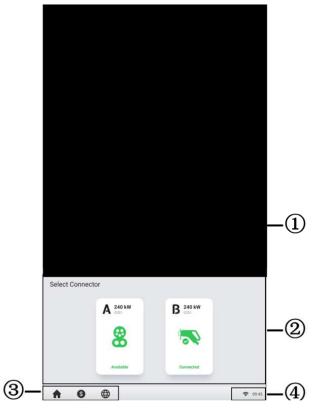


Figure 6-2 Standby Screen

- 1. Advertisement page can be displayed on a full screen and is omitted in the following sample figures
- 2. Connector options tap to view the connector information
- 3. Home button, Cost information, and language options
- 4. Time and Internet icon an x appearing at the lower corner of the Internet icon indicates the MaxiCharger is not connected to the Internet

After a connector is successfully connected to the EV, the MaxiCharger can automatically recognize the connector and the corresponding connector's Authorization screen will appear.

If no operation is performed for a period of time on the Authorization screen, the Standby screen will appear. Manually select the connector on the touchscreen to exit the standby screen.

#### 6.4.2 Authorization

#### **IMPORTANT**

- Observe the screen for any abnormality, such as an error message, before starting a charge session. Check the surroundings and the MaxiCharger for any abnormality or damage as well.
- **DO NOT** operate the MaxiCharger if the screen displays an error message. Contact Autel personnel for support.

When the Authorization Screen appears, you can use any of the following methods to start a charge session:

- Scan the QR code on the screen
- RFID card
- Plug & charge (supports the ISO 15118 PnC function)
- Credit card (optional)

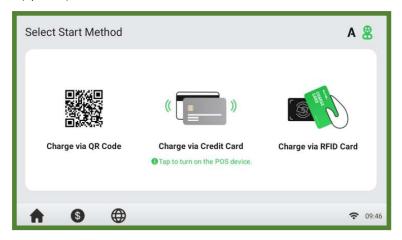


Figure 6-3 Authorization Screen

#### **6.4.3** Start Charging

The MaxiCharger enters communication with the EV following a successful authorization. The charge session will start automatically after passing safety tests.

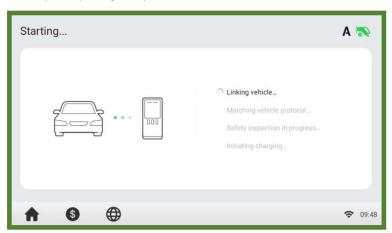


Figure 6-4 Start Charging Screen

#### 6.4.4 Charging

Information about the charging duration, volume, cost, and power will appear on the Charging screen. Tap the **Right Arrow** button on the right to view more information about the charging status, including SoC (State of Charge), current, and voltage.

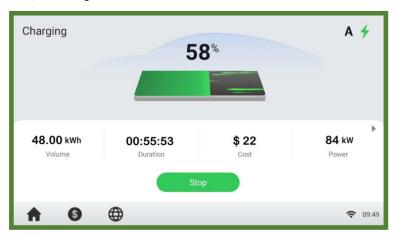


Figure 6-5 Charging Screen

#### 6.4.5 Stop Charging

#### > To stop charging

- 1. Unplug the vehicle or tap the **Stop** button on the touchscreen.
- 2. If a session stops unexpectedly, the charger requires another authorization to restart a charge session. Use the same authentication method to begin the charge again.
  - QR Code/Credit Card: Tap the Stop button on the Charging Screen of the Autel Charge app.
  - RFID Card: Tap the RFID card on the card reader again to finish charging.

#### **⊘** NOTE

The charging session stops automatically when the battery is full.

The order details will appear on the screen when a charge session is complete.



Figure 6-6 Order Details Screen



- Do not cover the vent during charging.
- Do not clean or operate in your EV during charging.

#### 6.4.6 Finish Charging

Return the connector to the holster on the MaxiCharger.

#### 6.5 Charging Errors

This section depicts several common problems that may arise during a charge session along with possible causes/solutions to resolve them. If the problem persists, contact Autel technical support.

#### 6.5.1 Connector Connection Error

If the connector is not connected to the EV, then the Connector Not Connected screen will appear. Disconnect completely, then plug in the EV and recheck the screen to see if the error message is resolved.

#### **6.5.2** Authorization Failure

The Authorization Failure screen appears when there is an error processing the chosen authentication method. The cause and possible solution(s) will display on the screen. Follow the on-screen instructions to resolve the problem, or contact Autel technical support.

#### 6.5.3 Charge Start Failure

The Charge Start Failure screen appears when the charger has failed to pass the initialization process. The cause and possible solution(s) will display on the screen. Follow the on-screen instructions to resolve the problem.

#### 6.5.4 Charging Failure

The Charging Failure screen appears when various errors occur during a charge session. The cause and possible solution(s) will be displayed on the screen. Follow the on-screen instructions to resolve the problem, or contact Autel technical support.

## 6.6 Powering Down the MaxiCharger

#### **General Procedure:**

- 1. Set the upstream breaker which provides the power to this MaxiCharger to **OFF** and lock it. Ensure that this breaker stays in the **OFF** position during the procedure.
- 2. Open the front door.
- 3. Measure the AC voltage. Ensure that all the measured voltages are 0  $\rm V.$
- 4. Measure the DC voltage. Ensure that all the measured voltages are 0 V.
- 5. Close the door.

#### 6.6.1 Measuring the AC Voltage

Use a voltage tester to measure the AC voltage between the terminals on the surge protection device switch:

- L1 to L2
- L1 to L3
- L2 to L3

#### NOTE

The surge protection device switch shows the indications L1, L2, and L3.

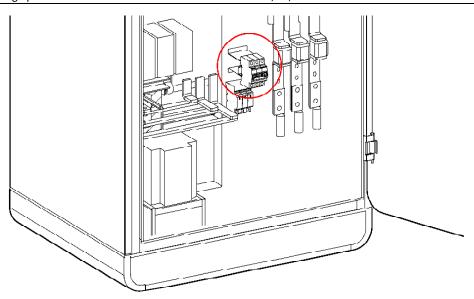


Figure 6-7 Measuring the AC Voltage

#### 6.6.2 Measuring the DC Voltage

Use a voltage tester to measure the DC voltage between the output terminals:

- Power module group output 1- (B) to power module group output 1+ (A)
- Power module group output 2- (D) to power module group output 2+ (C)
- EV charging cable 1 output (F) to EV charging cable 1 output + (E)
- EV charging cable 2 output (H) to EV charging cable 2 output + (G)

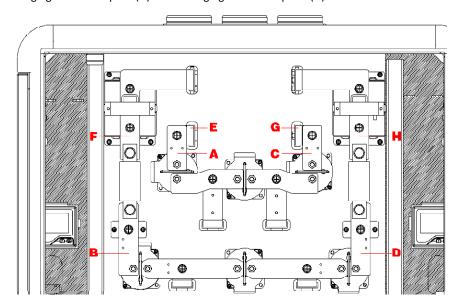


Figure 6-8 Measuring the DC Voltage

#### 6.7 Removing Condensation

#### ∅ NOTE

There may be condensation in the charger if the charger is powered off for more than four hours.

#### To remove condensation from the cabinet

- 1. Open the front door.
- 2. Set the main breakers to OFF position:
- 3. Energize the MaxiCharger.
- 4. Close the door. Wait two hours. The internal heater of the cabinet will heat the inside of the cabinet, and the condensation will evaporate.
- 5. Open the front door.
- 6. Set the main breakers to **ON** position:
- 7. Close the door.

#### 6.8 Local Service Portal Operations

#### NOTE

The OCPP parameter setup should be performed by an installation engineer.

#### 6.8.1 Setting the OCPP Parameters

#### To set the OCPP parameters

- 1. Tap the upper-left corner of the screen.
- 2. Tap **Device Maintenance**. Enter the default password (contact Autel customer service to obtain the password).
- 3. Tap **Set Parameters**. Wait for the system to load the data. This can take a few seconds.
- 4. (Optional) On the screen, tap the column of desired parameter values to modify the data for these subjects:
  - Running environment: current running environment
  - OCPP IP: IP address of the OCPP
  - OCPP URL: URL of the OCPP
  - OCPP PORT: port number of the OCPP
  - MGR IP: IP address of the management platform
  - MGR URL: URL of the management platform
  - MGR PORT: port number of the operational management platform

#### ∅ NOTE

Ensure the URL or ID is correct and does not contain spaces.

5. Tap **Save** to save the changes.

# 7. Maintenance

#### 7.1 Routine Maintenance

Routine maintenance can keep the MaxiCharger in a safe and stable state.

- Clean the cabinet every quarter, tighten the screws and bolts of key parts, and check whether the wire connection of the connector is burned out. If any abnormality is found, replace the parts in time.
- Clean the air filter and dust filter at least twice a year.
- Test the residual current device once a year.

#### **MARNING**

- Disconnect the power supply to the MaxiCharger during the entire maintenance procedure.
- Ensure unauthorized personnel are kept at a safe distance during maintenance.
- Wear proper personal protective equipment, such as protective clothing, safety gloves, safety shoes, and safety glasses.
- If the safety devices are removed for maintenance, reinstall them after completing the work.

#### 7.1.1 Cleaning the Cabinet

The cabinet is powder-coated. The coating must be kept in good condition. When the MaxiCharger is in a corrosion sensitive environment, superficial rust may appear on welding points. Visible rust has no risk to the integrity of the cabinet.

#### > To remove rust

- 1. Stop the charge session and power off the MaxiCharger.
- 2. Remove rough dirt by spraying with low-pressure tap water.
- 3. Apply a neutral or weak alkaline cleaning solution and let it soak.
- 4. Remove dirt by hand with a damp and non-woven nylon cleaning pad.
- 5. Rinse thoroughly with tap water.
- 6. Apply wax or a rust-preventive primer for extra protection if needed.

#### 7.1.2 Residual Current Device Maintenance

The internal residual current device (RCD) and residual current breaker with overload (RCBO) should be tested annually for correct functioning. Before testing, unplug the MaxiCharger from the EV and stop the charge session.

#### > To test the residual current device

- 1. Open the front door of the MaxiCharger. When the cabinet door is open, the MaxiCharger should not be directly exposed to a windy and rainy environment.
- 2. The MaxiCharger must be in the Standby mode. Tapping the touchscreen can wake up the MaxiCharger.
- 3. Locate the RCD (under the MCCB) and press the Test button to start testing.
  - Pass: The MaxiCharger stops operation when the MCCB is set to the middle position. The MaxiCharger starts operating again when the MCCB is set to the **OFF** then **ON** position.

- Fail: There is no response when pressing the **Test** button. Please disconnect the AC power of the MaxiCharger and close the cabinet door, then contact Autel technical support. Do not use the MaxiCharger until the repair is completed.
- 4. Close the front door of the MaxiCharger after the test is finished.
- 5. Mark the time when the test is needed to be repeated annually.

#### 7.1.3 Cleaning and Replacing the Air Filters

The MaxiCharger is equipped with an air inlet filter and an air outlet filter with a large mesh area to prevent the electronic components from being damaged by dust. Clean the air filters every 3 months (not exceeding 6 months). Replace the air filters once a year.

#### > To clean or replace the air inlet filter

- 1. Ensure there is no active charge session and perform lockout-tagout to secure the charger.
- 2. Open the right-side door of the MaxiCharger. When the cabinet door is open, the internal components of the MaxiCharger should not be exposed to rain, snow or harsh environments.
- 3. Remove the bezel (A) after removing the screws (E) using a screwdriver and take out the dust gauze (B), air inlet filter (C), and fixing board (D).
- Clean the air inlet filter of debris or dust and reinstall the cleaned filter. Or install a new air inlet filter.
- 5. Reinstall the bezel and screws.
- 6. Close the right-side door of the MaxiCharger.

