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VELOX RANGE

MEGAWATT CHARGING CABINET



CUSTOMER MANUAL

CM1-4

 **MADE IN
BRITAIN**

IMPORTANT

PLEASE READ ALL INSTRUCTIONS CAREFULLY BEFORE USE

KEEP SAFE FOR FUTURE REFERENCE

The contents of this Customer Manual are subject to recurring updates and modifications, as the VELOX Range Megawatt Charging Cabinet undergoes regular reviews for improvements.

Before any use, please check and download the latest revision of the Customer Manual using the QR code below to stay informed about any future changes.



OR CLICK LINK BELOW

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

PLEASE NOTE:

The VELOX Megawatt Charging Cabinet, subject of this Customer Manual, will hereafter be referred to as the VELOX MCC. This Customer Manual is intended for the following groups:

The OWNER of the VELOX MCC and USERS of the VELOX MCC including but not restricted to Installation and Maintenance personnel.

Responsibilities for the OWNER

It is the responsibility of the OWNER to ensure all USERS are able to install, maintain and operate the VELOX MCC in a safe manner.

For the purposes of this manual the OWNER is defined as:

The person, people or entity which holds legal title in the VELOX MCC. The OWNER is also a USER.

For the purposes of this manual a USER is defined as:

Anybody who comes into contact with the VELOX MCC for any purpose after the point of delivery to the OWNER. This includes but is not restricted to:

- Transportation and storage of the VELOX MCC
- Installation of the VELOX MCC
- Maintenance and inspection of the VELOX MCC
- Operation of the VELOX MCC for the purpose which it is intended.

Discharging the OWNER'S responsibilities includes but is not restricted to:

- Ensuring the instructions in this manual are understood and followed at all times.
- Ensuring installation of the VELOX MCC is carried out by appropriately qualified personnel.
- Ensuring all maintenance and inspection of the VELOX MCC is carried out by appropriately qualified personnel.
- Ensuring this document is kept in a safe location where it is easily accessible. It is an essential part of the VELOX MCC system.

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1. General Information

Turbo Power Systems Limited (TPS) operates an integrated Business Management System which includes Health & Safety, Environmental & Quality Management. TPS complies with ISO 45001:2018, ISO 9001: 2015 and ISO / TS 22163:2017.

1.1. Product Support Contact Information

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You can contact the Turbo Power Systems Customer Support Team via the following means:

 customersupport@turbopowersystems.com

 +44 (0) 191 482 9227

 +44 780 9656 709

 Monday to Friday (excluding bank holidays): 08:00 to 21:00 GMT*

*Additional support may be available outside these hours. For further details, please refer to your contract / service level agreement.

 www.turbopowersystems.com

Before contacting TPS, please ensure you have the serial number of your VELOX MCC to hand. Details of where to find the serial number are in section 3.3 of this manual. The serial number must be quoted in all communications with TPS.

1.2. Language

The original language of the document is English. All other language versions are translations of the original instructions.

1.3. Acronyms and Abbreviations

AC	Alternating Current
DC	Direct Current
DC-DC	DC-DC converter
DGI	Distribution Grid Inverter
DTR	Distribution Transformer Rectifier
EV	Electric Vehicle
EVC	Electric Vehicle Charger
HMI	Human Machine Interface
IT	Information Technology
kW	Kilowatt
MCC	Megawatt Charging Cabinet
MCS	Megawatt Charging System
OWNER	The Person who retains the title of the goods
PCB	Printed Circuit Board
PE	Protective Earth
PV	Photovoltaics
SiC	Silicon Carbide
SWL	Safe Working Load
TPS	Turbo Power Systems
USER	The person who uses the equipment for its intended purpose of creating the DC Microgrid
V2G	Vehicle to Grid
V2X	Vehicle to Everything

1.4. Figures

It is not always possible or practical to show the exact configuration of your VELOX MCC. Any figures used within this document are indicative and are for instruction and description purposes only.

2. Safety

2.1. Safe Working Practices

<h1>WARNING</h1>
1. Only suitably trained and authorised personnel should be allowed to work on this VELOX MCC.
2. This VELOX MCC uses high voltage: all possible steps must be taken to maintain safety of the personnel and any staff working near the unit at all times.
3. Once the installation is completed, under no circumstance should the doors be opened unless undertaken by either TPS or an approved / trained person.

2.2. Precautionary Notices

	WARNING! RISK OF ELECTROCUTION	Indicates an operation, sequence, or function that, if not followed, may cause electrocution or death to personnel and/or serious damage to equipment. Strictly adhere to all warnings.
	WARNING! RISK OF INJURY	Indicates an operation, sequence, or function that, if not followed, may cause serious injury or death to personnel and/or serious damage to equipment. Strictly adhere to all warnings.
	CAUTION! RISK OF DAMAGE TO EQUIPMENT	Indicates an operation, sequence, or function that, if not followed, may cause damage or malfunction of equipment.
	ATTENTION! OBSERVE PRECAUTIONS FOR HANDLING	This unit contains Electrostatic Sensitive Devices (ESD). DO NOT TOUCH any electrical components without Anti-Static Precautions.
	WARNING! RISK OF TIPPING	Indicates an operation, sequence, or function that, if not followed, may cause the unit to tip over and cause serious injury or death to personnel and/or serious damage to equipment. Strictly adhere to all warnings.
	NOTE	Provides additional explanatory information that may not be readily apparent from the text or illustrations.

2.3. Safety Precautions to consider when working on the VELOX MCC.

This chapter contains a list of general safety precautions. Before attempting any tasks, read and understand these precautions. Failure to do so can result in death or serious injury to individuals or damage to equipment. If in doubt regarding any of these precautions, ask for an explanation from your immediate supervisor before proceeding with any installation or maintenance task.

WARNING:

- High Risk of electrocution in this VELOX MCC if doors are opened.
- Lethal AC and DC Voltages are present within this VELOX MCC when it is not isolated.
- Should the doors need to be opened by either TPS or an approved / trained person, all supplies must be isolated and allow a minimum of 5 minutes to discharge.



2.4. Safety Precautions during Installation, Operation and Maintenance

- Attention must be given to all precautionary notices explained in this section.
- Do not attempt to operate the VELOX MCC if there is visible damage, or the unit is displaying a fault.
- Please report any faults and or damage to the VELOX MCC immediately to the OWNER.
- Never apply power to the VELOX MCC without the doors closed.
- Always use the VELOX MCC as described.
- The VELOX MCC should always be installed to allow access and good ventilation, especially to the rear of the unit.
- Do not place any objects which could block the vents. See Appendix A1 – VELOX MCC – OUTLINE of this manual for required clearances for ventilation and access.
- Do not install the VELOX MCC close to any heat sources.
- If in doubt refer to the installation drawing shown in Appendix A1 – VELOX MCC – OUTLINE, with the link to the latest version, which will contain the latest information.
- When performing maintenance operations, it is of the utmost importance that only one DC-DC module is withdrawn at any one time to ensure the stability of the VELOX MCC unit is maintained.

REPORT ANY PROBLEMS, ISSUES & CONCERNS IMMEDIATELY TO THE OWNER AND TPS

2.5. Disclaimer

The manufacturer (TPS) is not liable for any damages, losses, costs, expenses, or injuries incurred by any USER of the VELOX MCC, if such damages, losses, costs, expenses, or injuries occur as a result of failure to comply with all the instructions contained in this manual. This includes but is not limited to the following:

- Any damage or injury caused as a result of power outages or disruptions to the electrical supply of the VELOX MCC.
- Any damage resulting from accumulation of dirt or ingress of foreign substances within the VELOX MCC
- Any damage resulting from corrosion of component parts.
- Any damage resulting from any unauthorised upgrades, enhancements or modifications to the equipment or its use.
- Any damage to the software or hardware due to any IT security problem (i.e. virus breakout, malicious hacking of the system, etc.
- Any damage or failure caused by vermin, insect infestations or the like.
- Any damage or failure resulting from faults in some other equipment connected to the scope of work.
- Any damage, injury or loss caused by hazards such as fire, flood, storm or the like, spillage or leakage of chemicals or harmful substances into the VELOX MCC.
- Any damage resulting from an external source, unprofessional, incorrect, or non-compliant installation.
- Any damage, injury or loss resulting from improper operation, negligence or unauthorised repairs by third parties.
- Any damage or injury caused by failure to comply with all safety instructions or legal standards by users of the equipment.
- Any damage caused by insufficient ventilation of the VELOX MCC.
- Any damage resulting from operation of the VELOX MCC outside of its design conditions.

2.6. Warranty

As per the Supply of Goods and Services agreement between TPS and the OWNER, the goods supplied, and all products supplied shall:

- Conform to the configuration specified and technical data, contained within section 3.2
- Be of satisfactory quality and fit for any functionality and purpose set out in the configuration specified and technical data, contained within section 3.2
- Be free from defects in design, material and workmanship and remain so for the contract specified period after delivery to the OWNER.

3. Product Information

3.1. Functionality

The TPS VELOX MCC is a dedicated device for the distribution of 800 V DC to be used in a local DC Microgrid for EV Charging, while integrating localised energy storage (BESS) and localised energy generation (Solar PV or Wind).

The VELOX MCC has been designed and tested in accordance with international standards EN 62477-1 for Electrical Safety, and to IEC 61000-6-4, IEC 61000-6-2, IEC 61000-3-12 for EMC.

As illustrated in Figure 1, a TPS VELOX MCC connects to the 11kV AC grid supply via a TPS POTENZA Distribution Transformer Rectifier (DTR) or a POTENZA Distribution Grid Inverter (DGI) which converts the AC grid supply to a regulated 800 VDC bus. The POTENZA DTR / DGI will constantly monitor and maintain this 800 VDC nominal level enabling the establishment of a DC Microgrid.

The VELOX MCC is designed for continuously rated operation.

As also illustrated in Figure 1, EV Charging, Battery storage and on-site generation, for example solar PV, can be connected to the DC Microgrid via their own DC-DC conversion stage. This allows for Bi-Directional power transfer to occur within the DC Microgrid. TPS calls this system SMART FLEET.

Where specified, TPS own EVCs connect to this 800V DC bus via a DC Interface Unit within the VELOX MCC. The EVCs contain a 150kW bi-directional DC-DC converter which controls the charge to an electric vehicle whilst providing V2G/V2X vehicle discharging capability.

An Energy Management System (EMS) controls power transfer between all connected elements within the DC Microgrid. It will ensure power is always drawn from battery storage and/or solar energy, when available, at times of peak grid electricity tariff.

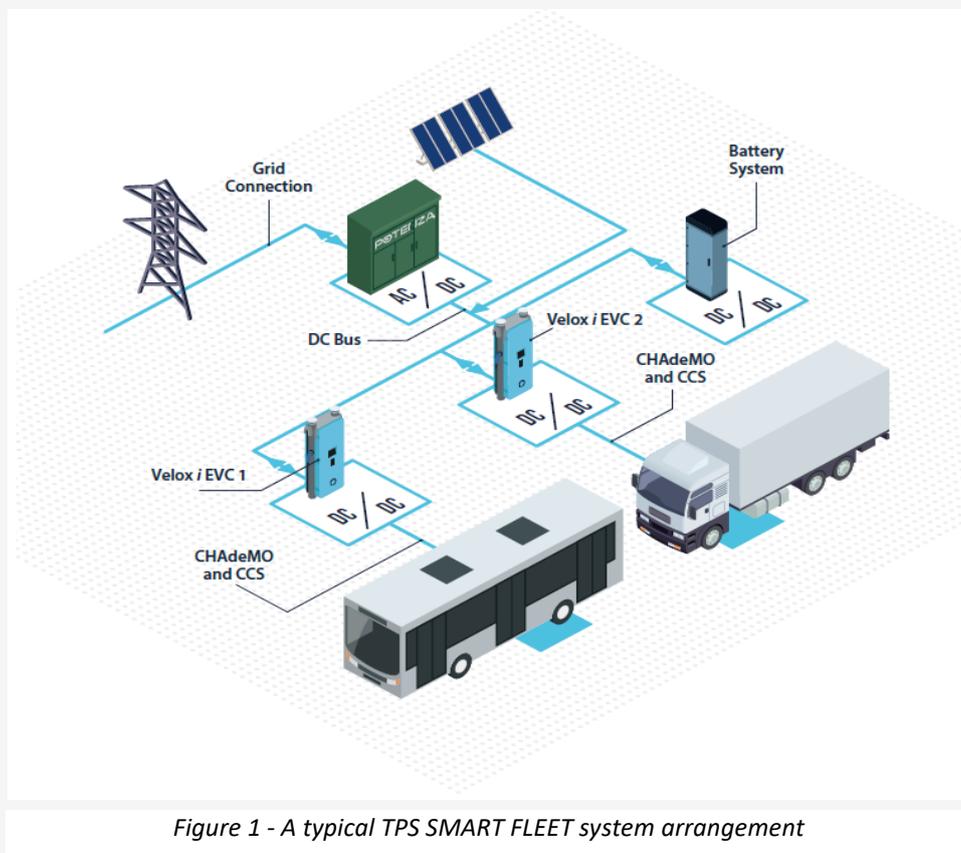


Figure 1 - A typical TPS SMART FLEET system arrangement

Technical Overview

The VELOX MCC uses a series of DCDC stacks to carry out power conversion and distribution to form a DC Microgrid. This device is unable to import or export power from the Power Grid directly; it relies on the POTENZA DTR / DGI to make this operation possible. As a result, the VELOX MCC can perform the following functions:

- Distribution and dynamic management of a DC Microgrid
- High efficiency
- Near silent operation
- The EMC measures of this product meet the interference voltage limits Class A ≤ 20 kVA (IEC 61851-21-2:2018). The VELOX MCC is designed for Type A (industrial) environments. Use in Type B environments (residential, commercial, and small businesses) may result in undesirable electromagnetic interference.

