Moixa Optimised Battery System 7.2/9.6kWh

Instructions for the configuration and connection of a Moixa Hub with a Victron Multiplus Inverter and Pylontech US2000 Plus battery storage system

The most up to date versions of any product documentation are available on our website: www.moixa.com/installers/

Email: operations@moixa.com
Mobile: 0207 734 1511

1.0 Introduction

This document is intended to be used by a Moixa Accredited Installer (MAI) to connect a Moixa Hub to a Victron Multiplus ii 48V/3000VA/35A inverter and between three and four Pylontech US2000 Plus LiFe batteries.

This document is not intended to replace or supersede any guidance from Victron, Pylontech, or any other manufacturers. Where guidance for installation of these items exists, this shall be followed by the installer.

2.0 Safety and Installation

It is a requirement that all installers be accredited by Moixa and be qualified to perform electrical work according to BS7671 or the equivalent applicable national regulations.

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3.0 Customer Expectations

The installation is an important part of the customer's experience with Moixa. By the time the installation day arrives, the customer may have been in the process of securing an energy storage system for several months.

Before you arrive, the customer should already be aware that:

- They will need to let you in the house to show you where the system will be installed;
- If the system is going to connect to a wired or Powerline internet connection, they will need to show you the location of their internet router;
- If the system will use a wireless internet connection, they will need to give you their Wi-fi password;
- The installation should take between three and four hours;
- During the installation there will be a time when the electricity supply will need to be switched off;
- During commissioning, they may be required to turn on some electrical load within the home to validate that the metering equipment is working correctly.

And once the installation is complete, the customer expects that:

- Their home will be left in a safe and tidy state;
- You, the installer, will show them the main features of the system, show them the product labelling, and hand over the product documentation for each component in the system.
- The Moixa Team will be in contact with them after the installation has taken place to provide them with login details for the Moixa Dashboard, where they can access data relating to their smart energy storage system and their energy use.

Online self-survey

An online or on-site survey should have been conducted to assess the site prior to the installation. If you have any questions, please contact Moixa Operations (**operations@moixa.com or call 0207 734 1511**) who will be happy to help determine if the site is suitable for install.

4.0 Components

To complete the installation, the following components will be required. Where mentioned, some of these components must be purchased by you, the installer, prior to the date of installation and brought with you to the installation.

4.1 Components Included

The following components are supplied by Moixa and will be delivered to the customer prior to the installer's arrival. Before starting the installation, please perform a visual inspection of the deliveries to ensure nothing has been damaged in transit.

Table 1. Included components

Component	Details	Provider
Moixa Hub	Including the DC power supply, Ethernet cable, and mounting bracket required for installation	
Victron Inverter Multiplus ii 3000VA/45/30A	AC/DC inverter charger	
3 or 4 x Pylontech US2000 Plus	LiFe battery storage	
VE Bus RJ45 Cable	3m cable	
VE-Can Type-B Cable	5m cable	
Smart Rails X45M Meter or Eastron 120	1-phase inline MID class meter	
Smart Rails X835E Meter or Eastron 630	3-phase MID class meter	
2 x CT Clamps	100/5A-CT	
Tp-Link PA4010	Powerline Communication Adaptor	
Battery Cabinet (9U)	WS3F-X-0965A	Canovate
Mersen 1 Pole Fuse Holder	Q229876	Mersen
100A Fuse	NH 1C 100A 500V GG	Mersen
Pylontech/Victron DC Cabling	-	Midsummer Wholesale

4.2 Additional Components

The following components must be supplied by the installer and must be brought with the installer to the installation. The payment for these components will be included in the payment made for the installation to the installer.

Table 2. Additional components

Component	Details	Provider
Eaton 3 Pole Enclosed AC Isolation Switch	T0-2-1/I1H/SVB/K-CI-K1/K2	Eaton
Proteus 4 Module Metal Enclosure or for 3-phaseCT meter	AENC204ML	CEF, Proteus
AWG4 M8 lugs for fitting DC battery cable fuse	-	-

Note: Alternatively, if a mini-consumer unit is required, this can be used in place of the Proteus enclosure to hold the 3-phase CT meter.

5.0 General Installation Guidance

5.1 Basic Checks

There are some basic checks that can be done on arrival to help prevent problems occurring during the installation.

✔ All installations should be installed in the following way:

✔ In accordance with all relevant standards such as: BS 7671, BS EN 50272, and the IET Code of Practice for Electrical Energy Storage Systems.

✔ With enough physical space for the inverter to have 10cm of ventilation around all sides.

✔ With enough space to add the AC isolated switch, external three phase meter, external single phase meter, and CT clamps.

✔ As close as possible to the customer's fuse box.

✔ In an indoor environment free from significant dust where temperatures are between 0 and 45 degrees Celsius, e.g. a utility room or weather protected garage.

Reminder: It is critical that Moixa's Operations Team are contacted as soon as possible after the system is installed.

✖ No installation should ever be installed in the following environments:

✖ Outdoors: the Moixa Hub, Victron inverter, and Pylontech batteries are not suitable for installation outside.

✖ Near bedrooms: the noise level of the Victron inverter is in excess of 60dB, and can be disruptive when located near sleeping quarters. The Moixa Hub and Pylontechs do not emit any sound.

✖ In the presence of any open sources of ignition or significant sources of heat.

✖ In the path of any fire escape routes or exits.

✖ Where splashing might occur e.g. above or near a sink, or in bathrooms.