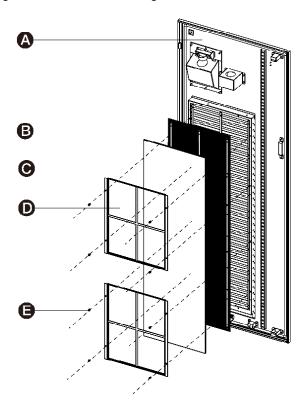


Figure 7-1 the Air Inlet Filter

#### > To clean or replace the air outlet filter

- 1. Ensure there is no active session and perform lockout-tagout to secure the MaxiCharger.
- 2. Open the left-side door of the MaxiCharger. When the cabinet door is open, the internal components of the MaxiCharger should not be exposed to rain, snow or harsh environments.
- 3. Remove the bezel (with fans) (A) after removing the screws (C) using a screwdriver and take out the air outlet filter (B) and fixing board (D). Be sure that the bezel cannot be placed on the floor after taking out the air outlet filter. It should be hung on the left-side door or held in the hand to prevent the cables of the fans from being pulled off.
- 4. Clean the air outlet filter of debris or dust and reinstall the cleaned filter. Or install a new air outlet filter.
- Reinstall the bezel and screws.
- 6. Close the left-side door of the MaxiCharger.

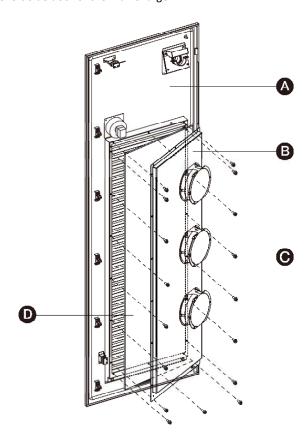


Figure 7-2 the Air Outlet Filter

#### 7.2 Inspection and Maintenance

Routine maintenance is needed even if the MaxiCharger is operating in normal condition.

Refer to *Troubleshooting* or contact Autel technical support to resolve any error.

When parts need to be replaced, cut off the power supply upstream and inside the equipment before proceeding.

Regularly conduct visual inspection of the following:

- Cable and connector: Check for cracks or ruptures.
- Display: Check for damage and cracks. Check whether the touchscreen works.
- Coating of the cabinet: Check for damage, cracks or ruptures.
- Cabinet: Check for rust or damage.

The following special inspections are needed for safe use:

- Check if the MaxiCharger was struck by lightning.
- Check if the MaxiCharger is damaged due to an accident or fire.
- Check if the MaxiCharger installation site has been flooded.

#### **MARNING**

Stop the charge session and do not connect the power to the MaxiCharger until all the inspections are completed.

#### 7.3 Remote Maintenance

The MaxiCharger can connect to the Autel cloud platform to monitor parameters in real time. Autel's cloud platform provides remote upgrades, diagnosis, and services, and identifies any issue during operation.

- Daily system self-check.
- Contact Autel technical support to resolve any issue found.
- Autel service engineers can check logs, update configurations and programs, and provide remote maintenance services such as remote management, diagnosis, configuration, and upgrade.

#### 7.4 Maintenance Schedule

Item	Frequency	Operations
Connector	Every 3 months	Check for cracks or ruptures on the connector.
Input Cable	Every 3 months	Check for cracks or ruptures on the cable.
Inlet Air Filter	Annually	Replace the inlet air filter.
Outlet Air Filter	Annually	Replace the outlet air filter.
Cabinet	Every 6 months	Clean and check for damage, including the air filters.

# **8.** Troubleshooting and Service

## 8.1 Troubleshooting

The table below describes the most common faults when operating the MaxiCharger. Contact Autel technical support if the fault encountered is not in this table.

Error	Error Code	Possible Cause	Solution
CP voltage abnormal	0x2037	It may be caused by signal interference, poor contact or software errors.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Communication error with the entire charging module group	0x3011	There is a problem with the module's address setting.	Power off the MaxiCharger and restart it.
Overvoltage	0x202D	The DC output voltage is above the upper limit of the vehicle or the rated voltage of the MaxiCharger during charging.	Stop the charge session and contact Autel technical support.
Communication error with the power control module	0x200E	The CCU does not receive messages from the ECU and the communication is timed out.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
BMS communication error	0x2007	It may be caused by charging incompatibility.	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Cooling fan abnormality	0x304A	Fan aged or damaged.	Power off the MaxiCharger and contact Autel technical support for repair or replacement of the fan.
Charging port electronic locking fault	0x2002	It might be caused by a vehicle-related fault.	Contact the vehicle manufacturer and Autel technical support.
CCU auxiliary power supply shutdown	0x202C	Sever power fault due to aged key components or lines.	Power off the MaxiCharger. Then locate the faulty component or line and contact Autel technical support for its repair or replacement.
Meter communication error	0x0001	Aged meter or line.	Stop the charge session and contact Autel technical support.
Insulation monitoring fault	0x2003	If it appears from time to time, it might be due to the vehicle or software error; if it appears frequently, there may be an aged key component.	Perform remote restart or reset. If the fault persists, contact Autel technical support.

Error	Error Code	Possible Cause	Solution
AC contactor stuck	0x3008	AC contactor fault or line aging	Power off the MaxiCharger and contact Autel technical support.
FPGA fault	0x3010	Controller fault	Stop the charge session, power off the MaxiCharger, and contact Autel technical support.
CCU current sampling and module output current accumulation fault	0x3014	Charging module output or sampling fault	Perform remote restart or reset. If the fault persists, contact Autel technical support.
Power distribution contactor sticking (charging possible)	0x3047	Contactor or sensor fault or line aging	Power off the MaxiCharger immediately and contact Autel technical support.
Communication error on one charging module	0x3051	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Fan fault with one charging module	0x305A	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Inconsistent CCU voltage sampling and the module output voltage	0x305C	Abnormal charging module	Contact Autel technical support to identify the fault, and then clear the fault or replace the module.
Insulation detection alert	0x2040	If it is a one-time problem, there is may be a falling object, and no operation is required; if it has occurred for several times, the connector cable may be damaged or there are foreign objects in the busbar.	Power off the MaxiCharger immediately and contact Autel technical support.
Charger offline	0x9001	Communication error between gateway and the Autel Charge Cloud	Check the network connection and OCPP configurations.

# **9.** Technical Specifications

# 9.1 General Specifications

**Table 9-1 Product Specifications** 

Parameter	Description
Compliance and Safety	<ul> <li>UL 2202</li> <li>UL 2231-1, UL 2231-2,</li> <li>CSA C22.2 No. 107.1-16;</li> <li>NEC Article 625</li> <li>FCC Part 15 Class A</li> </ul>
IP Rating	NEMA 3R
IK Rating	IK10
Short Circuit Current Rating	65 kA
EMC	<ul><li>FCC Part 15 Class A</li><li>Class B (Optional)</li></ul>
Output Voltage	<ul> <li>CCS: 150 to 950 V DC</li> <li>CHAdeMO: 150 to 500 V DC</li> </ul>
Output Current	<ul> <li>CCS: 200 A</li> <li>CCS boost: 300 A (Peak: 400 A)</li> <li>CHAdeMO: 125 A/200 A</li> </ul>
EV Charging Cable Length	<ul> <li>13.1 ft. (4 m)</li> <li>24.6 ft. (7.5 m)</li> </ul>
Maximum noise level at a distance of 1 m	< 65 dB @ 1 m /77 ° F (25 ° C)/full load
Input AC Power Connection	3P + PE (No neutral)
Input Voltage Range	480 V AC (+10 % to -15 %), 60 Hz
Power Factor at Full Load	>= 0.98
Peak Efficiency	>= 96%
Total Harmonic Distortion (current / > 50% load)	<= 5%, 150 to 950 VDC

**Table 9-2 Operating Conditions** 

Parameter	Specification
General Environment	<ul><li>Indoor</li><li>Outdoor</li></ul>
Storage Temperature	-40 to 158 ° F (-40 to +70 ° C)
Operation Temperature Range	<ul> <li>-31 to + 131 ° F (-35 to + 55 ° C)</li> <li>+122 to + 131 ° F (+50 to +55 ° C) with linear power de-rating</li> </ul>
Maximum Altitude above Sea Level	< 6561.7 ft. (2000 m)

## 9.2 Packaging Specifications

**Table 9-3 General Dimensions** 

	Specifications			
Parameter	DF120		DF240	
	in	mm	in	mm
Width of the Cabinet	32.3	820	32.3	820
Depth of the Cabinet	25.2	640	29.1	740
Height of the Cabinet	76.8	1950	76.8	1950
Loughb of the chausing coble (six socied)	157.5 inches (4000 mm)			
Length of the charging cable (air-cooled)	295.3 inches (7500 mm) (Optional)			

**Table 9-4 Packaged Product Specifications** 

Parameter	Specification		
Width	48.8 in	1240 mm	
Depth	39.8 in	1000 mm	
Height	84.5 in	2146 mm	
Mass of the Package	121 lbs.	55 kg	
Maximum Tipping Angle	30°		

**NOTE**: The MaxiCharger is mounted on a standard size wooden pallet and protected to prevent damages during transport.

# 9.3 Installation Specifications

Table 9-5 Operable Element Specifications

Parameter	Description	Specification		
Parameter	Description	in	mm	
<b>Z1</b>	Highest user operable element of MaxiCharger	53.2	1350	
<b>Z2</b>	Lowest user operable element of the POS	30.2	766	
<b>Z3</b>	Foundation height of MaxiCharger	5.9	150	

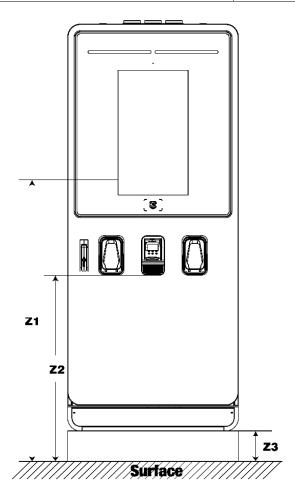


Figure 9-1 Operable Element Specifications

## 9.4 Communication Interface Specifications

Table 9-6 Communication Interface Specifications

Parameter	Specification
RFID Standard	ISO 14443 A + B to part 4 ISO/IEC 15693
RFID-supported Applications	<ul> <li>Mifare</li> <li>NFC</li> <li>Calypso</li> <li>Ultralight, Pay-Pass</li> <li>HID</li> <li>For information about the options, contact the manufacturer.</li> </ul>
Network Connection	<ul><li>3G/4G modem</li><li>10/100 Base-T Ethernet</li><li>Wi-Fi</li></ul>

## Table 9-7 Ethernet Cable Specifications

Parameter	Specification
Ethernet Type	RJ45
Cable Type	8P + PE, Shielded
Uploading Bandwidth	Minimum 128 Kbit/s
Downloaded Bandwidth	Minimum 4 Mbit/s
Availability	99.9%

## 9.5 Power Rating Specifications

Table 9-8 Rating During Normal Duty Operation

Model	Specification			
DF120 (UF60A3001)	60 kW			
DF120 (UF80A3001)	80 kW			
DF120 (UF100A3001)	100 kW			
DF120 (UF120A3001)	120 kW			
DF240 (UF140A4001/ UF140A3001)	140 kW			
DF240 (UF160A4001/ UF160A3001)	160 kW			
DF240 (UF180A4001/ UF180A3001)	180 kW			
DF240 (UF200A4001/ UF200A3001)	200 kW			
DF240 (UF220A4001/ UF220A3001)	220 kW			
DF240 (UF240A4001/ UF240A3001)	240 kW			
<b>NOTE:</b> Normal duty operation applies for use in public applications with moderate traffic.				

Table 9-9 De-rating During Normal Duty Operation

Ambient Temperature		Power Output (%)	Derating (%)		
°F	°C	rower output (78)	Derating (/0)		
-31 to +122	-35 to +50	100	0		
+122 to +131 +50 to +55		100 to 75 (linear de-rating)	0 to 25		
NOTE: Steady state rating of the MaxiCharger at specific ambient temperatures.					