3.2. Technical Data

VELOX MCC	
TECHNICAL DATA	
Electrical	
Rated DC power	1,200 kW with MCC cable and suitable vehicle
Rated DC Input Voltage	800 V
Max AC voltage (Aux supply)	120V AC 50/60 Hz
Max AC current	3A
Rated DC Output Voltage	150 - 1,250 V
Max Output DC Current	1,600 A
DC-DC efficiency	> 97 %
Overall System Efficiency	> 94 % default (fully controllable)
Max. total harm distortion @rated power	NA
User	
User display	HMI
Communication interface	Mod Bus / TCP
Operating modes available	G2V / DC Microgrid import
General	
Dimensions	3,500 (W) x 1,400 (D) x 1,850 (H) mm
Weight	2,900 kg
Ingress Protection Rating	IP 54 / NEMA 3 R
Operating temperature range	-30 °C to +50 °C
Storage temperature range	-40 °C to +60 °C
Humidity	< 95% non-condensing
Certificates, standards, directives	IEC 61851, NFPA 70, UL 508A, UL2202, UL 8240, IEE 519

PLEASE NOTE: The above ambient temp max will not trip the unit. Only if there is a failure in any of the components will the unit trip.

3.3. General Arrangement of the VELOX MCC

PLEASE NOTE: The rating plate is located on left-side face. Always quote the unit serial number when contacting the TPS Product Support Team.



Figure 2 – VELOX MCC

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TURBO POWER SYSTEMS

MEGAWATT CHARGING CABINET

TPS Part No.	151163	Serial No.	
Rated Power	1.2 MW	Manufacturing Date (MM / YYYY)	
Input Voltage	800 Vdc	Weight (Kg)	
Output Voltage Range	150 Vdc - 1250 Vdc	Cooling	Forced Air
Rated Output Current Configuration DC	800 X 200 A	Operating Temperature	-30°C to +50°C
	4 X 400 A	Ingress Protection	IP54 / NEMA 3R
	2 X 600 A, 1 X 400 A	Max AC Voltage	120 VAC, Single Phase, 50/60 Hz
	2 X 600 A, 2 X 200 A	Max AC Current	3 A
	2 X 800 A	IEC Compliance	IEC 61851
	1 X 1600 A	Designed to UL	Awaiting Formal Certification
Dynamic Allocation			

Mod Strike Record

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"Powering Intelligent Solutions"

Figure 3 -VELOX MCC Data Plate

3.4. Storage

3.4.1. General Storage

- The VELOX MCC must be transported and stored in its original packaging. TPS is not liable for any damage incurred when the VELOX MCC is stored or transported in non-TPS packaging.
- It must be stored out of direct sunlight in a dry environment.
- Always disconnect the input power before removing the VELOX MCC for storage or transport.
- Always transport the VELOX MCC in the upright position.
- Always lift the VELOX MCC crate from the base using a suitable forklift truck.

3.4.2. Longer Term Storage

If the VELOX MCC is switched off for a period exceeding 6 months, an inspection will be needed before it can be switched back on. This must be carried out by TPS or an approved / trained person. Please contact your TPS Product Support Team. Details are provided in section 1.1.

3.5. Packaging

3.5.1. MCC

For Domestic destinations (inside the UK), the VELOX MCC is shipped without a pallet or packaging. It is wrapped to give protection from the weather and lifted using the forklift pockets. The VELOX MCC must be kept upright at all times. Care must be taken when removing the protective wrapping to avoid damage to the VELOX MCC.

For export destinations (outside of the UK), the VELOX MCC is fixed to a mounting plinth, which is then locked onto a pallet. This is encapsulated with a foil bag to prevent moisture ingress, before being enclosed by a bespoke wooden crate. This crate must be always kept upright. Care must be taken when removing the crate to avoid damage to the contents.

The approximate dimensions and weight of the packaged VELOX MCC are below:

Height	1,850 mm / 72.8 inches
Width	3,500 mm / 137.8 inches
Depth	1,400 mm / 55.1 inches
Weight	3,100 kg / 4,630 lbs with packing crate 2,900 kg without

4. Installation

PLEASE NOTE: The VELOX MCC must only be installed by TPS or a qualified Installation Engineer.

The qualified Installation Engineer must:

- Have a full working knowledge of the VELOX MCC and its safe installation.
- Be qualified according to the applicable local rules to do the work e.g. in the UK, BS 7671 18th Edition, in the USA, NFPA 70, National Electrical Code (NEC).
- Comply with the instructions contained in this manual.

4.1. Tools required to install and maintain the VELOX MCC

This is a non-exhaustive quick reference list of the essential tools required to carry out the key elements of the installation:

- Electrical cable preparation tools to prepare the cables for the AC and DC connections.
- Torque wrench, range 4.5-30 Nm.
- 5mm AF allen key driver for the PowerSafe termination of the 3P conductors.
- 6mm AF allen key driver for the attachment of the DC and PE conductors.

4.2. Preparing the foundation

TPS cannot advise on individual installations, however the following recommendations should be followed to ensure proper functioning of the VELOX MCC, and compliance with equipment warranty requirements. If there is any doubt, please contact your TPS Product Support Team, details are provided in section 1.1.

The VELOX MCC must be mounted on a firm and level surface. Ideally this should be a concrete foundation of suitable strength to withstand the static weight of the VELOX MCC and any loading imposed by wind or weather. Precautions should be taken to prevent damage from impact or collision. Mounting details can be found on the Appendix A1 – VELOX MCC - OUTLINE. The cable bending radius must be allowed for in any underground routing. It will be of great advantage if the cables are left with at least 2m of length above the foundation mounting face.

4.3. Mechanical Installation of the VELOX MCC

The location of the VELOX MCC and-if specified-any connected elements, must conform to the following requirements. Prior to final positioning of the cabinets check settings and necessary clearances relative to each other. The distances shown below are minimum recommendations.

Rear Air-Out
1500mm



Front Air-In
1500mm

Figure 4 - Clearance zones

See Appendix A1 – VELOX MCC - OUTLINE for the latest information relating the installation and details of recommended clearance zones for the safe operation and maintenance of the units.

4.4. Unpacking the VELOX MCC



The following information shows the procedure to unpack units which are contained within a wooden crate. This is the typical packaging arrangement for export units shipped by sea. For domestic destinations, the units will not be packaged in crates but will be shipped in covered transport. In these cases, please make reference to section 4.5 Lifting and positioning the VELOX MCC for details on lifting and positioning of the MCC.

Before attempting to unpack the VELOX MCC perform a check of the transport indicators. There are 2 types of indicators fitted: one to record shock, the other to record tilt. If either of these has been triggered, they will show a **RED** signal.



Figure 5 – Typical Packaging Crate & Indicators

If either indicator is showing a red signal, a record of this must be made on the delivery paperwork. Next, inspect the packaging fully. If there is any visible damage, pause the unpacking process until the carrier can attend to make a full inspection and witness the rest of the unpacking process.

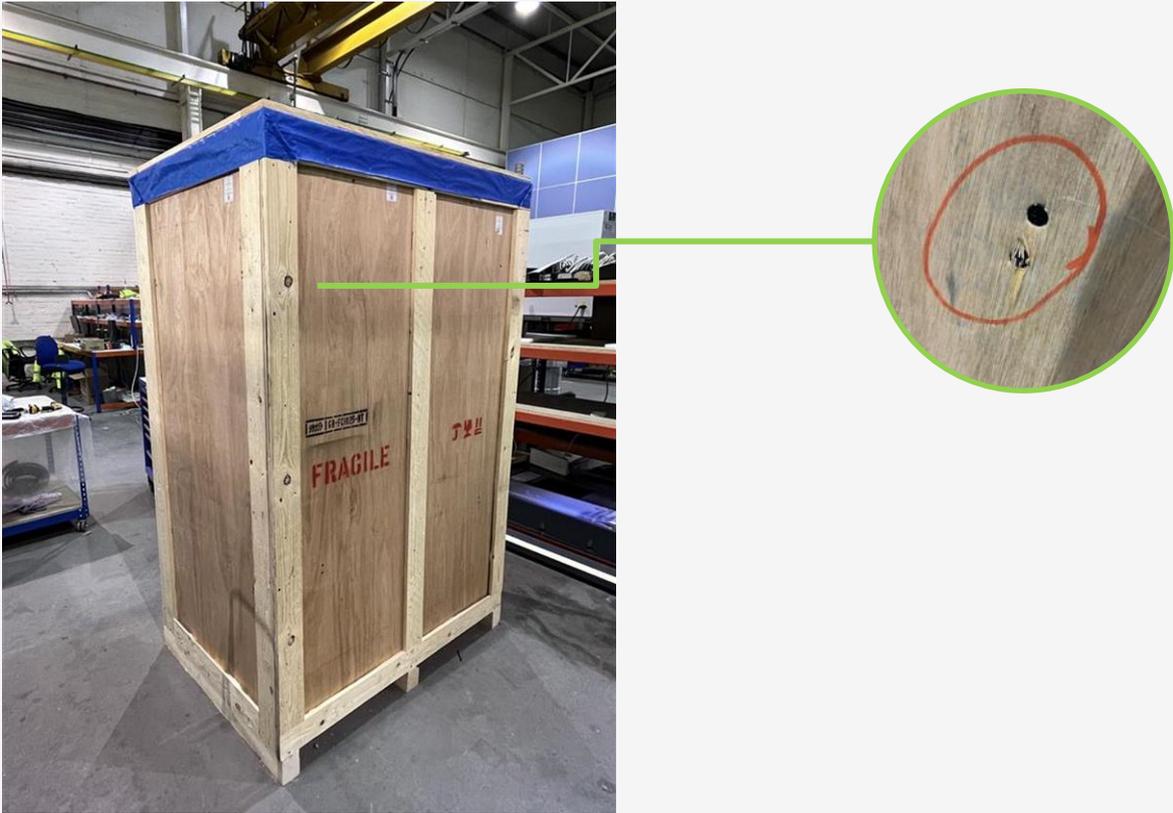


Figure 6 – Typical Packed Unit

A typical packing crate is shown above. To help with removal, the main screws are circled with a **RED** marker pen as shown. For details of the construction of the packing crate, and how it can be disassembled for unpacking please refer to the latest version of the drawing here: Appendix D - Packing.

Disassembly is the opposite of assembly. Always remove the top panel first. If there is a protective foil bag surrounding the VELOX MCC it will have been sealed during packing to protect the unit from moisture. This should still be intact. Carefully cut the foil bag open to remove it.

If the VELOX MCC is found to be damaged in any way following removal of the external packaging, **STOP** immediately. Inform OWNER and TPS urgently, taking and sharing photographs to indicate the areas and severity of any damage. See section 1.1 for contact details. YOU will be informed of the next steps.

If there is no visible damage, proceed as below.

4.5. Lifting and positioning the VELOX MCC



The VELOX MCC must be lifted from the base with a Forklift Truck. Only lifting equipment suitable for a SWL of 2100 kg / 4630 lbs must be used. It is the responsibility of the OWNER to ensure that all lifting and handling operations are carried out in a safe manner and are compliant with any local regulations.

Please refer to the following steps for information on lifting. Please also pay particular attention to any Health and Safety requirements which may apply (e.g. working at height, selection and use of appropriate lifting equipment, use of appropriate PPE etc).



Figure 7 - Lifting Locations

1. Lift the VELOX MCC into position locating the unit in relation to the AC cables.
2. Fix the VELOX MCC directly to the concrete foundation using suitable fixings.
3. Align the VELOX MCC tightening all fixings to recommended torques.

See Appendix A1 – VELOX MCC - OUTLINE for the latest information relating to installation.

4.6. Electrical Installation of the VELOX MCC

The information provided in this section is for guidance only, for the latest details on the Electrical Installation please refer to TPS drawing number 002792-outline VELOX MCC in Appendix A1 – VELOX MCC - OUTLINE. This drawing contains dimensions and details relating to this installation. The VELOX MCC electrical supply must be delivered via a suitable, lockable isolation box supplied by the Owner.

The Top-Level electrical connection information can be found on the latest version of drawing 375-050 Fleet Charging Megawatt DCFC in Appendix A2 – VELOX MCC – Electrical connections.

4.6.1. Cable Entry Points



The MCC DC input cables connect as shown in the following sections. Due to the nature of the system, the connection details are very complex and all cables must be routed and connected with care.

4.6.2. Internal Termination Details

To make the internal electrical connections, the gland plates will have to be removed. The location of the gland plate is shown in Figs 8-12.

Prior to undertaking any connection work, ensure the VELOX MCC is fully electrically isolated.

All power cables must be cut to a suitable length and terminated in an approved manner using the correct tooling. Use the following information as a guide.

