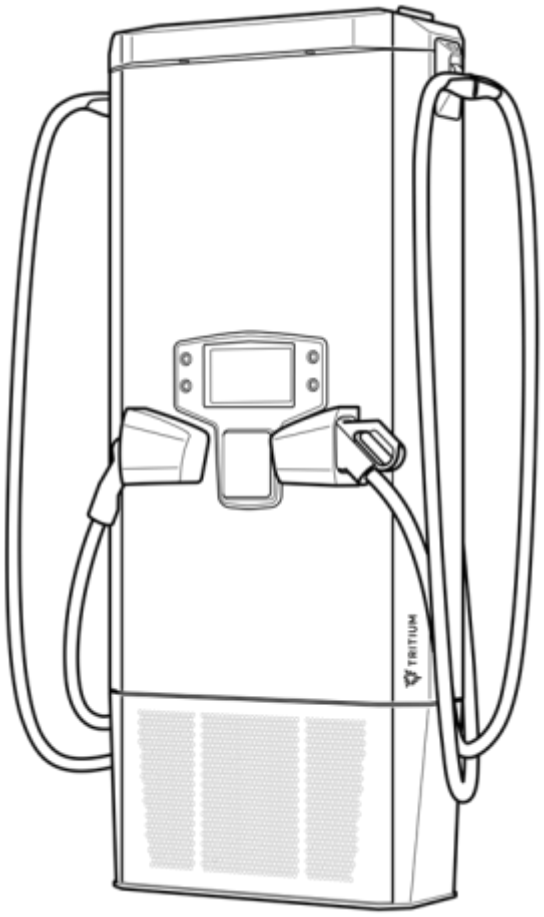
PKM Charge Station Installation Manual



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Contact

North America	Tritium Power Solutions Inc 16192, Coastal Highway, Lewes, Delaware 19958, County of Sussex USA
Europe	Tritium NexGen Solutions B.V. Opaallaan 1180, 2132LN Hoofddorp, Netherlands
ANZ	Tritium Power Solutions Pty Ltd 6 Hunt Club Road Narre Warren South, Victoria 3805 Australia

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Revision record

Rev	Date	TC #	Change	Author
5	8/06/2023	4699	Conversion from InDesign document to Word and latest template. Various changes made, new content added and re-structure of document to improve the flow.	S George, A Prewecki, D Muldoon, X Casley
6	3/07/2023	4928	Import to MadCap Flare and export to PDF	A Prewecki
7	25/10/2023	5260	Added FCC - 47 CFR 15.105 statement as per BP finding	S George
8	31/10/2023	5475	Updated wording in *RF Site Survey* section.	A Prewecki, G Smith
9	10/11/2023	5533	Link to newly created doc: CHK.2834v1_Radio Frequency (RF) Site Survey Requirements and Checklist	A Prewecki, G Smith
10	24/01/2023	5650	Update to section 4.0.6 Foundation Requirements	G Smith, S Sommerschuh
11	16/04/2024	5862	Addition of topic on RMA Installation	G Smith
12	10/05/2024	5501	Update for UAE legislation to Section 4.0.1. Added French warning statement to Section 1.3.2	S George R Weir
13	17/09/2024	6089	Update copyright information	S Caddaye
14	01/11/2024	6112	DC feed system update	S Sommerschuh
15	30/01/2025	6008 6287	The minimum acceptable voltage has been changed to a value above the undervoltage lockout point.	B Cran, J Wu
16	24/03/2025 21/05/2025	6389 6470	Review and update for variants now available. Added Conditions of Acceptability. Document updated for current copyright info and doc standards. Update RF site survey section to include MyTritium link. Updated the following sections: • 1.2 - Models related to this document • 14 - Special Use Case: DC-powered PKM Charge Station • 14.1.1 - Conditions of Acceptability • 14.2 - Enablement settings on the PKM CS	S George A Prewecki J Wu

This document is based on TEM114v15.

Contents

1 PKM Charge Station Installation Manual

1.1 Purpose

This manual contains important instructions for the installation of the PKM Charging Station (PKMCS) and is relevant to all power levels.

- The PKMCS is available with various output power levels based on the number of 25kW DC:DC power modules installed.
- The maximum output power configuration is 150kW (6 x 25kW DC:DC).
- Units with lower power levels may be upgraded to the maximum 150kW configuration by adding 25kW DC:DC power modules up to the maximum of six.
- There are PKMCS variants to suit North America (UL) or worldwide (CE) requirements.

The PKMCS is electrically powered by the PKM150 AC-DC Rectification Unit (PKM150RU).
Read the installation and operating instructions before installing and commissioning the equipment. These instructions must be followed during installation.

1.2 Models related to this document

	Models	Input		Output		
		Voltage:	Current:	Voltage:	Max Current:	Power:
Global	TRI155-PKM-01 TRI155-PKM-01-150	950 V DC	170 A DC	150 to 920 V DC	200A DC or 350A DC*	150 kW
	TRI155-PKM-01-100	950 V DC	114 A DC	150 to 920 V DC	200A DC or 268A DC*	100 kW
	TRI155-PKM-01-075	950 V DC	85 A DC	150 to 920 V DC	200 A DC	75 kW
	TRI155-PKM-01-050	950 V DC	57 A DC	150 to 920 V DC	134 A DC	50 kW
North America	TRI155-PKM-02 TRI155-PKM-02-150	950 V DC	170 A DC	150 to 920 V DC	200A DC or 350A DC*	150 kW
	TRI155-PKM-02-100	950 V DC	114 A DC	150 to 920 V DC	200A DC or 268A DC*	100 kW
	TRI155-PKM-02-075	950 V DC	85 A DC	150 to 920 V DC	200 A DC	75 kW
	TRI155-PKM-02-050	950 V DC	57 A DC	150 to 920 V DC	134 A DC	50 kW

*Dependant on Charge Cable configuration (200A Charge Cables or 350A Charge Cables)

1.3 Important safety instructions

Read the Installation and Operating Instructions before installing and commissioning the equipment.
These instructions must be followed during installation:

CAUTION – RISK OF ELECTRIC SHOCK

- The PKMCS must be serviced only by trained and qualified electrical personnel when upstream power is switched off.
- Read all instructions in this manual before servicing the charger.
- Ensure that all local and regional regulations are observed.

1.3.1 Identifying symbols

Symbol	Definition
	**CAUTION**
	**CAUTION – RISK OF ELECTRIC SHOCK**
	**IMPORTANT**
	**READ THE MANUAL**

Symbol	Definition
	Equipment Grounding Conductor Symbol
	Phase Symbol
	Alternating Current Supply Symbol
	DC Current

Wiring

Tritium recommends the use of copper cables. Take care to observe local regulations regarding wiring different circuits in the same conduit, including the Ethernet link if used.

In general, all conductors occupying the same conduit must have an insulation rating equal to at least the maximum circuit voltage applied to any conductor within the conduit. Liaise with the local authorities to ensure local regulations are met.

1.4 Electromagnetic compatibility

1.4.1 USA

The PKM150 has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Changes or modifications not expressly approved by Tritium DCFC could void the user's authority to operate the equipment.

1.4.2 Canada

The PKM150 contains licence-exempt transmitters/receivers that comply with Innovation, Science and Economic Development Canada's licence-exempt RSSs. 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.

L'émetteur/récepteur exempt de licence contenu dans le present appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. L'appareil ne doit pas produire de brouillage;
2. L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Changes or modifications not expressly approved by Tritium DCFC could void the user's authority to operate the equipment.

1.4.3 Other regions

The PKM150 has been tested to and complies with IEC 61851-21-2 – EMC requirements for off board electric vehicle charging systems.

Caution: This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

1.4.4 Radio frequency exposure

- The PKM150 complies with the general population/uncontrolled exposure limits of FCC Part 1.1310.
- The PKM150 complies with the general public/uncontrolled environment limits of RSS-102.
- The PKM150 complies with the applicable exposure limits of EN 62311.
- The PKM150 complies with the general public exposure limits of ARPANSA RPS S-1.

Transmitter	Minimum separation distance
EG25-G radio modem LTE-FDD: B1, B2, B3, B4, B5, B7, B8, B12, B13, B18, B19, B20, B25, B26, B28 LTE-TDD: B38, B39, B40, B41 WCDMA: B1, B2, B4, B5, B6, B8, B19 GSM: B2, B3, B5, B8	20 cm from antenna
Payter credit card reader 13.56 MHz RFID	0 cm from contact surface
TRI153-28 13.56 MHz RFID	0 cm from contact surface
Ingenico credit card reader 13.56 MHz RFID	0 cm from contact surface

1.5 References

- CHK.2834_Radio Frequency (RF) Site Survey Requirements and Checklist
- TRI155.INS.1968 PKM150 Piping and Cabling
- TRI155.FSP.1970 PKMCS - General Interior Maintenance/ RMA Installation
- ENG.001- Veefil OCPP 1.6 Firewall Requirements
- TRI153.FSP.2927 Replace the CU Modem
- INS.013 Tritium OCPP 1.6J Client Documentation
- DOC.1653 Veefil-RT Options for Site Power Management

2 Save these instructions

This manual contains important instructions for PKMCS that shall be followed during installation, operation, and maintenance of the unit:

CAUTION

Installation MUST NOT be made in Hazardous Areas as defined by local legislation/standards.

These include: (but not limited to)

USA – UL 2202: 2012

Installation shall not be made in a commercial Garage (Repair Facility), closer than 6m (20ft) to an outdoor combustion fuel dispensing device or Hazardous areas as defined by local legislation.

UK – RC59 Ver.2: 2023 – Fire Safety When Charging Electric Vehicles

Where hazardous installations, such as ignitable liquids storage, are present, EV charging points should be separated from the edge of hazardous areas (Zone 1 or 2, ATEX) by a minimum of 10 metres. This minimum separation distance shall be extended for vehicles >5 metres long, to be equivalent to the full length of the vehicle, plus 5 metres.

Singapore – TR25-1: 2022

EVCS shall be installed outside any hazardous zones where flammable/combustible gas may be present. Where necessary or in doubt, the fire agency shall be consulted.

2.1.1 Charger access

The following equipment applies to locations with non-restricted access as defined in:

- IEC 61851-1: 2017
- IEC 61439-7: 2022
- TR25-1: 2022

2.1.2 Electrical input

The PKMCS is supplied with DC by the PKM150RU:

- Maximum continuous input power (Kw): 156 (@950VDC)
- Maximum continuous input current (A): 170

2.1.3 Regional specific installation requirements

Liaise with local authorities to ensure that any national, regional, and local regulations are obeyed in the country of installation.

These include (but are not limited to):

- ANSI/NFPA 70 – National Electrical Code (North America)
- LA DBS – LAMC: Los Angeles Municipal Code
- BS 7671 – IET Wiring Regulations

2.1.4 Isolation

250A DC Isolator switch with shunt operation:

Device	CID	MPN	CE/UL	Location
DC Isolator Switch	18890	ZJBENY (BDH-250)	CE	RU
	20117	ZJBENY (BDH-250-U-MF)	UL	RU
OCPD Fuse	18328	EATON (PV-250ANH2)	CE/UL	RU
SPD	19486	NVENT ERICO (PVT21000R)	CE/UL	CS
SPD Fuse	18720	EATON (PV-125ANH1-B)	CE/UL	CS

2.1.5 Bonding/grounding instructions

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

Connections to the PKMCS charger must comply with all local codes and ordinances.

Observe all pertinent national, regional, and local safety laws and regulations when installing and commissioning the PKMCS charger.

2.1.6 Tightening torque

Wire	Torque
DC+	30 Nm
DC-	
Earth	20 Nm

2.1.7 Weather rating

IP65 & NEMA 3R Electronics Enclosure

2.1.8 Usage limitations

Cord extension sets or second cable assemblies must not be used in addition to the cable assembly for the connection of the vehicle to the charger.

Adaptors must not be used to connect a vehicle connector to a vehicle inlet.

CAUTION

This product can expose workers to chemicals including Ethylene Glycol, which is known to the State of California to cause birth defects or other reproductive harm. For more information go to:

- *https://www.cdc.gov/niosh/topics/ethylene-glycol/default.html*
- *https://www.p65warnings.ca.gov/*

3 Moving and storage instructions

Read these instructions carefully to become familiar with the PKMCS packaging and handling procedures prior to unpacking and installation.

In all cases, the PKMCS must be transported to the installation site in its original packaging and only unpacked at the installation site.

Installation, commissioning, and servicing of the PKMCS should only be carried out by qualified personnel.

3.1.1 Materials

The PKMCS charger is transported in a reinforced crate. Please respect the environment and recycle/reuse the materials.

3.1.2 Storage

Store in the original packaging, in a horizontal position.

Store in a dry location, protected from the weather (warehouse conditions).

3.1.3 Storage temperature

-35°C to 70°C (-31° to 158°F)

3.1.4 Handling

Only lift the PKMCS packaging in its horizontal orientation using a forklift, pallet jack, or with lifting straps and forklift or crane. Check the weight on the delivery documents and ensure the lifting apparatus used is compatible.

3.1.5 Receipt

Check that the crate packaging is in good condition and that the PKMCS is not damaged.

If any problems are noted, make a formal complaint to the carrier and notify your supplier.

3.1.6 Shipping/Storage dimensions

Packed crate weight

Up to 415kg (915lbs)

Crate size

In mm: (Metric)

- 1190 (W) x 2135 (L) x 685 (H)

In inches: (Imperial)

- 46.85 (W) x 84.05 (L) x 26.96 (H)

PKMCS weight

Up to 335kg (739lbs)

	PKM 150kW CS	PKM 100kW CS	PKM 075kW CS	PKM 050kW CS
Weight	Up to 335kg	Up to 298kg	Up to 280kg	Up to 262kg

4 Site Configuration

4.1.1 Structural/Geographic Site Survey

A qualified engineer must survey the installation site to determine the correct ground preparation for the size and weight of the PKMCS charger, in accordance with local regulations.

The PKMCS charger is best installed following the recommended site configuration requirements.

Additional considerations need to be observed when placing the charger in an outdoor environment. To ensure charger functionality, it is recommended the charger be installed in a shaded environment. However, where the local environment reaches temperatures over 50°C (122°F), the charger must be installed in a shaded environment as this may impact the warranty.

4.1.2 Grid Quality Survey

It is highly recommended that a Grid Quality survey be performed before installation.

A poor-quality grid can cause the charger functionality to be diminished and in a worst case, damage the charger which will void warranty. Some regional standards/recommendations may include:

Generic – IEEE 519: 2022 (Applicable where there is no regional specific standard)

Standard for Harmonic Control in Electric Power Systems

UK – ENA G5-5: 2020

Harmonic voltage distortion and the connection of harmonic sources and/or resonant plant to transmission systems and distribution networks in the United Kingdom

Europe - EN 50160: 2022

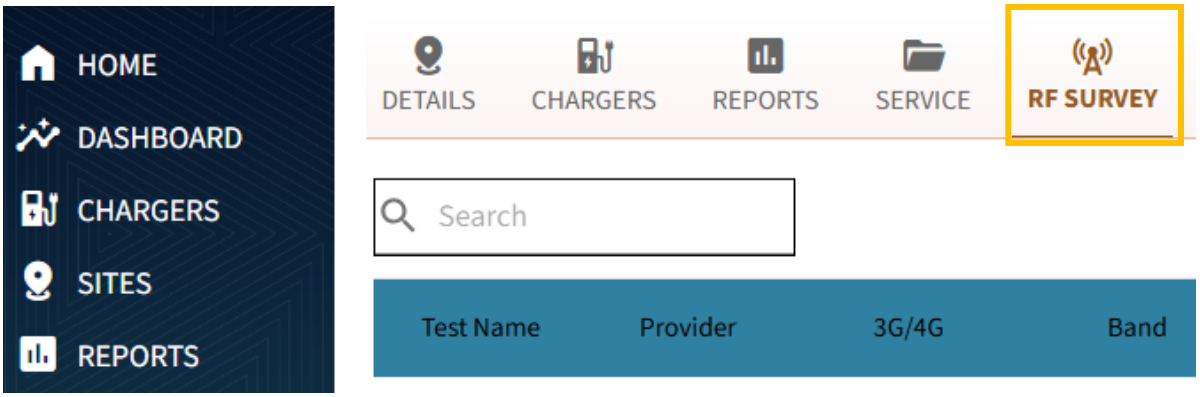
Voltage Characteristics of Electricity Supplied by Public Electricity Networks

4.1.3 RF Site Survey

It is a requirement for a qualified Radio/RF/EMC engineer to perform an RF survey of the site across the full 3G and 4G/4.5G frequency spectrum prior to installation.