## 9.6 AC Input and DC Output Specifications

Table 9-10 Rating During Heavy Duty Operation

Parameter	Specification
Wire Shielding (optional)	If the local regulations require shielded wires, connect the wire shielding to the PE bus at both ends of the wire.
Diameter of the Phase Conductors	Refer to the local regulations.
Diameter of the PE Conductor	Refer to the local regulations
Surface and Diameter	Based on the current rating of the MaxiCharger and local regulations.
Material	Copper
Maximum Temperature of the Input Wires	167 ° F (75 ° C)

Table 9-11 Detailed AC Input Specifications

Daniel and a second	MaxiCharger DC Fast									
Parameter	60	80	100	120	140	160	180	200	220	240
Maximum Rated Input Current (A)	81	107	133	158	184	209	235	260	286	312
Recommended Input Circuit Breaker (A)	125	225	225	250	400	400	400	400	500	500
Maximum Power Dissipation (kVA)	65.4	86.4	107.5	128.5	149.6	170.6	191.7	212.7	233.8	254.8
Short Circuit Current Rating (kA)	65	65	65	65	65	65	65	65	65	65
Maximum Size of the Input Wire (Kcmil)	250 x	2	1	1	ı	1	ı	1		

#### **⊘** NOTE

- Refer to the above table to determine the electrical specifications needed for installation in order to meet NEC standards.
- Refer to local code for specific design verification.
- Use proper cable routing methods (such as underground conduit and cable grooves, etc.) to ensure environment factors are taken into consideration.
- If local laws and regulations have different requirements, the provisions of local laws and regulations shall prevail.
- XLPE insulated power cable is recommended.
- The MaxiCharger can be upgraded to larger power ratings. Take the cable size into consideration at the point of purchase in case that an upgrade is needed in the future.

Table 9-12 General DC Output Specifications

Parameter	Specification		
DC Output Voltage Range	<ul> <li>CCS: 150 to 950 V DC</li> <li>CHAdeMO: 150 to 500 V DC</li> </ul>		
Minimum DC Output Current	5 A		
Connection Standard	<ul> <li>CCS: IEC 62196-1:2014 and IEC 62196-3:2014, UL2251:2013, 3rd Ed. and SAE J1772™:2017</li> <li>CHAdeMO: CHAdeMO 1.2</li> </ul>		

Table 9-13 Detailed DC Output Specifications

	Parameters					
MaxiCharger	Maximum DC Output Power for One EV Charging Cable (kW)	Maximum DC Output Power for Two EV Charging Cables Simultaneous DC on Two Outlets		Maximum DC Output Current		
60	60	40 + 20 kW				
80	80	40 kW x 2				
100	100	60 + 40 kW				
120	120	60 kW x 2		CCS connector: 200 A		
140	140	80 + 60 kW	Vac	• CCS boost: 300 A		
160	160	80 kW x 2	Yes	(Peak: 400 A)  • CHAdeMO connector:		
180	180	100 + 80 kW		125 A/200 A		
200	200	100 kW x 2				
220	220	120 +100 kW				
240	240	120 kW x 2				

## ⊘ NOTE

The output power of each connector depends on its rated voltage and maximum current.

## 9.7 Power Consumption Specifications

Table 9-14 Power Consumption during Stand-by

Parameter	Specification
Stand-by Power (Heater Off)	0.08 kVA
Stand-by Power (Heater On)	1.00 kVA

#### **⊘** NOTE

The heater will operate daily when the outside air reaches the dew point, to avoid condensation inside the cabinet. When the heater is working, it will consume most of the required stand-by power.

## 9.8 Input Short Circuit Current Specifications

Table 9-15 Input Short Circuit Current

Situation	Specification
Rated Peak Withstand Current (kA peak)	65 kA
Rated Short-time Withstand Current (kA rms)	65 kA

# POWER ELECTRONICS STANDALONE NB 120 INSTALLATION MANUAL



## **ABOUT THIS MANUAL**

#### **PURPOSE**

This manual contains important instructions for the installation, configuration and use of the electric vehicle charger **Standalone NB 120**, which manages the power transformation and main control for the charge. From now on, this manual refers to **Standalone NB 120** with the term "equipment" or "charger".

Please notice the NB 120 range includes the chargers NB 60 / NB 90 / NB 120.

Power Electronics reserves the right to modify product features.

#### **TARGET AUDIENCE**

This manual is intended for qualified customers who will install, configure and operate the  ${\bf NB}$  120 chargers.

Only qualified technical personnel validated by Power Electronics may install and start up the equipment.

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#### **REVISIONS CONTROL**

		REVIOLONO CONTROL
DATE (DD/MM/YYYY)	REVISION	DESCRIPTION
30 / 11 / 2021	Α	First edition.

The equipment and technical documentation are periodically updated. Power Electronics reserves the right to modify all or part of the contents of this manual without previous notice. To consult the most updated information on this product, you may access our website <a href="https://www.power-electronics.com">www.power-electronics.com</a>, where the latest version of this manual can be downloaded. The reproduction or distribution of the present manual is strictly forbidden unless express authorization from Power Electronics.

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## **ACRONYMS**

The terms commonly used in the documentation of Power Electronics' products are listed in the table below.

Please notice this is a general series of terms and it encompasses all our product divisions (industrial, solar, storage, and electric mobility), thus, some of the following expressions may not apply to this particular manual.

ACRONYM	MEANING
AASS	Auxiliary Services
AC	Alternating Current
Al	Analogue Input
AO	Analogue Output
BESS	Battery Energy Storage System
BMS	Battery Manager Solution
CCID	Charge circuit interrupting device
CCL	Charge Current Limit.
CCS	Combined charging system – charging and communications protocol following the standard IEC 61851-23 Annex CC
CHAdeMO	Charging and communications protocol following the standard IEC 61851-23 Annex AA
CPU	Central Processing Unit
DC	Direct Current
DCL	Discharge Current Limit
DI	Digital Input
DSP	Digital Signal Processor
DO	Digital Output
EV	Electric Vehicle
FPGA	Programmable device (Field-Programmable Gate Array)
FRU	Field Replaceable Unit
GFDI	Ground Fault Detector Interrupter
GPRS	General Packet Radio Services, a data transmission system
HVAC	Heating, Ventilation, and Air Conditioning
IGBT	Insulated Gate Bipolar Transistor
IMI	Insulation monitoring device
IT	Grid system where the power supply is kept isolated and the electrical equipment system is grounded.
LOTO	Lock Out – Tag Out
MCB	Miniature Circuit Breaker
MPCS	Multi Power Conversion System
MID	Measuring Instrument Directive
MV	Medium Voltage. This term is used to refer to high voltage in general
PE	Ground connection
PI	Proportional and Integral
POI	Point Of Interconnection
PPE	Personal Protection Equipment

ACRONYM	MEANING
PV	Photovoltaic energy
RCD	Residual Current Device
RCM	Residual Current Monitor
RFID	Radio Frequency Identification
SOC	State Of Charge – referred to battery
SOH	State Of Health – referred to battery. It compares the actual state of the battery to its initial conditions. It is measured in percentage
STO	Safe Torque Off
TN	Grid system where the power supply is grounded, and the electrical equipment system is brought to the same ground through the neutral connector.
TT	Grid system where both the power supply and the electrical devices are connected to the ground via separate connections
UPS	Uninterruptible Power Supply
VSD / VFD	Variable Speed Drive, Variable Frequency Drive. Both terms are used

## **SAFETY SYMBOLS**

Always follow safety instructions to prevent accidents and potential hazards from occurring.

In this manual, safety messages are classified as follows:

WARNING	Identifies potentially hazardous situations where dangerous voltage may be present, which if not avoided, could result in minor personal injury, serious injury or death.  Be extremely careful and follow the instructions to avoid the risk of electrical shocks.
CAUTION	Identifies potentially hazardous situations, which if not avoided, could result in product damage, or minor or moderate personal injury.  Read the message and follow the instructions carefully.
NOTICE	Identifies important measures to take in order to prevent damage equipment and warranty lost, as well as encouraging good use and environmental practices.

Other symbols used in this manual for safety messages are the following:



Hot surface. Be careful and follow the instructions to avoid burns and personal injuries.



Risk of fire. Be careful and follow the instructions to prevent causing an unintentional fire.





Caution, risk of electric shock. Energy storage timed discharge. Wait for the indicated time to avoid electrical hazards.

## SAFETY INSTRUCTIONS

#### **IMPORTANT!**

Read carefully all documentation before handling the equipment and pay special attention to safety recommendations to maximize the performance of this product and ensure its safe use and installation.

This document covers the most important and frequent potential causes of damage to equipment or personnel. It is the responsibility of the installer to follow the instructions provided in this manual, follow good electrical practices and identify all warnings and recommendations before starting up and operating the electric vehicle chargers.



#### **WARNING**

#### FIRST CONSIDERATIONS

#### The operations detailed in this manual can only be performed by qualified personnel.

The condition of qualified personnel referred to in this manual shall be at least the condition that meets the standards, regulations and safety laws applied to the installation and operation of this equipment.

#### Read and retain the Hardware and Installation Manual for future reference.

Before assembling the equipment, read all instructions, caution signs and other sections of this manual. Failure to follow these warnings can result in severe electrical shock or death. Pay attention at all times to prevent possible accidents.

In addition to the recommendations in this manual, **local and site-specific safety procedures should be observed.** Additionally, local and national electrical regulations must be followed to avoid personal injury and/or equipment damage.

The electric vehicle charging system may cause an ELECTRICAL DISCHARGE if the warnings indicated in this manual are not followed.

Make sure the equipment is completely disconnected from the power supply and grounded before handling or servicing. Otherwise, there is a risk of electric shock. To avoid electrical hazards, disconnect the input supply, ground the equipment, remove control voltages before performing any tasks, and ensure that busbars are completely discharged. Warning and safety labels must be properly affixed to terminals, cabinets, and control panels in accordance with local regulations.

#### When working on electrical installations, always remember to apply the FIVE GOLDEN RULES:

- 1. Visible shutdown of all live sources.
- 2. Mechanical locking of all cutting elements.
- 3. Verify the absence of voltage by using the appropriate tools for the voltage of the installation.
- 4. Ground and short-circuit all possible voltage sources.
- 5. Delimit and mark the work area.

**Do not modify the equipment.** If you fail to do so, Power Electronics will not assume any liability, and the product warranty will be voided.



#### **WARNING**



**The housing must be properly closed,** otherwise it may not adequately protect people or property from any abnormal situation inside the equipment.

**Always follow the instructions in the manual to move and position the equipment.** The weight of this equipment can cause injuries, serious injuries and even death if not handled correctly.

The output airflow can reach high temperatures that could harm people exposed to it.

**Electric shock danger.** The steps to isolate the equipment must be carefully followed before performing any task or opening any cover of the equipment. Avoid inappropriate actions that may cause electric shock

Always wear the appropriate personal protective equipment (PPE) for each task and work in electrical areas with dry hands. Otherwise, you may get an electric shock.

Do not use cables with damaged insulation. Do not subject cables to abrasion, excessive stress, heavy loads or pinching. Otherwise, you may get an electric shock.

Do not supply power to a damaged equipment or with missing parts, even if the installation is complete. Otherwise, you may get an electric shock.

In the event that the equipment stops due to a loss of power, do not do any work on it. The autorestart function may be enabled, and you may receive an electric shock.



The equipment has capacitors. Wait until the capacitors have discharged before performing any maintenance task.

#### USE

Do not use this equipment for purposes other than the electric vehicle charging with the modes provided for this product and defined in this manual.

**Do not disconnect or connect any terminals while the equipment is running.** Otherwise, you may get an electric shock and the equipment may be damaged.

Do not use this product if its enclosure or electric vehicle connector(s) (on both the equipment and vehicle sides) are broken, cracked or otherwise damaged. Otherwise, you may get an electric shock.

#### CONNECTION TO EARTH

Prevention of electric shock:

- The equipment chassis must be properly grounded to prevent a possible electrical shock if a leakage current flows through the enclosure. Disconnect all power supplies before proceeding with maintenance operations inside the equipment.
- Only connect the grounding device to the equipment's grounding plate. Do not use the enclosure
  or chassis screws for grounding.
- The protective earth wire must be connected first and last disconnected.



#### **CAUTION**

Install the equipment, both the power station and the recharging posts, on a solid, level surface in a location where there is no risk of explosion, flooding, or impact damage. Follow the recommendations on how to build the foundation of this manual. Otherwise, there is a risk of malfunction and even permanent damage.

Never clean the surfaces or the inside of the equipment with abrasive liquids, solvents or cleaning products that could damage it. Water should not be applied under excessive pressure.