4.6.3. Connection of 3P 415VAC Aux Cables and PE to the VELOX MCC

The connectors used for the 3P 415V AC inputs are standard crimp terminals with 8mm Dia fixings.

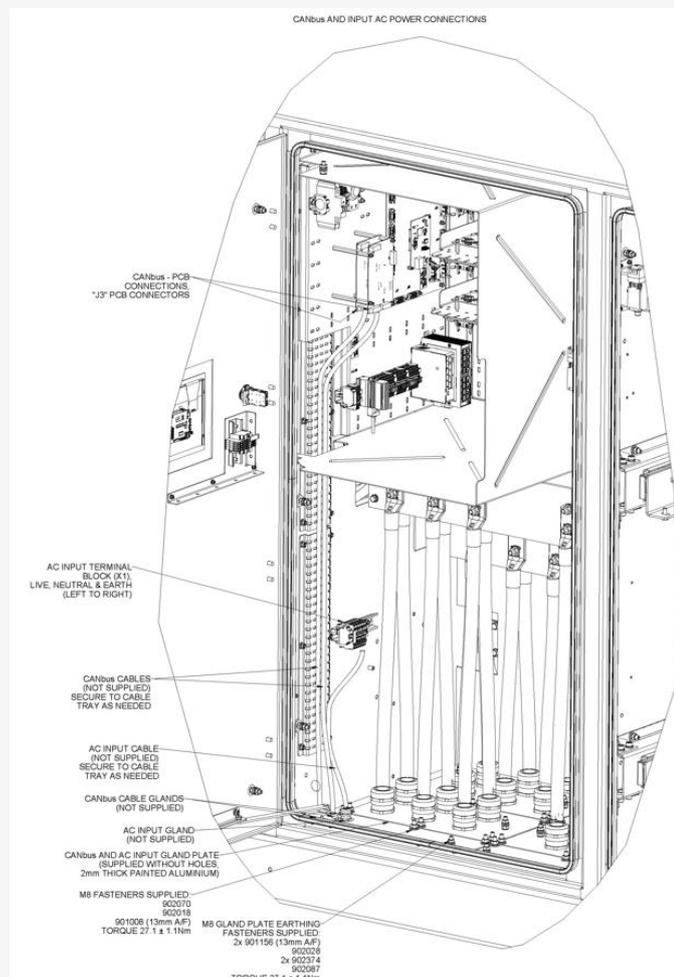


Figure 8- Communication and AC input connections

4.7. Electrical Installation of the VELOX MCC DC cables

4.7.1. Cable Entry Points

The VELOX MCC DC input cables connect as shown below:

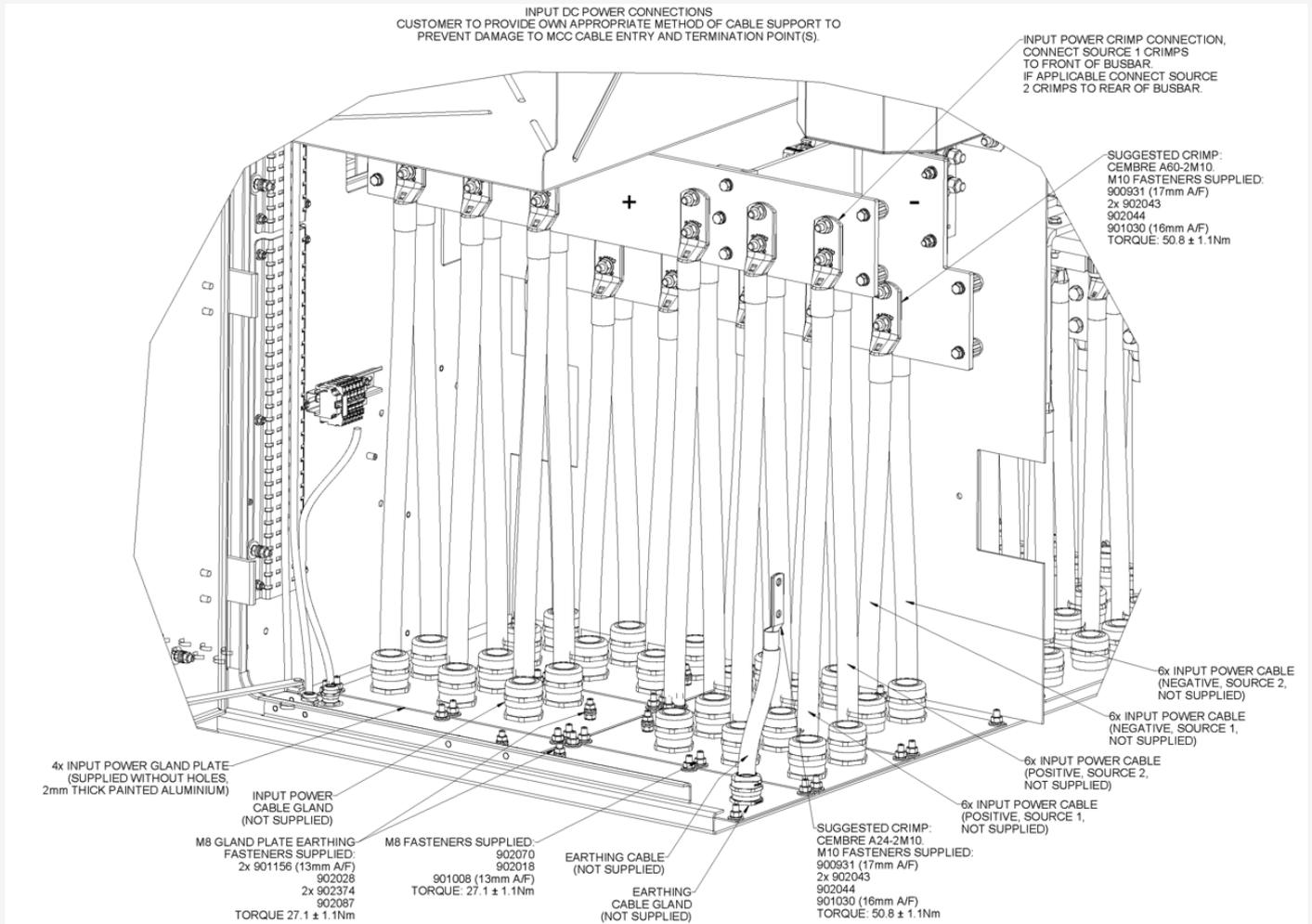


Figure 9 - 800VDC Positive and Negative input cables

The DC Interface Unit input cables connect into it from below through a gland plate as shown.

4.7.2. Internal Termination Details

To make the internal electrical connections, the VELOX MCC's doors will have to be opened.

Prior to undertaking any connection work, ensure the VELOX MCC is fully electrically isolated.

All power cables must be cut to a suitable length and terminated in an approved manner using the correct tooling. Use the following information as a guide, and reference to the suggested fixing torques.

4.7.3. Connection of the DC supply cables out of the VELOX MCC DC Interface Unit

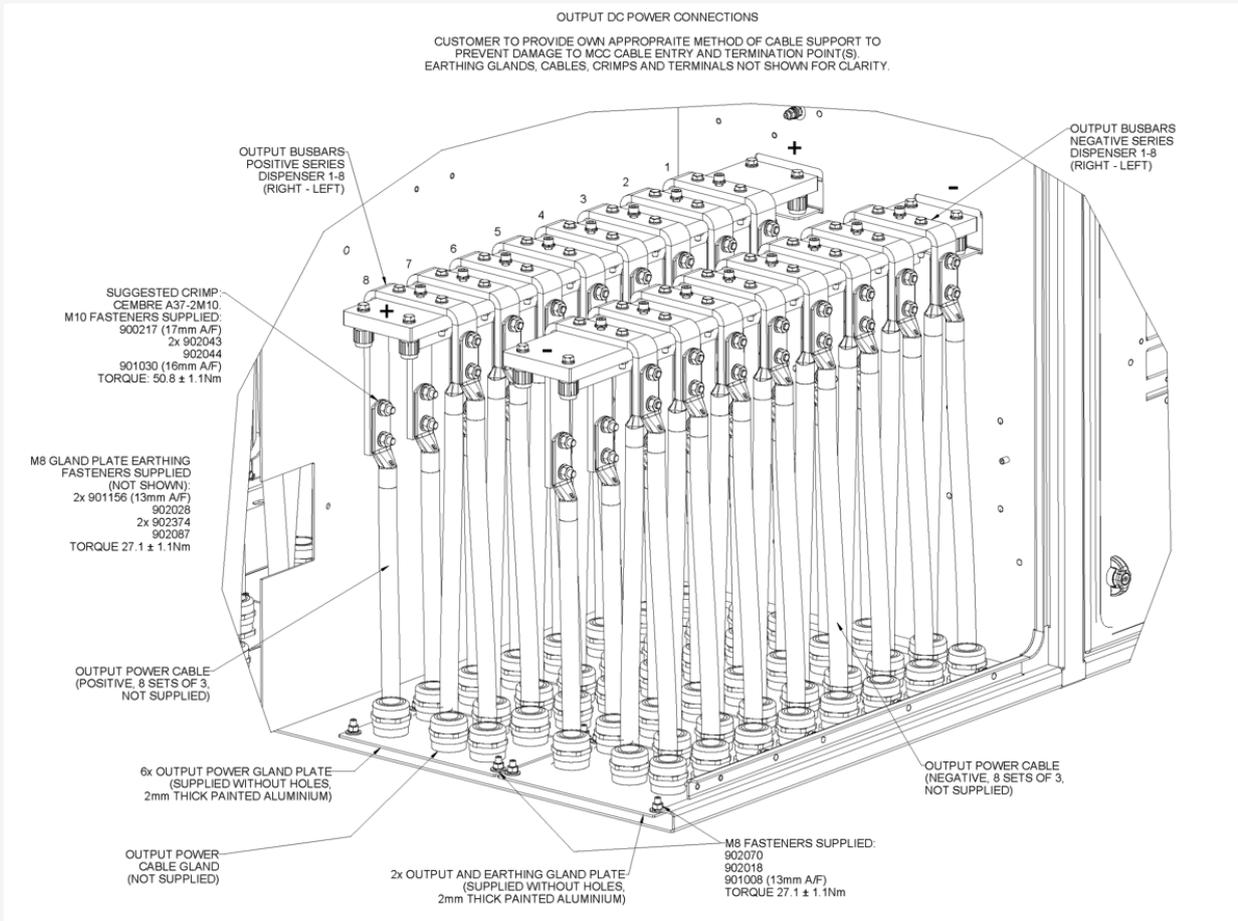


Figure 10- 800VDC Positive (+) and Negative (-) terminals for output cables

The required fixings will be fitted to the attachment points. M10 Lug crimps to suit the DC and PE conductors will be required. Using a 6mm Allen Key driver and torque wrench, tighten the fixings to 10.5Nm. **DO NOT OVERTIGHTEN!**

4.7.4. Connection of Communications

Depending upon specification, there may be a requirement to connect an ethernet communications and a Can-Bus cable to the MCC. These should be connected to the connection points shown below.