This will help determine if there is sufficient signal strength for the applicable regional bands and identify any potential interfering signals at the site.

For guidance on how to obtain and apply the Site Survey results to Tritium Chargers, go to *MyTritium* (*SITES > select a site > RF Survey).*



4.1.4 Ground fixing

The PKMCS charger is to be fixed to the ground through the baseplate fixing holes with 4x M16 fasteners. Fasteners are not supplied, because the type required depends on the foundation used and must be chosen by the installer accordingly.

The fasteners should fix the PKMCS charger securely to the foundation through the baseplate in accordance with the dimensions and fixing points shown in the *Baseplate dimensions* section.

Note: Keep the plastic inserts from the bolts for use in the baseplate holes.

4.1.5 Conduit requirement

Up to Ø110mm (4”) OD conduit maximum. Ø50 (2”) conduit standard. Refer to the document *TRI155.INS.1968 PKM150 Piping and Cabling* for guidance on conduit sizing.

4.1.6 Foundation requirements

The foundation must be flat, even, and have the appropriate density for the weight of the charger.

Check the flatness and level of the foundation and level of the PKMCS charger baseplate prior to fixing.

IMPORTANT

The charger base plate is not designed to sit on stand-offs. Using stand-offs reduces the contact surface for the load distribution and can create local stress concentration that has not been considered in the product design. Ensure the foundation provides a flat and level surface large enough to suit the charger footprint.

In situations where sites provide inadequate installation conditions, a Civil Engineering service provider should be engaged to propose an adequate solution for creating a flat mounting surface that supports the weight of the charger.

4.1.7 Communications

Wired ethernet or 3G/4G network capability.

4.1.8 Power supply

The PKMCS charger is designed to accommodate input wiring from either an underground foundation or above ground.

4.1.9 High power input wiring

High power input wiring can only be provided to the charger as individual wires to suit the gland plate.

- 2x M40, Ø19-28mm (3/4"-1.1" for DC+ and DC-
- 1x M32, Ø13-18mm, (1/2"-0.7"), for earth

Refer to the document *TRI155.INS.1968 PKM150 Piping and Cabling* for guidance on cable selection.

4.1.10 Auxiliary field wiring

The auxiliary field wire must be a single multi-conductor cable Ø6-13mm (0.23”-1/2”), to suit the supplied M25 cable gland.

CAUTION

It is critical to product safety and warranty that IP65 is achieved for all input wiring.

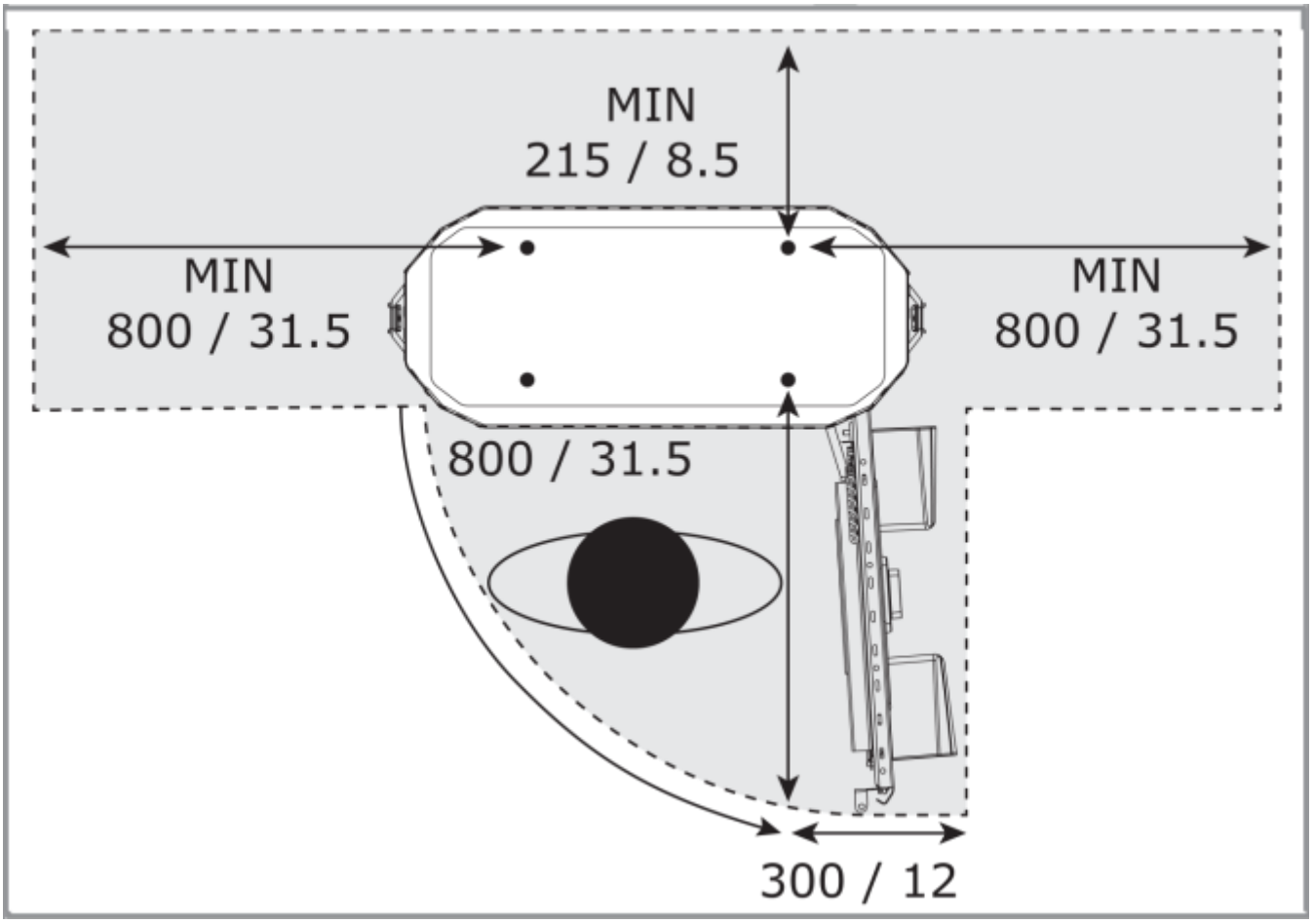
To continue to achieve the IP65 rating the power cabling must be fitted correctly into the conduit and the conduit sufficiently sealed so no water or debris can enter.

4.2 Servicing distance

CAUTION

Additional space is required around the PKMCS charger for servicing, as shown in the following image. Measurements are from the PKMCS foundation points.

Note: The grey areas shown in the image must be kept clear of all obstructions. This allows the charger to be serviced and provides clearance when the front door of the charger is opened:



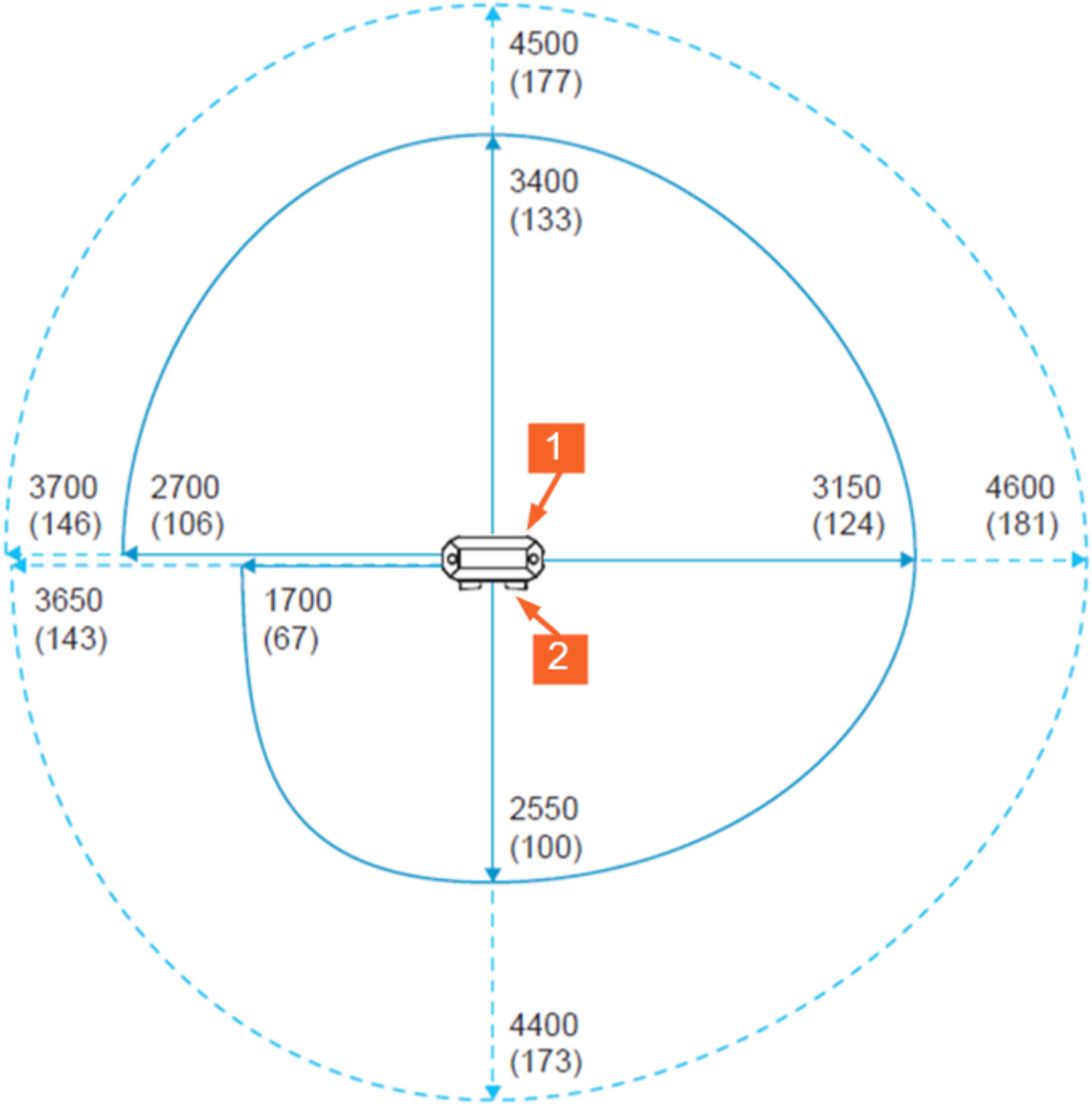
Front of charger

Key	Description
	Keep clear area
MIN	Minimum

Note: Do not scale drawing. Dimensions in mm / inches.

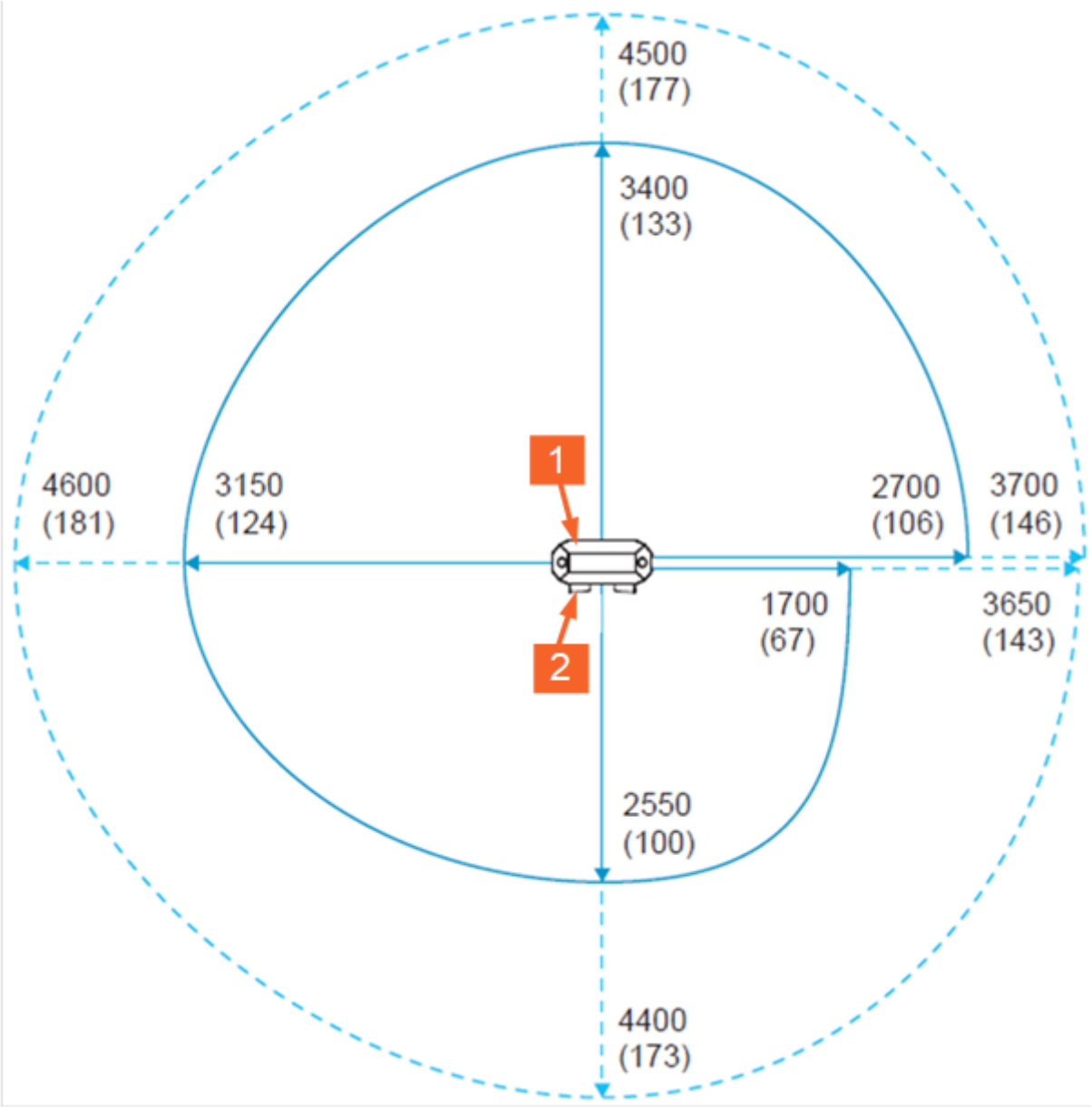
4.3 Cable reach

4.3.1 Right side cable reach



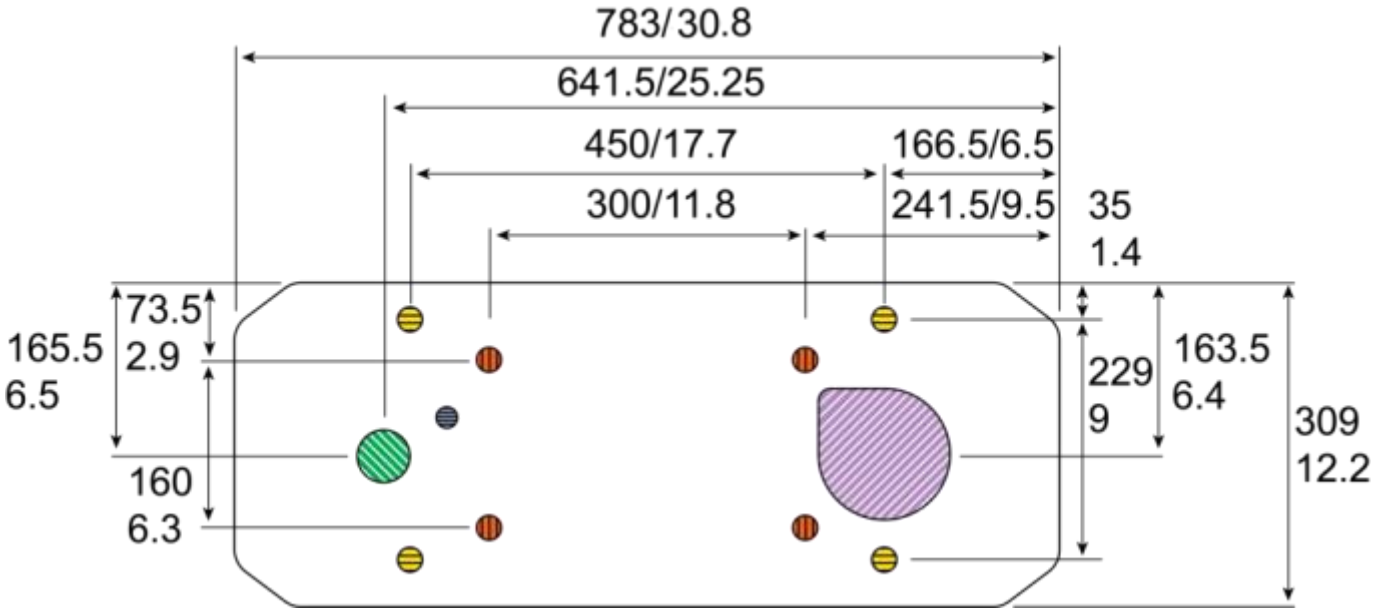
Key	Description
1	Back
2	Front

4.3.2 Left side cable reach



Key	Description
1	Back
2	Front
——	3.6 m (11.8 ft) Cable without management
----	6 m (19.6 ft) Cable with management
Do not scale drawing. Dimensions in mm / inches.	

