

Shaping the power of the future

Installation Guide

Multicabinet installation



System safety and environmental precautions

Product warranty becomes invalid if following precautions are not followed during handling, storage, installation, commissioning and operation of Pixii energy storage systems.

General precautions



Although this system incorporates protective circuits and other security features, it may still be destroyed, damaged, work poorly or shorten its lifetime if exposed to improper handling during transportation, installation or operation. Always handle the system with care, use proper lifting techniques, do not roll, climb or drill holes in the cabinet or enclosure.



Opening the equipment may cause serious injury even when the AC power is disconnected. Dangerous voltage may be present inside, as system can be still running from batteries or capacitors may still be charged.

Environmental precautions



Some devices can reach high temperatures during normal operation. It is very important to ensure that airflow through equipment is not blocked, filters are in good condition and fans can rotate freely. If other equipment is installed in close proximity, secure that inlets and outlets are not blocked.



Electronic devices installed in the energy storage system are designed for indoor environment with pollution degree 2. When installed in an outdoor enclosure (open or closed loop heat management system), it is important to ensure, that the enclosure is closed and sealed during normal operation, to avoid external air with increased level of humidity and dust from entering. In addition, in open loop systems, filters maintenance must be properly planned. In case of indoor systems, operating environment must be of pollution degree 2, without increased level of dust and humidity.



Installer is responsible to protect system against current surges, over-voltages, etc. caused by lightning, electrostatic discharges, etc. To avoid system damage, it is mandatory to always install proper SPDs.

Installation precautions



Read carefully user documentation before installation and using this equipment. Follow all commands, always use recommended tools and torque values as described. Commissioning and configuration of equipment should be done only by Pixii personnel or by other authorized and qualified persons.



For safety reason, before you start installation, ensure all external power sources are disconnected, as well as internal battery and load fuses/breakers. To avoid injuries caused by high leakage/touch current you must always start installation by connecting earthing wire (PE), before you connect other AC input wires (phases, neutral).

If system contains batteries, they represent major energy hazard. To avoid short circuit on batteries, do not operate with full metallic tools close to battery poles. Be careful also about other objects (rings, watches, necklaces, etc.).



All Pixii devices are certified according to international safety, environmental and EMC standards. If any other devices will be installed inside this product, it might influence parameters and violate original approvals. Installer is responsible that during installation environmental properties of this device are not impaired and installation is according to local regulations.

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Revision	Date	Comment
1.0	23.06.2023	Initial
1.1	17.01.2024	Added chapter "1.1 References" and "4.5 Phase distribution adjustment"

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1 Introduction

This document describe step by step installation of multiple cabinet energy storage system. Read it carefully and follow all recommendations to be sure system is running in correct environment under good conditions and installation reached all safety requirements.

1.1 References

- 14483_Installation guide_PowerShaper 2.0.

1.2 Recommended tools and torque

	Tool
W	Wrench
PZ2	Pozidriv screwdriver
Flat	Flat screwdriver
T-W	Torque wrench
T-PZ2	Torque Pozidriv screwdriver

	Type & Size	Torque
T1	Terminal block (WDU16, WPE16)	3.0Nm
T2	Terminal block (WDU35, WPE16)	4.5Nm
T3	Terminal block (WDU2.5, WPE2.5, WSI4)	0.4Nm
T4	AC Mains input terminals (6-25mm ²)	12.0Nm
	AC Mains input terminals (35-95mm ²)	22.0Nm
T5	M6 self tapping screw	9.8Nm
T6	Internal terminals (-X2) (1.5-2.5mm ²)	1.5Nm
	Internal terminals (-X2) (4-10mm ²)	5.0Nm
	Internal terminals (-X2) (16-50mm ²)	10.0Nm

1.3 Description

It is recommended to divide cabinets to the separate groups. Each group can contain up to 1x Master cabinet and appropriate amount of Switch/Client cabinets (depending on layout).

1.3.1 Master cabinet

Master cabinet(s) MAC1 - MACx could be the basic outdoor cabinet(s) with Gateway controller equipped, set up to Master or Master/Client function.

NOTE:

The Gateway in the master cabinet/unit must have the "Multicabinet role" defined as "Master/client" or "Master".

The difference between these two are:

- "Master/client": This has active converters and batteries connected to the Gateway and will monitor these units. It will also send the service settings and scheduler if changed from the web interface. This is suitable for multicabinet systems up to 4 – 5 cabinets.
- "Master": this is a Gateway that does not have active converters and batteries connected to it. This is suitable for larger multicabinet systems from 6 – 20 cabinets.

1.3.2 Switch cabinet

Switch cabinet(s) SWC1 - SWCx are basic outdoor cabinets with additional 8-port ethernet switch equipped.

NOTE:

Switch cabinet could be set up to Master at the same time.

1.3.3 Client cabinet

Client cabinet(s) SLC1 - SLCx are basic outdoor cabinets.