5.2 Standard Installation

As stipulated in Moixa's definition of a **standard installation**, the following is included:

✔ Fitting of the inverter to a brick / masonry wall or floor mounted and attached to a plaster or other partition wall;

✔ Fitting of up to 5 metres (twin and earth / flex) of cable from the inverter to the consumer unit and/or electricity supply meter;

✔ Fitting of up to 3m of trunking or conduit;

✔ Fitting and testing of all electrical connections required for your battery;

✔ Installing a 4 way consumer unit as the Smart Meter enclosure;

✔ Installing the Smart Meter and clamps with cable up to 10m to each connection (i.e. battery, solar PV incoming live wire, mains incoming live wire);

✔ Installing the Inline Meter with the inverter;

✔ Installing a DC isolator switch for the battery;

✔ Installing a 16A type A RCBO;

✔ Connecting a CAT 5 shielded cable to the customer's router up to 5m away from the battery, or installing a powerline adapter from the battery to a mains plug up to 5m away.

If work outside of the above is required, Moixa will reimburse you, the installer. Approval from Moixa must be obtained for any additional work prior to it being conducted.

5.3 Tools Required

To perform the installation, all standard tools required for basic electrical work will be required. In addition to these tools, the following are required:

- (AWG 8-1/0) crimping tool (required for crimping of the battery terminals).

6.0 Commissioning the Victron Multiplus ii Inverter

Note: this applies to the Victron Multiplus ii Inverter 48V/3000VA/35A only. No other inverters are currently supported by the Moixa Hub.

6.1 Installation

It is recommended that the **Victron Multiplus ii 48V/3000VA/35A inverter** be installed by an installer who has completed the appropriate Victron training program.

For all guidance on installing the Victron Multiplus ii Inverter, please refer to the documentation provided by Victron. This is available on their website here:

https://docs.victronenergy.com/manual-multiplus-ii-gx-24Vand48V-3000and5000-230V.html#installation

Additionally, a physical copy of the installation instructions will be included with each Victron inverter.

6.2 Firmware and Configuration

The Victron Multiplus will arrive preprogrammed with the correct configuration and firmware required for installation in the UK, including the correct grid connection settings for G98/G99.

No onsite modifications via VeConfig or VE Flash are required.

If, for any reason, the Victron Multiplus should require configuration or update, this can be performed remotely by the **Moixa Operations team.**

6.3 Connection

Connecting the Moixa Hub with the Victron Multiplus is a simple process. Using the supplied VE.Bus RJ45 cable, connect one of the “VE.Bus connectors” of the Victron Multiplus - “L” in image 2, of the inverter below - to the Moixa Hub’s “VE.BUS Inverter” connector shown below in image 1.

Image 1. Moixa Hub connections

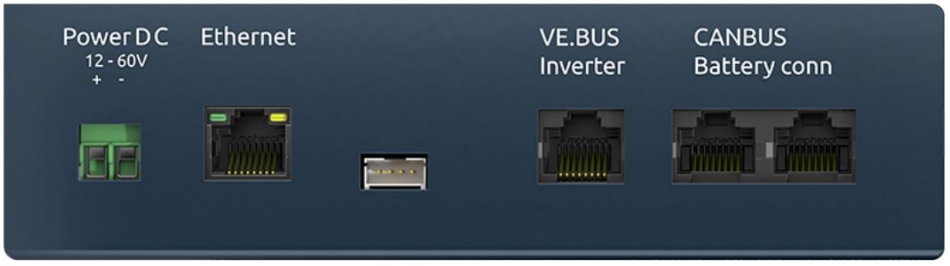
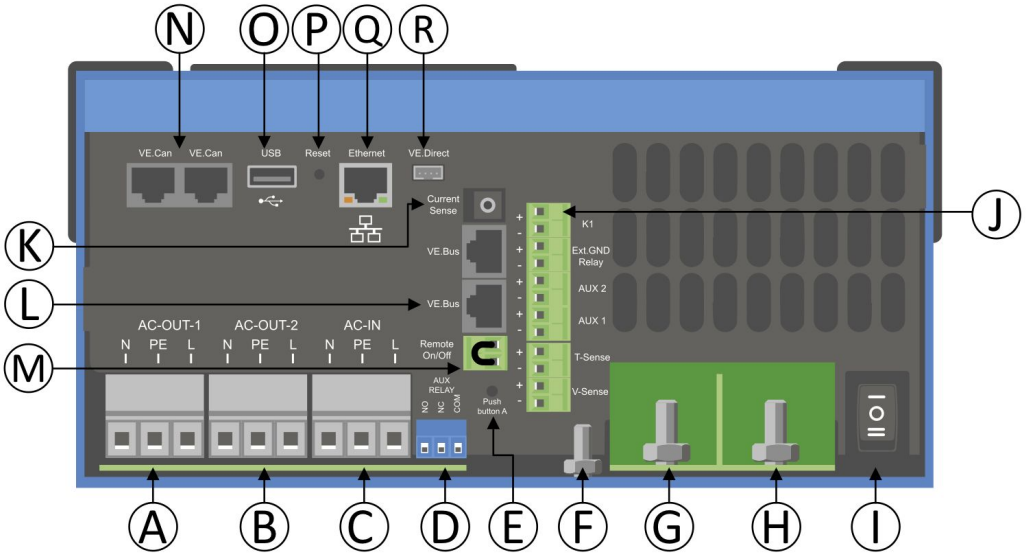


Image 2. Victron Multiplus connections



7.0 MID Meter Installation

In order to correctly monitor the performance of the system, two MID class II meters must be installed at the customer's property:

1. An Eastron SDM120M or Smart Rails X45 MID Meter, installed inline with the Victron Mutliplus Inverter;
2. An Eastron SDM630M or Smart Rails X835E MID Meter, installed in a separate mini-consumer unit.