4.4 Baseplate dimensions



Front of charger

Key	
	125mm (5") Wiring in hole
	50mm (2") Grounding conductor hole
	20mm (0.78") Grounding conductor hole (Retro fit over Veefil-RT installation)
	Fixing point holes (Retro fit over Veefil-RT installation)
	Fixing point holes new installation
Note:	Do not scale drawing. Dimensions in mm / inches. Tritium can supply a mounting stencil at customer request that features measurements in mm and inches.

IMPORTANT

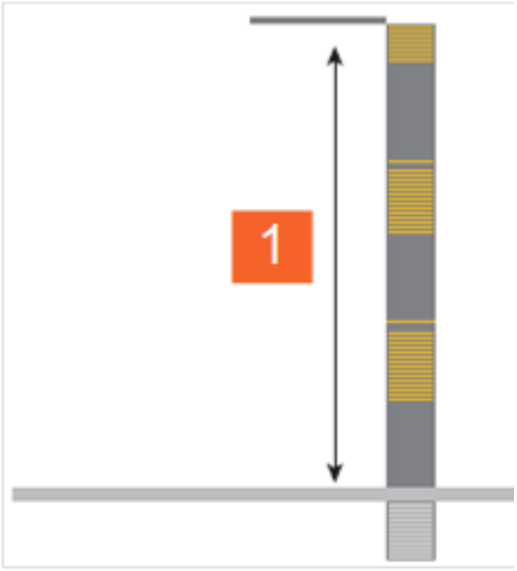
- Fixing point holes (shown in red) are only to be used when retrofitting over an existing Veefil-RT 50kW installation.
- If installing on an existing Veefil-RT foundation refer to the retrofit installation section.
- A lower wind load rating will apply in retrofit installation.

5 Site preparation

5.1 Underground wiring

Power supply preparation

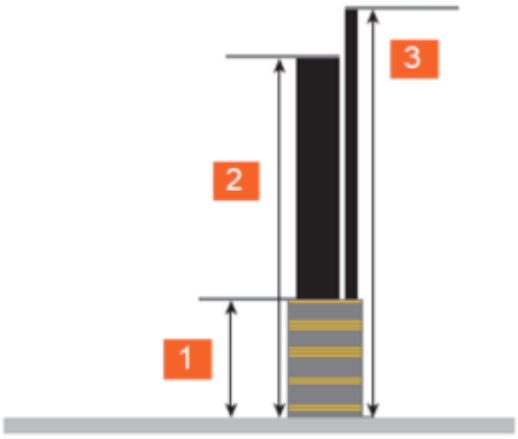
When preparing the foundation, allow approximately 1m (40”) of conduit and wiring from the foundation surface:



Key	Description
1	1 metre (40”)

Conduit and wire preparation

Cut the conduit 200mm (8") from the foundation surface. Cut the wiring as shown below:



Key	Description
1	Cut conduit 200mm (8”) from foundation
2	HP input ground ethernet 900mm (35.5”)
3	AUX field wiring 1000mm (40”)

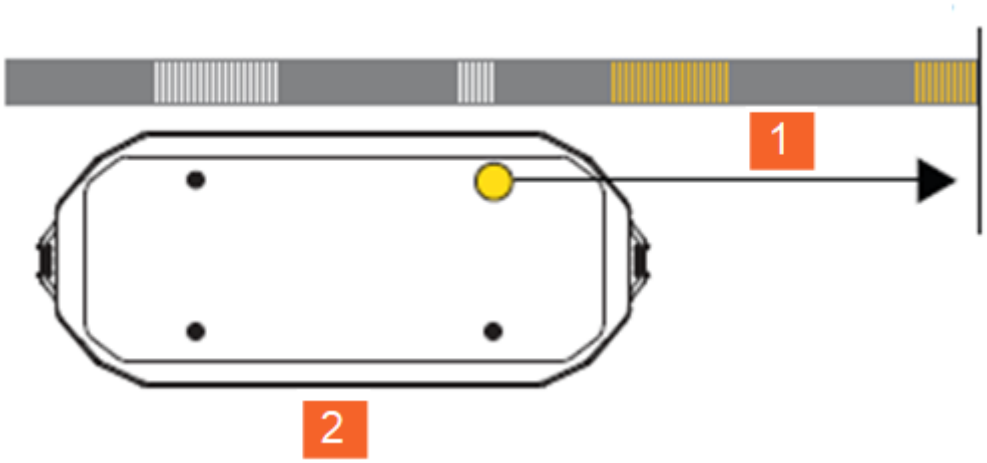
Note: Use expanding foam to fill in or around the conduit, to avoid it filling with water and debris.

5.2 Above ground wiring

Power supply preparation

Use 50mm (2") flexible conduit for providing power above ground.

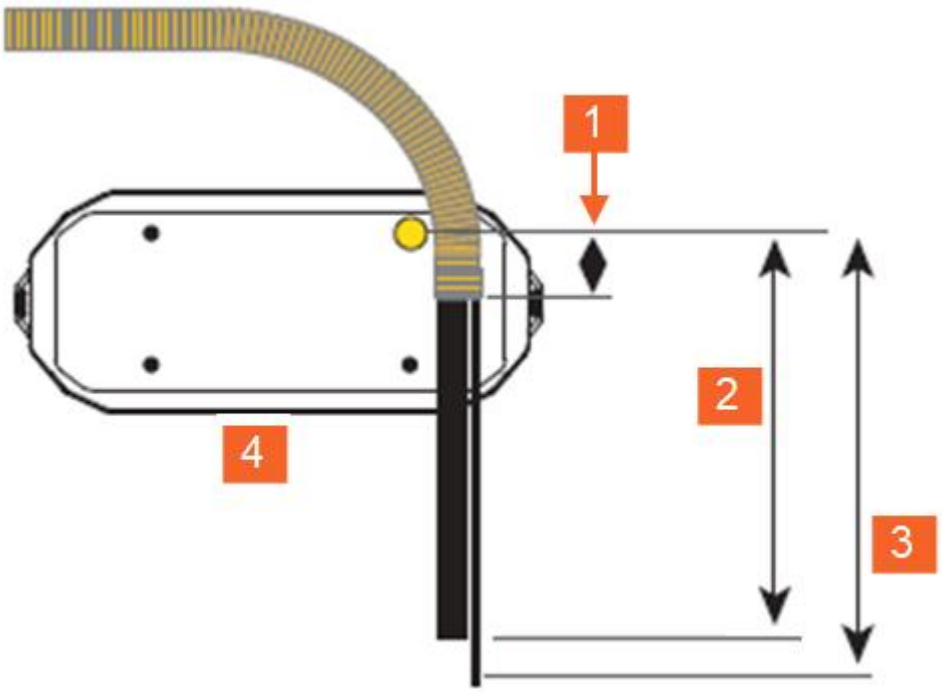
Leave a minimum of 1500mm (59”) of conduit and wiring from the right rear foundation hole. Prior to installation, the conduit and wiring will require trimming:



Key	Description
1	Minimum 1500mm (59”)
2	Front of charger

Conduit and wire preparation

Cut the conduit 100mm (4") from the right rear foundation hole. Cut the wiring as shown below:



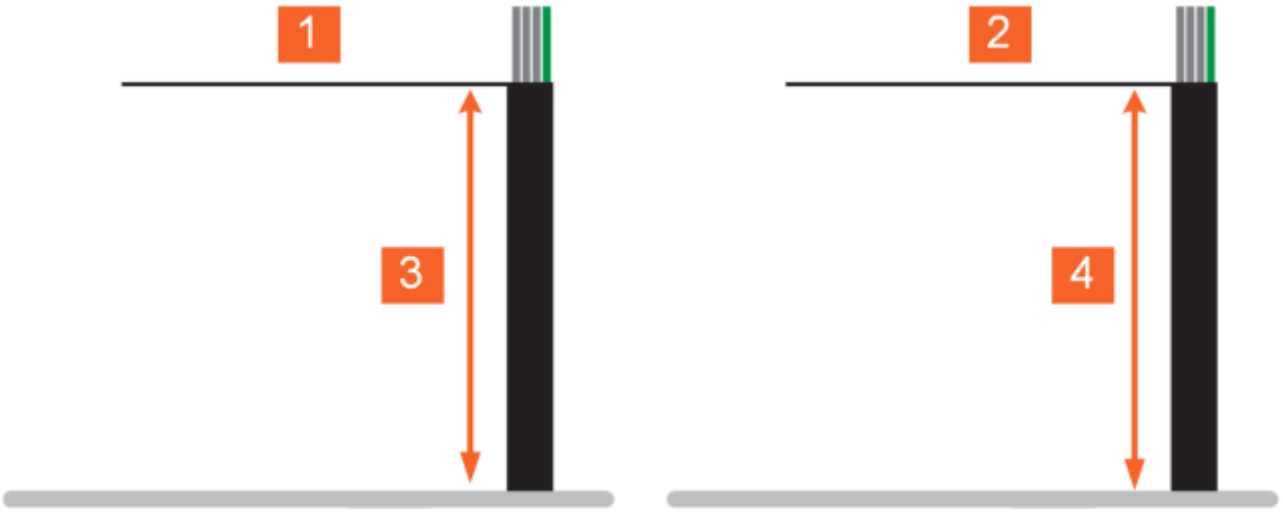
Key	**Description**
1	Cut conduit 100mm (4”) from foundation hole
2	HP input grounding ethernet 1000mm (40”)
3	AUX field wiring 1100mm (43.3”)
4	Front of charger

Note: Use expanding foam to fill in the conduit to avoid it filling with water and debris.

5.3 High Power (HP) input wiring

Prior to installation of the PKMCS, cut the wiring sheath as per the diagrams shown for underground and above ground wiring:

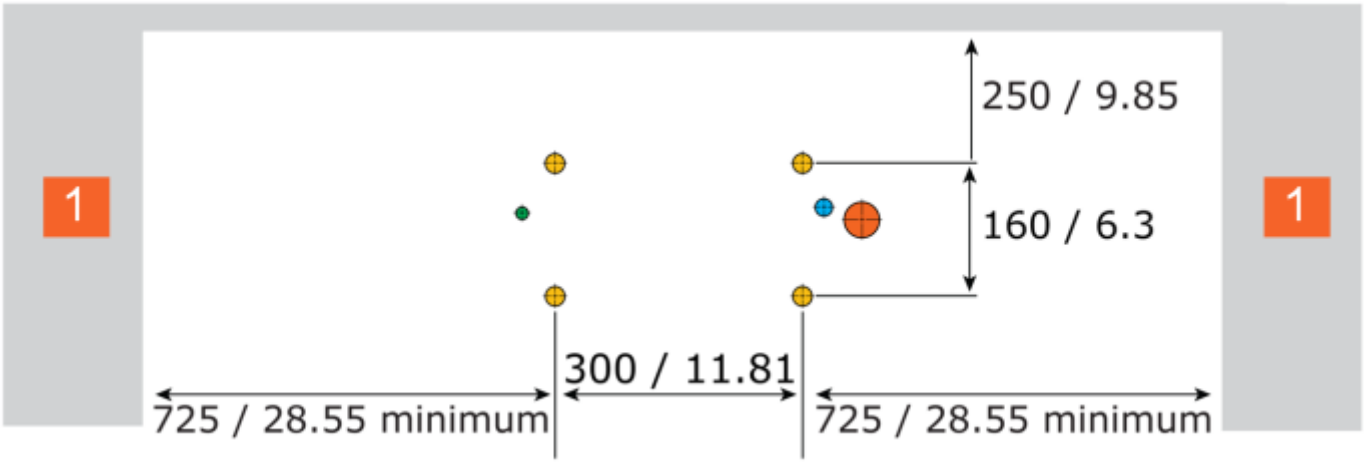
Note: Drawing is not to scale. Measure and cut on site.



Key	Description
1	Underground installation
2	Cut the wiring sheath 400mm (15.75") from foundation
3	Above ground installation
4	Cut the wiring sheath 480mm (19") from foundation

5.4 Veefil-RT retrofit

- If retrofitting the PKMCS onto a Veefil-RT site, you must change the foundation to suit the PKMCS charger and ensure the radiator is not damaged during installation.
- All cabling should be replaced.
- These instructions assume the Veefil-RT has been removed from the site, and the foundation has a protruding threaded rod to mount the PKMCS charger.
- If a different mounting system has been used, all minimum requirements must still be met, and the radiator shifted to gain access to the rear fixing points.
- If the dimension from the wall to the rear fixing points is smaller than 250mm (9.85”), the PKMCS should not be retrofitted onto the Veefil-RT foundation and the PKMCS installation instructions should be followed.