Disconnect the input power in case the equipment gets damaged.

Otherwise, it could result in a secondary accident or a fire.

Do not allow lint, paper, wood chips, dust, metallic chips, or other foreign matter into the equipment. Otherwise, a fire or an accident could occur.



After the input power is applied or removed, the equipment will remain hot for a few minutes. Touching internal hot parts could result in skin burns

#### IMPORTANT RECOMMENDATIONS FOR CHARGING ELECTRIC VEHICLES:



#### **CAUTION**

Follow at all times the charging process described by the electric vehicle manufacturer.

This device should be monitored when used near children.

Do not handle the vehicle or equipment during the loading process (washing of the vehicle, intervention in the vehicle engine compartment, handling of the loading post, etc.).

Do not modify or interfere with the electrical installation while charging the vehicle.

Failure to do so could result in electric shock.

Do not charge the vehicle in the event of water, signs of corrosion or foreign matter on the charger cable connector or vehicle charging socket. Otherwise, there is a risk of fire and electric shock.

Do not attempt to touch the terminals of the charging station connector cable or the vehicle charger socket, nor insert objects into them. Failure to do so could result in electric shock.

Do not attempt to disassemble, repair, alter or modify the charging connector or any part of the charger. The connector is not a user-serviceable device. Contact Power Electronics.

Always be careful with the charger's cable and connector: treat it carefully, do not crush it, immerse it in water, pull it out, or hit it, etc.

Follow the directions given by the vehicle manufacturer regarding the suitability of charging the vehicle when you or the vehicle are exposed to intense rain, heavy electrical storm, or other severe weather.

#### PERSONAL PROTECTIVE EQUIPMENT (PPE from now on) REQUIRED

The use of PPE in accordance with standards is required to repair and maintain the equipment. Follow applicable instructions at the installation site to comply with national and local regulations.

In the case of tasks with voltage present, it is mandatory to use an Electric Arc Safety Kit (gloves, clothing and face protection).

A detailed example of the PPE used is shown below. The customer must specify in his safety instructions (hazard statement and work procedure) which PPE is required and when and how they should be used according to his electric arc studies, the characteristics of the site, the chargers, the installation and the country.

Power Electronics assumes no liability for damage resulting from improper use of the equipment or failure to comply with local or national regulations.

Always follow local regulations / NEC Health & Safety standards.

The following table shows an example of commonly used PPE:

ITEM	DESCRIPTION
Safety glasses	Eye protection according EN 166.
Electric gloves	Gloves with mechanical, dielectric and against arc flash. Class according to voltage. EN 60903; ASTM D120 specifications and NFPA 70E standards.
Safety footwear	S3 class complying with BS EN ISO 20345.
Insulation carpet	Isolation carpet according to IEC 61111 Class according to voltage.
Safety kit arc flash	Arc flash personal protective equipment kit (including arc flash protective face shield & hard hat), fire resistant 40 cal/cm².
Padlock set	Padlock and auxiliary elements set to lock out dangerous equipment.
HI-VIS vest	Fr VIS vest 9 cal/cm <sup>2</sup> .
MV stool	Medium Voltage insulation stool.
Rescue pole	Insulated body rescue pole.

#### PPE FOR INSTALLATION







Safety boots





Additional PPE for commissioning and maintenance tasks









Safety clothes according to NFPA-70E and safety labels

The following table shows the protection class type, depending on the working voltage.

#### **ELECTRICAL INSULATED GLOVES**

Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )
00	500	750
0	1000	1500
1	7500	11250
2	17000	25500
3	26500	39750
4	36000	54000

#### **ELECTRICAL SAFETY MATTING**

Class	AC (V <sub>AC</sub> )	DC (V <sub>DC</sub> )
0	1000	1500
1	7500	11250
2	17000	25500
3	26500	39750
4	36000	54000



#### PPE should be checked according to the manufacturer's instructions.

The electrical gloves must have thermal, electric and mechanical protection. Some models of gloves have the three kinds of protection, so it is not necessary to combine them with more gloves.

If the gloves only have dielectric protection, it is mandatory to use under fireproof gloves and over gloves cover.



#### **NOTICE**

#### RECEPTION

- Electric vehicle chargers are supplied after passing strict performance tests and are carefully packed for shipment.
- In case of damage to the unit during transportation, notify the shipping agency and Power Electronics (International +34 96 136 136 65 57, USA + 1-415-874-3668) or your nearest agent within 24 hours of receipt of the merchandise.

#### RECYCLING

Packaging equipment must be recycled. Separate all different materials (plastic, paper, cardboard, wood...) and place them in the corresponding containers. Ensure waste collection is properly managed with a Non-Hazardous Waste Agent.

To guarantee health and natural environmental sources protection, the European Union has adopted the WEEE directive concerning discarded electric and electronic equipment (SEEA).



Waste of electrical and electronic equipment (WEEE) must be collected selectively for proper environmental management.

Our products contain electronic cards, capacitors and other electronic devices that should be separated when they are no longer functional. These WEEEs should be managed accordingly with a Hazardous Waste Agent.

Power Electronics promotes good environmental practices and recommends that all its products sold outside of the European Union, once they reach the end of their life, are separated and the WEEE managed according to the particular country applicable legislation (especially: electronic cards, capacitors and other electronic devices).

If you have any questions about the electric and electronic equipment waste, please contact Power Electronics.



## NOTICE

#### CYBERSECURITY DISCLAIMER

This product is designed to be connected to and to communicate information and data via a network interface. Access to the system is restricted to those employees who legitimately need it for reasons of maintenance and/or updating of the system.

It is the customer's sole responsibility for providing and continuously ensuring a secure connection between the product and customer network or any other network (as the case may be). Customer shall establish and maintain any appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of antivirus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

Power Electronics and its affiliates are not liable for damages and/or losses related to such security breaches, any unauthorized access, interference, intrusion, leakage and/or theft of data or information.

## **TORQUE AND SCREW SIZING**

The following table shows, broadly speaking, the recommended torque for both mechanical and electrical connections, applicable to all cabinets [1,2].

SCREW SIZE		RECOMMENDED TORQUE			
METRIC E	ENGLISH	DIN (Nm)		ASTM (ft*lb)	
(mm)	(in.)	6,9 QUALITY[a]	8,8 QUALITY[a]	A449 TYPE 1 <sup>[a]</sup>	A325 TYPE 1 <sup>[a]</sup>
M3	1/8	1	1,3		
M4	5/32	2,5	3	-	
M5	3/16	4	6		
M6	1/4	5	10	4	-
M8	5/16	20	25	9	
M10	7/16	40	50	25	
M12	1/2	60	70	38	50 – 58
M14	9/16	100	120	54	-
M16	5/8	150	210	75	99 – 120

[a] For other qualities, follow the screw's manufacturer guidelines.



## **CAUTION**

For all screwing that holds a **particular component** such as a bus, contactor, etc. it will be necessary to **apply the tightening torque indicated by the manufacturer** of the same component

Screwing should be tightened correctly only when necessary, i.e. when the factory marks are not in place. For small screws that do not have marks, the good electrical praxis will determine if it is loose.

<sup>&</sup>lt;sup>1</sup> Power Electronics recommends the use of Zinc Steel quality 8.8 bolts for internal connections in general, DC and earth connections included.

<sup>&</sup>lt;sup>2</sup> Power Electronics recommends the use of A2-70 stainless bolts for external connections in general, AC connections included.

## 1.INTRODUCTION



Power Electronics' NB 120 standalone manages both the power transformation and main control for the charge, and the user interface and connection with the EV at the same enclosure.

The equipment integrates a built-in cable management system that allow five meters long charging cables without them dragging on the ground.

Long charging cables and convenient handling has become a must for EV drivers while the preservation of both cables and plugs is key to charging point owners.

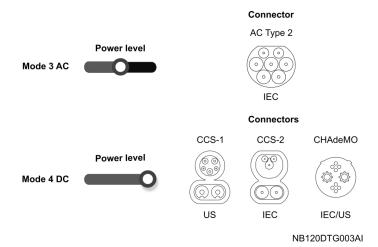
The charger can be easily power-scalable adding power modules to support EV fleets growth or to follow the increase in EV market size over time.

The power modules, FRU concept (Field Replaceable Units), are designed to be easily replaceable on the field without the need of advanced technical service personnel providing an easy and reduced maintenance with low operating costs.

Thanks to the smart fleet management functionality, the available power can be shared among all connected vehicles at an EV charging site. So the total power required to supply the energy gets substantially reduced, representing a cost savings due to reduced grid interconnect requirements.

The charger offers a fast DC charging (mode 4 of charging) up to 120 kW, ideal for installation in electric cars charging stations, commercial car parks and business areas; or optionally for IEC standard, a semi-fast charge in AC (mode 3 of charging) up to 22 kW.

The charger has up to two independent hoses with the standard connectors: CCS-1, CCS-2, CHAdeMO in DC mode being compatible with electric vehicle standards. Optionally, for IEC standard, a type 2 socket is available for AC charging. User can charge three cars at the same time, as long as they are on different charging modes.



## **Equipment overview**

The following sections describe the different components of the EV charger.

#### Charger

The NB 120 series charger can be provided with two independent hoses with connectors for DC charging of electric vehicles with CCS-1, CCS-2 and CHAdeMO standards for DC. In addition, it can optionally include a type 2 socket for AC charging. The possible installation and combination of connectors depends on the application of local regulations. Each post has a user-interactive touch screen display and an optional RFID card reader to be used when carrying out a charging session. The following image shows the charger main components:



#### **Connectors**

The charger has up to two independent cable straight hoses with the standard connectors. The possibility of installing and combining the connectors depends on which regulations are applied in each country and the interest in offering different options to the users.

The connector brackets are located on each side of the equipment.

The following sections describe the parts of each type of connector. Be aware that the shape of the connectors may vary from those listed below.

#### **CCS-1** connector



#### **CCS-2 connector**



#### CHAdeMO connector



#### AC connector type 2



## **Charging process**

The user must follow the instructions given below when performing a charging session:

- If the charger is available, activate the charging session from the display, RFID contact or mobile App (depending on available options).
- 2. Select the corresponding connector referred to the expected charge mode.
- 3. Connect the charger to the EV using the corresponding hose.
- 4. Ensure that the connector has been interlocked.
- If the session and communication between the charger and vehicle are established correctly, the charging process will begin.
- 6. Stop charging. The charging can be stopped in different ways: when it has reached 100% and it stops automatically, through the display touching on the "Stop session" button, by RFID contact, through the mobile application or by stopping the charging from the vehicle itself.
- 7. Once the charging has stopped, the connector can be released.

## Advanced charge functionality

#### **Smart Fleet Management**

This functionality has been designed to minimize the initial investment and operation costs.

It is able to balance the power based on the number of charging posts in use. Therefore, the total power required to supply the total energy gets substantially reduced, representing a cost reduction in the electrical facility infrastructure and a cost saving due to a minor power contracted. Besides, the hardware and the back-office communication are optimized.

#### Smart power balance technology (optional)

With the smart power balance functionality, NB 120 is able to dynamically allocate power modules depending on the power demand of each vehicle.

This functionality optimizes the use of the total power of the charger and therefore the investment.

#### Simultaneous charging

The NB 120 is designed for maximum revenue from a single charger. Allows working with voltage ranges between 150 Vdc and 1000 Vdc and can work between 300 Vdc and 1000 Vdc at maximum power.

#### IEC standard

Each charger can install up to two connectors per post, allowing the simultaneous charging of two vehicles in DC. Optionally, an AC socket can be included, for an AC charge. The charger is compatible with the most extended connectors for DC charging (CCS, CHAdeMO) and AC.

#### US standard

Each charger can install up to two connectors per post, allowing the simultaneous charging of two vehicles in DC. The charger is compatible with the most extended connectors for DC charging (CCS, CHAdeMO).

## **Open door detection**

Door contact switches are used in order to recognize if the front access door of the power cabinet is open. If it is detected that the door is open, ongoing charging sessions will be immediately stopped.



#### **WARNING**

The power cabinet door must be correctly locked after installation, service or repair operations.

#### Power retrofit (optional)

The power retrofit uses modular technology It allows the NBi 180 power cabinet to be easily powerscalable adding power modules to support EV fleets growth or to follow the increase in EV market size over time.