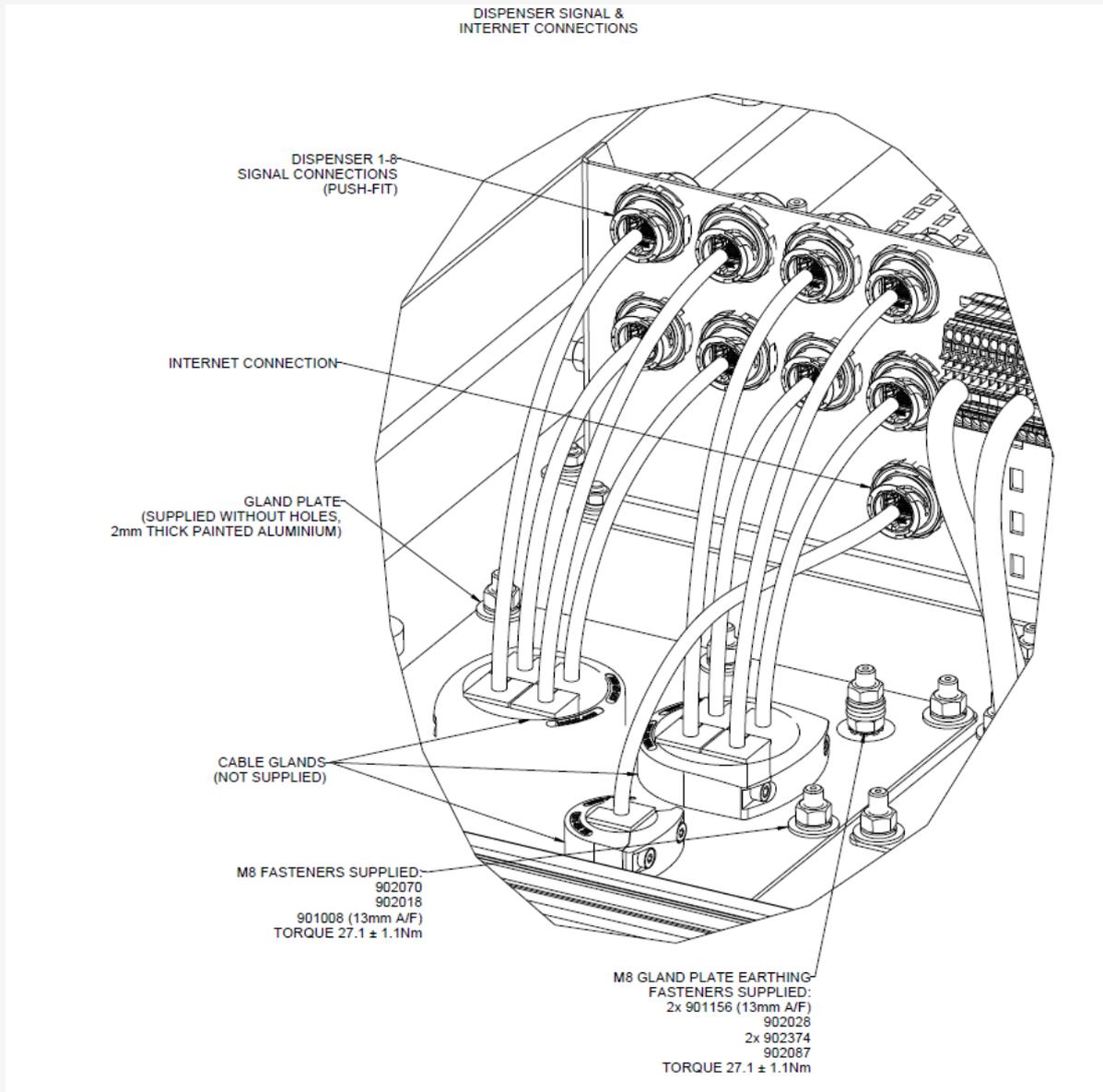


Figure 11 – Signal and Internet connections

4.7.5. Connection of PE cables

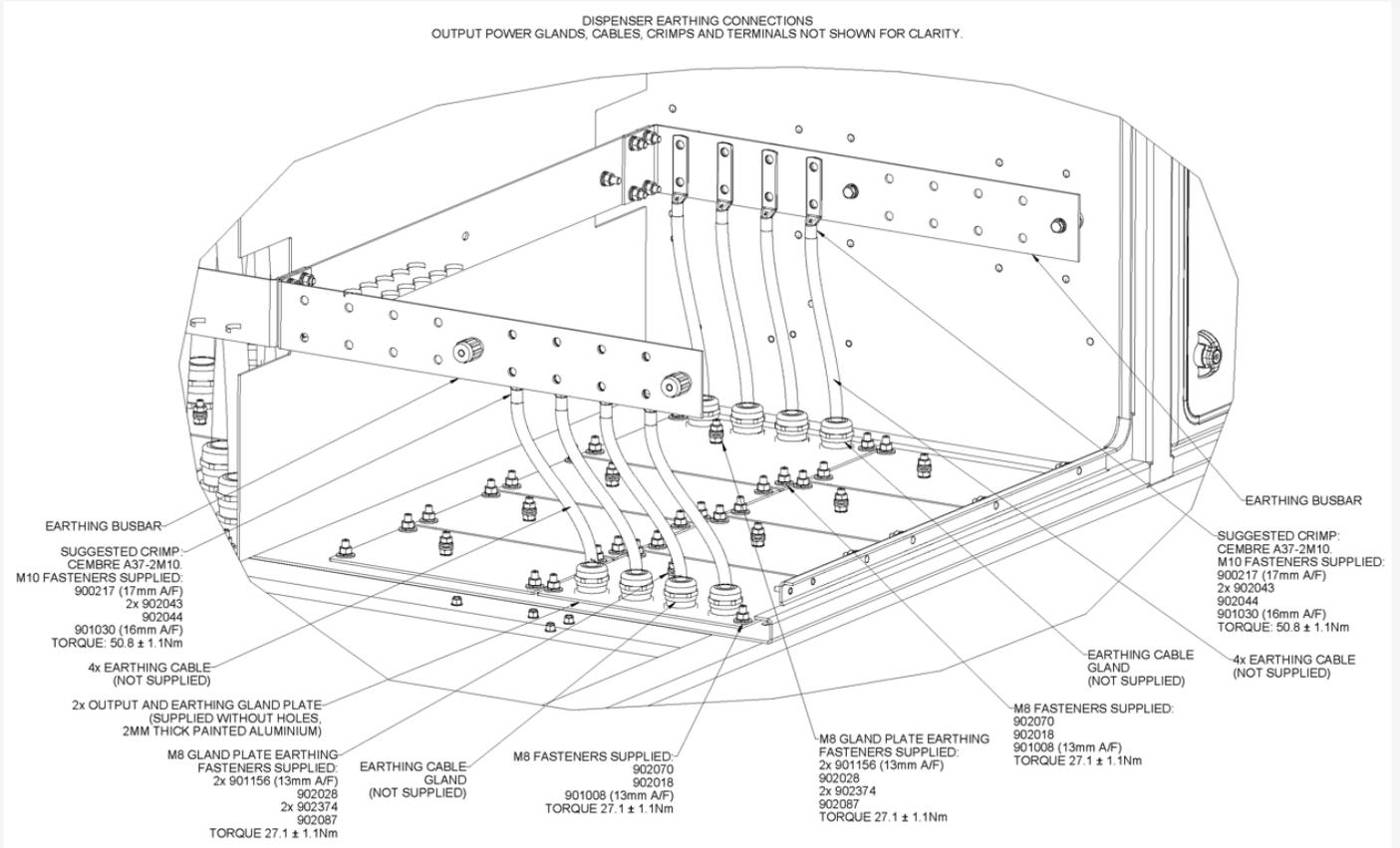


Figure 12- Connection of PE cables

The required fixings will be fitted to the attachment points. M10 Lug crimps to suit the DC and PE conductors will be required. Using a 6mm Allen Key driver and torque wrench, tighten the fixings to 10.5Nm. **DO NOT OVERTIGHTEN!**

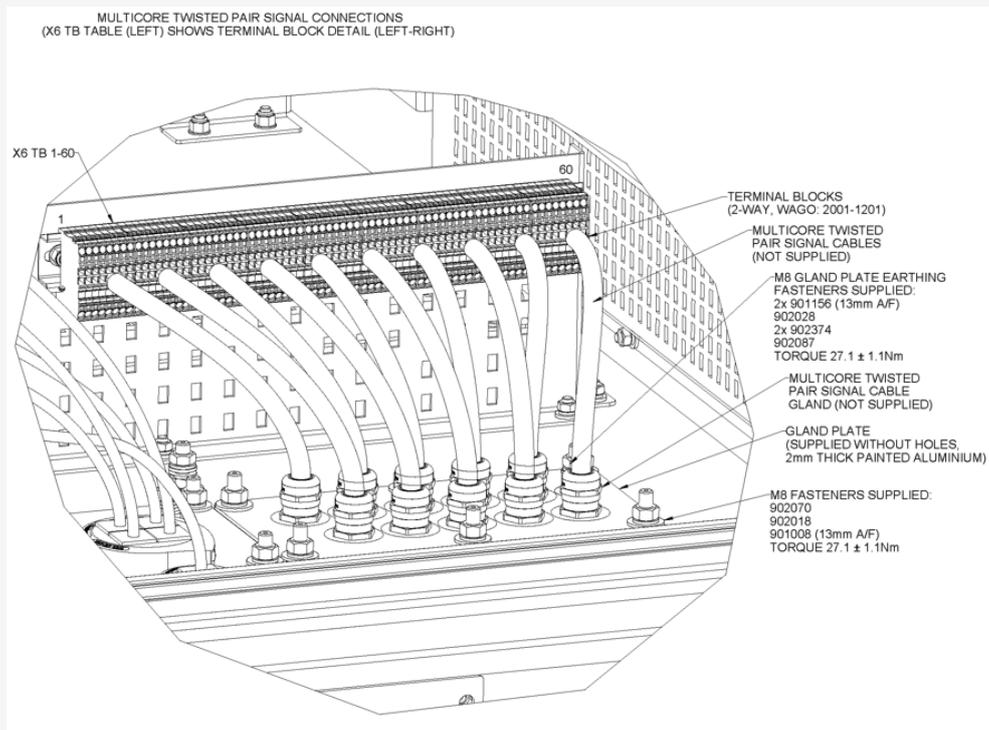


Figure 13 - Multicore signal cables making the interlock loop

DESCRIPTION	GROUPING	X8 TB	Destination
EXT E-STOP-OUT		1	Door interlock 6 NC1
EXT E-STOP-IN		2	E-stop
CONT_ENB1		3	X6-3
CONT_ENB2		4	X6-4
SFT RLY 1	DISPENSER 1	5	X6-5
SFT RLY 2		6	X6-6
E_STOP_IN		7	X6-7
E_STOP_OUT		8	X6-8
CONT_ENB1		9	X6-9
CONT_ENB2		10	X6-10
SFT RLY 1	DISPENSER 2	11	X6-11
SFT RLY 2		12	X6-12
E_STOP_IN		13	X6-13
E_STOP_OUT		14	X6-14
CONT_ENB1		15	X6-15
CONT_ENB2		16	X6-16
SFT RLY 1	DISPENSER 3	17	X6-17
SFT RLY 2		18	X6-18
E_STOP_IN		19	X6-19
E_STOP_OUT		20	X6-20
CONT_ENB1		21	X6-21
CONT_ENB2		22	X6-22
SFT RLY 1	DISPENSER 4	23	X6-23
SFT RLY 2		24	X6-24
E_STOP_IN		25	X6-25
E_STOP_OUT		26	X6-26
CONT_ENB1		27	X6-27
CONT_ENB2		28	X6-28
SFT RLY 1	DISPENSER 5	29	X6-29
SFT RLY 2		30	X6-30
E_STOP_IN		31	X6-31
E_STOP_OUT		32	X6-32
CONT_ENB1		33	X6-33
CONT_ENB2		34	X6-34
SFT RLY 1	DISPENSER 6	35	X6-35
SFT RLY 2		36	X6-36
E_STOP_IN		37	X6-37
E_STOP_OUT		38	X6-38
CONT_ENB1		39	X6-39
CONT_ENB2		40	X6-40
SFT RLY 1	DISPENSER 7	41	X6-41
SFT RLY 2		42	X6-42
E_STOP_IN		43	X6-43
E_STOP_OUT		44	X6-44
CONT_ENB1		45	X6-45
CONT_ENB2		46	X6-46
SFT RLY 1	DISPENSER 8	47	X6-47
SFT RLY 2		48	X6-48
E_STOP_IN		49	X6-49
E_STOP_OUT		50	X6-50
SFT RLY 1		51	X6-53
SFT RLY 2	TX REC	52	X6-54
E_STOP_IN		53	X6-51
E_STOP_OUT		54	X6-52
EXT LOOP OUT			55
XET LOOP IN	EXTERNAL LOOP 1	56	X6-56
EXT LOOP OUT		57	X6-57
XET LOOP IN	EXTERNAL LOOP 2	58	X6-58
EXT RELAY +		59	X6-59
XET RELAY -	EXTERNAL RELAY	60	X6-60

Figure 14 - Multicore signal cable connection references

5. Commissioning and Operation



Please note: Commissioning can only take place once the installation stage has been completed correctly and in full.

The commissioning of the VELOX MCC is a detailed and complex process which must only be undertaken by either TPS or an approved / trained person.

To arrange commissioning, or if your VELOX MCC needs to be relocated or decommissioned, please contact your TPS Product Support Team. Details are provided in section 1.1.

5.1. VELOX MCC Operation

The stand-alone VELOX MCC is simple to operate. It is switched on by energising the main isolator for the 12kV incoming supply after first ensuring that the internal MCB's are not tripped and the E Stops are unlocked. The RED STATUS LED will illuminate to indicate that mains power is present. If an integrated DC Interface Unit is fitted, ensure the DC isolators within it are in the OFF position before starting the above procedure. The RED STATUS LED on the MCC will illuminate to indicate that mains power is present.

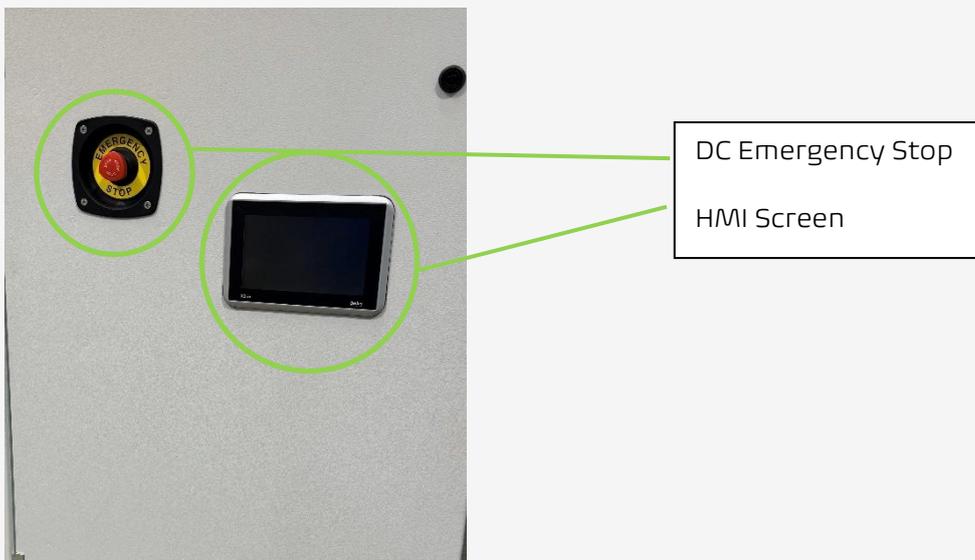


Figure 15 - Detail of DC Isolation Box lower door

5.1.1. Safety interlock loop

The dispenser, together with all other components in the system, contain safety devices. These are a door interlock switch, an Emergency (E) Stop and a safety relay.