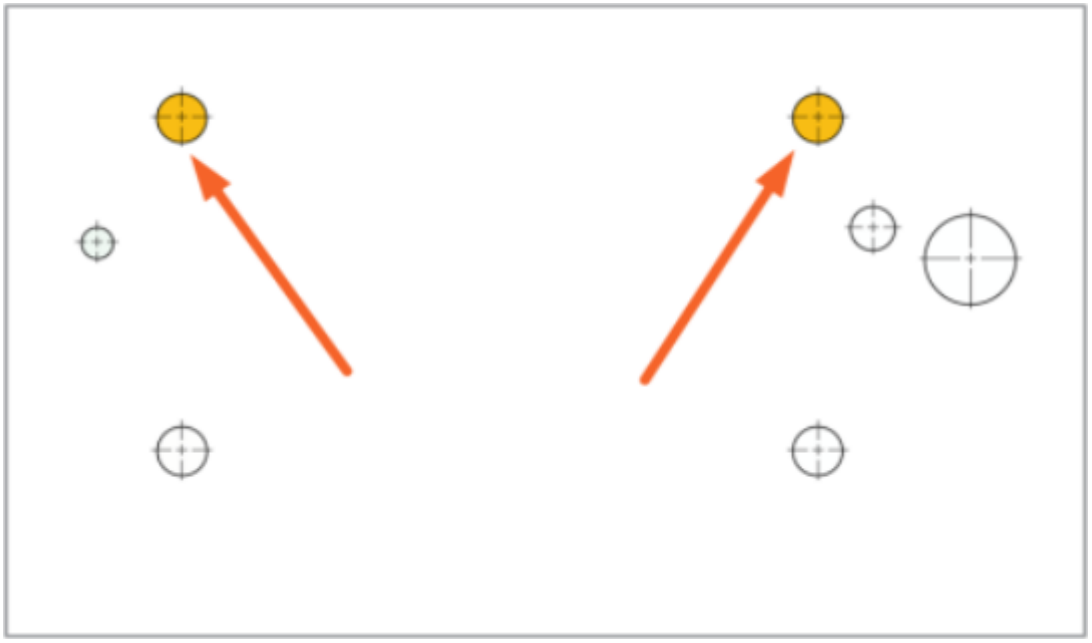
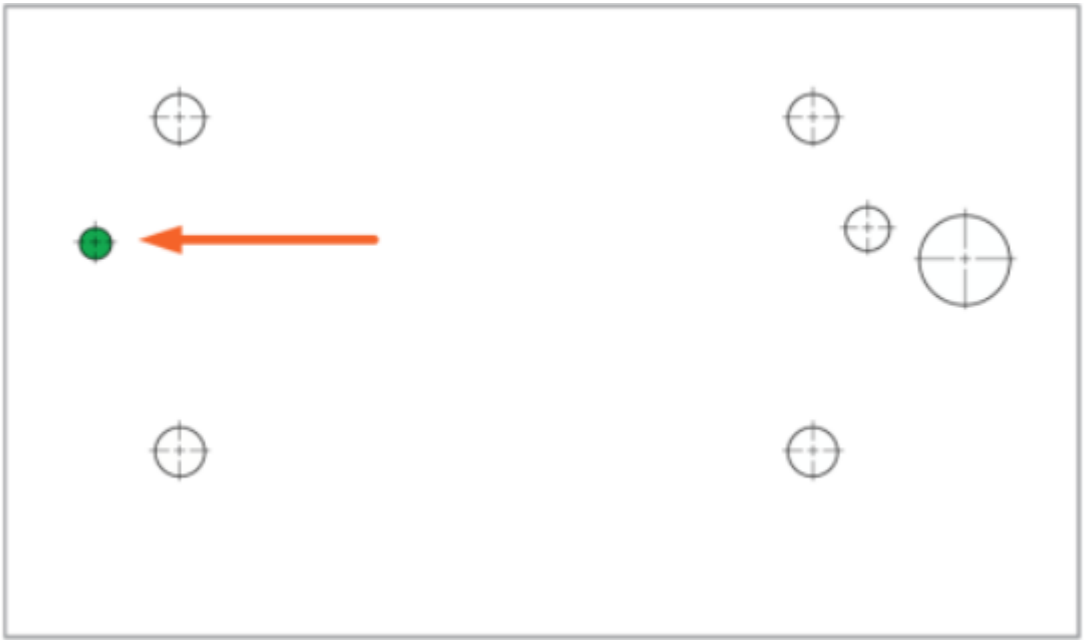


Veefil-RT Front

Key #	Description
1	Wall
	Power in conduit/cable
	Veefil-RT foundation fixing points
	Ethernet cable
	Grounding conductor
Note	All dimensions shown in mm/inches. Do not scale.

5.4.1 Adjustment of threaded rods

When using the existing threaded rods from a Veefil-RT for mounting to the foundation, additional clearance must be provided to the internal components in the bottom of the Veefil-PKMCS. The mounting rods shall be cut as follows:

Step	Action
1	Cut the rear threaded rods down to 30mm (1.2”) from the foundation surface. Alternatively, cut off all the threaded rods at foundation level and fix to the foundation through the PKMCS fixing point holes:  **Veefil-RT Front**
2	Cut the grounding rod down to 40mm (1.6") from the foundation surface:  **Veefil-RT Front**

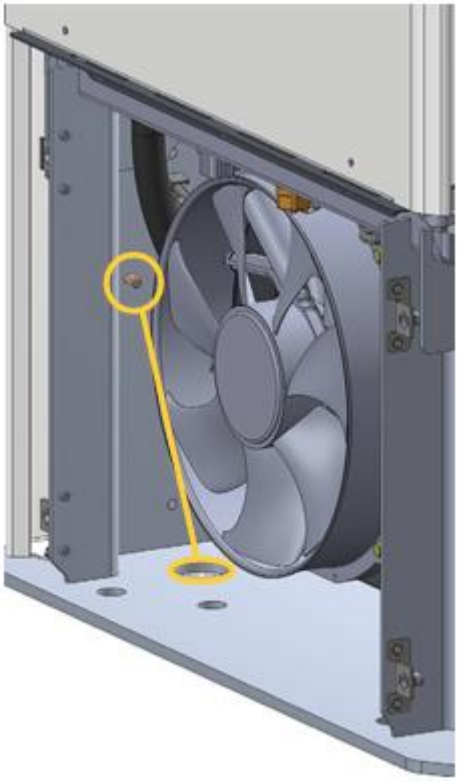
5.5 Local earth

This is a secondary point for connecting local earth to the chassis.

Attach the bandeizen or earth stake to the stud on the chassis. Follow local regulations regarding lightning protection and local earth bonding.

If retrofitting over a Veefil-RT site, the earth stake must be cut down to a maximum of 40mm (1.6") from the foundation surface to ensure it doesn't interfere with the radiator.

Note: This does not remove the need to attach the protective earth conductor at the charger input terminals.



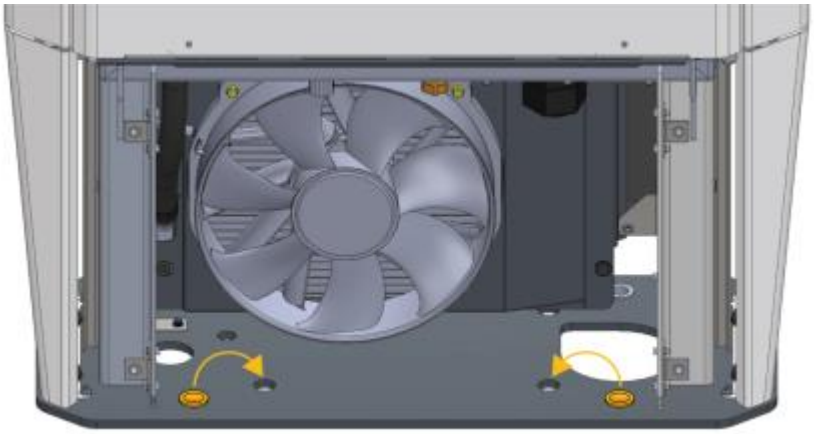
6 RMA installation

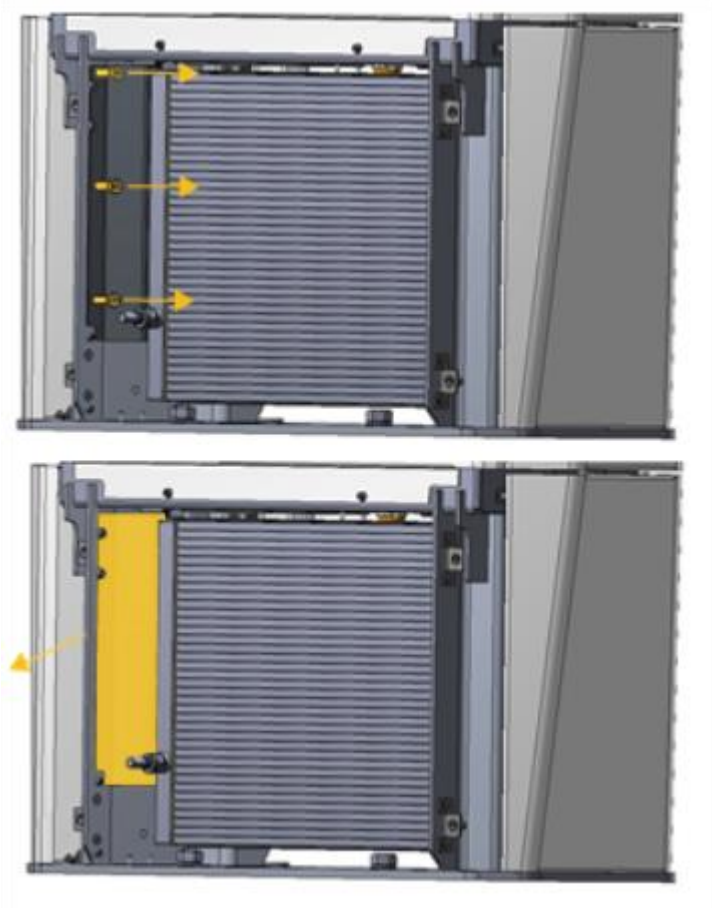
IF…	THEN…
the installation is due to a Return to Manufacturing Authority (RMA),	• print off and complete the procedure *TRI155.FSP.1970_PKMCS - General Interior Maintenance/ RMA Installation*. • Once you have completed *TRI155.FSP.1970_PKMCS - General Interior Maintenance/ RMA Installation*, return to this manual and continue onto the next topic below.
this is the initial installation,	• continue onto the next topic below.

7 Veefil-RT retrofit procedure

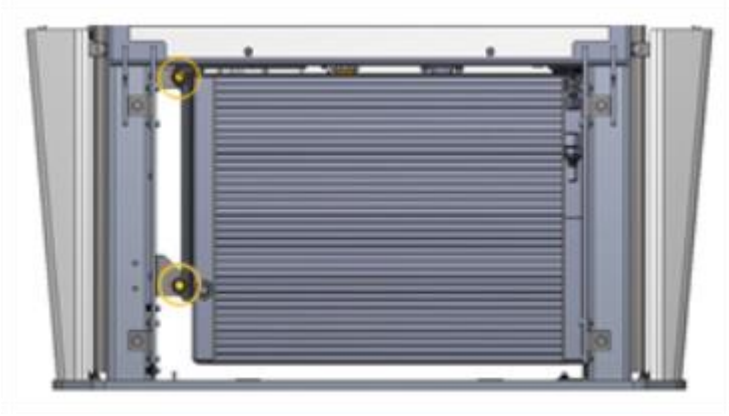
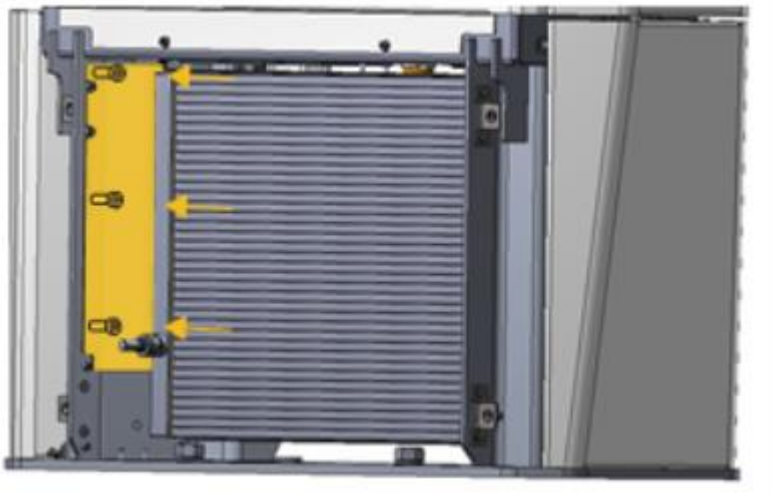
Installing an PKMCS over a Veefil-RT site requires temporarily moving the PKMCS radiator so that the fixing bolts at the bottom-rear of the charger can be accessed. Once the PKMCS is installed, return and secure the radiator to its original position.

The following steps take place when the PKMCS charger has been unpacked and the radiator panels removed, prior to installation:

Step	Action
1	Remove the plastic flanges from the PKMCS baseplate holes and put them into the RT holes on the baseplate, front and rear:  **PKMCS Front**  **PKMCS Rear**

Step	Action
2	Remove the M6 flange bolt on the front-left base fixing point of the radiator: 
3	A baffle plate is bolted onto the rear of the unit. Remove the 3x M5 bolts and the baffle: 

Step	Action
4	Remove the 2x M6 flange bolts from the rear of the radiator: **Note:** The radiator should still be connected to the unit at the front-left, upper fixing point. DO NOT remove. 
5	Move the radiator base towards the front of the charger to gain access to the rear Veefil-RT fixing points. The PKMCS unit is now ready to mount onto the foundation following the standard procedure:  After securing the charger to the foundation, remount the PKMCS radiator.

Step	Action
6	Return the radiator to its original position and fix it into place with the M6 flange bolts at the front and rear:  **PKMCS Front**  **PKMCS Rear**
7	Mount the baffle back into position and fasten with the 3x M5 bolts: 
8	Follow the *Site Preparation - Local Earth* section. The grounding rod requires trimming, and a longer wire may be required to reach the grounding stud.

8 Installation requirements and equipment

These instructions provide a systematic guide for installing and commissioning the PKMCS charger:

- The PKMCS charger must be installed and serviced by qualified electrical personnel.
- Observe all pertinent national, regional, and local safety regulations when you install and commission the PKMCS charger.
- The PKMCS charger has an IP65 electronics enclosure rating. However, because it must be opened for installation, this is best done in dry weather or under cover to avoid moisture or debris ingress.
- The PKMCS charger must be properly installed and assembled according to these instructions before it is used. Prior to installation, contact your supplier to organise commissioning information.

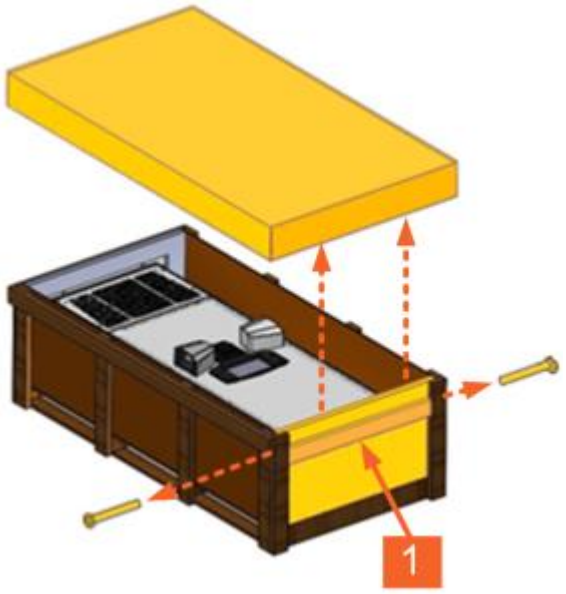
CAUTION

Do not work under suspended loads. Two people may be required, because the charger could swing.

Equipment supplied with PKMCS	Equipment required (not supplied)
• 5mm (0.2") pin hex tool • External Ethernet connector • M5 flange nuts x2 • M5x12 Socket head screws x2 • Warranty documentation	• Lifting apparatus. See *Moving and storage instructions* for weights. Ensure lifting apparatus is sufficiently rated. • 110mm (4") or 50mm (2") OD Conduit. • 1x M8 lug (earth) and 2x M10 lugs (DC+ and DC-) and crimping tool. • Bootlace ferrules 20AWG 0.5mm². Quantity dependent on field wiring requirements. Refer to the *Auxiliary field wiring* section. • 4x site specific fasteners. Fasteners are not supplied, because the type required depends on the foundation used and must be chosen by the installer accordingly. • Socket set and ratchet. • Torque wrench.

9 Unpacking

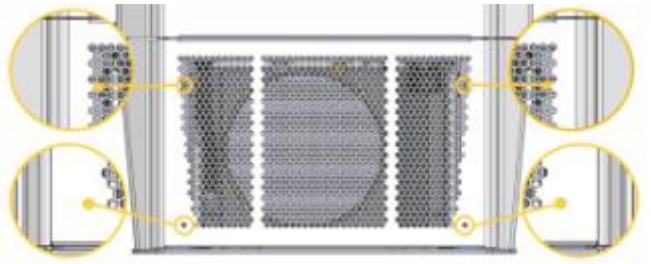
Document Key	Colour
Items shown in orange are parts that require action for that step.	