#### **NOTICE**

The power retrofit is an optional functionality, it must be ordered by the customer for each specific project.

It is the customer's responsibility to consider the cable cross-sections for the maximum power to be installed in the future.

## Regulatory framework

The **NB 120** is a device that is connected to the AC low-voltage network and provides a DC power supply at a variable voltage of 150 to 1000 V¹ for charging electric vehicles.

Its certification as a product in accordance with current Spanish and US legislation is carried out through the evaluation, where applicable, of compliance with the following standards:

- IEC 61851 Conductive charging system for electric vehicles
- o Part 1: General requirements.
- $_{\rm O}$  Part 23: DC charging station for electric vehicles.
- o Part 24: Digital communication between a DC EV charging station and an electric vehicle for control of DC charging.
- IEC 61851-21-2:2018 Electric vehicle conductive charging system.
- UL 2202: Electric Vehicle (EV) Charging System Equipment.
- NEC Article 625: Electric Vehicle Charging Systems.
- FCC part 15 class A: Unintentional radiators industrial application.

 $<sup>^{1}</sup>$  150 - 500 V<sub>DC</sub> for CHAdeMO.

## 2.TECHNICAL CHARACTERISTICS

Depending on the regulation to be followed, the equipment will fulfill different technical characteristics.

## Standalone NB 120 - IEC

REFERENCE		NB0600H NB060SH	NB0900H NB090SH	NB1200H NB120SH		
	Maximum power [kW]	60	90	120		
	Voltage range [V]		150 - 1000 [1]			
	Available connectors		CCS-2, CHAdeMO			
DC OUTPUT	Maximum continuous current CCS [A]	:	200 (optionally, 250 or 300)			
	Peak current CCS [A] [2]		350			
	Maximum current CHAdeMO [A]	125				
	Maximum number of EVs charging	1	4	2		
	simultaneously	1	1	2		
	Power [kW]		22			
AC OUTPUT	Voltage range [V]		400 ± 10%			
(OPTION)	Maximum current [A]		32			
,	Available connectors		AC Type 2 Socket			
	Power [kVA]	63	95	126		
	Voltage [V]		400 (3ph + N + PE) ± 10%			
AC INPUT FOR	Power factor		> 0.99			
DC OUTPUT	Frequency [Hz]		50 / 60			
	Efficiency		95%			
	Interface		RFID card reader			
		[	Emergency stop pushbutto	n		
	=		dit / debit card reader (option			
		Isolation monitor				
	-	Surge arrester Type 2 (optional)				
	Protections	DC charge: RCD Type A (optional) + MCB				
	-	AC charge (optional): MCB + RCD Type A + RCM				
		Smart Fleet Management				
	Others –	Smart Power Balance (optional)				
		DC meter for DC output (optional)				
GENERAL	Meter –	AC MID meter for AC of				
	Cable length [m]	5 with cable management system (optionally, 7.6)				
	Enclosure / foot / glass color		AL 9016) / Grey (RAL 701			
	Customization [3]	Enclos	ure / Foot / Glass / Logo /	Display		
	Degree of protection	IP54   IK10	IP54   IK10 (IK08 for display and ventilation grilles)			
	Operating temperature		From -30°C to 50°C			
	Relative humidity		From 4% to 95%			
	Maximum altitude (above sea	Z 0000		2000)		
	level)	≤ 2000	m without derating (max.	3000 m)		
	Communications	Ethernet + (	OCPP 1.6 + Wifi + 3G / 4G	connectivity		
	Dimensions (W x D x H) [mm]	670 x 750 x 1800				
	Regulation	IEC 61851-1, IEC 61851-23, IEC 61851-24, IEC 61851-21-2:2018				
1-4 [4] 450 5	200 1/1 6 0114 1 140	,	,			

Be aware that Power Electronics is not responsible for the charger's input power connection, as well as its installation.

Notes: [1] 150 - 500 Vdc for CHAdeMO.
[2] Consult with Power Electronics for more information about the connector overload capability.
[3] Consult with Power Electronics for further information.

## Standalone NB 120 - US

REFERENCE		NB0600H NB060SH	NB0900H NB090SH	NB1200H NB120SH	
	Maximum power [kW]	60	90	120	
	Voltage range [V]		150 – 1000 [1]		
	Available connectors		CCS-1, CHAdeMO		
DC OUTPUT	Maximum continuous current CCS [A]	200 (optionally, 250 or 300)			
	Peak current CCS [A] [2]	350			
	Maximum current CHAdeMO [A]		125		
	Maximum number of EVs charging simultaneously	1	1	2	
	Power [kVA]	63	95	126	
AC INPUT FOR	Voltage [V]		480 (3ph + N + PE) ± 10%		
DC OUTPUT	Power factor		> 0.99		
DC OUTPUT	Frequency [Hz]		60		
	Efficiency		95%		
			10" Touchscreen		
	Interface	RFID card reader			
			Emergency stop pushbutton		
		Cre	dit / debit card reader (option	nal)	
			Isolation monitor		
	Protections	Surge arrester Type 2 (optional)			
	Frotections	RCD Type A (optional) + MCB			
		AC charge (optional): MCB + RCD Type A + RCM			
	Others	Smart Fleet Management Smart Power Balance (optional)			
	Others				
GENERAL	Meter	DC meter for DC output (optional)			
OLINLINAL	Cable length [ft]	16.4 with cable management system (optionally, 25)			
	Enclosure / foot / glass color	White (RAL 9016) / Grey (RAL 7016) / Black			
	Customization [3]	Enclos	sure / Foot / Glass / Logo / D	isplay	
	Degree of protection	NEMA 3R			
	Operating temperature	From -30°C to 50°C			
	Relative humidity		From 4% to 95%		
	Maximum altitude (above sea level)	≤ 2000 m without derating (max. 3000 m)			
	Communications	Ethernet + OCPP 1.6 + Wifi + 3G / 4G connectivity			
	Dimensions (W x D x H) [ft]	2.20 x 2.46 x 5.90			
	Regulation	UL 220	)2, NEC 625, FCC Part 15 C	lass A	

Be aware that Power Electronics is not responsible for the charger's input power connection, nor its installation.

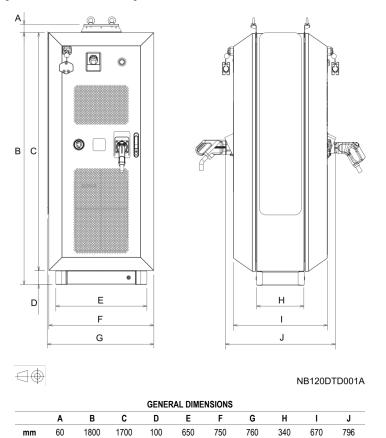
Notes: [1] 150 - 500 Vdc for CHAdeMO.
[2] Consult with Power Electronics for more information about the connector overload capability.
[3] Consult with Power Electronics for further information.

## 3. DIMENSIONS AND WEIGHT



The dimensions, gravity center and the weight of the NB 120 equipment are detailed in this section.

The right and front view, from left to right, are shown below:



**Note:** The bottom-up view is shown in the "Anchoring of the equipment" and "Cable access plate" section of this document.

25.59

29.53

29.92

13.39

26.39

31.34

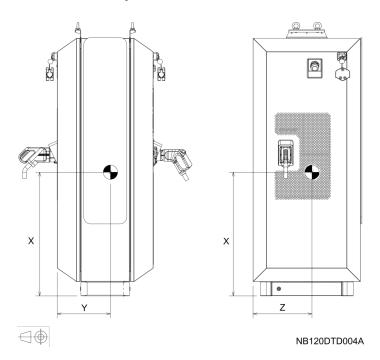
66.93

3.94

2.36

70.87

The front and left view, from left to right, are shown below:



GRAVITY CENTER				
X Y Z				
864	371	412		
34.02	14.60	16.22		
	<b>X</b> 864	<b>X Y</b> 864 371		

The approximate weight for the NB 120 is 360 kg (793.66 lb)<sup>1</sup>.

 $<sup>^{\</sup>rm 1}$  For other equipment of the NB 120 range, consult Power Electronics.

## 4. HANDLING AND TRANSPORTATION





#### **CAUTION**

Please read the following transport and installation instructions carefully.

Failure to follow the transport and installation instructions could result in damage to the equipment or injury to persons.

#### Reception

The equipment is delivered perfectly packed and checked. Upon receipt, inspect the equipment. In the event of damage to the equipment, notify the logistics agent and Power Electronics 902 40 20 70, (International +34 96 136 65 57), or your nearest agent within 24 hours of receipt. Verify that the goods received correspond to the delivery note, models and serial numbers.

## **Storage**

Whenever possible, the equipment should be unloaded at its place of installation and operation.

If it is necessary to store the equipment, it must be kept in its original packaging and the following rules must be followed to keep it in proper condition:

- Store the equipment in a place protected against harmful elements such as animal entries, excess moisture (inside and outside the equipment), thermal radiation, direct solar radiation, contact with chemicals, corrosive gases, etc.
- Store the equipment on a flat, level surface. Never rest the equipment on wooden beams
- Store equipment away from passageways where it may be damaged
- Keep the covers on during storage.
- Keep the equipment packed until the time of installation.
- The temperature in the storage location must be between -40°C y +60°C and the relative humidity at <95% without condensation.</li>



#### **NOTICE**

Standard storage is defined as the expected time period from the time the equipment arrives at its location until its commissioning occurs. It is assumed that this period is less than 6 months. This period is variable according to the weather conditions of the site.

Customer is responsible of deciding if the posts are installed within the standard period or otherwise, the installation date is to be defined. In this case, customer must take the appropriate measures.

## **Extended Storage**

If the equipment is stored for an extended period of time (6 months or more) before installation for an undefined date, new considerations should be taken, in addition to the recommendations in the previous section "Storage":

- The equipment shall be protected under cover, by means of an external protector or by the method
  adapted to the local conditions which prevents condensation and humidity inside the equipment.
- Draining bags shall be included inside the equipment to prevent moisture from damaging electronic components. These shall be replaced when storage conditions require it.
- A clearance shall be left around the equipment so that inspections can be undertaken.
- Periodic inspections should be performed when possible. Proper internal cleanness must also be checked.



#### **WARNING**

Tasks shown above are standard and **they are not applicable to all weather conditions**. In those plants where customer considers extreme weather conditions, these requisites should be adjusted for each particular case, as well as the maximum storage time for these conditions.

## Unpackaging

During the unpackaging, remove carefully the packaging (do not use sharp tools). After removing the packaging, check the material inside. If you receive replacement parts with the product, please separate and store it in a safe place.



#### **NOTICE**

Waste disposal is customer's responsibility, and it is not within Power Electronics' scope.

## Handling and transportation



#### **CAUTION**

**Follow the handling and transportation requirements described here.** Any other method of transport or handling could damage the unit or void the warranty.

During handling and transport, the goods must not be exposed to moisture, overturned, inverted, inclined or impacted.

The elevation angle should be less than 90°.

Avoid sudden movements and jerking during lifting. Stop the load just before placing it on the ground and then lower the equipment slowly to avoid knocks. Otherwise, the equipment may get damaged.

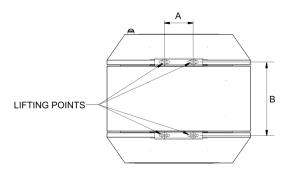
The equipment has a lifting tool with hoist rings located at the upper part of the tool. To lift them, slings must be attached to each ring. Also, the slings must be firmly attached to the crane.

For maritime shipment, the equipment is packed assembled vertically, in a cardboard box and fixed on a pallet base with screws at four steel brackets. Externally the box is strapped and shrink-wrapped.

In case of air shipment, the charger is shipped lying down in a wooden box.

The equipment is ready to be handled by forklift truck and be transported by truck or container. Keep in mind the load distribution and center of gravity.

For handling, the equipment has four lifting rings at the top. The image below (top view) shows the location of the four lifting points.