Both of these meters will be provided in the accessories pack accompanying the Moixa Hub and Victron Inverter. These meters are preprogrammed to the correct CT ratio and communication settings.

Please note the following points regarding the installation of the meters:

✔ All AC mains connections between the meters and the ancillary components must be made using suitable insulated 2.5mm cable.

✔ All data cabling, twisted pair cabling must be used, such as CAT5e network cabling.

✔ The clamp cables must not be extended without prior approval by the Moixa Operations team.

✔ The meter must be housed in a Moixa approved mini-consumer unit (see table 2.)

✔ If extending the clamp wiring, ensure that the Moixa operations team are notified.

✖ Do not extend the wiring of the clamps beyond 10m.

✖ Do not use clamps or any metering component that was not provided by Moixa.

✖ Do not extend the clamps with anything other than 2.5mm cable.

7.1 Eastron SDM120M or Smart Rails X45 1-phase MID Meter

The **SDM120M** or **X45** meter must be installed **inline** with the Victron Multiplus Inverter and must be mounted in the customer's consumer unit. If the customer's consumer unit does not have a spare slot, **an additional mini-consumer unit may be required.**

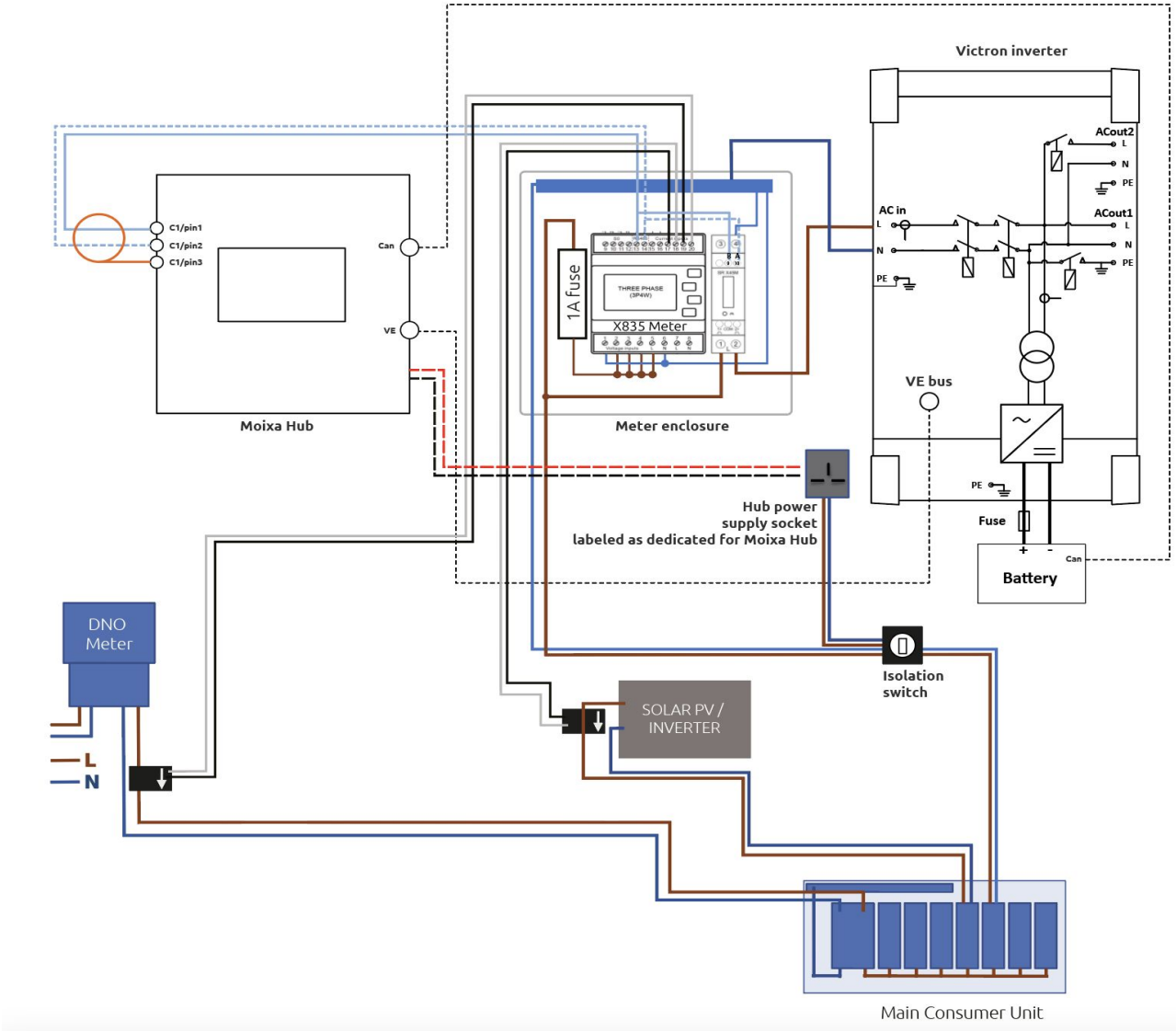
The following table 3 and schematic 1 outline the connections required between the MID meter, the Moixa Hub, and the Victron Inverter. For more detail on the MID Meter connections, see **Appendix 2.**

Table 3. Single phase MID meter connections

Connect (MID Meter)	Moixa Hub	Victron Inverter
Pin 7 (B) - RS-485	C1 (Pin 1)	N/A
Pin 6 (A) - RS-485	C1 (Pin 2)	N/A
Pin 1 (L)	N/A	N/A
Pin 2 (L)	N/A	AC Live (Input)
Pin 4 (N)	N/A	N/A

To connect Pin 7 and 6 of the MID Meter to Pin 1 and 2 of C1 on the **Moixa Hub**, the connection should be made using twisted pair cable, e.g. CAT5e.