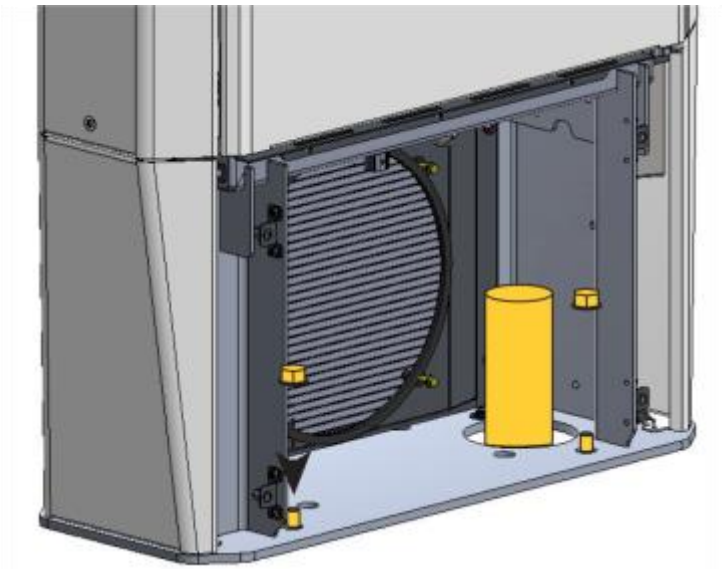
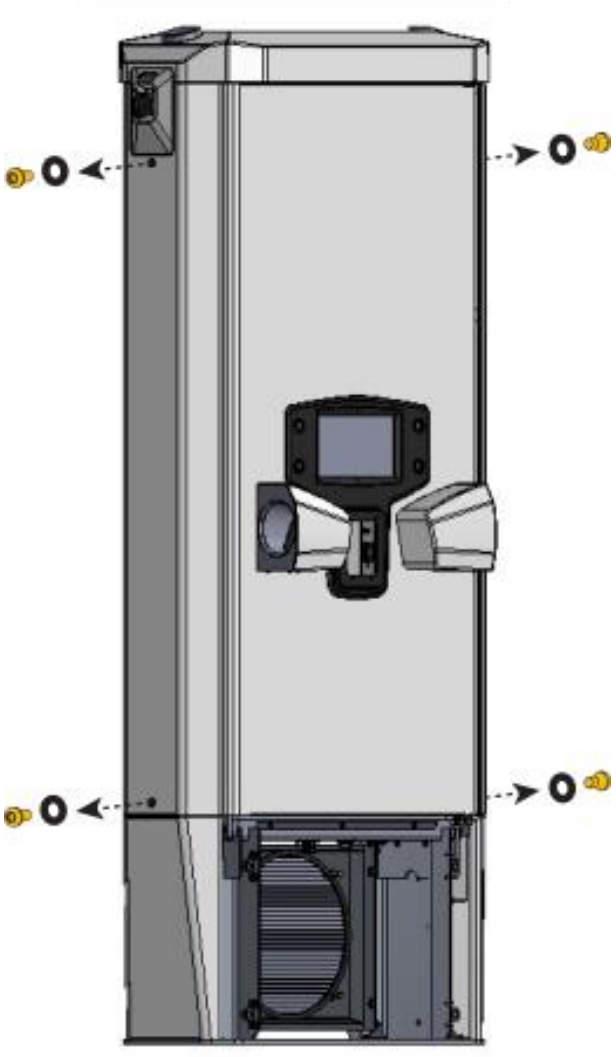
Step	Action	
1	Open the crate: a. Move the crate as close to the prepared installation site as possible. b. Ensure there is enough room to manoeuvre the lifting apparatus. c. Remove the exterior packaging, straps, and cardboard lid. d. The crate end is secured with a batten screw each side. Remove the batten screws and slide out the crate end.	 | # | Description | | --- | --- | | 1 | Crate end with horizontal batten. |

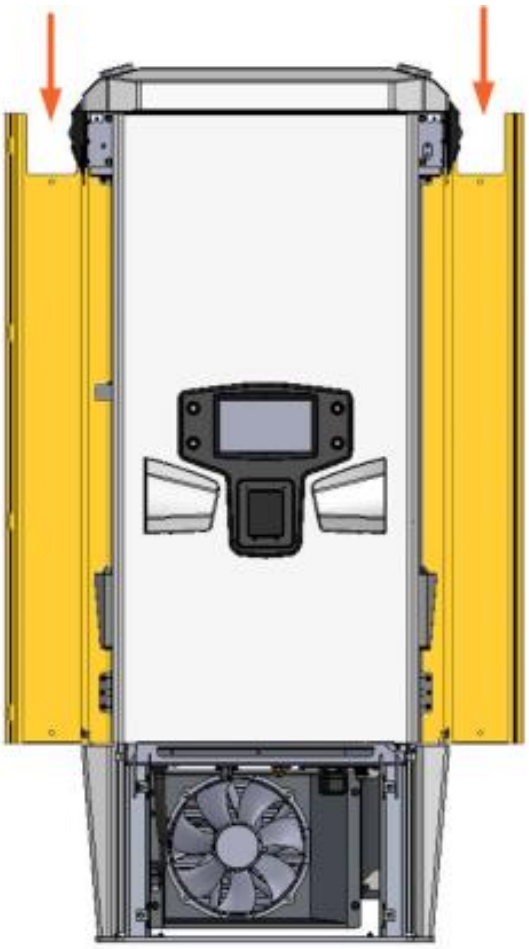
Step	Action
2	**CAUTION** Do not work under suspended loads. Two people may be required, because the charger could swing. a. Securely attach the lifting straps at the top of PKMCS to the lifting apparatus and gently raise to a standing position on the shipping baseplate: **Notes:** • Lifting may require two people as the charger could swing when suspended. • The PKMCS charger is 2030mm (80") tall on the shipping baseplate. b. When the charger is upright, remove all wrapping. c. Ensure the connection to the lifting apparatus is secure at all times. **CAUTION** Make sure the cable plugs are not sitting in the holsters to protect them from damage during installation.  d. Place charging cables out of the way during installation to avoid damage.

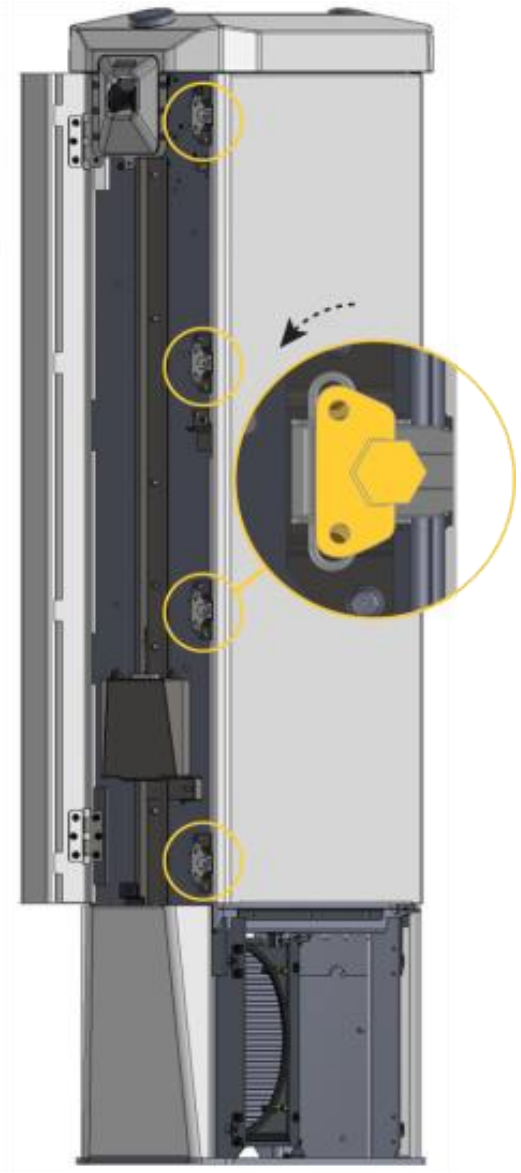
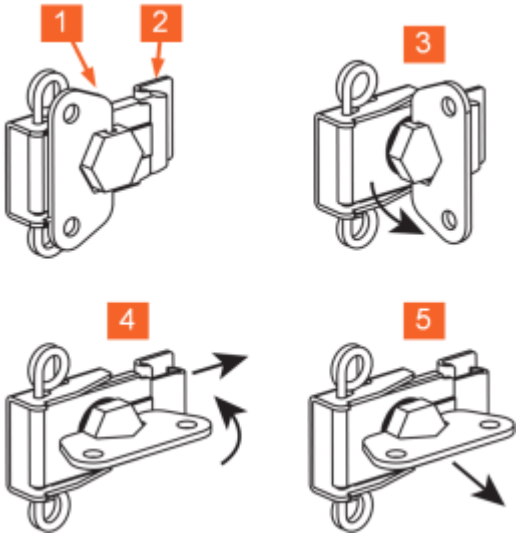
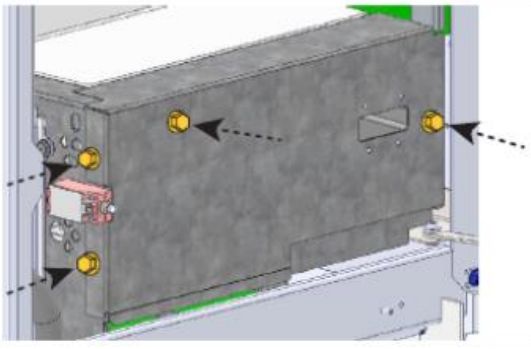
#	Description
1	Lifting straps
2	Shipping baseplate

9.1 Installation

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Remove the radiator panels.
Fixing points for the front and rear radiator panels are located behind 4x hex holes as shown:
a. Use the 5mm (0.2") pin hex tool to unscrew the 4x security screws, which will disengage the radiator panels.
b. Pull the radiator panels forward to remove, and safely store.</td><td>  </td></tr>
<tr><td>2</td><td>Remove the shipping bolts.
a. Unscrew the 4x bolts from the shipping baseplate, located at the front and rear of the radiator.</td><td>  </td></tr>
<tr><td>3</td><td>Secure the unit to the foundation:
a. Review the sections Underground wiring and Above ground wiring in Site Preparation to ensure the correct wiring and conduit preparation.
b. Lift the PKMCS charger and place over the prepared foundation.
<table>
<tr><th>IF…</th><th>THEN…</th></tr>
<tr><td>wiring is provided from underground,</td><td>feed it through the power-in hole and secure the PKMCS charger to the foundation fixing points, (fasteners not supplied.)</td></tr>
<tr><td>the power is provided above ground,</td><td>secure the PKMCS charger to the foundation and proceed with the installation instructions.</td></tr>
</table>
Note: Use the plastic inserts in the holes of the baseplate.</td></tr>
</table>

Step	Action
	
4	**CAUTION** Opening the charger with the cable plugs sitting in the holsters will damage the plugs. a. Check that the cable plugs have been removed from the holsters. b. Remove the side panel security screws. **IF…** / **THEN…** the PKMCS has cable management, / do this for both side panels. there is no cable management, / open the left side panel only. c. Use the 5mm (0.2") pin hex tool to unscrew the 2x security screws on each side panel. d. Remove the security screws and washers.
	

Step	Action	
5	a. Open the hinged side panels: **IF…** / **THEN…** there is cable management, → open both side panels. there is no cable management, → open the left side only. b. Unhook the cable cord from the cut-out in the top of the side panel when opening.	

Step	Action	
6	Open the door.: 	a. The front door has 4x latches that seal the door to the enclosure. If a lock is fitted, unlock to unlatch. b. Starting with the two latches in the centre, follow the instructions shown for opening the latches. c. Once all latches are disengaged, open the hinged door. **Note:** Compressing the door seal assists in disengaging the latch from the hook. 
7	Remove the 4x M8 hex bolts and remove the escutcheon:	

#	Description
1	Latch
2	Hook
3	Flip the latch handle up
4	Turn the latch handle anti clockwise to slide the latch away from the hook
5	Pull the latch handle away from the latch to disengage from the hook.

10 Wiring in

CAUTION

It is critical to product safety and warranty that IP65 is achieved for all input wiring.

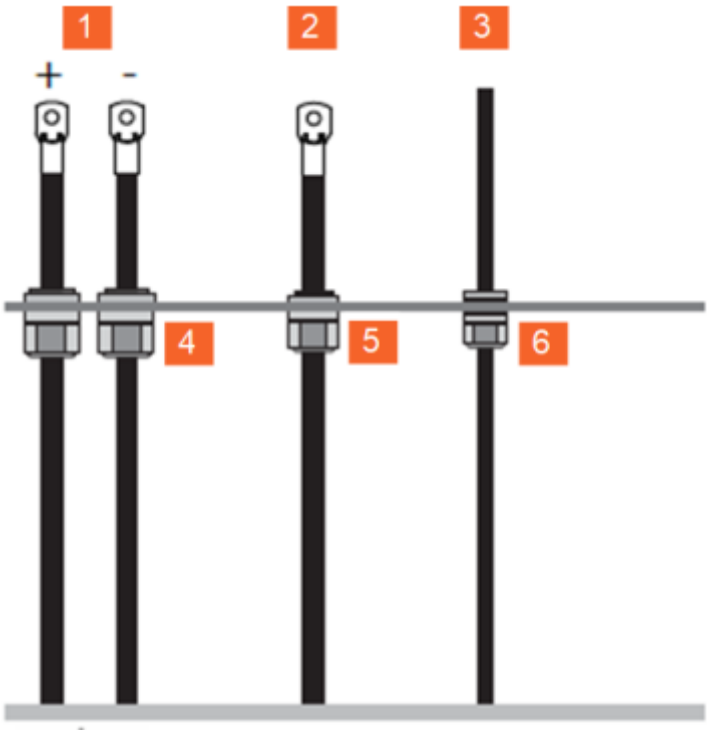
To continue to achieve the IP65 rating the power cabling must be fitted correctly into the conduit and the conduit sufficiently sealed so no water or debris can enter.

CAUTION

If using an auxiliary field wire, the wire must be a single multi-conductor cable Ø10-14mm (0.3"-1/2") to suit the M25 cable gland.

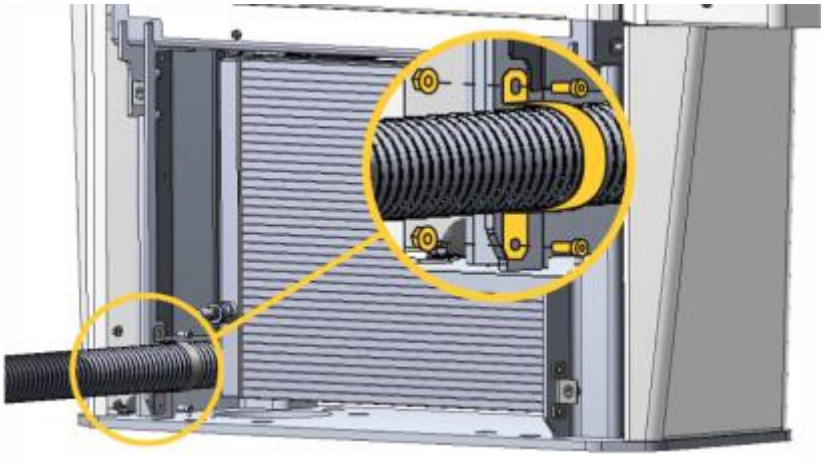
If the auxiliary wire is smaller than Ø10, the conduit installation must be used.