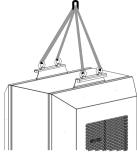
NBC120DTD004AI

	DIMENSIONS		
	A B		
mm	150	382	
in.	5.9	15.0	

#### Be aware of all caution and warning messages before lifting the equipment.

To lift the equipment, a sling or a chain must be attached to each ring and securely fastened to the crane.

The following image shows an example of lifting the equipment with slings:



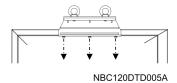
NBC120DTD006A

#### Removal of the lifting tools

Once the equipment has been anchored, the lifting tool must be removed by following these steps:

 Open the two side doors of the equipment. First, the door that has a handle. Once opened, from the inside, it will be possible to unscrew the two M8 screws (one at the top of the equipment and one at the bottom) to open the other door.

Once both doors are open, remove both lifting tools by unscrewing the three M6 screws of each one.



3. Close the doors again by following the reverse procedure.



## **NOTICE**

If the methods described here cannot be applied, please contact Power Electronics.

It is the customer's responsibility to ensure unhindered access of vehicles to the final site or location, taking into account their movement and handling at the unloading site.

It is important to keep the equipment in the packaging and place them as close as possible to the final location for installation.

Ensure that loading/lifting equipment has a greater capacity than the weight of the equipment plus the auxiliary elements and the loading/lifting task is carried out in a way that ensures the stability of the equipment.

## 5.PREPARATION FOR INSTALLING THE EQUIPMENT

5

#### Site recommendations

When deciding the location of the equipment and planning its installation, it is recommended to follow a series of guidelines derived from its characteristics.



#### **CAUTION**

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure the cables enter the equipment perpendicularly and the spacing between them is appropriate.

Avoid corrosive environments that may affect the equipment's proper functioning.



#### **NOTICE**

The instructions given in this section must not replace in any way the mandatory regulations of the country in which the equipment will be installed.

Prior to installation, a geotechnical study of the terrain where the equipment will be installed must be carried out to determine its characteristics and to decide the most suitable type of foundation.

It is the customer's responsibility to design and build concrete foundations with the necessary piping and ground network in accordance with the applicable regulatory requirements.

Proper installation is absolutely necessary and it is not within the scope of the manufacturer's responsibility.

#### Soil

The soil should have the following characteristics:

- The soil must be dry, compacted, stable and homogeneous.
- The land will be gravel, ballast or pebbles.
- Do not install on floodplains, neither in places where objects can fall on.
- The land should be provided with a drainage system, especially in locations with high water tables and/or heavy rainfall.
- It is recommended that the ground should not exceed the level of the foundation.
- Maximum permissible ground pressure of 150 KN/m<sup>2</sup>.
- Soil compaction degree of 98%.
- Maximum land unevenness of 0.25%.
- It must not be a direct place of passage so that the load cables do not interrupt the movement of pedestrians or traffic.

#### Site basis

Power Electronics recommends making a concrete foundation slab to support the charger. The support surface for the equipment must be perfectly level. The client is responsible for the correct dimensioning and construction of the foundation in accordance with current regulations. The foundation must meet the following characteristics:

- It is recommended that a layer of cleaning concrete be installed between the ground and the foundation.
- The sizing should be appropriate for the weight of the equipment and the characteristics of the soil
- It must be thick enough to support the equipment.
- It must have trenches wide enough to ensure proper wiring passage (the suggested cable access size is shown below).



The client is responsible for building a solid concrete base perfectly leveled and elevated with respect to the user's floor height.

In case of specification of variable actions such as snow, wind or earthquake, the slab must comply with the following requirements, **not being excluding those indicated by the specific regulations** of the country of installation:

- Ability to withstand compression forces of 25 N/mm<sup>2</sup>.
- Steel reinforcement capable of withstanding tensile forces of 500 N/mm<sup>2</sup>.
- Taking into account severe wind conditions (60 m/s), the reinforcement should be dimensioned as follows:
- o The longitudinal side of the reinforcement must be able to withstand forces of up to 80 kN.
- $_{
  m O}$  The transverse side of the reinforcement must be able to withstand forces of up to 10 kN.

Note that the thickness of the slab must be determined from the results of the geotechnical study.

See anchor recommendations at the "Anchoring of the equipment" section.

## Minimum working distances

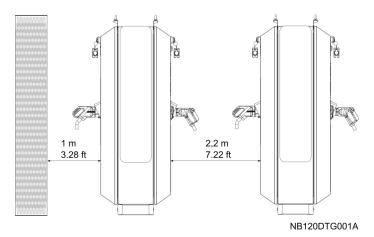


# CAUTION

When installing the equipment, keep the minimum safety distances. Be aware of all the minimum insulation requirements established by the applicable electrical code, as well as the thermal, safety and accessibility requirements. The safety distances given in this section must not replace in any way the mandatory regulations of the country in which the equipment will be installed.

For proper inspection and ventilation, as well as correct handling, it is important to leave clearance around the equipment. The following image shows the recommended minimum distances:

#### Side to side distance:



Front side distance: It does not require a special front space, beyond the one that allows a user to access the display and the RFID.

Although this is the minimum distance between chargers, the distance between parking spaces to be able to maneuver between two cars must also be taken into account, as well as the maximum range of the hose.

Rear side distance: It does not require a special rear space; it can be installed in touch with a wall or other element.



The distances shown are minimum safety distances. Greater distances may be necessary for adequate ventilation.

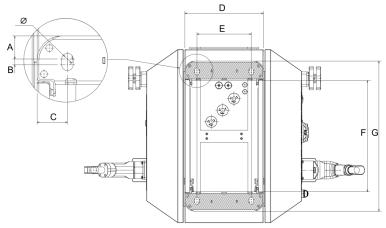
# Anchoring of the equipment



It is the customer's responsibility to dimension correctly posts anchoring to the foundation, guaranteeing stability towards horizontal actions.

The equipment must be anchored to a solid and leveled surface (slab), see slab recommendations at the "Site basis" section.

The following image (bottom-up view) shows the location and diameter of the charger's anchoring holes. They are located at the foot of the charger.



NB120DTD002A

	GENERAL DIMENSIONS							
	Α	В	С	D	E	F	G	Ø
mm	40	10	52,5	340	235	482	650	20
in.	1.57	0.39	20.67	13.39	9.25	18.98	25.59	0.79

It is recommended to use an expansive anchoring M16x145, with a tightening torque of 120Nm (manufacturer's recommendation). To guarantee the proper fixing of the equipment, install a total of 4 anchors.

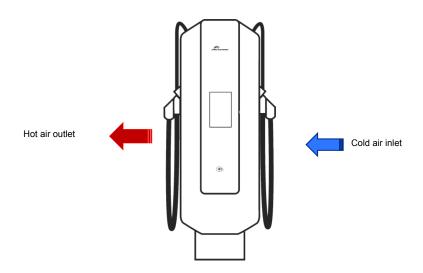
# **Ventilation system**



# CAUTION

Special care must be taken to ensure that there are no external elements near the air inlets and outlets that prevent proper ventilation of the equipment.

The equipment has a forced ventilation system with an inlet located on the right side of the equipment (front view) and a hot air outlet on the opposite side.



## 6.CABLE ACCESS AND CONNECTIONS

6



### **WARNING**

Before opening any door, the equipment must be completely isolated, without any tension. Make sure to follow the insulation guidelines and all safety instructions indicated in the "SAFETY INSTRUCTIONS" section. Please use all the indicated PPE.

Otherwise, you may get an electric shock.

During the connection, you must ensure the proper cable installation in the terminals of the equipment so that there are no voltage parts accessible in this wiring and the polarity is respected



### CAUTION

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable. The customer must ensure that the trenches are deep enough and consistent with the section "SITE RECOMMENDATIONS".



### NOTICE

Refer to the recommended tightening torque for mechanical and electrical connections in the " <u>TORQUE AND SCREW SIZING</u>" section.

Power Electronics is not responsible for damages resulting from an incorrect connection.

The dimensioning of the input power cable of the charging point must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

The customer is responsible for choosing and installing the communication cables.

The customer is responsible for the correct sizing and execution of the corresponding ground networks in accordance with the regulatory requirements applicable in the country of installation.

Power, ground, auxiliary and communication cables are not included within Power Electronics' scope.

#### MATERIAL WITHIN CUSTOMER'S RESPONSIBILITY:

The following cables and elements are not provided by Power Electronics, they are customer's responsibility.

- AC input power cables and terminal lugs (as applicable).
- · Ground input cable and terminal lug to site local ground system (as applicable).
- +/- DC power cables and terminal lugs to each Dispenser or pantograph (as applicable).
- Ground cables and terminal lugs to each Dispenser or pantograph (as applicable).
- MV switchgear wiring terminals (as applicable).
- Auxiliary power supply cable to each Dispenser or pantograph (as applicable).
- Control optical fiber to each Dispenser or pantograph (as applicable).
- Ethernet cable (CAT5e or CAT6) with RJ45 terminals OR optional multimode optical fiber to each Dispenser (as applicable).

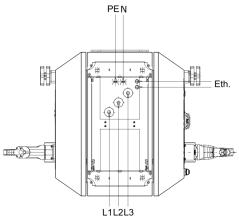
Several factors can influence the choice of cable, including the distance between the distribution board and the power cabinet, the maximum input current, and the installation mode.

## **Access**

The power and communication cables can enter through the bottom part on the equipment.

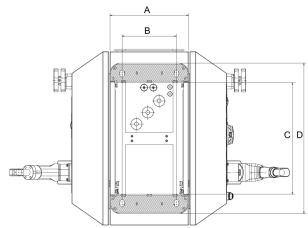
To access the lower part, remove the front and rear bezel, see "Anchoring of the equipment".

The power and communication cables enter and exit through the lower part of the charger by using the following space. Below, the bottom-up view is shown:



NB120DTG004A

Access dimensions are detailed in the figure below (bottom-up view):



NB120DTD003A

		DIMENSIO	NS	
	Α	В	С	D
mm	340	235	482	650
in.	13.39	9.25	18.98	25.59

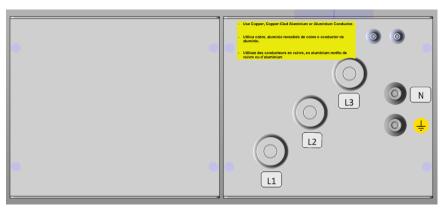
## Cable access plate

The following images show the standard cable entry plate. Only the amount of cable glands needed for the project must be used. It is configured as follows:

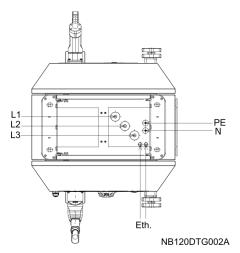
On the right side the AC connection is located. It is composed of three phases, ground wire
and the neutral wire. The plate is labeled with their identification letter so that, at the time of
connection, the cables go directly to their plates, avoiding excessive crossings and twists.
 For the equipment communications, two small glands have been arranged at the top to pass
the Ethernet or fiber optic hose.

• On the left side only a blind plate is installed for sealing the equipment.

The footprint view of the cable access plate is show below:



The bottom-up view is as follows:



### **Connections**

This section details the input and output connections that must be performed in the equipment.

There are several factors that can influence the choice of cable, including the distance between the distribution board and the charger, the maximum input current and the installation mode.



## **NOTICE**

The dimensioning of the cables must be checked by a qualified electrician. The customer is responsible for the correct sizing and execution of the corresponding connections in accordance with the regulatory requirements applicable in the country of installation.

To guarantee proper electrical installation, it is very important to comply with the bend radius of the cable.

To guarantee proper insulation, it is very important the cable diameter is within the tolerable range of the cable gland.

The power cables and RJ45 connector must be inserted into the equipment without crimping the terminal, or they will not be able to pass correctly through all the expected spaces. Forcing them could affect the sealing of the equipment.

The AC connection is composed of three phases, ground wire and the neutral wire. Both, the power supply input/output and the communication connections input/output will be introduced through one of the accesses and will pass through their corresponding space in the internal cable entry plate to reach the connection panel.