Schematic 1. Moixa Hub connecting to MID Meter and Victron Inverter



7.2 Eastron SDM630M or Smart Rails X835E 3-phase MID Meter

To allow Moixa to correctly predict and optimise the behaviour of the Victron Multiplus inverter, the SDM630M or X835E 3-phase clamp meter must be installed. This provides moixa with:

- The amount of AC power being generated by the PV.
- The amount of AC power being imported or export to the grid.

The three phase meter can be installed in three easy steps:

1. Fitting the meter to the mini-consumer unit and connect all AC wiring required.
2. Fitting the two CT clamps to the meter and clip them around their respective Live cables (PV and grid).
3. Connecting the RS-485 twisted pair communication cable between the Moixa Hub and the meter.

For all wiring connections, refer to **table 4** on the next page. For further guidance, refer to the product documentation accompanying the 3-phase meter. For more detail on the MID Meter connections, see **Schematic 1** and detail in **Appendix 2.**

Step 1: fitting the meter to the mini-consumer unit

The three phase meter should be installed in a mini-consumer unit, such as a Proteus.

Step 2: fitting the CT clamps

There are two clamps connected to the 3-phase meter.

- The first of these must be fitted around the Live cable connected to the PV inverter.
- The second must be fitted around the Live cable feeding the customer's property (i.e. the main feed to the home).
- The direction the clamp must be placed can be seen in the image to the right.
- The orientation of the wires on the clamp inputs are critical as the clamp phase is used to detect if the system is charging or discharging or has positive PV.

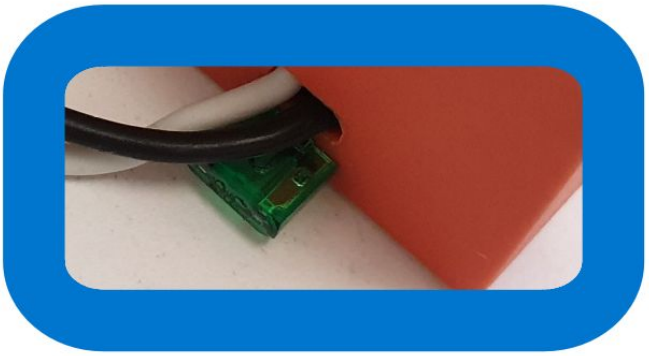
1 Clip for clamp

For further details, see schematic 1 provided on page 13.

Note: if the clamps are required to be extended to suit the installation, they cannot be extended more than 10m and must be extended using 2.5mm cable.

Step 3: connecting the meter to the Moixa Hub (via RS-485)

Using twisted pair cabling (e.g. CAT5e), connect the Moixa Hub to the three phase meter. The connections required are listed in table 4 below and schematic 1 (shown on page 13).



Note: the shorting link for safe installation must be removed from the clamp in order for the clamp to function correctly. This is the green fuse that is attached to the bottom of the clamp as pictured.

Table 4. 3-phase MID meter connections

Connection (MID Meter)	Connection Moixa Hub
Pin 12 (A) - RS-485	Moixa Hub - C1 (Pin 2)
Pin 13 (B) - RS-485	Moixa Hub - C1 (Pin 1)
Pin 14 (GND) - DO NOT CONNECT - ground the cable shield at the Hub ONLY	Moixa Hub - C1 (Pin 3) Ground the shield here, at the Moixa Hub end
Pin 1 (N)	Neutral
Pin 3 (L)	Live
Pin 4 (L)	Live
Pin 5 (L)	Live
Pin 6 (N)	Neutral
Pin 17 (CT)	Black - CT Clamp 1 (PV)
Pin 18 (CT)	White - CT Clamp 1 (PV)
Pin 19 (CT)	Black - CT Clamp 2 (Grid)
Pin 20 (CT)	White - CT Clamp 2 (Grid)

8.0 Connecting the Pylontech Battery Modules

Note: this applies to the Pylontech US2000 Plus Battery Modules only. No other battery modules are currently supported by the Moixa Hub.

8.1 Installation

For guidance on installing the Pylontech US2000 plus battery modules, please refer to the installation documentation provided by Pylontech. A copy of this is included with each Pylontech battery module and is available on their website.

Moixa requires that the Pylontech battery modules be installed in a preapproved battery cabinet. This is to ensure that the battery modules are not easily accessible after installation, as per the requirements of BS7671 / 13.8.

Below is a list of suitable battery cabinets:

Table 5. list of cabinets

Name	Description
Battery Cabinet (9U)	WS3F-X-0965A

Installations outside of the pre-approved list above may be permitted, but will be assessed on a case-by-case basis.

8.2 Mounting

In line with section 13.8 of BS7671, the batteries must be installed in a suitable enclosure or location with access restricted to authorised personnel, whilst allowing suitable access for maintenance.