10.1 Underground

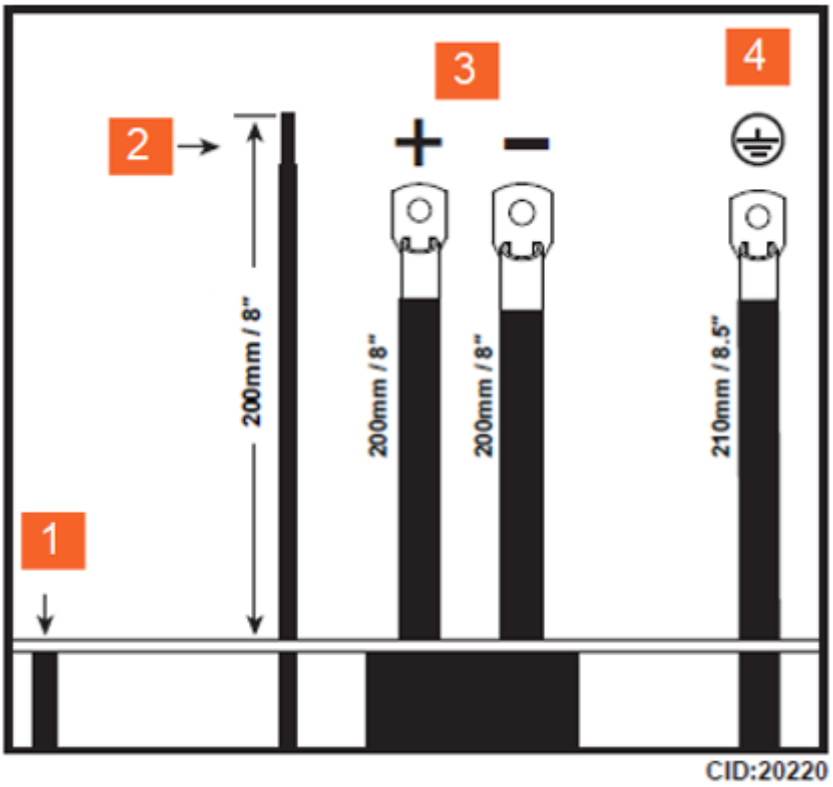
Step	Action
1	Prepare conduit and wiring as per section: *Site preparation - Underground wiring*. Trim lengths for wiring as per cable termination.
2	Loosen all cable glands and feed the appropriate wire through the gland: 
3	Ensure the cable is sitting correctly in the gland and tighten to ensure no water or debris can enter. If in doubt, use an appropriate outdoor rated sealant.
4	When the cable gland has been tightened, pull on the cable to ensure it doesn't slip.

Key #	Description
1	HP Input
2	Grounding
3	Auxiliary field wire
4	M40 cable gland
5	M32 cable gland
6	M25 cable gland

10.2 Above ground

Step	Action
1	When providing wiring above ground, all HP input, grounding, and auxiliary field wires are routed inside a flexible 50mm (2") conduit. Prepare conduit and wiring as per section *Site preparation - Above ground wiring*.
2	Trim lengths for wiring as per cable termination.
3	Ensure the correct length of conduit from the rear installation point. Fasten the 50mm (2") conduit to the rear-left side of the chassis using the supplied conduit clamp and M5 fasteners: 

11 Cable termination

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>1</td><td>Fix the HP Input wiring to the terminals with the supplied fasteners.
Note: The wiring in label is located on the inside of the left side panel.</td></tr>
<tr><td>2</td><td>For auxiliary field wiring termination go to the appropriate section in Auxiliary field wiring.</td></tr>
<tr><td>3</td><td>Use a torque wrench to tighten to the specified tightening torque. Apply a torque mark to the stud and nut. See below for details:
Cable preparation and termination
 

<table>
<tr><th>Wire</th><th>Cut length</th><th>Lug</th><th>Torque</th></tr>
<tr><td>DC+</td><td rowspan="2">200 mm (8")</td><td rowspan="2">M10</td><td rowspan="2">30 Nm</td></tr>
<tr><td>DC-</td></tr>
<tr><td>Earth</td><td>210 mm (8.5")</td><td>M8</td><td>20 Nm</td></tr>
<tr><td>Auxiliary</td><td>200 mm (8")</td><td>Bootlace Ferrule</td><td>Push in</td></tr>
</table></td></tr>
</table>

Step	Action

#	Action
1	Ethernet 1. Cut from foundation 2. Trim to suit connector 3. 600mm (23.5")
2	Auxiliary field wires 1. Cut from gland plate 2. Trim and fit bootlace ferrules
3	DC Input Terminals 1. Cut from gland plate 2. Trim and fit M10 lugs 3. Torque to 30Nm
4	Protective Earth wire 1. Cut from gland plate 2. Trim and fit M8 lug 3. Torque to 20Nm

11.1 Ethernet port

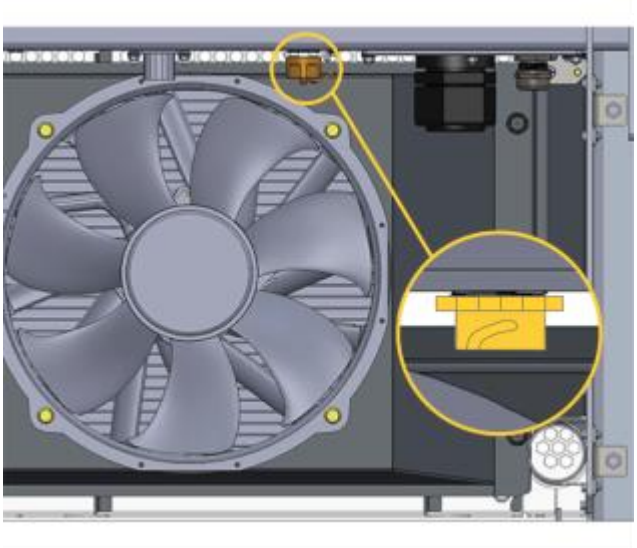
CAUTION

It is critical to product safety and warranty that IP65 is achieved for all input wiring.

To continue to achieve the IP65 rating the power cabling must be fitted correctly into the conduit and the conduit sufficiently sealed so no water or debris can enter.

CAUTION

A Cat 6a shielded ethernet cable is required for high signal integrity. The shield must be earthed at the RU end because the shield will not be connected at the charger end.

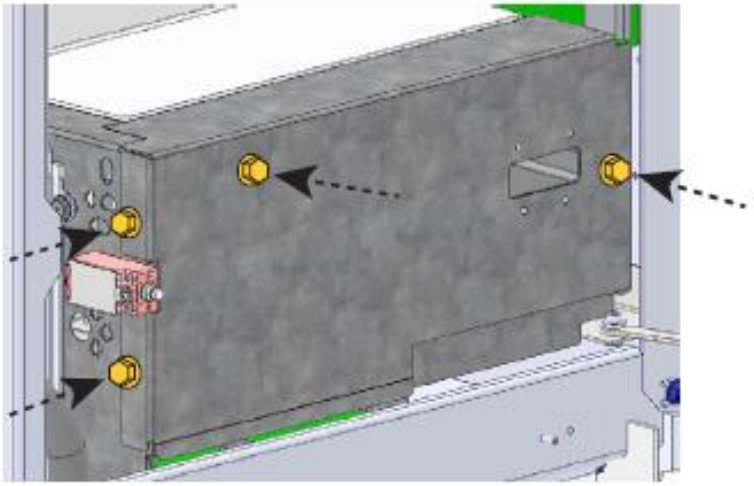
Step	Action
1	Ethernet connection between the CS and RU is required for correct operation. The ethernet port is situated under the front of the chassis. Remove the ethernet cap.
2	Use the supplied watertight ethernet adaptor to terminate the ethernet wire. **Note:** A Cat 6a shielded ethernet cable is recommended for high signal integrity. The shield should be earthed at the building end because the shield will not be connected at the charger end.
3	Fit the wire onto the ethernet port: 

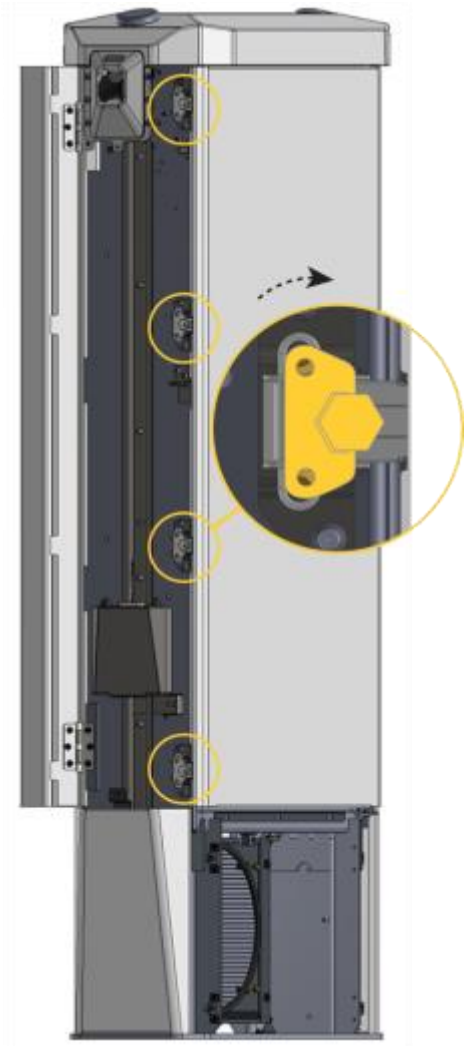
12 Closing instructions

CAUTION

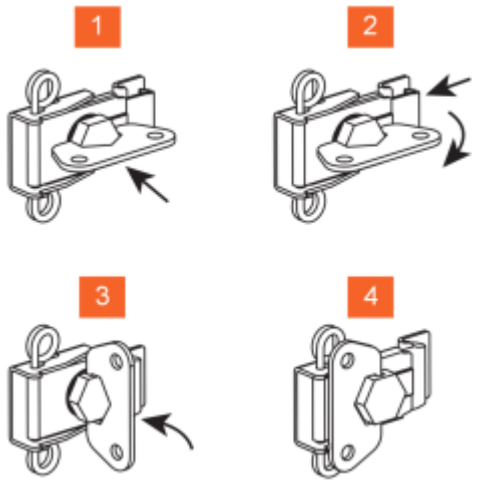
It is critical to product safety and warranty that IP65 is achieved for all input wiring.

To continue to achieve the IP65 rating the power cabling must be fitted correctly into the conduit and the conduit sufficiently sealed so no water or debris can enter.

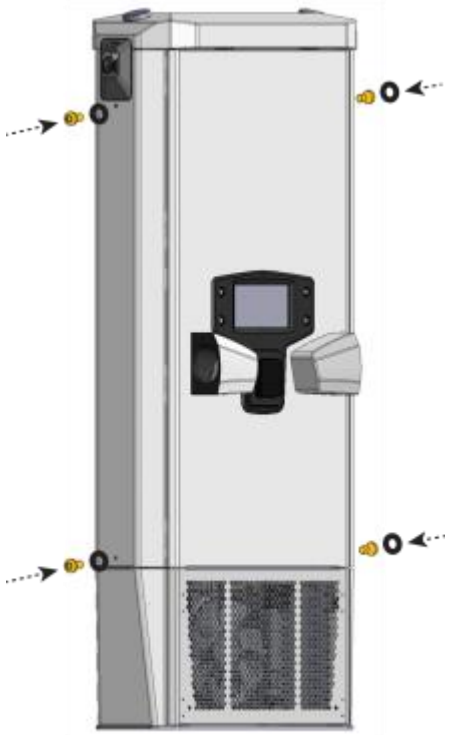
Step	Action
1	Carefully remove the lifting straps from the lifting devices.
2	Ensure the cable is sitting correctly in the gland and tighten to ensure no water or debris can enter. If in doubt, use an appropriate outdoor-rated sealant. When the cable gland has been tightened, pull on the cable to ensure it doesn't slip. Check all glands are tight and the cable doesn't slip.
3	Replace the escutcheon, and secure with 4x M8 hex bolts:  **CAUTION** If using a power drill to fasten the nuts, ensure the torque is set to no greater than 10Nm. If using a hand tool, fasten until resistance is felt. Do not overtighten.

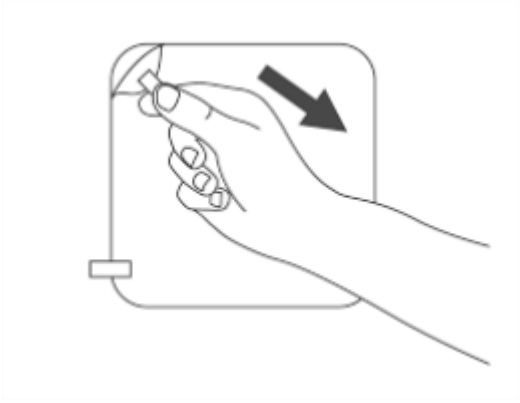
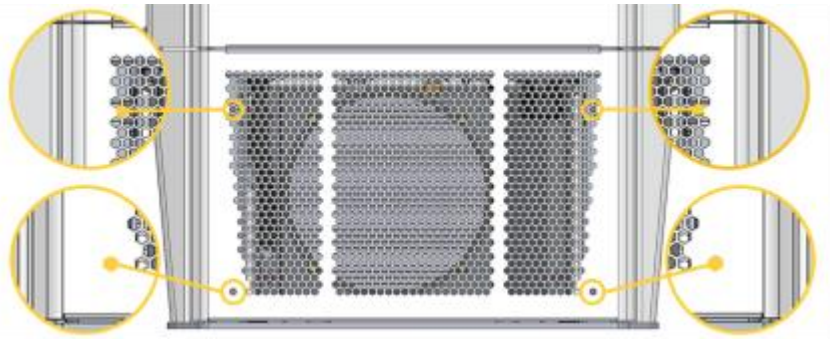
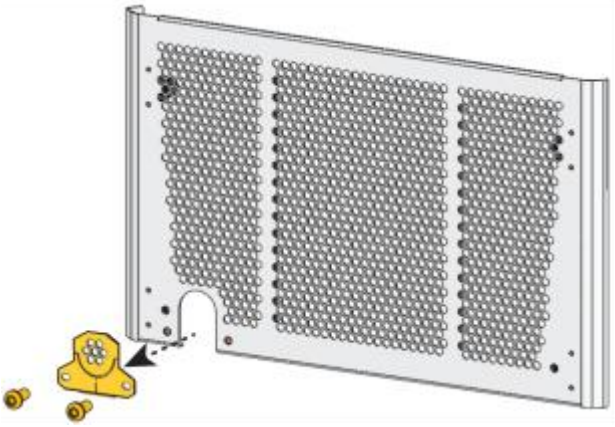
Step	Action
4	Close and seal the front door. The front door has 4x latches that seal the door to the enclosure: 

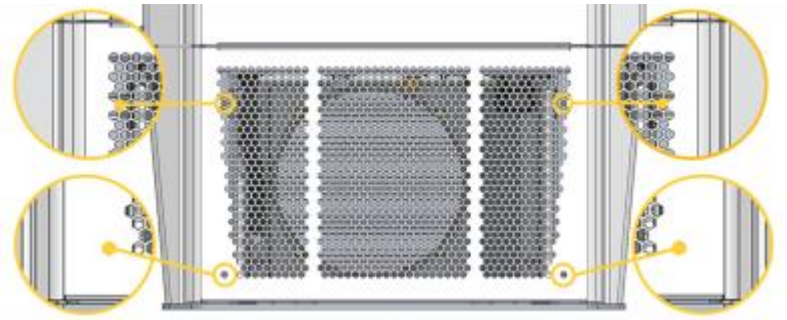
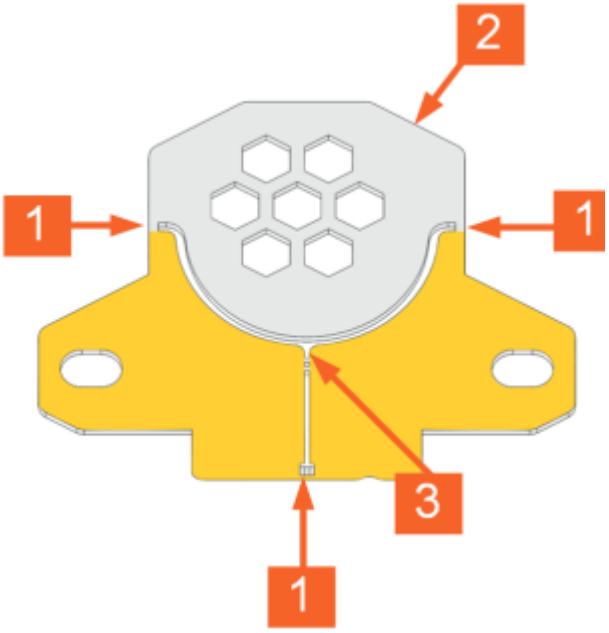
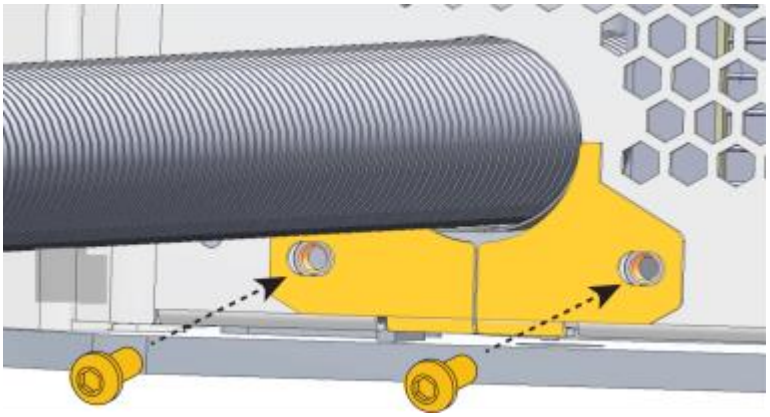
a. Check all latches are sitting inside the door edge.
b. Close central latches first.
c. Compressing the door seal assists in engaging the latch and hook.
d. Check all latches are hooked, closed, and the door seal is compressed.
e. If a lock was fitted, re-attach and lock.