The door switch and the E Stop switch are wired in series with 24V DC to the Supervisor PCB. Likewise, the safety relay is also wired with 24V DC to form a loop to and from the supervisor PCB. Each component that is added into the system is wired in series with its predecessor and simply extends the loop of the safety interlocks and safety relays.

When any of the safety interlock devices is activated, all components will be powered down by the supervisor card.

Drawing 375-050 details all the connections which are required, the latest version can be found here Appendix A3 – 375-050 Top Level System Diagram. The last dispenser will need the cables connecting to complete the loop.

The mode of operation of the safety interlock devices is as follows:

- If an E Stop Button is pressed or a door is opened (safety interlock loop broken) when the unit is off, you can still run, with the warning notification.
- If either of the above happens whilst running, a power cycle is required of the system as the fault will remain latched even if the condition is removed / resolved (as it is assumed an investigation needs to take place.)

5.2. Safety Precautions during Installation, Operation and Maintenance

- Attention must be paid to all precautionary notices explained in this section.
- Do not attempt to operate the VELOX MCC if there is visible damage or it is displaying a fault.
- Please report any faults and or damage to the VELOX MCC immediately to the OWNER.
- Never apply power to the VELOX MCC without the covers in place.
- Always use the VELOX MCC as described.
- Do not install the VELOX MCC close to any heat sources.
- If in doubt refer to the installation drawing shown in Appendix A1 – VELOX MCC - OUTLINE, with the link to the latest version, which will contain the latest information.

REPORT ANY PROBLEMS, ISSUES AND CONCERNS IMMEDIATELY TO THE OWNER AND TPS

6. Preventative Maintenance and Inspection Information

PLEASE NOTE: the VELOX MCC contains no USER serviceable components. All repairs and maintenance can only be carried out by either TPS or an approved / trained representative. Please refer to customer contractual agreements for specific details.

However, there are a number of preventative maintenance and inspection activities which can be carried out by the USER.

TPS recommends that all preventative maintenance and inspection activities should be recorded with a date using the form provided in Appendix A3 – 375-050 Top Level System Diagram Indicative information only. Dimensions may be subject to change. Latest version can be found here:

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

Appendix B - Installation Checklist Document.

The schedule of activities and frequency is shown below. Please use this for reference before completing the record form in Appendix C - Maintenance & Inspection Record.

Ref No.	Equipment Part No. / Description	Interval (Months)	Type of Inspection
6.1	Cleaning the Exterior of the VELOX MCC	3	Visual and clean
6.2	Air Ducts	3	Visual / clean as required
6.3	Enclosure and Doors	6	Visual
6.4	LED	12	Visual
6.5	HMI	12	Visual
6.6	E Stop Button Safety Interlock System	12	Visual and Test

6.1. Cleaning the exterior of the VELOX MCC



When cleaning the exterior, do not use high pressure water jets (pressure washer or steam cleaner) as there is a risk water can leak into the interior and cause serious damage to internal components and / or potentially electrocution to persons.

1. Rinse with low pressure tap water to remove rough or loose dirt.
2. Apply a mild detergent-based cleaning solution if required and let it soak.
3. Manually remove dirt with a non-abrasive tool such as a sponge or brush.
4. Rinse with low pressure tap water.

If there are any visible defects, corrosion, or damage; this should be reported to the OWNER of the VELOX MCC

6.2. Air Ducts and Vents

Locate all ducts using the image below as a guide. Ensure that all vents are free from debris such as leaves or rubbish.

6.3. Enclosure and Doors

Locate all doors using the image below as a guide. Ensure that all doors are free to move and that the locks work. **Doors should be kept locked at all times!**

6.4. LEDs

Locate Status LED... make sure it is clean and damage free.



Figure 17 - Detail of optional HMI panel

HMI

6.5. HMI

Locate the HMI. It will be

Figure 16 – VELOX MCC external component identification



Ensure the display is working, it will be displaying the status of the VELOX MCC

6.6. E Stop Button

Locate the E Stop Button on the side of the VELOX Dispenser.

At least once every 12 months perform a full power down cycle of the VELOX Dispenser. This can only be implemented by the authorised Site Engineer as part of a planned maintenance procedure. (This procedure may have implications on the protection system of the MV supply).

7. Trouble shooting

The table below shows a list of faults that may arise and actions that will help with troubleshooting. If they do not, please contact TPS for support. Refer to section 1.1 for details on how to do this.

7.1. Fault codes and actions

Ref	Symptom	Action
1	Status LED not illuminated	Check that the VELOX MCC power supply is good. If yes, call TPS
2	No DC output (any connected items will not function)	Call TPS
3	HMI has no display	Call TPS

7.2. HMI Diagnostics

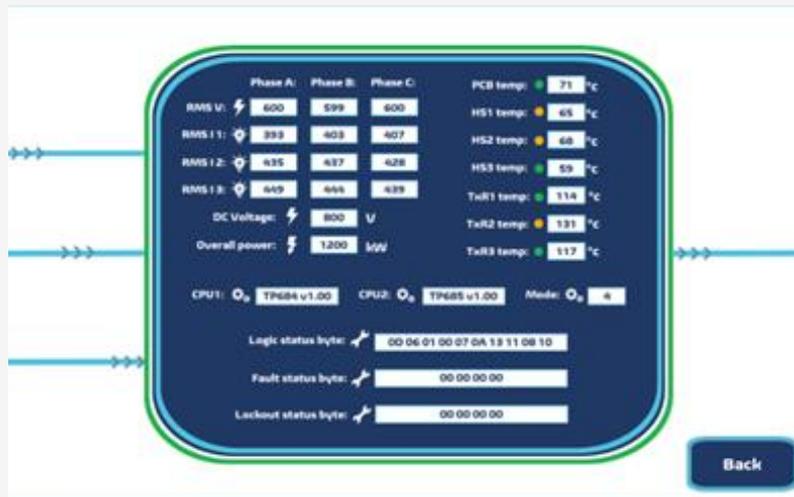
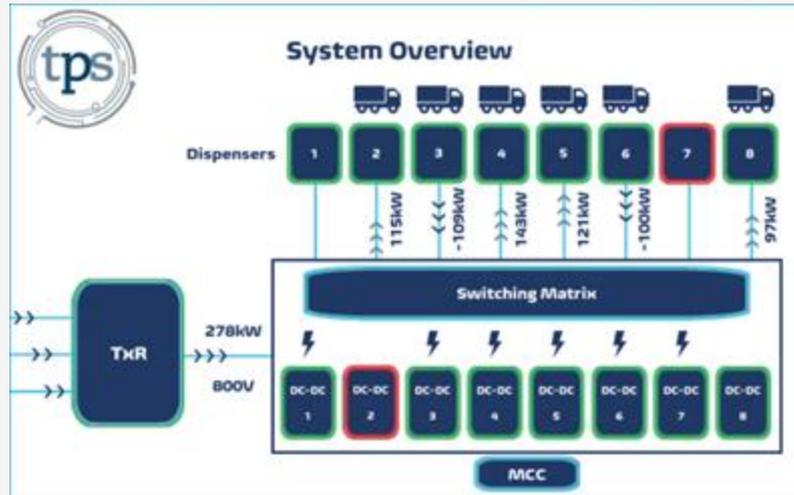


Figure 19*TxR screen



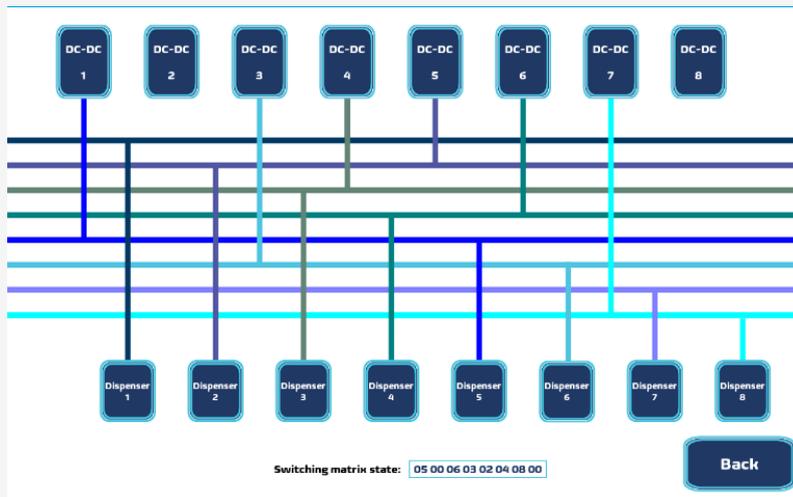
Figure 20 *VELOX MCC screen

DC-DC Module 2

Used voltage demand: ⚡ 900 V	Secondary voltage: ⚡ 1330 V	
Used current demand: ⚡ 182 A	Transformer current: ⚡ 200.1 ARMS	
Available ptherm: ⚡ 150 kW	Main fan speed: ⚙️ 2720 rpm	
Available pdyn: ⚡ 150 kW	Run cmd: <input type="checkbox"/> On Ready cmd: <input type="checkbox"/> On	
PCB temp: 🟢 43 °C	Q3 temp: 🟢 52 °C	TH1 temp: 🟢 60 °C
Q1 temp: 🟢 47 °C	Q4 temp: 🟡 66 °C	TH2 temp: 🟢 64 °C
Q2 temp: 🟡 65 °C	Q5 temp: 🟢 58 °C	TH3 temp: 🟢 54 °C
CPU1: ⚙️ TP658 v1.00	CPU2: ⚙️ TP659 v1.00	Mode: ⚙️ 7
Logic status: ⚡ 00 00 01 07 1C 01 13 0B 00 09 0D 10		
Warning status: ⚡ 00 00 00 00	Contactor Mismatches:	
Fault status: ⚡ 00 00 00 00 00 00	DC-DC: <input type="checkbox"/> Inactive	
Lockout status: ⚡ 00 00 00 00 00 00	Matrix: <input type="checkbox"/> Inactive	

Input 800V 170A 720V Output 182A

[Back](#)

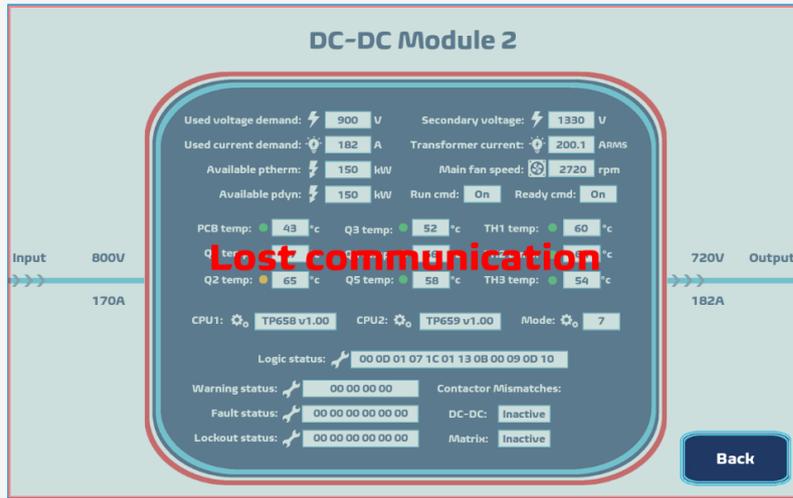


Dispenser 2

Run command: ⚡ 1	LED: ●
Voltage demand: ⚡ 673 V	
Current demand: ⚡ 182 A	
Charge power offered: ⚡ 125 kW	
Discharge power offered: ⚡ 125 kW	
EV maximum charge power: ⚡ 150 kW	
EV maximum discharge power: ⚡ 150 kW	
EV maximum voltage: ⚡ 1000 V	
Battery capacity: 🔋 200 kWh	
Fault code: ⚙️ 00 00	
Power Function: ⚙️ <input type="checkbox"/> Pow transfer	
PWM software ID: ⚙️ TP670 v1.00	
UI software ID: ⚙️ TP665 v1.00	

[Back](#)

(Configurations are on the next page)



If communication is lost – this is present across DCDC, Dispenser and TxR

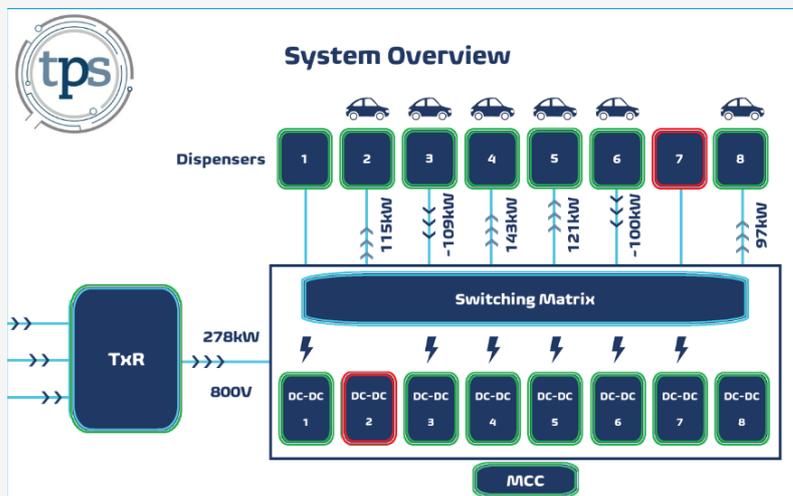


Figure 21*The screen might appear like the above if there are only 4 dispensers.