Image 4. Pylontech batteries in 9u cabinet

Each cabinet will arrive with a key, which should be left in the door of the cabinet (or in an easy to remember and quickly accessible location). On rare occasions, Moixa's Support Team may ask the customer to access the batteries. In the event that this is required, the key may be used to gain access to the front of the batteries.

It is important to remember that:

- ✔ All DC cables between the Pylontech battery modules and the Victron Multiplus Inverter should be either double-insulated or encased in flexible conduit.
- ✔ All connections between the battery components should be correctly connected and well fitted.

✔ All wires connected to walls are correctly grouped and securely fixed in place.

✖ No wires should be left hanging, exposed, or in a way that may be dangerous or disruptive to the customer.

8.3 Connection

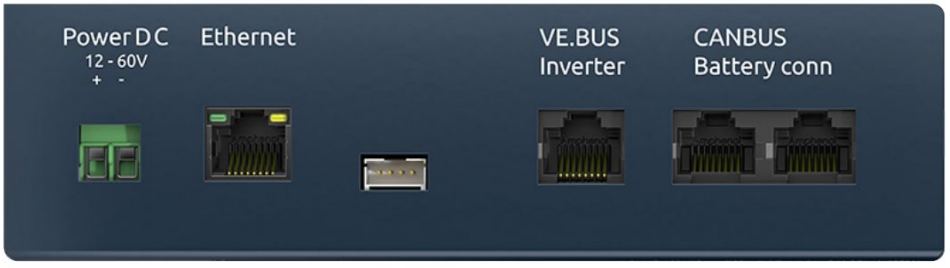
Connecting the Pylontech battery modules to the Moixa Hub is a simple process.

You should have been supplied with the required Victron CAN-5m cable. If you have not been supplied with this, please contact **Moixa Operations on 0207 734 1511.**

The supplied Victron CAN cable is polarised and must be connected in the correct way to function. One end of the cable is labelled as **"VE CAN"** and one labeled **"Battery CAN"**.

- The end labeled **"Battery CAN"** must be connected to the primary Pylontech battery's CAN connection.
- The end labeled **"VE CAN"** must be connected to one of the "CANBUS Battery conn" connectors of the Moixa Hub, as shown below in image 5.

Image 5. Connections of the Moixa Hub



For further guidance on installing the Pylontech batteries in the cabinet, including connecting each battery module together, please see Pylontech's installation manual.

https://midsummerwholesale.co.uk/pdfs/pylon-plus-manual.pdf

The orange and black battery cables must be completely connected in order to function correctly. The battery cables will emit an audible click when connected correctly.

8.4 Fusing the Pylontech batteries

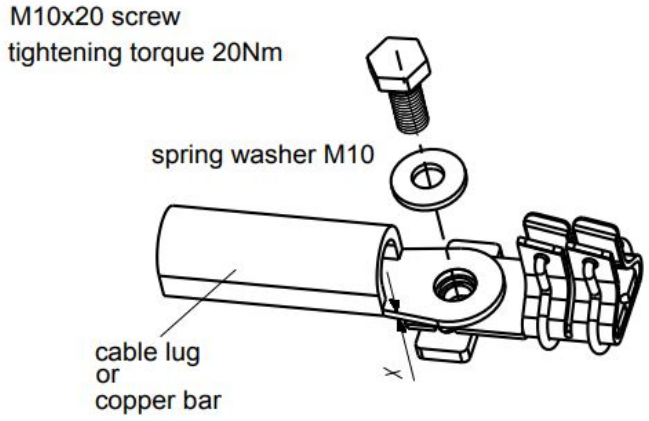
As per the requirements of BS7671, the DC positive cable between the Victron Multiplus inverter and the Pylontech battery assembly must have overcurrent protection and be breakable via a mechanical switch.

To provide overcurrent protection and mechanical breaking, Moixa mandate that a Mersen Q229876 fuse holder be placed inline with the positive DC cable from the Pylontech to the Victron Multiplus inverter.

It is important to note:

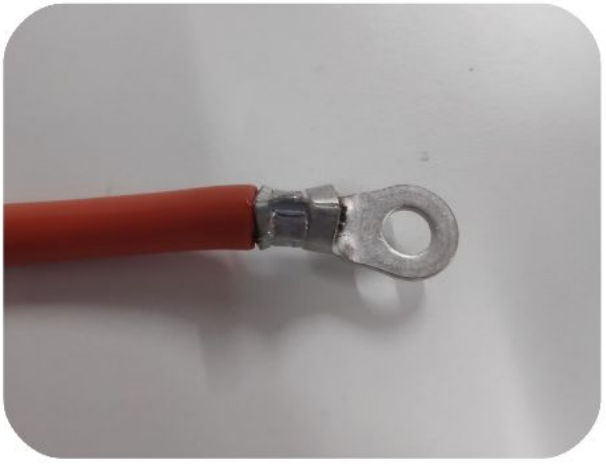
- The fuse holder must be fixed to a wall.
- The DC cable will need to have two lugs fitted to each side in order to fit the cable to the Mersen Q229876 fuse holder. An example of this lug is shown below.