#	Description
1	Check the latch is extended and push in to engage with the hook.
2	Turn the latch handle clockwise to slide the latch inwards. Check the hook is engaged.
3	Flip the handle down.
4	Latch closed.

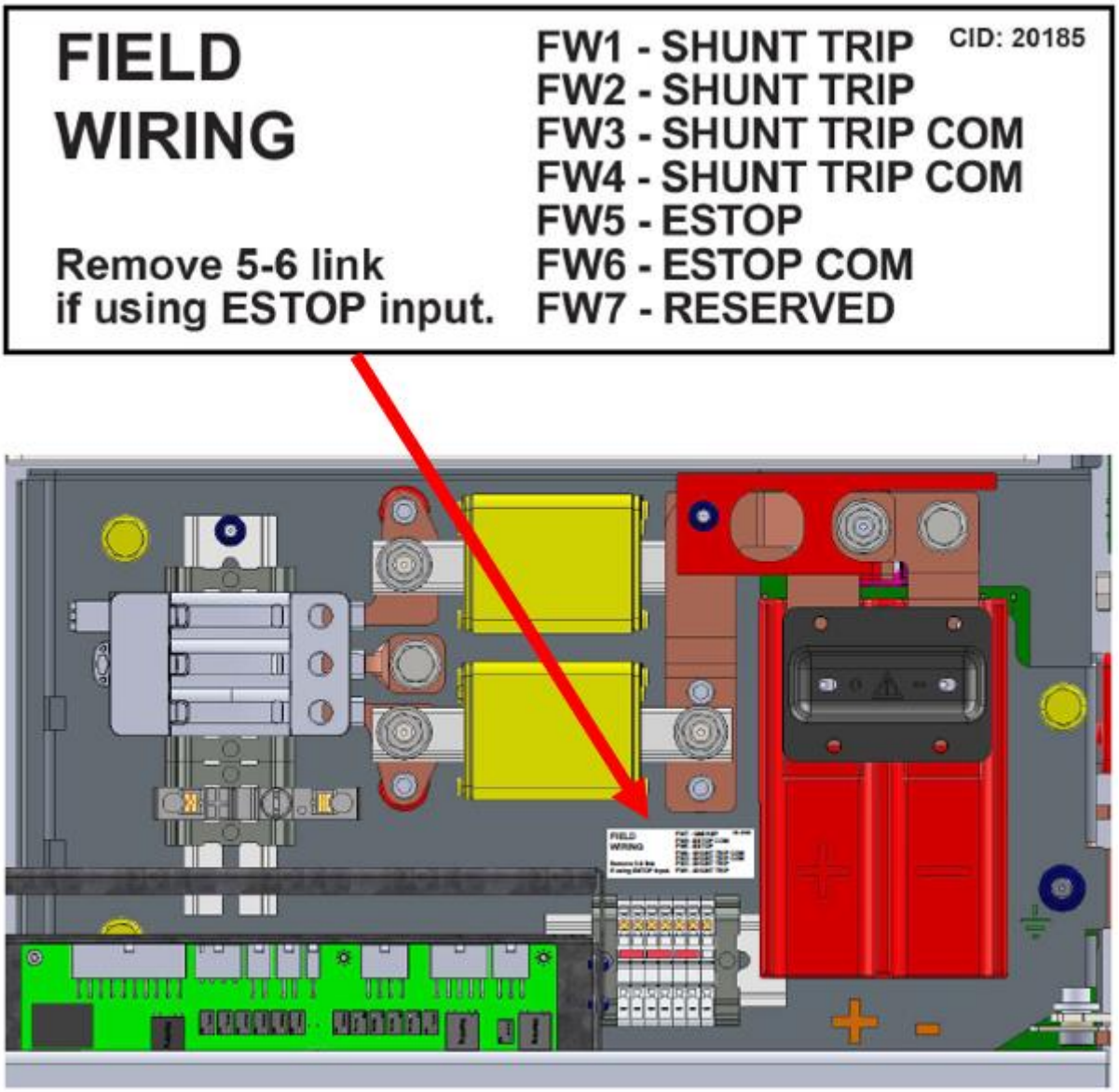
<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>5</td><td>
<table>
<tr><th>IF…</th><th>THEN…</th></tr>
<tr><td>the charger has no cable management,</td><td>skip to the next step.</td></tr>
<tr><td>the charger has cable management,</td><td>a. Lower the cable management weights on both sides.
b. Pull the cable cord down (not shown) to raise the weight above the latch. Slide the latch towards the door and gently let the weight lower to the natural resting position inside the lower panel.
c. Hook the cord into the cut-out in the top of the side panel and close the panel.</td></tr>
</table>
</td><td>  </td></tr>
<tr><td>6</td><td>a. Secure the side panels.
b. Fasten with 2x nylon washers and security screws, using the 5mm Pin Hex tool.
Note: Do not overtighten.</td><td>  </td></tr>
</table>

<table>
<tr><th>Step</th><th>Action</th></tr>
<tr><td>7</td><td>Remove the clear protective plastic film from the CCR / RFID reader:
  </td></tr>
<tr><td>8</td><td>Mount the radiator panels. Align the fasteners with the brackets on the enclosure box. Use the 5 mm (0.2") pin hex tool to fix into position. Do not overtighten:
 
<table>
<tr><th>IF…</th><th>THEN…</th></tr>
<tr><td>underground wiring is used,</td><td>• repeat this step for the rear panel.
• skip to step 11.</td></tr>
<tr><td>above ground wiring is used,</td><td>• go to the next step.</td></tr>
</table></td></tr>
<tr><td>9</td><td>Mount the rear radiator panel (for above ground power).
Using the 5mm (0.2") Hex bit, remove the 2x security screws and rear infill panel:
  </td></tr>
</table>

Step	Action
10	Slot the rear radiator panel over the conduit. Align the fasteners with the brackets on the enclosure box. Use the 5mm (0.2") Pin Hex tool to fix into position. Do not overtighten: 
11	The infill panel is made from 2mm (0.07") Aluminium. Cut the infill panel as shown and break apart into three sections. Discard the centre section with hex holes and remove any sharp edges from the remaining two pieces:  | # | Description | |---|---| | 1 | Cut | | 2 | Remove | | 3 | Break apart |
12	Fit the two infill panel pieces under the conduit, and secure with 2x M8 security screws: 

13 Auxiliary field wiring

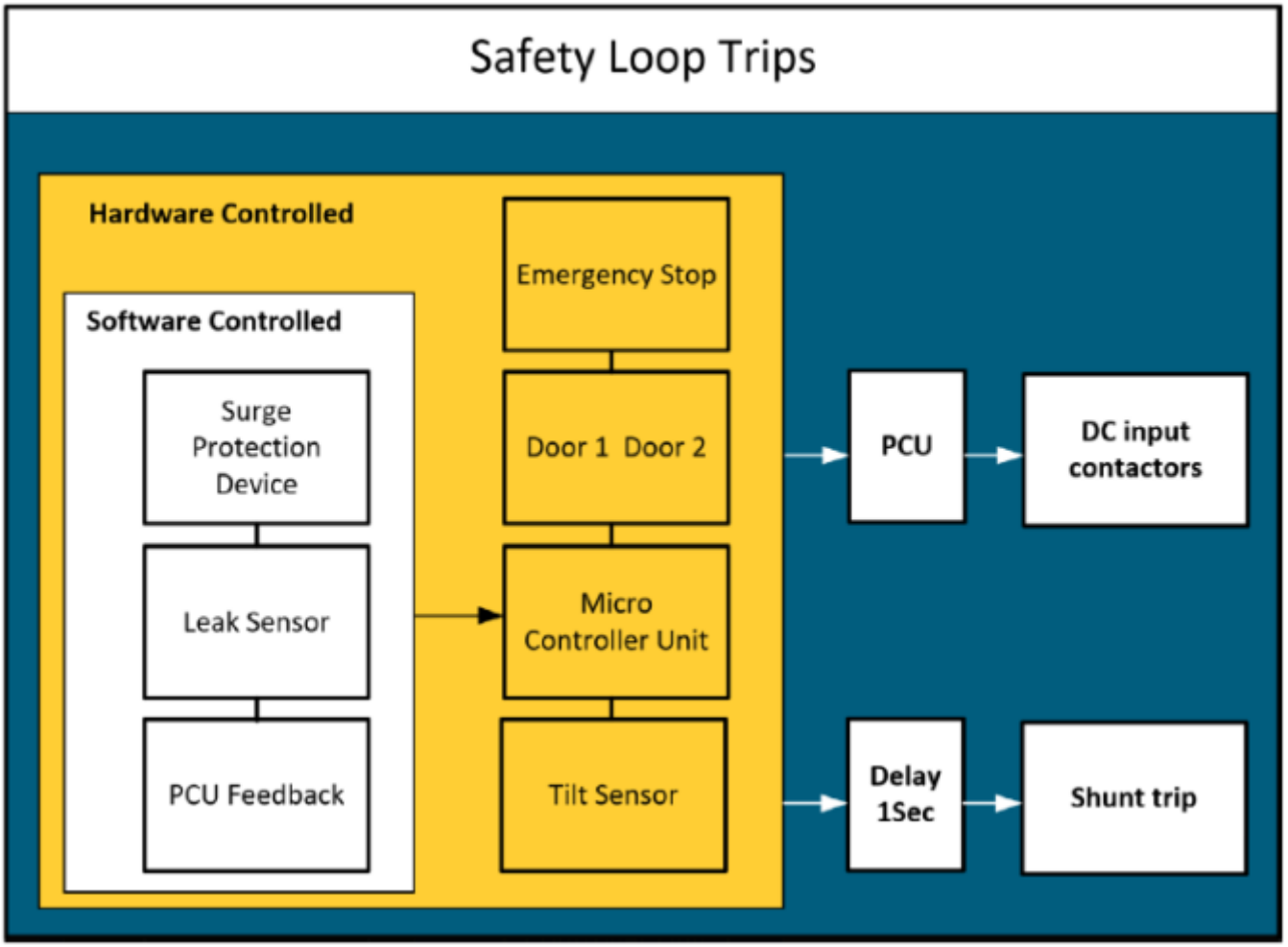
13.1 Wiring terminals



13.2 Safety loop

The PKMCS has an internal safety system that can detect safety events and shut off supply power to the charger in the event of a fault. As shown in the following Safety Loop Trips diagram, there are two types of trips within the safety loop:

- Software controlled trip via a micro-controller unit.
- Hardware controlled trip via a hard-wired component in a series loop.

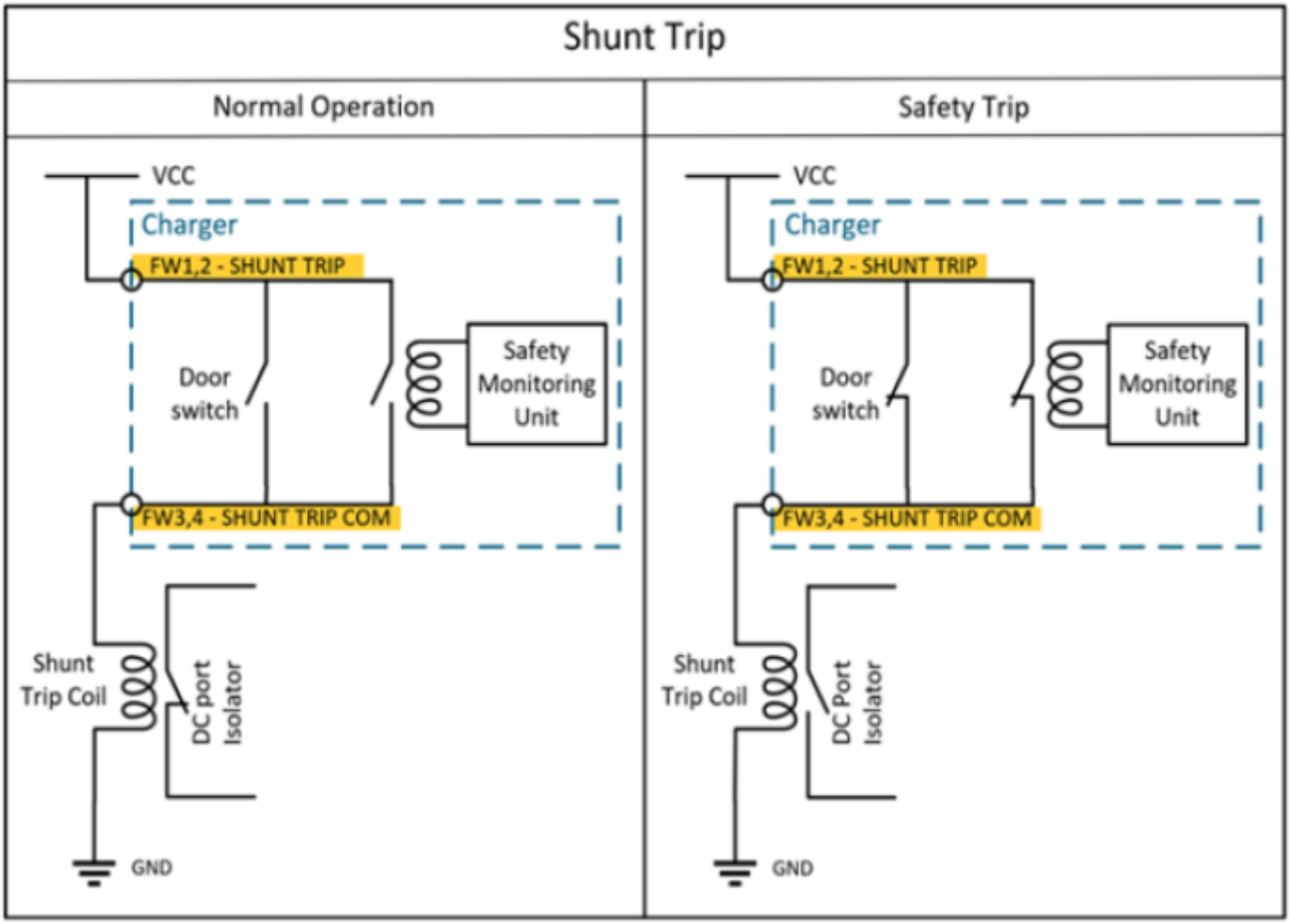


Faults detected on the safety loop can trigger a shunt trip, thus tripping the corresponding DC port within the PKM rectification unit.

13.3 Shunt trip

A shunt trip will trip the DC port within the PKM rectification unit when the charger detects a fault within the safety loop.