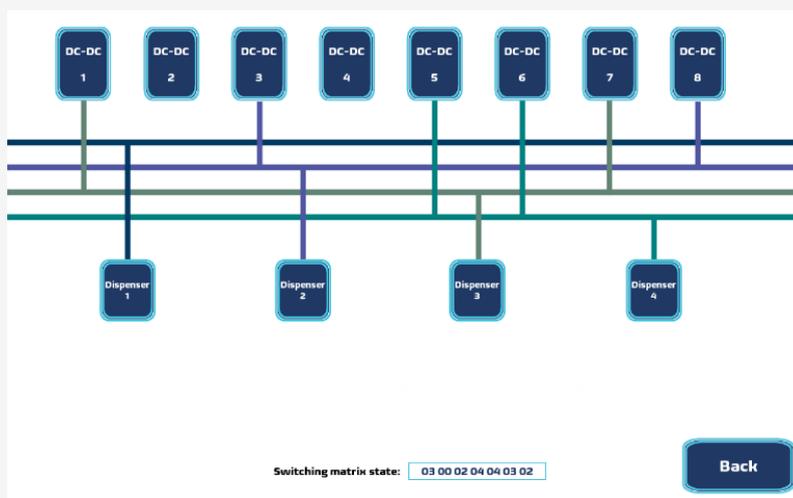


Figure 22 *The screen might appear like the above if there are only 4 dispensers.

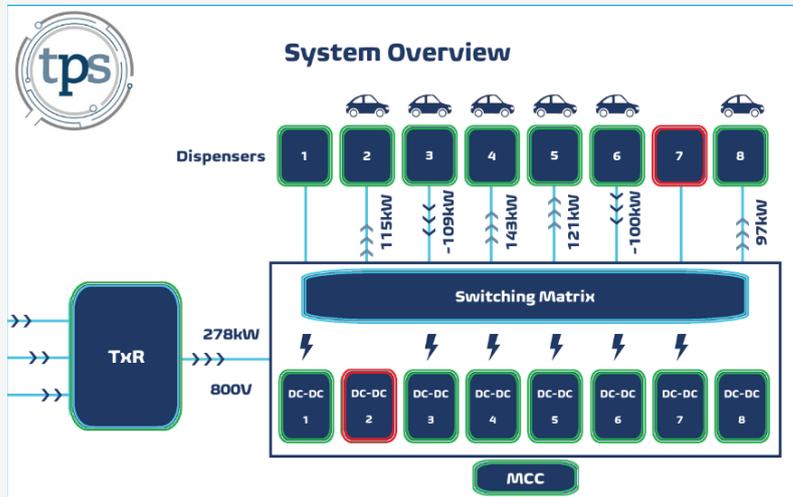
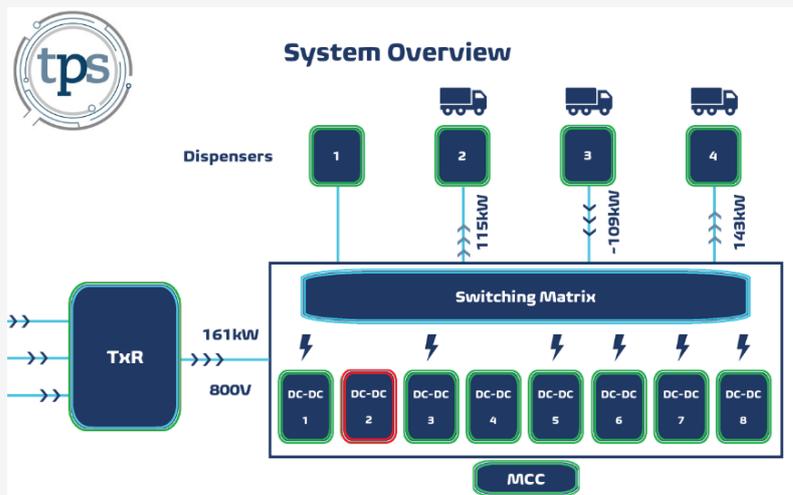
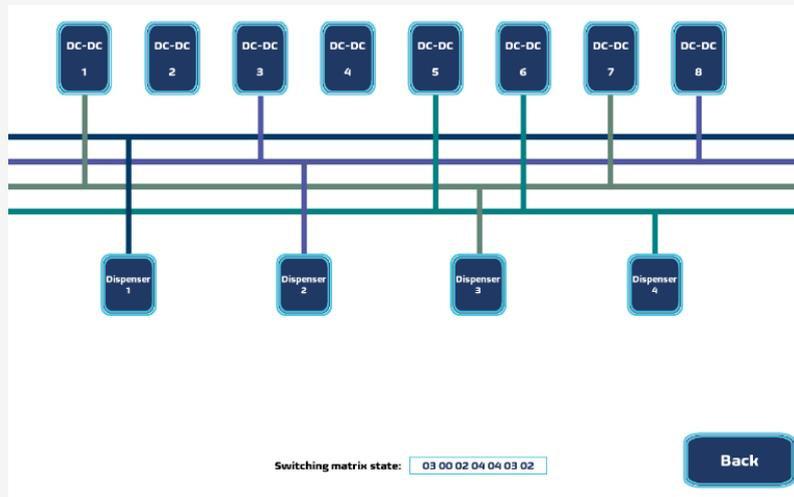


Figure 23 *The screen might appear like the above if there are 4 hard-wired dispensers.

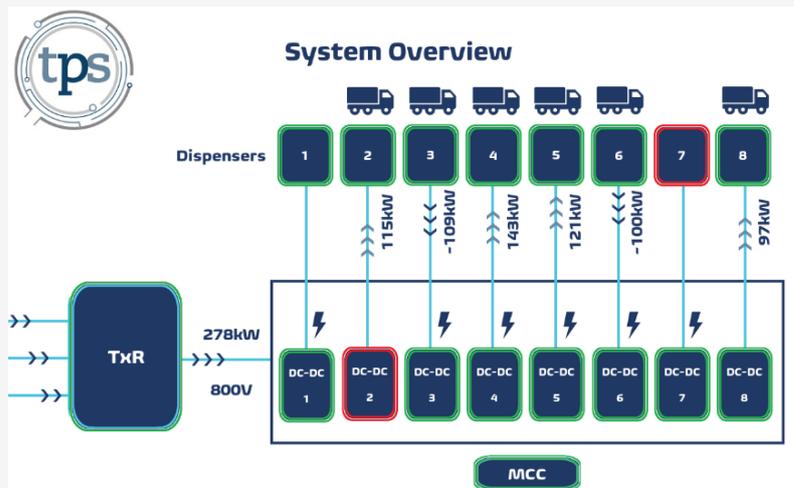
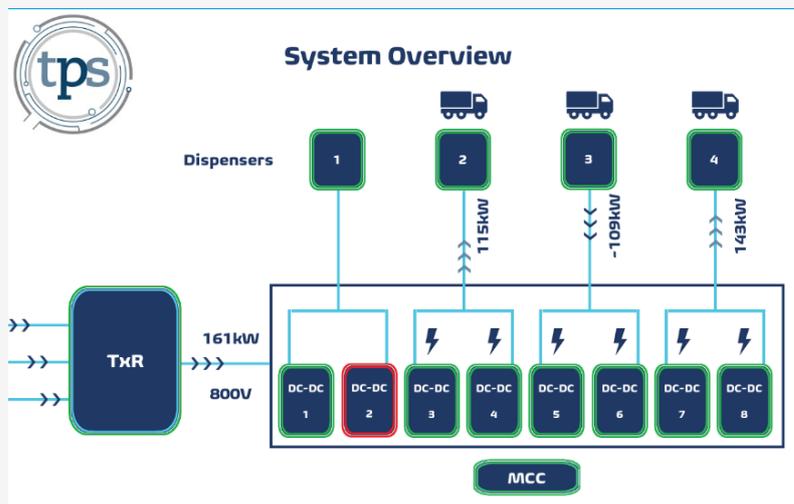


The dispenser screen might appear like the above if application is primarily for cars.





The switching matrix screen might appear like the above if there are only 4 dispensers.



The system screen might appear like the above if there are 8 hard-wired dispensers.

8. Corrective Maintenance Tasks.

There may be occasion where there are internal problems within the MCC unit. In this section you will find instructions for the removal and replacement of major components.

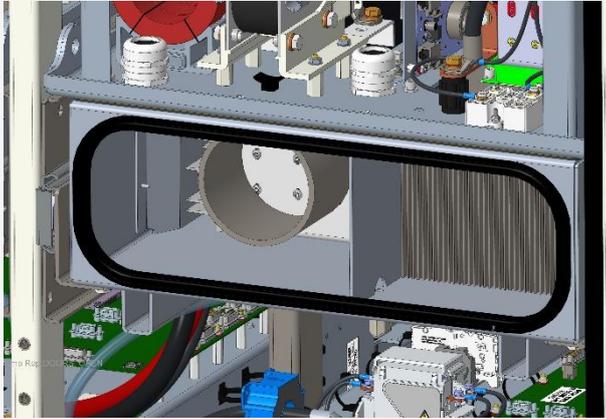


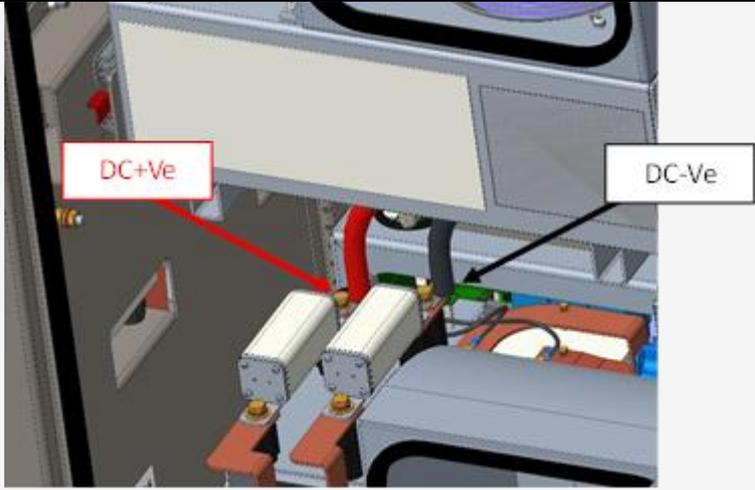
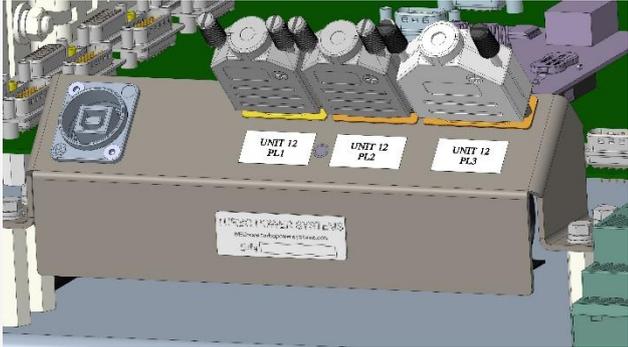
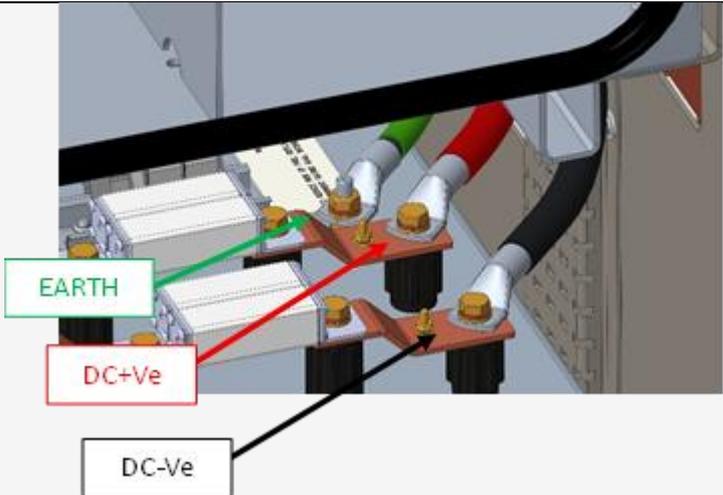
Before attempting any maintenance work on the exterior or interior of the MCC unit, it is of the utmost importance that the unit is electrically isolated from both the incoming electrical supply and any loads.