**Note**: The equipment does not require auxiliary power supply input, because it includes an internal transformer.

### **AC** input power connections

#### Cable size:

The tables below show the recommended cable size for the NB 120 range equipment. Customer must choose the cables taking into consideration the minimum and maximum diameter, as well as the particularities of the project:

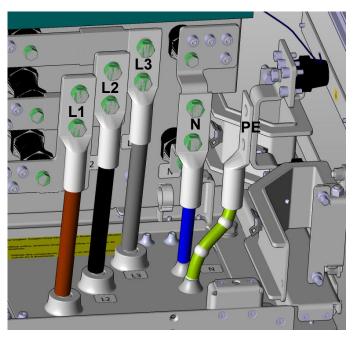
#### INPUT POWER SUPPLY (L1, L2, L3)

	MAXIMUM CURRENT	RECOMMENDED SECTION	CABLE GLAND	MINIMUM Diameter	MAXIMUM DIAMETER
NB60	124 A	70 mm² (2/0 AWG)	M40 (1-1/2")	19 mm (0.75 in.)	28 mm (1.1 in.)
NB90	169 A	95 mm² (3/0 AWG)	M40 (1-1/2")	19 mm (0.75 in.)	28 mm (1.1 in.)
NB120	214 A	120 mm² (4/0 AWG)	M40 (1-1/2")	19 mm (0.75 in.)	28 mm (1.1 in.)

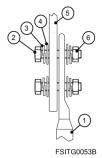
#### **GROUND AND NEUTRAL (PE, N)**

	MAXIMUM CURRENT	RECOMMENDED SECTION	CABLE GLAND	MINIMUM DIAMETER	MAXIMUM DIAMETER
NB60	124 A	50 mm² (1 AWG)	M25 (1")	11 mm (0.43 in.)	17 mm (0.67 in.)
NB90	169 A	50 mm² (1 AWG)	M25 (1")	11 mm (0.43 in.)	17 mm (0.67 in.)
NB120	214 A	70 mm² (2/0 AWG)	M25 (1")	11 mm (0.43 in.)	17 mm (0.67 in.)

### Connections:



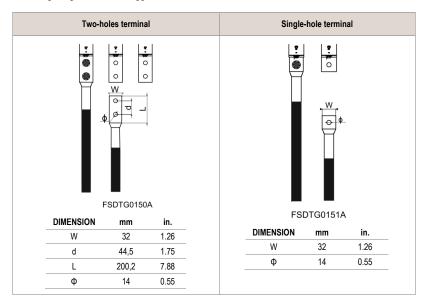
The following figure shows the correct connection:



ELEMENT
Terminal lug
M12 (1/2") bolt
Spring washer
Fender washer
Plate
M12 (1/2") nut

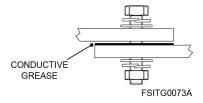
**Note:** If the terminal is a single-hole terminal, it is recommended to connect it to the upper hole in the busbar, so that the contact area is maximized.

The following image shows the suggested terminal dimensions:



The following recommendations must be taken into account for the correct ground connection:

- Before connecting the cable, clean the contact surfaces with a clean cloth and ethanol cleaner. Once cleaned, apply conductive grease.
- It is recommended to use Ø11mm (7/16") copper, aluminum or copper-clad aluminum terminal lugs with a maximum width of 45mm (1-3/4").
- Use M10 (7/16") bolts and nuts and apply the recommended torque according to the quality (See "TORQUE AND SCREW SIZING").
- Use a spring washer and a fender washer between the nuts or bolts head and the busbar or terminal lug.



## **Communications connection**

**Ethernet or Optical fiber (GOF):** For high level communications protocols. By default, it is done through Ethernet, but it is possible to change it to optical fiber<sup>1</sup>.

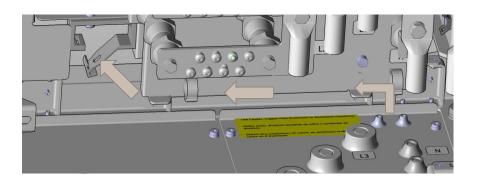
- Recommended cable size: Ethernet CAT 5e or CAT 6 UTP RJ45 Connection Switch. Or
  Optical Fiber (GOF) multi-mode OM3 (50/125 micron) 2 x SC Connectors optional.
- Maximum cable diameter: 7mm (cable gland M16).

#### Connections:

The installation of the communications cable must be done as follows through the interior of the unit until it reaches the router located on the upper panel.

• Enter the cable inside the equipment through the cable gland. Refer to "Cable access plate" section for further information.

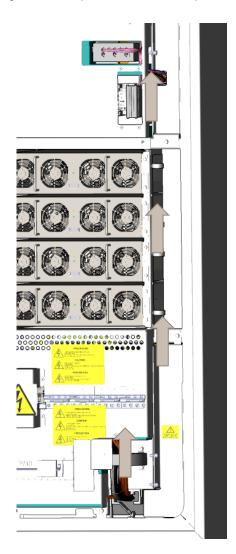
Use the clamps to hold the cable and pass it to the frontal side of the charger.



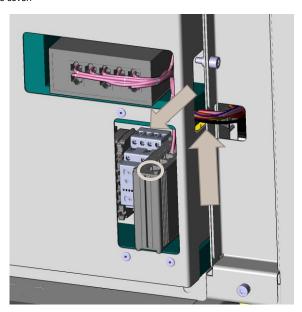
<sup>&</sup>lt;sup>1</sup> Upon request. Please contact Power Electronics in case of requiring this option.

- Once the cable is in the equipment's front part, pull the cable up:
  - First, through the interior of the polycarbonate element located on the bottom panel, as shown in the figure.

 $_{\odot}$   $\,\,$  Then, through the cable clamps located on the inner side part of the enclosure.



 Remove the polycarbonate cover of the router. Introduce the Ethernet cable through the side slot of the main polycarbonate panel to access the WAN port of the router. Place back the router's cover.



## 7.PROTECTIONS



The charger is equipped with multiple hardware protections. This section describes the different protections available to the equipment.

# Insulation monitoring

The equipment has an insulation monitor to detect possible insulation faults in DC charge.

## Overcurrent and short circuit protection

The equipment includes other protections for each charge line with following characteristics:

	Туре	Nominal current (In)	Nominal voltage (U <sub>n</sub> )	Breaking capacity (kA)
DC charge line 30 kW	3-phases	63 A	480 V <sub>AC</sub>	6 kA
AC charge line (only in IEC)	3-phases + N	40 A	400 V <sub>AC</sub>	10 kA
Auxiliaries	2P	10 A	480 V <sub>AC</sub>	10 kA

# **Overvoltage protection (optional)**

The equipment can include as optional an AC overvoltage protection type II, located in the main control cabinet.

OVERVOLTAGE PROTECTION	Nominal voltage (U <sub>n</sub> )	Discharge capacity (In)
NB120 – Type II	400 V <sub>AC</sub>	20kA
NB120 - Type II (only in US)	480 V <sub>AC</sub>	20kA

# Residual current protections (RCD) (optional)

The equipment can optionally include a type A differential relay. This element monitors for any current leakage above the operational limit.

	Operational limit
RCD	0,03 – 40 A

If this optional is included, the auxiliary protection is replaced by a type A RCBO.

	Туре	Nominal current (I <sub>n</sub> )	Nominal voltage (U <sub>n</sub> )	Breaking capacity (kA)	Operational limit	Curve	
RCBO	F+N	10 A	480 Vac	10 kA	0,03 A	С	_

In case of including AC charge option of 22kW, the equipment includes, on one hand, a type A differential.

	Туре	Nominal current (I <sub>n</sub> )	Nominal voltage (U <sub>n</sub> )	Breaking capacity	
AC charge line (only in IEC)	Type A / 4P	40 A	480 V <sub>AC</sub>	30 mA	

On the other hand, the charger contains a residual current device (RCD). This element monitors for any leakage current in excess of the operational limit in the AC charging hose; if detected, it provides a fault signal that will stop the charge.

	Operational limit
RCD	6 mAnc

## 8.INTERFACE



## **Controls**

The electric vehicle user interacts with the charger through a third-party mobile application, a touch screen (*display*) and other optional extras. Check the user manual for more information.

The charger has different forms of payment: by mobile application, by RFID card (optional) or by credit card (optional). The development and maintenance of the mobile application are beyond the reach of Power Electronics, but the interoperability of the equipment with the application selected by the client is guaranteed, prior validation by Power Electronics.

It can include as optional an emergency stop button.

### **LED** indicators

The following control elements and indicators can be found in each NB 50 / NB 60 charger:

- RFID card reader (optional): Allows the user to be identified by an RFID card.
- Touch screen: Allows selecting some characteristics of the charger and the charging options, ending the session, as well as displaying the charging status or fault messages.
- Charger status indicator: It is displayed on the Power Electronics logo, located on the glass face of each charger
- Internally, the power stages have three LEDs:



LED INDICATOR	NORMAL STATE	ABNORMAL STATE
FALLET (no.d)	Off	On
FAULT (red)	Oli	Flash
ALM (valley)	Off	On
ALM (yellow)	Oli	Flash
DUM (see e.g.)	0-	Off
RUN (green)	On	Flash

Normally, "Fault" and "Alm" LEDs should be OFF. If any of them is ON (either still or flashing), it indicates an abnormal condition. Should this occur, please contact Power Electronics.

## 9.COMMUNICATIONS

9

The equipment requires several communications to work and to interact with the customers. Each one has its own aim and purpose, described in this section.

Refer to "Communication connections" section for further information about connections to enable these communications



### **WARNING**

Before opening any door, the equipment must be completely isolated, without any tension. Be sure to follow the insulation guidelines and all safety instructions indicated in the "<u>Safety instructions"</u> section. Please use all the indicated PPE.

Otherwise, you may get an electric shock.

## **Ethernet communication**

The equipment requires an Ethernet entry connection for OCPP1.6 communications and internet connection.

There is an Ethernet connection for communication with the main control board of the different chargers. However, it can be replaced by an optical fiber connection.

Moreover, there is an Ethernet connection to monitor and configure the parameters through the Power Electronics' applications, commonly used by the back office. This use is mainly focused on maintenance and commissioning.

Power Electronics recommends using CAT5e or CAT6 copper cable and RJ45 connector for these connections.

## Optical fiber communication

The equipment requires, for power regulation, an optical fiber communication between the electronic boards.

Besides, it can include, as optional, the optical fiber connection to replace the Ethernet communication with the main control board of the charger. This optional communication method allows locating the charger farther than with Ethernet connection.

### Wi-Fi communication

Wi-Fi network communication can be included as optional. It is designed to facilitate user access to the charger. This connection requires the device and the user connected to the same Wi-Fi network. Once configured, the user can start a charging session through the mobile application.

# 3G / 4G communication

Communication via 3G / 4G can be included as optional. In this case, insert a MicroSIM card into the indicated charger control card slot:





Once the MicroSIM has been inserted, then it is required to configure it, and finally reset the system.

# 10. LOTO procedure

10

The aim of the lockout / tagout or LOTO procedure is to protect the user towards unintended reconnections and to avoid risks associated with the control of energy sources.

This involves isolating, locking and tagging the dangerous energy sources to avoid accidents / incidents mainly derived from dangerous movements, unexpected energizations or stored energy discharges.

Appropriate devices must be used, possible residual energies must be eliminated and, finally, the absence of energies must be verified.





## **NOTICE**

### LOCKOUT / TAGOUT (LOTO)

Lockout / tagout standards establish procedures to protect personnel from hazardous energy sources on equipment during service and maintenance.

Lockout/tagout disables equipment from producing hazardous amounts of electrical energy, allowing service and maintenance personnel to safely perform their jobs. Employees must be trained to understand and follow the hazardous energy control procedures.

Use only lockout/tagout devices authorized for particular equipment.

Lockout / tagout devices must be durable, standardized and individual.

PPE is required according to standards while executing LOTO actions. Refer to section "Safety instructions" for further information and recommendations.



## **CAUTION**

The shutdown of the equipment must only be carried out by personnel qualified. Read these instructions and all safety recommendations carefully. Otherwise, the equipment could get damaged, and personnel get seriously injured.

The instructions in this manual do not replace or local or national regulations. It is the user's responsibility to comply with all safety standards that apply at the installation site.

## **Equipment statuses**

Before working with the equipment, it is convenient to define two possible statuses.

#### **NB 120 STATUSES**

Equipment running (no action required from safe stop).