FW1, FW2 – SHUNT TRIP and FW3, FW4 –SHUNT TRIP COM provide connection points to the safety system shunt trip output as a normally open clean con- tact relay. A break in the safety loop will close the shunt trip relay after a 1 second delay, thus tripping the corresponding DC port within the PKM rectification unit and isolating supply power from the charger. This delay is used to bootstrap the charger at power-up.



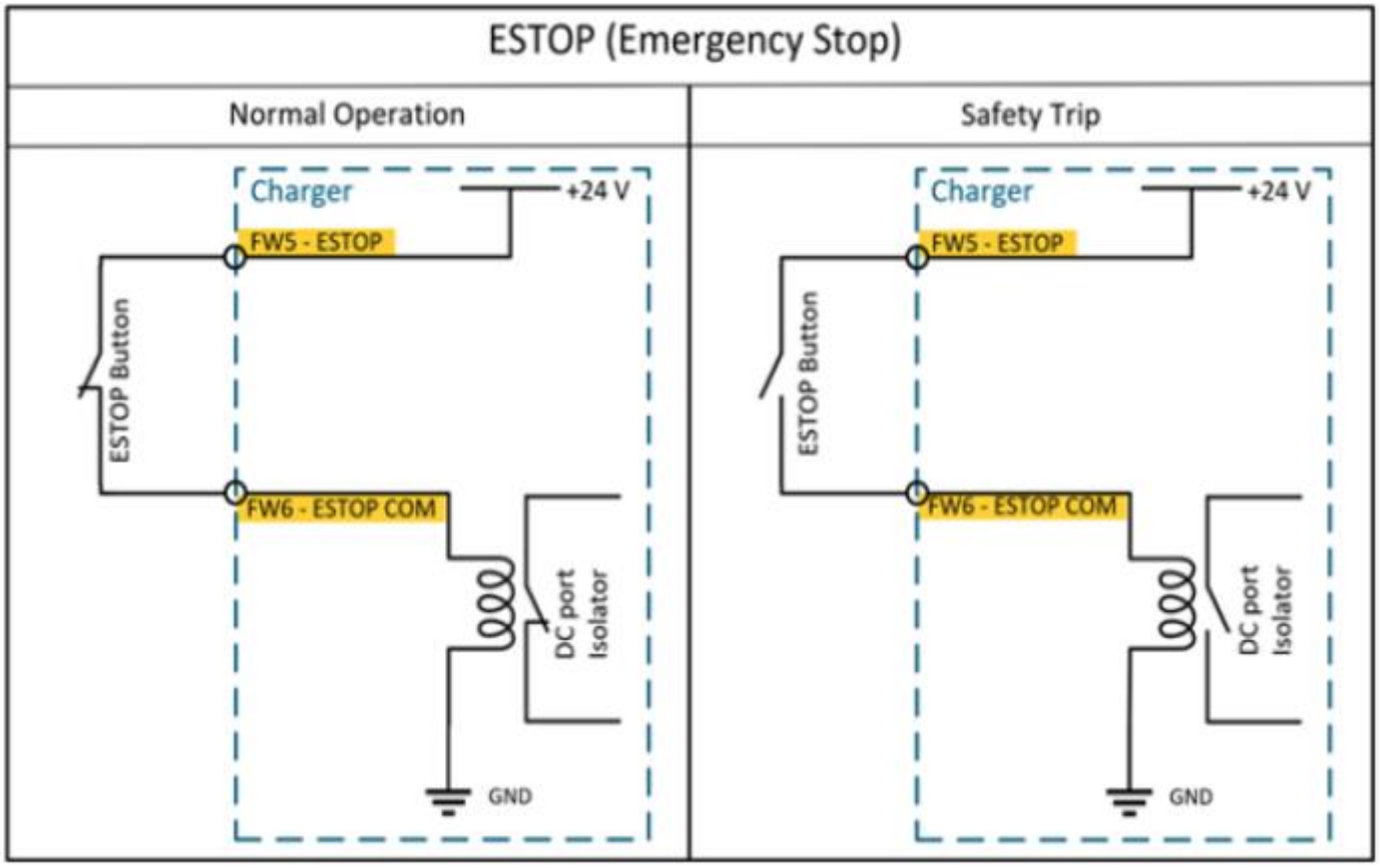
13.4 Emergency Stop (ESTOP)

An emergency stop (Estop) input is provided on the charger that can be used to trigger a fault in the charger safety system. It is a fail-safe method of protection, break/ failure in the control voltage will trip the corresponding DC port within the PKM Rectifier unit and isolate supply power to the charger.

FW5 – ESTOP and FW6 – ESTOP COM provides connection points to the safety system ESTOP input. A continuity break between FW5 and FW6 induces a shunt trip thus tripping the corresponding DC port within the PKM rectification unit and isolating supply power from the charger.

Multiple devices (normally closed-circuit) can be placed in series connections. For example, ESTOP followed by a vapor sensor. Break/ open circuit in any of the devices will trigger ESTOP.

Note: Jumper connector between FW5 and FW6 needs to be removed before using this feature. Isolated 24VDC @ 20 mA is supplied by the charger to facilitate the connection of ESTOP.



14 Special Use Case: DC-powered PKM Charge Station

14.1 Introduction

This chapter is relevant to the use case where a PKM Charge Station (CS) will be connected to a Third-Party 950VDC Source instead of a Tritium Rectification Unit (PKM RU).
In a standard PKM system comprised of PKM RU and PKM CS, the Rectification Unit (RU) performs several functions including:

- Supply of 950VDC / 170A to each CS.
- Load management of the system such that the total CS demand is not allowed to exceed the available rectification capacity in PKM charge station systems configured with three or four CS.
- Single WAN connectivity point for the entire system including all OCPP management of the CS via its built-in modem.
- Overcurrent protection of the CS.
- Point of electrical isolation for each CS.
- Management of the Emergency Power Off (EPO) system, e.g. a downstream tilt sensor trip from a CS will result in that charging station being electrically isolated.

IMPORTANT INFORMATION

Where a third-party DC source is used in place of Tritium's Rectification Unit, the following requirements must be met by the third-party solution selected by the Charge Point Operator:

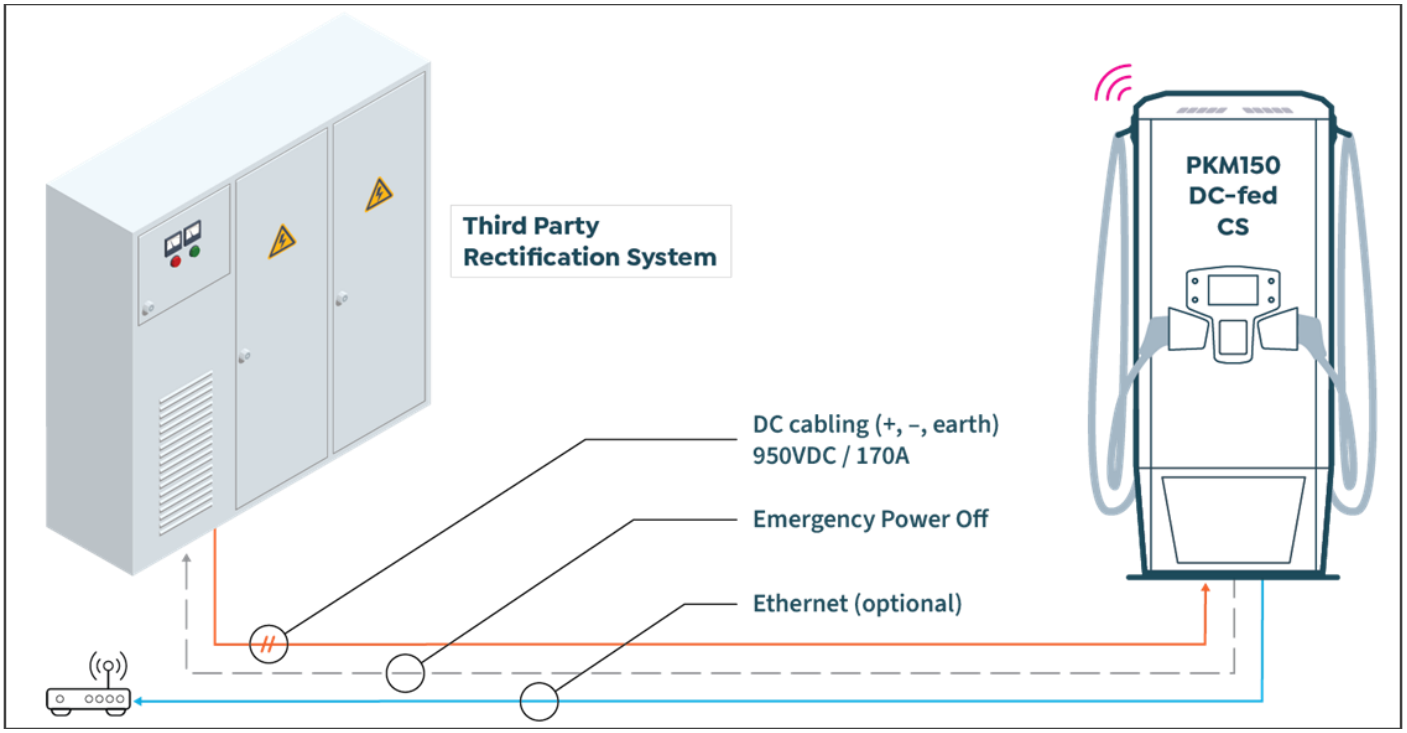
- Supply of 950VDC / 170A as per specification defined in chapter *14.3 950VDC Supply.*
- Overcurrent protection of the CS.
- Point of electrical isolation for each CS.
- The hardware-controlled safety sensors installed in the CS require connection to a shunt trip at an upstream location to ensure electrical isolation of the CS is provided in case of e.g. a downstream tilt sensor trip.
- Load management: CS demand limitation in accordance with the available rectification capacity via static limit settings on the PKM CS and Smart Charging profiles via OCPP.
- External single WAN connectivity point for the CS to enable OCPP management or upgrading the CS with an available modem kit.

14.1.1 Conditions of Acceptability

If the PKM Charge Station is supplied by a third-party DC Source (not Tritium), the following requirements need to be reverified by the CPO at the system level i.e. PKM Charge Station + DC Source:

- Voltage measures DC+ or DC- to PE must not exceed 500V.
- Perform normal startup, normal shutdown and emergency shutdown cases according to IEC 61851-23 or SAE J1772 without violating corresponding pass criteria.
- Abnormal Tests (53), Component short- and open-circuit test (53.8)
  - Input Short Circuit from DCL+ to DCL-
  - Open Circuit Emergency Power Off
  - Open Circuit additional safety loop (when provided) between PKM CHARGE STATION and DC Source

Note: The CPO is responsible for ensuring the PKM Charge Station is compatible with third-party DC supply systems, in accordance with UL 2202, UL 9741, or IEC 61851-xx standards. Contact Tritium Customer Service if assistance is required.



14.2 Enablement settings on the PKM CS

The Rectifier Communication Disable Setting (*RDPLinkDisable)* must be set to true to enable the PKM CS to be connected to a DC supply system other than the Tritium RU.

All factory-built PKM CS products have this setting set to false by default. It is required to organise with Tritium Customer Service to make the setting change during commissioning of the unit.

Note: Disabling RDPLink raises a constant status code when in this mode.
E1529 RDPM_INFO_POWER_MANAGEMENT_DISABLED. CPOs will need to ignore this status code on their backends, this status code doesn't trigger an error log or change in behavior.

14.3 950VDC supply

Tritium has selected a voltage of nominally 950V for the DC bus voltage, as this gives adequate headroom above the 920V maximum of the vehicle.

Each CS draws a maximum of 170A during full power operation.

If the Current Maximum needs to be further limited, Tritium Customer Service must be contacted during commissioning to apply the necessary changes on the CS.

14.3.1 Voltage

- The minimum acceptable voltage is 930V DC.
- The nominal voltage is 950V DC – this is the recommended input voltage.
- The maximum acceptable voltage is 960V DC.

The PKM CS has a fixed undervoltage lockout mechanism set at 920V DC.

The voltage must never be changed during power delivery. Based on the expected voltage output, a 30V headroom must be applied to the delivered voltage. To maintain PKM CS output voltage range to a maximum of 920V, 950V DC input is required.

The steady-state output voltage precision is to be within 0.5%.

14.3.2 Ripple

Max ±20V for 0 – 400Hz, preferable at ±10V.

The rectifiers may reduce their output power to maintain low ripple when incoming phase imbalance is >3%.

14.3.3 Load type

The load on the DC bus will come from the CS. These are switchmode DC/DC converters operating as a constant power load, with power varying only slowly as the vehicle battery voltage increases during charge. They have controlled power slew rates under most circumstances.

Bus capacitance in the charging heads is approx. 200uF per 100kW of charger power.

14.3.4 Dynamic regulation

The PKM CS can, in an emergency situation such as a loss of control signal (uncontrolled shutdown), go from full power to 0kW in less than 30msec. This results in a load dump. The load dump must not exceed the maximum voltage rating of the CS of 1000VDC.

14.3.5 Grounding

Centre grounded output, i.e. ±475V for a “950V” DC bus with respect to Earth.

14.3.6 Overcurrent protection

For any device connected to the DC bus, either:

- Fuse + DC-rated contactor combination (preferred), or
- DC-rated circuit breaker + shunt trip.

14.3.7 Pre-charge

Pre-charging of devices connected to the bus is required, as they may be engaged while the bus is live (e.g. after a CS or the rectifier has been serviced). This requirement is why the fuse + DC-rated contactor is the preferred option for overcurrent protection, as the contactor used in that function can also function as the main control device in the pre-charge circuit.

For uni-directional rectifiers that only supply power to the bus, the pre-charge requirement can be met by the use of an output diode.

14.3.8 Discharge

Self-discharge of internal capacitance (including y-capacitance) shall be provided by all devices connected to the bus, on removal of voltage, in under 1 minute.

14.3.9 Y-Capacitance

No limit.

14.3.10 Insulation

Input/Output w.r.t Earth:

Basic insulation. Refer to IEC 62477 for the relevant dielectric withstand levels

14.4 Communication and connectivity

A DC-powered PKM CS requires internet access to perform remote diagnostics, firmware updates, customer support and charge point operator back-end integration. For firewall requirements please refer to *ENG.001- Veefil OCPP 1.6 Firewall Requirements.*

DC-powered PKM charge station will not have direct communication with the Third-Party DC Supply system. Instead, it will rely on internet access via a site host connection using the ethernet port on the CS. Refer to section *11.1 Ethernet port* for details where the port is located.

Alternatively, Tritium can provide a 4G modem as an add on device via a Service Kit. Contact Tritium Sales or Customer Service to order service kit **SK-RTM75-0116.** Refer to *TRI153.FSP.2927 Replace the CU Modem* for modem installation instructions.

14.4.1 Utility control

Utility control will be limited to static limit settings on the PKM CS and Smart Charging profiles via OCPP.

Contact Customer Service during commissioning to define the Absolute Power Limit (also referred to as a hard limit) via *HU1.CCUFlashDCMaxOutputPower* that the CS can never exceed.

For details of Tritium's support for Smart Charging refer to:

- *INS.013 Tritium OCPP 1.6J Client Documentation*
- *DOC.1653 Veefil-RT Options for Site Power Management*

14.5 Management of the Emergency Power Off (EPO) system

The PKM CS has hardware-controlled safety sensors installed that require connection to a shunt trip at an upstream location outside of the CS. It is the responsibility of the site operator to identify a suitable solution that complies with local regulations.

The present safety sensors are:

- Tilt switch.
- Door sensors.

Refer to section *13 Auxiliary Field Wiring* for information on how to connect the safety loop to a shunt trip. The auxiliary wiring terminals are 24VDC.

FW1, FW2 – SHUNT TRIP and FW3, FW4 –SHUNT TRIP COM provide connection points to the safety system shunt trip output as a normally open clean contact relay. A break in the safety loop will close the shunt trip relay after a 1 second delay. This delay is used to bootstrap the charger at power-up.