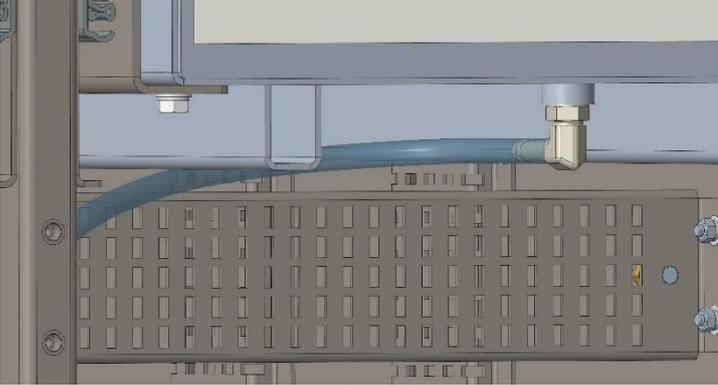
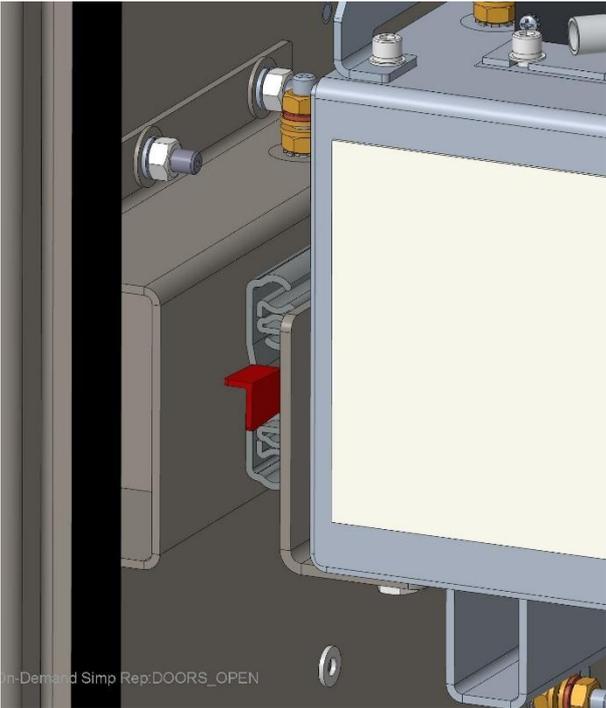
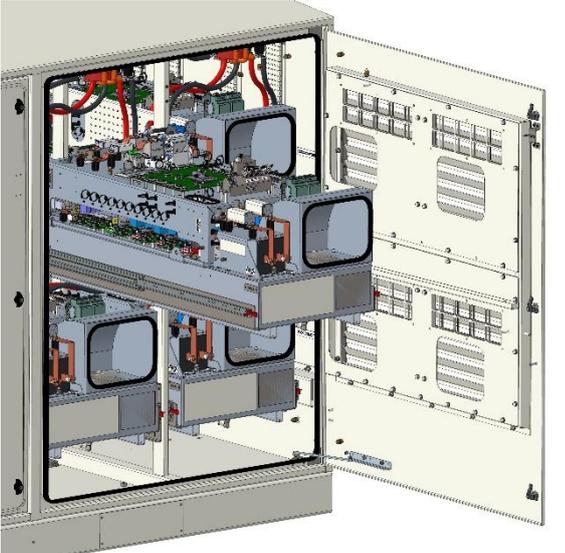
Failure to ensure this by testing for dead, could result in serious injury, death or serious damage to internal componentry.

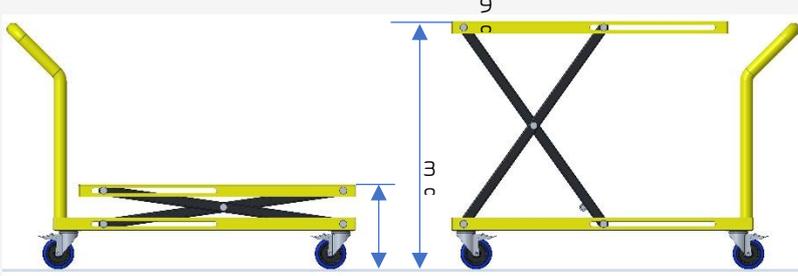
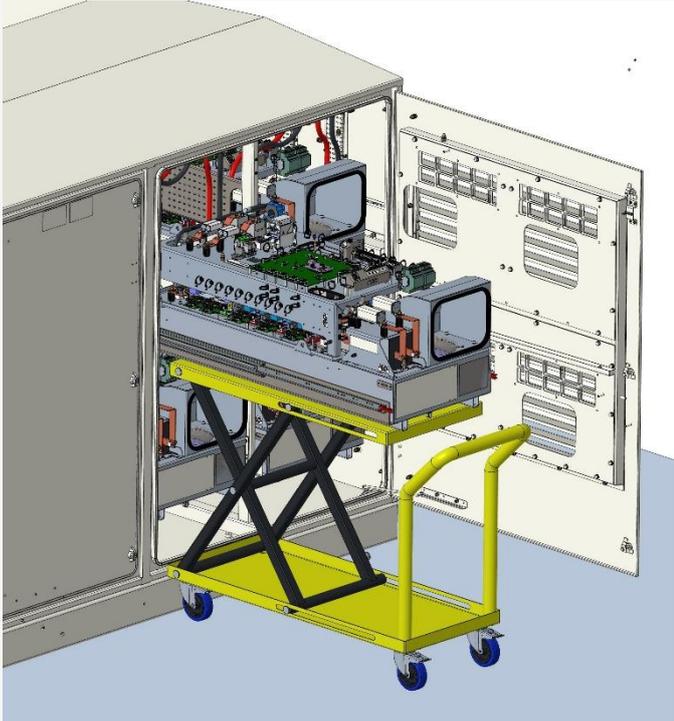
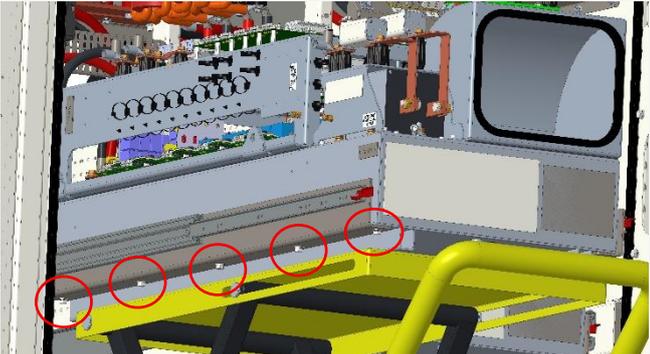
8.1. DC-DC MODULE REMOVAL Method

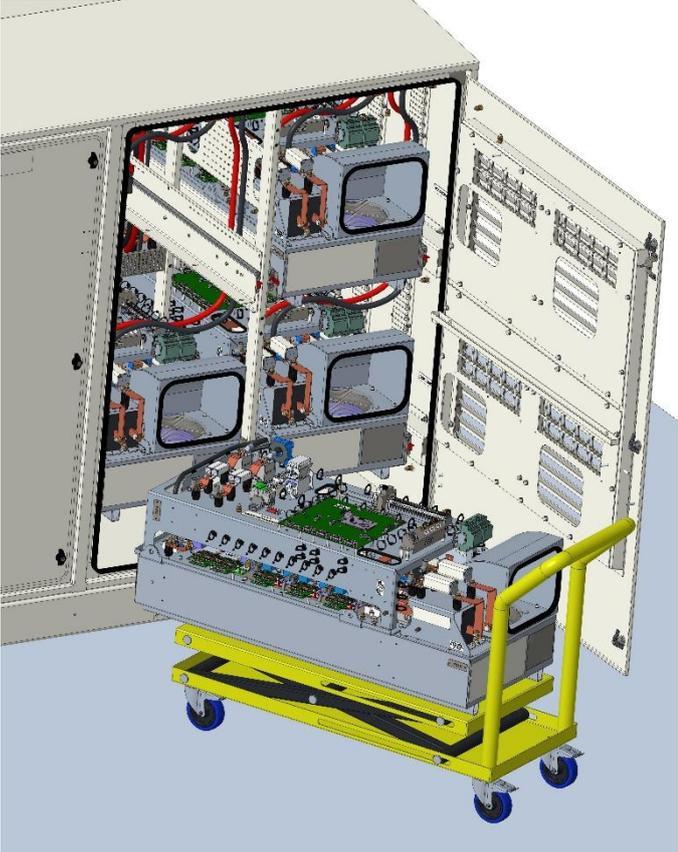
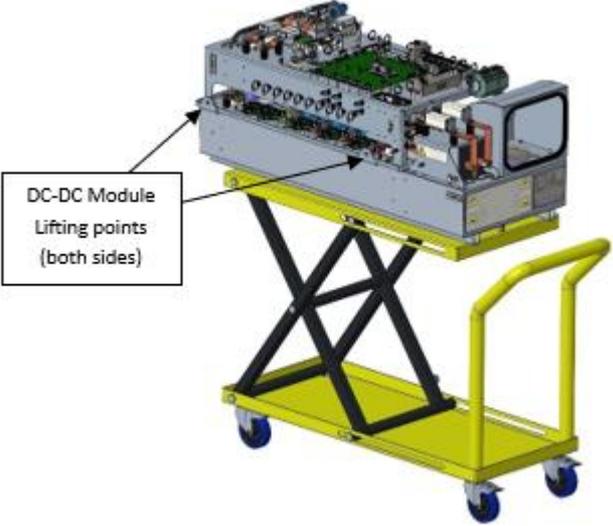
The following describes the removal of a 151680 DC-DC module out of a 151163 MCC cabinet. Each DC-DC module weighs approximately 160 kg, so it cannot be lifted manually. A suitable lifting device and equipment rated for the load must be used at all times.

8.1.1	Open both Output side and Input side doors on the side of the MCC in which the DC-DC module is to be removed.	
8.1.2	From the Input side, check the magnetics duct for any residual water, if present do not proceed to remove the DC-DC module until dry. If dry, proceed as follows.	

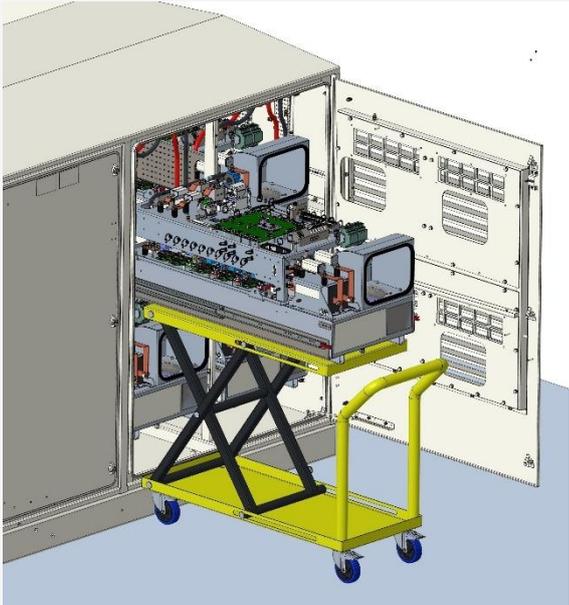
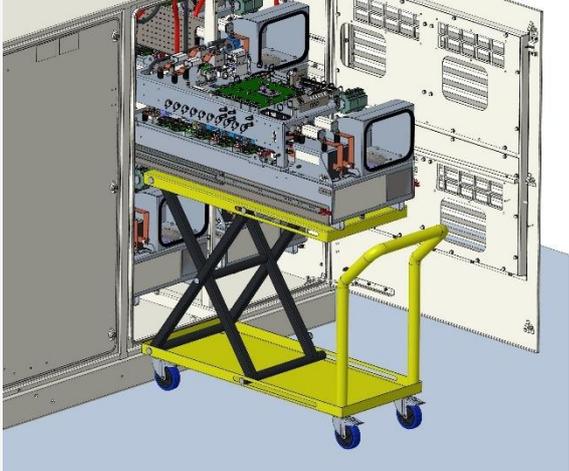
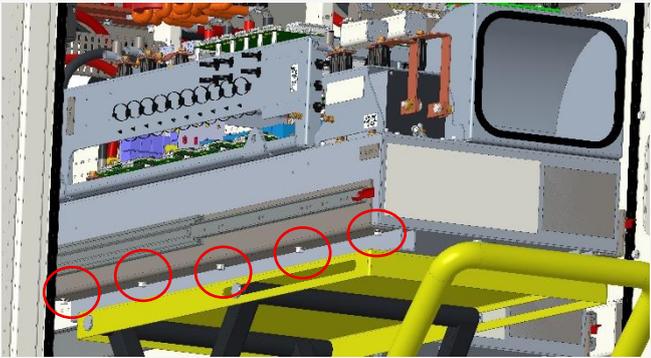
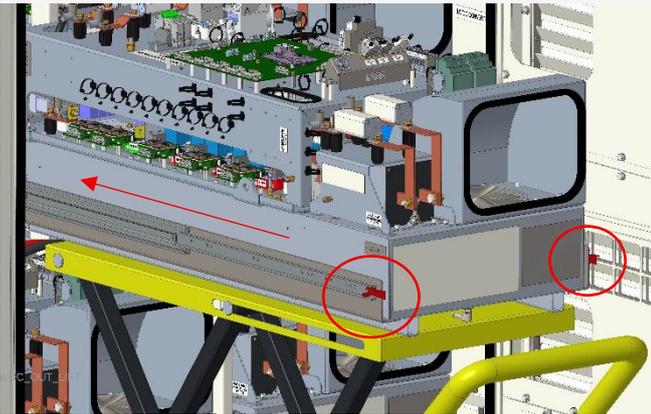
<p>8.1.3</p> <p>From the Output side, locate the DC-DC module that is to be removed and disconnect the output cable connections using a 13mm socket and wrench.</p> <p>Secure cable out of the way by way of a temporary cable tie or similar.</p>		
<p>8.1.4</p> <p>From the Output side, locate the Canbus (PL1 & PL2) & Control (PL3) connectors on top of the DC-DC module and disconnect.</p> <p>Secure cables away from the DC-DC module by way of a temporary cable tie or similar.</p>		
<p>8.1.5</p> <p>From the Input side, locate the input cable connections & main earth cable connection and disconnect using a 13mm socket and wrench.</p> <p>Secure cables out of the way with a temporary cable tie or similar</p>		
<p>8.1.6</p> <p>From the Input side, locate the drain hose located under the DC-DC module and pull the hose from the fitting, allow any excess water in the hose to drain away.</p>		