Image 6. M10 Cable Lug



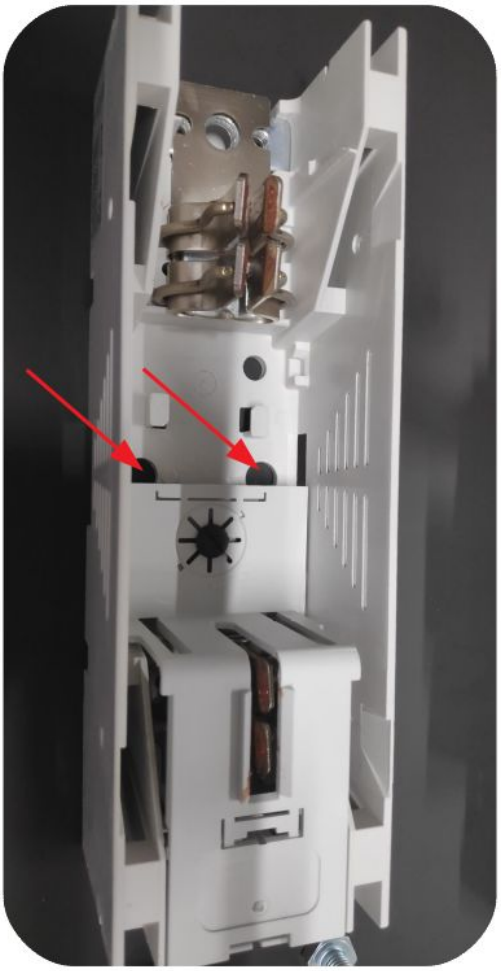
More details on fitting these lugs can be found in the Mersen Q229876 datasheet: https://ep-cn.mersen.com/sites/mersen_cn/files/DS-IEC-Low-Voltage-GP-Multibloc-Size-1-ST8-NH-Fuse-Switch-Disconnector-EN.pdf

To fit the cable to the fuse holder, the cable will need to be cut where appropriate, and will need AWG4 M8 lugs at each end of the split.



These lugs should be insulated with heat shrink (**not** shown in the image to the right). These lugs should be bolted to each end of the Mersen fuse holder.

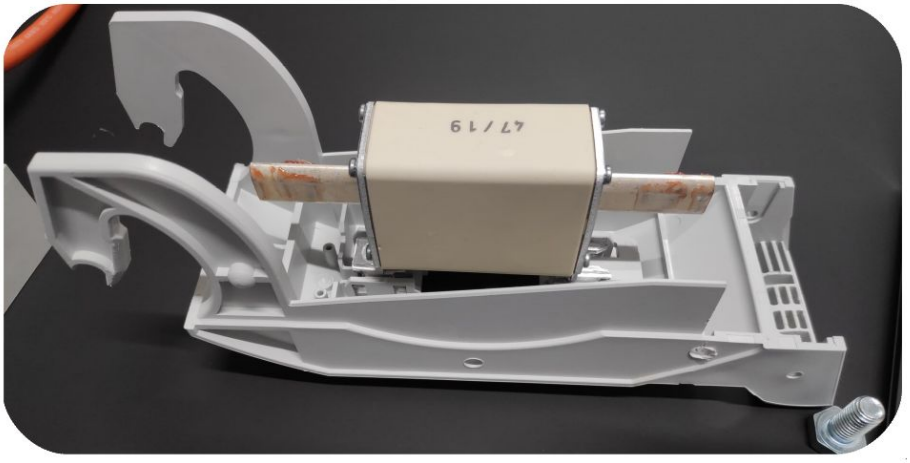
Image 7 and 8. Mersen fuse holder and components



To mount the Mersen fuse holder to the customer's wall, remove the internal component (pictured below).

Two fixing screws should be used along with the washers included to install the fuse holder.

To fit the fuse, first attach the fuse to the lid of the Mersen fuse holder (as shown below), then attach the lid to the fuse holder.



9.0 Commissioning

9.1 Scanning the batteries

No installation is complete **until the device is commissioned.** There are a number of checks that must be made to determine whether the device is operating correctly. The commissioning process is conducted with the help of the Moixa Operations team. When the device is ready to be commissioned please call **0207 734 1511**.

i. Submitting the details of the installation via the installation app

Using your smartphone, open the Field service app. Go to the installation part of the app. and follow the instructions in the app to submit details and photographs of the installation. Included in this process will be capturing the serial number details for each of the Pylontech battery modules. These can be taken from the packaging of the batteries or from the batteries themselves.

ii. Verifying that the device is connected to the internet

The first thing the Moixa Operations team will check is that the device is connected to the internet.

- They will ask you to provide them with the “Wi-fi mac address” for the device. This is printed on the label on the left side of the Moixa Hub and on the packaging of the Moixa Hub.
- After you read this number to the team, they will check the device is online and will ask you to perform some tests.

iii. Verifying that the Moixa Hub software is correct

The installed device should be running the most up to date software. The Moixa Operations team will check the version of software that the device is running. They might need to update the device software if there is a newer version available. This update will take a couple of minutes and the device may need to be restarted.

iv. Verifying that the data cables are all connected properly

The next thing the team will check is that the system is receiving data from all the necessary inputs. This involves checking the data connection to the batteries, the inverter, and the site monitoring equipment. During this process, the team will ask you to confirm some details of the installation. If these are different to the installation job details, the team will ask for more information.

v. Verifying that the device can charge and discharge

The Operations team will then check that the device is able to charge and discharge. The team can do this at their end – they will send a command to the device to get it to charge and then verify that it charges at the expected level. They will then send a command to get the device to discharge and then verify the device discharges at the expected level.