Proper state for carrying the Power revision.

STATUS 1

CHECK POINTS FOR ABSENCE OF VOLTAGE:

No measuring in Status 1.

The equipment is completely stopped, isolated, discharged and locked.

Follow the complete process from "Loto actions" subsection. Make sure there is no independent auxiliary supply coming from outside the charger.

STATUS 2 Proper state for carrying out the **Dead revision**.

CHECK POINTS FOR ABSENCE OF VOLTAGE:

Follow the complete process.



## **CAUTION**

The absence of voltage must be verified once an equipment has been isolated, with the necessary means and PPE.

In addition, the equipment specific diagrams of the installation should be reviewed.

Even the multimeters have scheduled revisions, it is convenient always to check the multimeter is working fine before taking any measure, especially to prove dead. This might be damaged and show false values. Use a commercial proving unit to check it.

Use appropriate equipment for DC power measures.

It is responsibility of the technical personnel to have their tools calibrated and in good conditions.

Always wear the PPE according to electric risk and to the current Health and Safety regulations.

### **LOTO** actions

This section shows the LOTO actions that must be carried out, as part of the safety actions, every time the equipment is started or stopped.

It is responsibility of the customer to carry out maneuvers at the low voltage facility network and on the post to guarantee a safe scenario for maintenance and operation routines inside the charger.

Follow the indications on "Commissioning" or "Safe stop" sections before applying any LOTO action.

Disconnect all charging processes following the safe stop instructions or wait until all charging sessions are finished.

Then, limit the access to the charger, so no one can start a new charging process.



Disconnect and lock with padlocks all LV facility network connections to eliminate power completely before the charger input.

The customer is the one who disconnects and locks the LV supply connections, all keys must to be stored in a locked box and Power Electronics will keep one of the opening keys.



Once the equipment is stopped, wait until the different storage buses are discharged (4 or 5 min).

Check with the software visualization application that the input voltage and equipment's power are zero.

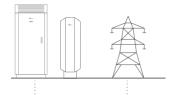


Open all the circuit breakers.

Although the supply to the AC switch was removed, this step confirms and locks it, then reconnection is not possible until the LOTO actions are removed.

Follow the "check points for absence of voltage".







After all these actions, status 2 is reached on the charger.



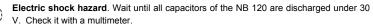
# **CAUTION**

Auxiliary supply must be disconnected last and connected first when possible.



**Electric shock hazard**. Auxiliary supply power layout is a characteristic of each plant and may vary from one installation to another. Check the latest electrical schematics of the plant and make sure no voltage is present by confirming with a multimeter.





Before any maintenance operation, verify that **the equipment is completely stopped** before maneuvering any cutting element. This applies to elements with load-breaking capacity (circuit breakers and switches) as well as those with no capacity (disconnectors). **Under no circumstances** any of these components must be **manually** operated when the NB 120 is energized.

### **Remove LOTO actions**

Follow the LOTO actions in the inverse order.

## Check points for absence of voltage

Follow this procedure as last LOTO actions to reach status 2 in the equipment.

#### CHECK POINTS FOR ABSENCE OF VOLTAGE

- 1. Wear the appropriate PPE based on the electrical arc studies and the risk assessment carried out by the customer.
- 2. Ensure the correct operation of the multimeter.
- 3. Once the equipment is stopped, wait until the different storage buses are discharged (4 or 5 min).
- 4. Check that NB 120's LED are NOT illuminated.
- Remove polycarbonate to be able to measure voltage, both in the plates upstream of the disconnector and in the plates downstream of the disconnector.
- 6. Short-circuit the input and ground it.
- 7. There will be no voltage in the equipment.



## **CAUTION**

The absence of voltage must be verified once an equipment has been isolated, with the necessary means and PPF

In addition, the charger specific diagrams of the installation should be reviewed.

Even the multimeters have scheduled revisions, it is convenient always to check the multimeter is working fine before taking any measure, especially to prove dead. This might be damaged and show false values. Use a commercial proving unit to check it.

Use appropriate equipment for DC power measures.

It is responsibility of the technical personnel to have their tools calibrated and in good conditions.

Always wear the PPE according to electric risk and to the current H&S regulations.

## 11. COMMISSIONING





## **CAUTION**

Commissioning may only be carried out by personnel authorized by Power Electronics.

Read these instructions and all safety recommendations carefully. Failure to do so could result in damage to the equipment and serious injury to personnel.

Make sure that no voltage is present at the power terminals. Make sure that no voltage source can be unexpectedly connected.

The instructions in this manual do not replace local or national regulations. It is the responsibility of the user to comply with all applicable safety standards at the installation site.

The following steps describe the process for starting up the charger and turn it on for the first time.

Visual inspection: unpackage the equipment and ensure that all components are in good condition and have not suffered any damage in transit.



Disconnect the external power supply before starting with the installation. Open the door of the device and ensure internal protections are deactivated.



Perform the anchoring of the equipment:

Make the holes according to the measurements given in the technical drawings.

Check "Anchoring of the equipment" section.



Make the cable access and connections without voltage, starting by the ground connection.

Make sure connections and tightening torque are correct.

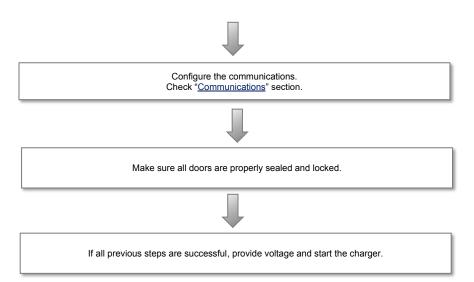
Check "Torque and screw sizing" and "Cable access and connections" sections.



Verify the selectivity of the external protections to the equipment and control parameters.

Activate the equipment's internal protections

Provide power to the external power supply and verify boards and power source light up.



# 12. SAFE STOP

12



## **CAUTION**

The shutdown of the equipment must only be carried out by personnel qualified. Read these instructions and all safety recommendations carefully. Otherwise, the equipment could be damaged and seriously injured personnel.

The instructions in this manual do not replace or replace local or national regulations. It is the user's responsibility to comply with all safety standards that apply at the installation site.

The following steps describe the process to follow for disconnecting the charging station NB 50 / NB 60.

End the charging process if it were active.

Disconnect the external AC voltage input and block.





Wait the time indicated on the protection label to avoid electrical hazards. Time for discharge of stored energy and cooling of components. After this time and when the light signal indicates that the voltage is no longer present, with the appropriate PPE, check that the DC capacitors are discharged by measuring the bus on the connection card.



With the appropriate PPE, check the absence of voltage at the AC input.



Delimit and signal the work area.

# 13. MAINTENANCE

13

The **NB 120 charger** has been developed based on a revolutionary design concept that simplifies significantly the tasks and reduces preventive and corrective maintenance times. Nonetheless, there are some actions and revisions required.

## **Equipment statuses**

Before detailing the maintenance procedure, it is convenient to define 2 possible statuses to carry out the maintenance tasks.

Status 1: Proper state for carrying the Power revision. Equipment with voltage and operating.

Status 2: Proper state for carrying the Dead revision. Equipment with no voltage, stopped, uncharged, isolated and blocked.



#### **CAUTION**

Maintenance tasks must only be performed by qualified personnel and approved by Power Electronics. Otherwise, the equipment may get damaged, and personnel could suffer severe injuries.

Use the necessary PPE according to the electrical risk and the Health and Safety regulations



### **WARNING**

Before opening any door, be sure to follow insulation guidelines and all safety instructions. Failure to do so may result in electric shock.

Make sure to follow the insulation guidelines and all safety instructions before opening any door or handling the equipment internally. Otherwise, you may get an electric shock.

To carry out maintenance tasks or any activity inside the charger, the user must verify that there is no voltage present in the equipment, as well as carry out the procedure of a <u>safe stop</u>. Always apply the <u>five golden rules</u> to ensure that there are no dangerous tensions.

In addition to the recommendations given in this manual, local safety procedures and those specific to the installation site must be taken into account. Also, local and national electrical regulations must be followed to avoid personal injury and/or damage to the equipment.

Failure to comply with safety instructions and electrical codes may void the warranty.

# Checklist

The list of tasks detailed below should be carried out annually. The time of each task is an estimate.

MAINTENANCE	TIME
GLOBAL OPERATION TIME	2h and 5min

	POWER REVISION (STATUS 1)	TIME (MINUTES)	ок
1	Environmental conditions – Visual check	5	
2	Enclosure state – Visual check	5	
3	Make sure the equipment can be accessed remotely - connection to the PC if it exists.	5	
4	Display operation - visual and manual check	5	
5	Main temperatures within range - remote check, if it exists.	10	
6	Ventilation system and absence of vibrations - visual and auditory check	5	
7	Charge connector operation - visual and manual check	5	
8	Charge test recommended (optional)	10	
9	Operation of the differential switch - Visual and manual check (optional)	5	

The following tasks must be performed with the equipment completely off (no voltage at all, stopped, uncharged and isolated):

	DEAD REVISION (STATUS 2)	TIME (MINUTES)	ок
1	Internal cleaning	15	
2	Filters - visual check and replacement	15	
3	Doors condition	10	
4	Cables and conductors - visual and manual check	10	
5	External and internal tightening torques - manual check	10	
6	Control circuit and protections - manual check	10	

## Power revision (status 1)

### 1. Environmental conditions

Verify that the equipment environment complies with the specifications. Verify that the humidity is adequate.

#### 2. Enclosure state

Check the enclosure is in good general state and no traces of corrosion or impacts are present. Check the posts anchoring.

#### 3. Remote access

Verify that the equipment can be accessed remotely. If it exists, verify the connection with a PC.

### 4. Display operation

Check if the operation of the display is correct: Check the good condition of the screen, cleanliness, deterioration or signs of any damage (impacts or breakage). Verify that the touch screen works on its entire surface. Check that the lighting is correct and verify the interaction with the menu is smooth.

### 5. Main temperatures within the range

Remotely, if it exists, check the main internal maximum temperatures after 30 minutes at full power / high power. Record the values. If the values are higher than 115°C for IGBT and higher than 50°C inside, check the equipment completely.

### 6. Ventilation system and absence of vibrations

Verify that there are no abnormal noises or oscillations in the ventilation system.

## 7. Charge connector operation

Check the condition of the hoses and charging connectors, check that they are in good condition and have no impact, cut or other marks.

## 8. Charge test

It is recommended to perform a complete charge on an electric vehicle to verify that it is finished correctly, and the communications are working fine.

If the charge test is performed, it is the customer's responsibility to ensure the presence of an electric vehicle to perform the charging procedure with each type of connector.

If the charge test is performed, the costs derived from it must be assumed by the customer.

### 9. Operation of the differential switch (optional)

If the optional differential switch has been requested, check the correct operation of it using the test button enabled for this purpose on the differential itself. Open the unit without voltage, then energize it without any load, carry out the test and finally close the door. May wear the PPE needed for this task.

## **Dead revision (status 2)**

## 1. Internal cleaning

Check that the equipment does not show signs of dust, moisture, oxidation or presence of animals. If dust is found in the control electronics, use a specific vacuum cleaner for electronic boards. Otherwise, the electronic components may be damaged.

### 2. Filters

Visual inspection of air filters. Use a set of screwdrivers to access the filters and take them off. Check that they are clean and unobstructed. Clean them if they are dirty. It is not necessary to replace the air filters unless they show signs of saturation.

### 3. Doors condition

Check that each door closes correctly, seals and closures are in good condition. Check hinges, gaskets, closures and doors.

### 4. Cables and conductors

Visual inspection of cables and terminals. Check the cables are in good condition and sealed. Check that the connectors and terminals are correctly inserted and there are no visual signs of overheating.

## 5. External and internal tightening torques

Check the accessible connections of the Low Voltage circuit and **retighten correctively only if necessary**. To do so, check that all tightening marks are in place. In the case of small screws that do not have marks, good electrical practice will determine if a screw is loose.

Pay special attention to the input connections of the equipment, check the torque and retighten.

#### 6. Control circuit and protections

Check if overvoltage protectors are operational.

Visually check the fuses to guarantee they are not blown.

Check the good condition of the control cards, as well as its connections.