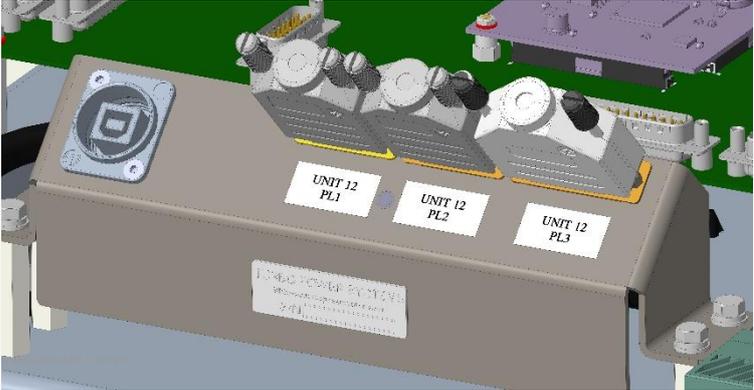
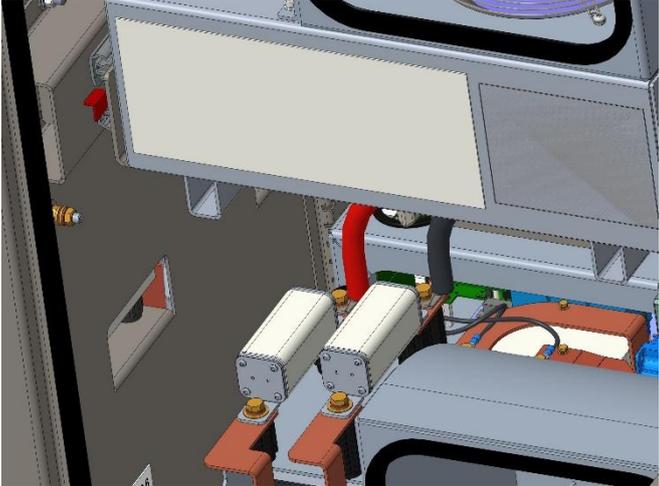
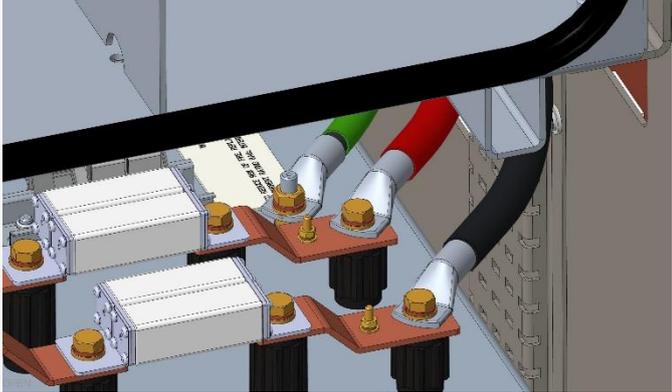
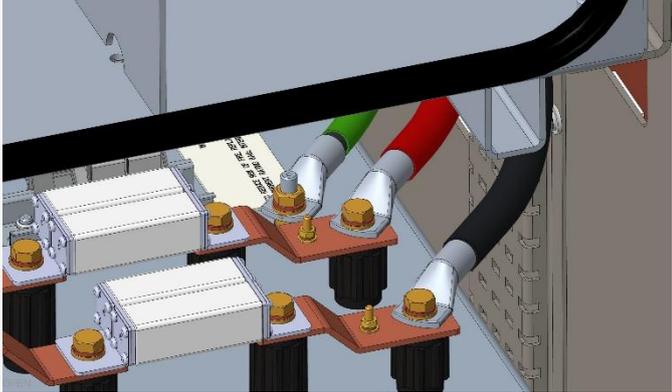
<p>8.1.7</p>	<p>From the Output side, locate the drain hose located under the DC-DC module and pull the hose from the fitting, allow any excess water in the hose to drain away.</p>	
<p>8.1.8</p>	<p>From the Output side, locate the red locking tabs and depress both sides simultaneously and pull the DC-DC module away from the unit slowly whilst ensuring there are no cables trapped or snagging.</p>	 <p style="font-size: small;">On-Demand Simp Rep:DOORS_OPEN</p>
<p>8.1.9</p>	<p>Slide out till the DC-DC module is in the full outward position and is locked in the outermost position.</p>	

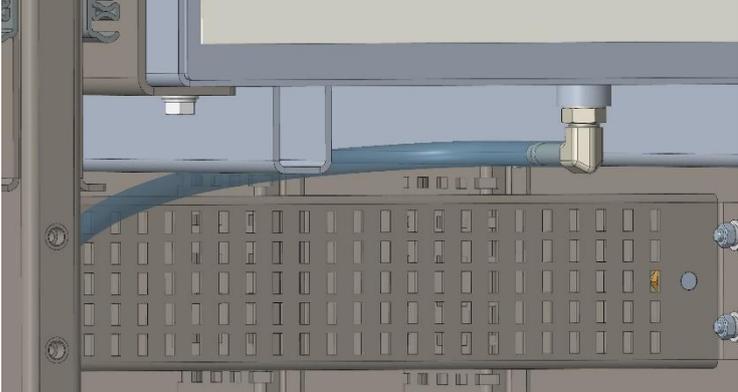
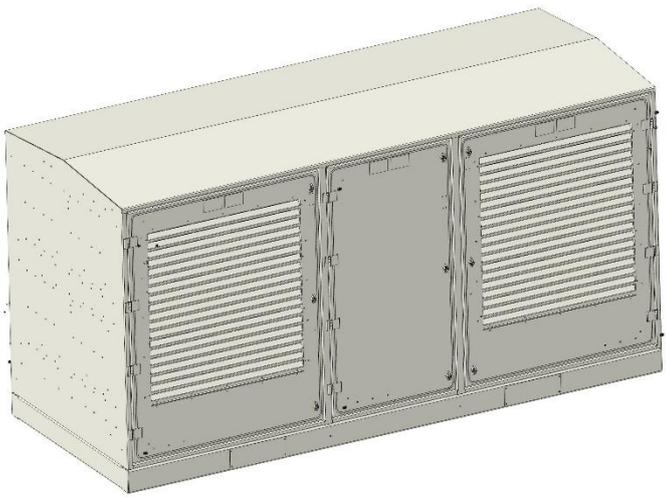
<p>8.1.10</p>	<p>Obtain a hydraulic lift platform that conforms to the parameters shown.</p> <p>Minimum raised height = 988mm Maximum lowered height = 338mm Platform size 500mm x 1100mm MIN SWL 160Kg</p>	
<p>8.1.11</p>	<p>Using a suitable scissor lift platform trolley that has a safe working load of at least 160Kg support the weight of the DC-DC module.</p>	
<p>8.1.12</p>	<p>Once the weight of the DC-DC module is taken by the platform trolley, remove the 10 off fixings from under the DC-DC module with a 13mm socket and wrench.</p>	

<p>8.1.13</p>	<p>Using the lift platform, slightly lift the DC-DC module then unlock. Push the sliders back into the MCC cabinet.</p>	
<p>8.1.14</p>	<p>Pull the DC-DC module clear of the MCC cabinet and lower.</p>	
<p>8.1.15</p>	<p>Move trolley to the desired destination.</p>	
<p>8.1.16</p>	<p>Note;- DC-DC module is to be lifted using a hoist or crane using the dedicated lifting points (2 on each side).</p>	
<p>8.1.17</p>	<p>Replacement of the DC-DC module is the reverse of removal.</p> <p>All power cable connections to be tightened to 10.8Nm.</p> <p>10 off fixings for module to slider to be tightened to 23Nm</p>	

8.2 DC-DC MODULE Installation Method

<p>8.2.1</p>	<p>Position the DC-DC module in front of the MCC cabinet in the required DC-DC module position and lift to align with the slides.</p>	
<p>8.2.2</p>	<p>Unlock and pull out both slides until they lock into the outermost position.</p>	
<p>8.2.3</p>	<p>Slightly lower the DC-DC module onto the open extended slides and fit 10 off fixings and Torque to 23Nm</p>	
<p>8.2.4</p>	<p>Lower the platform lift trolley so the slides take the weight of the DC-DC module.</p>	
<p>8.2.5</p>	<p>Depress both red locking tabs and slowly push the DC-DC module into the MCC cabinet, ensuring that the DC-DC module does not snag or catch any cabling.</p> <p>Slide in until the DC-DC module locks in the innermost position.</p>	

<p>8.2.6</p>	<p>From the Output side, locate the Canbus and control connectors PL1, PL2 & PL3 and connect.</p> <p>Tighten thumb screws.</p>	
<p>8.2.7</p>	<p>From the output side, locate the DC-DC module output terminals and connect the DC+Ve and DC-Ve cables, noting polarity. Torque terminals to 10.8Nm</p>	
<p>8.2.8</p>	<p>From the Input side, locate the DC_DC module Input power terminals and connect the DC+Ve & DC-Ve cables noting polarity. Torque terminals to 10.8Nm.</p>	
<p>8.2.9</p>	<p>From the Input side, locate the Main earth terminal and connect the earth cable. Torque the terminal to 10.8Nm.</p>	

<p>8.2.10</p>	<p>From the Input side, locate the drain hose fitting and connect the drain hose by pushing the hose over the barbed fitting.</p> <p>Ensure the hose is pushed fully onto the fitting.</p>	
<p>8.2.11</p>	<p>From the Output side, locate the drain hose fitting and connect the drain hose by pushing the hose over the barbed fitting.</p> <p>Ensure the hose is pushed fully onto the fitting.</p>	
<p>8.2.12</p>	<p>Close & lock the doors on both sides.</p>	

9. End of life disposal of the VELOX MCC or component parts of the unit



Incorrect waste handling can have a negative effect on the environment and human health due to potential hazardous substances. With the correct disposal of this product, you contribute to reuse and recycling of materials and protection of the environment.

- Obey the local law and rules when you discard parts, packaging material or the VELOX MCC as a whole.
- Discard electrical and electronic equipment separately in compliance with the WEEE - 2012/19/EU Directive on waste of electrical and electronic equipment.
- As the symbol of the crossed out wheeled bin on your VELOX MCC indicates, do not mix or dispose of the VELOX MCC with your household or commercial waste, at the end of use. Instead, hand the VELOX MCC over to your local community waste collection point for recycling.
- For more information, contact the Government Waste-Disposal department in your country.

10. Document History

Revision number	Revision date	Summary of changes	Changed by
1	Jan 2026	Preliminary release for Customer visibility	A Lister
2	March 2026	Terminal wiring update for extra dispensers	A Lister

11. All Appendices and associated document latest versions can be found here:



[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

13. Appendix A2 – VELOX MCC – Electrical connections

Indicative information only. Dimensions may be subject to change. Latest version can be found here:

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

14. Appendix A3 – 375-050 Top Level System Diagram

Indicative information only. Dimensions may be subject to change. Latest version can be found here:

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

15. Appendix B - Installation Checklist Document

Link to latest version:-

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

Checklist items	Completed?
Do you have all necessary tools as set out in section 4.1	
Have you unpacked the VELOX MCC as set out in section 4.4 ?	
Have you lifted the VELOX MCC as set out in section 4.5 ?	
Have you mechanically installed the VELOX MCC as set out in section 4.3?	
Have you electrically installed the VELOX MCC as set out in section 4.7	

Completed By	Date

16. Appendix C - Maintenance & Inspection Record

Link to the latest version:-

[Customer Area - Manual VELOX Megawatt Charging Cabinet \(MCC\) - Turbo Power Systems](#)

Ref No.	Equipment Part No. / Description	Interval (Months)	Type of Inspection	Carried out by Sign and Date
6.1	Cleaning the Exterior of the VELOX MCC	3	Visual and clean	
6.2	Air Ducts	3	Visual / clean as required	
6.3	Enclosure and Doors	6	Visual	
6.4	LED	12	Visual	
6.5	HMI	12	Visual	
6.6	E Stop Button Safety Interlock System	12	Visual and Test	

17. Appendix D - Packing

Link to the latest version:-

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