If everything goes well, there will be nothing for you to do at this stage. If there are issues, they will need you to support debugging this, which will most likely involve checking the power connections.

vi. Verifying that the AC power readings are correct

- The final thing the team needs to check is the data readings from the site monitoring equipment.
- First they will check PV generation. They will check the initial value of PV that is being generated by asking you to put a current meter around the AC PV output from the PV inverter. They will verify this against the value being read by the site monitoring equipment.
- They will then ask you to turn off the isolator switch for the PV and verify that the PV generation goes to 0.
- With the isolator switch still off, they will then want to check the amount of power that the house is consuming. They will ask you to check the household consumption using a current meter and check it against the reading they are getting.
- Next, they will ask you to ask the customer to turn on some electrical load in the house e.g. a kettle. They will then ask you to take another reading of the household load and they will check this against the reading the battery is getting. Once they are satisfied with this, they will ask you to ask the customer to turn the load off.
- They will then ask you to turn the PV isolator switch back on and they will verify that the readings of PV generation and household load are as expected.

This is usually everything the Moixa Operations team will want to check, but they may ask you to do some other testing. If they give the all-clear, you can then proceed to the next section.

9.0 Finishing the Installation

9.1 Testing, labelling and tidying up the product and cables

After the commissioning step is complete, the final steps are to test the circuits, to ensure the system is earthed, to tidy the customer's home, and to hand the product information over to the customer.

i. Testing the electrical circuits

Please remember to do all relevant electrical testing in accordance with electrical safety and wiring regulations.

ii. Earthing the system

1. The Pylontech batteries each have grounding lugs that must be connected to the potential earth of the building.
2. Once these cables have been fitted, a continuity test should be performed on the system to ensure there is good contact to the earth of the customer's home.

iii. Tidying up the house and securing external and internal cables

1. Please ensure that all external cables e.g. the Ethernet cable, the data cabling to the meters, and the clamp cables are secured tidily and safely.
2. Please ensure that all internal cables are secure and the internal cable ties have been tightened if required.
3. Ensure that cut-offs from cables and dust is cleaned up before leaving the customer's property.
4. If any damage has occurred during the installation, please resolve this to the best of your abilities, photograph the damage, apologise to the customer and let them know Moixa will be in contact. You will then need to inform and share the photographs with Moixa as soon as possible.

iv. Labelling

Ensure that any electrical safety labels that are required are placed on the relevant parts of the system as per regulations.

v. Notifying the DNO / certifying the work

Where required, please ensure that the DNO is notified for any work that has been done as per regulations. Certify the work (EIC) and notify Building Control as required.

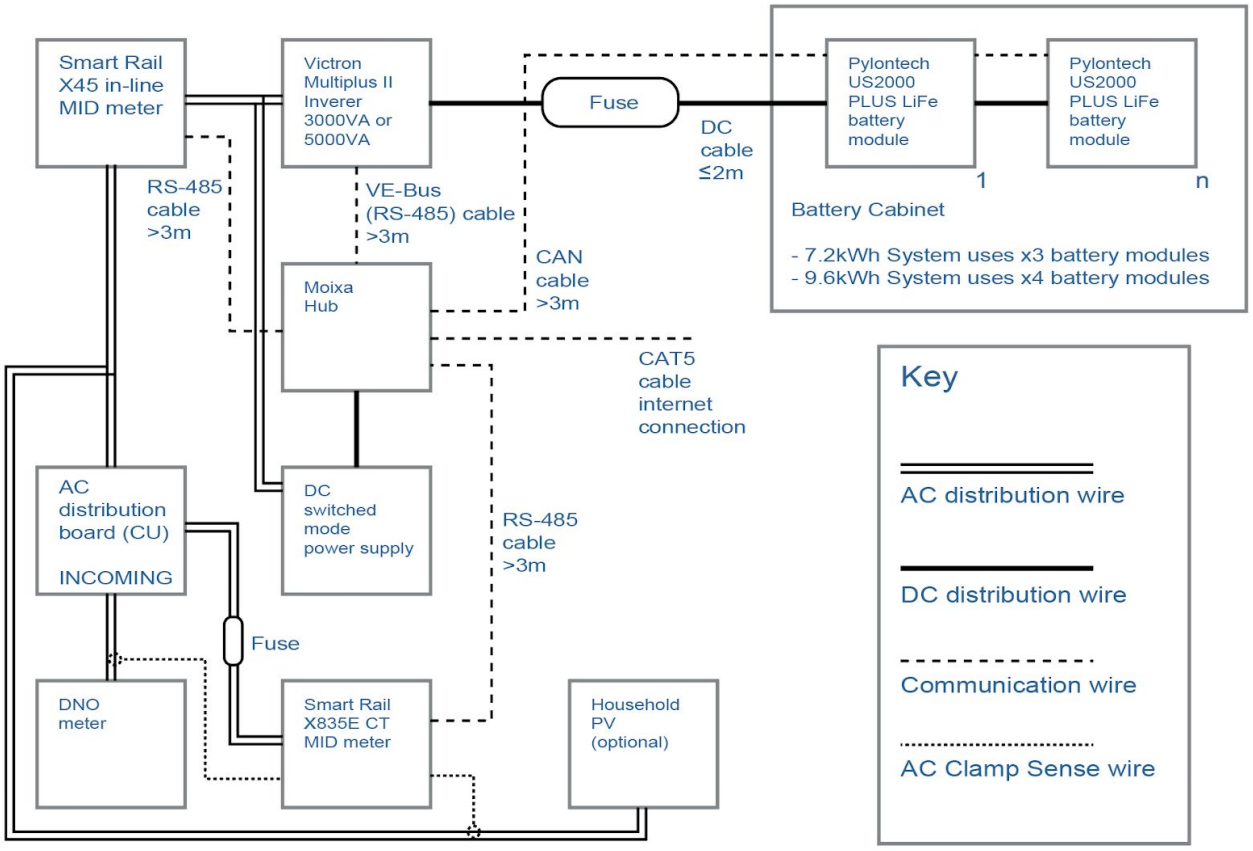
9.1 Handing the product over to the customer

We ask that installers give the customer an introduction to the product. This should take around 5 minutes and include the following:

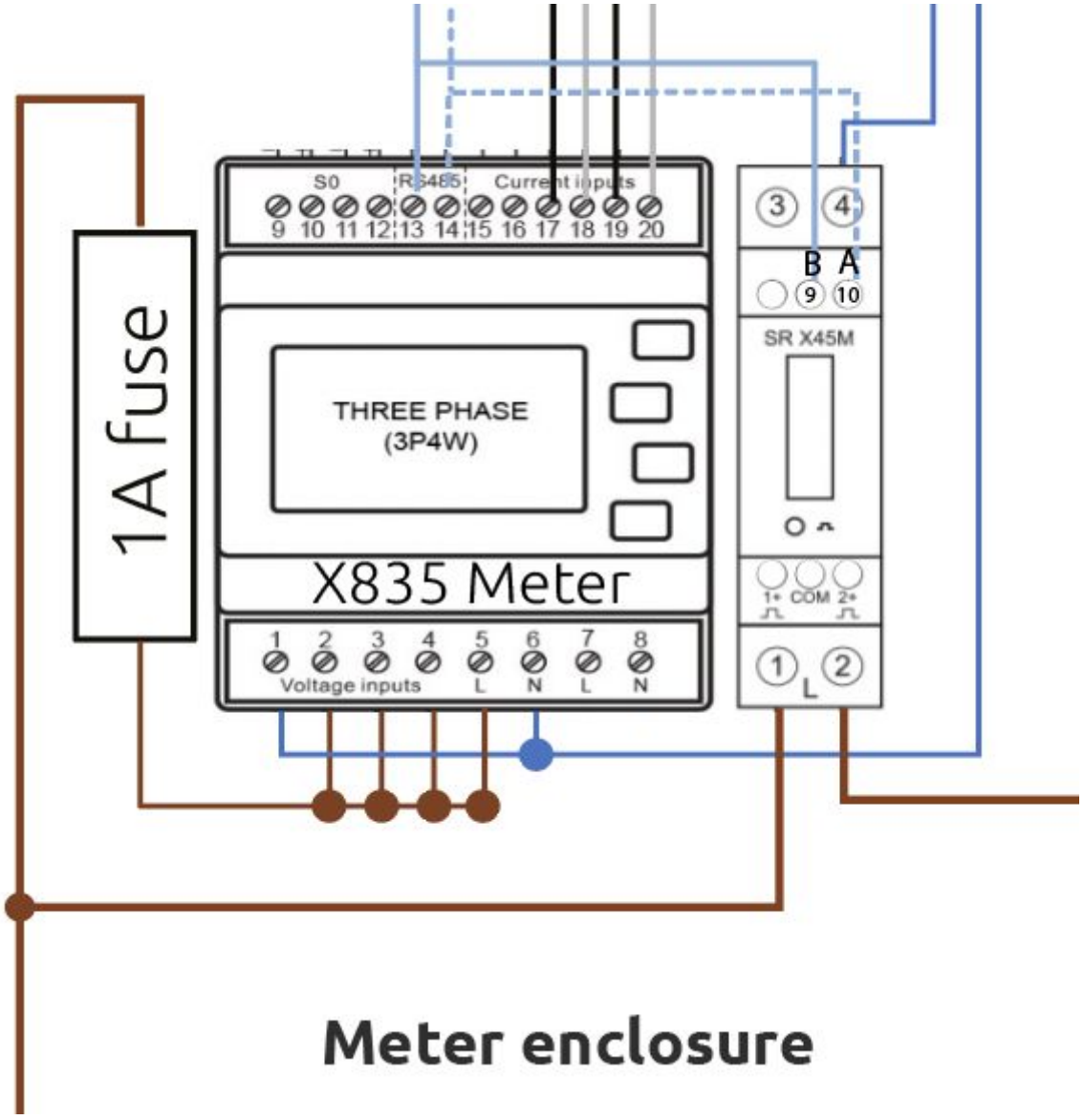
- Point out the newly installed site monitoring equipment (meter and / or CT clamps) and explain its purpose.
- Point out the isolator switch to the inverter and how it can be turned on and off.
- Point out the warning labels on the equipment.
- Remind them they must not take the outer lid off the battery or this will void their warranty.
- Provide them with all supporting product documentation, such as the Moixa Hub product manual, Victron Multiplus Inverter manual, and Pylontech battery manual.
- If the customer has any more in depth questions, please point them towards their product manuals, and let them know they can contact customer support at support@moixa.com.
- The customer may ask you how they can get access to the Moixa Dashboard and app to view their energy data – you can let them know that they will receive an email from the Moixa team with a link to create their account. Let them know that if they have not heard from Moixa after 2 working days that they should reach out to Moixa Support on 0207 734 1511 or by email to support@moixa.com.

That's it! The installation is now complete – thank you for your diligence in conducting the installation!

Appendix 1 - Single Line Diagram



Appendix 2 - Meter connections



Meter enclosure

0207 734 1511

operations@moixa.com

www.moixa.com/installers/