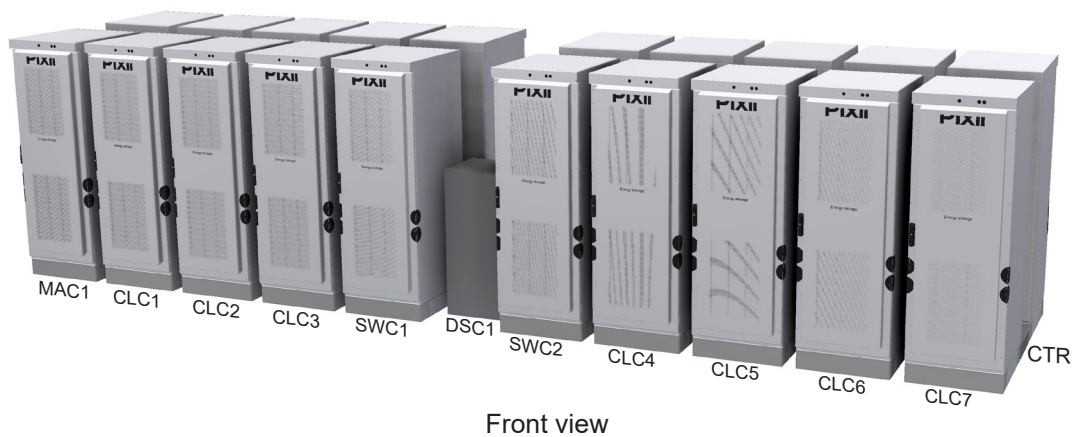
1.3.4 Distribution cabinet

Distribution cabinet(s) are dedicated to connect power cables from other cabinets and connect whole power system to the grid.

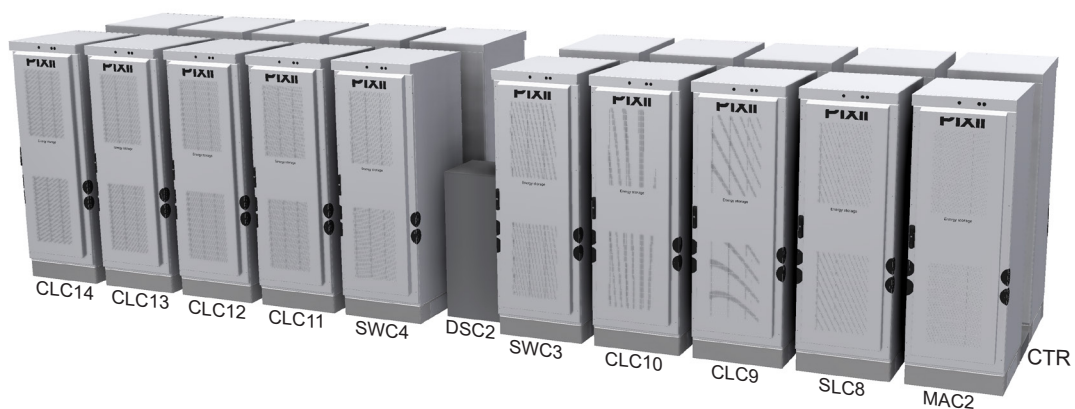
1.4 Layout

Typical multicabinet system consist of:

Master cabinet	MAC1, MAC2
Client cabinet	CLC1 - CLC14
Switch cabinet	SWC1 - SWC4
Distribution cabinet	DSC1, DSC2
Cable trunk	CTR



Front view



Rear view

Figure 1.1 Layout

NOTE:

Pictures in this guide are showing an example of the multicabinet system installation. Number and types of cabinets may differ depending on the customer demands.

2 Preparing installation site

2.1 Pre-installation steps

1. Organize installation site

- Mounting base strong enough to carry weight of fully equipped system (see Installation guide for each system)
- Recommended clearances for cabinet access are described in chapter 3.1.1.

NOTE:

It is strictly required to follow local regulations if separation distances larger than the table above are required.

NOTE:

If the energy storage system is installed indoor, automatic sprinkler system is highly recommended and sometimes required. Local regulations must be adhered to.

2. Prepare installation tools

- Use insulated tools suitable for electrical installations
- Recommended tools list is in chapter "Tool" on page 8

3. Prepare AC Mains supply

- Correct type of AC Mains supply
- Correct rating of AC input cables and external fuses
- AC Mains supply meter

**!!! WARNING !!!**

System is designed to operate on 1-phase or 3-phase networks. It is strictly forbidden to connect multiple single-phases to the system.

3 Mechanical installation

3.1 Preparing site for installation

To secure correct system operation, cabinets and cable trunk(s) must be properly fixed to solid horizontal leveled surface.

3.1.1 Minimum distances / clearances

Follow dimensions in the table below, when preparing layout of installation site.

	Minimum distance		Suggested distance	
	Fan Filter Cabinet	Cabinet with AC	Fan Filter Cabinet	Cabinet with AC
Front	80cm		100cm	
Rear	5cm		25cm	
Top	30cm		90cm	
Sides	25cm		60cm	
Between cabinets (multi-cabinet installation)	5cm	20cm	25cm	35cm

Table 1. Minimum distances / clearances

NOTE:

It is strictly required to follow local regulations if separation distances larger than the table above are required.

NOTE:

If the energy storage system is installed indoor, automatic sprinkler system is highly recommended and sometimes required. Local regulations must be adhered to.

3.2 Cabinets

Dimensions of cabinets and position of holes are described in installation guides for each cabinet. Because of small space in plinth and easier installation, it is recommended to prepare all cables in areas directly under cable entries. See installation guides for cable entries dimensions and positions.

3.2.1 Fixing the cabinet

Position and fix the cabinets to their location. Follow fixing procedure in installation guide for each cabinet.

!!! WARNING !!!

Do NOT use any other technique to lift the cabinet because of imminent damage.

Never lift cabinet with opened door.

Do NOT lift cabinet with installed modules and batteries.

3.3 Plinth covers

To prevent access to cabling under the cabinet, unpack the two plinth covers from the enclosed items and fix each of them with six screws to cabinet plinth (see *Figure 3.1*).

Plinth covers could be used for cable routing. In that case, drill holes to the covers and use cable glands.

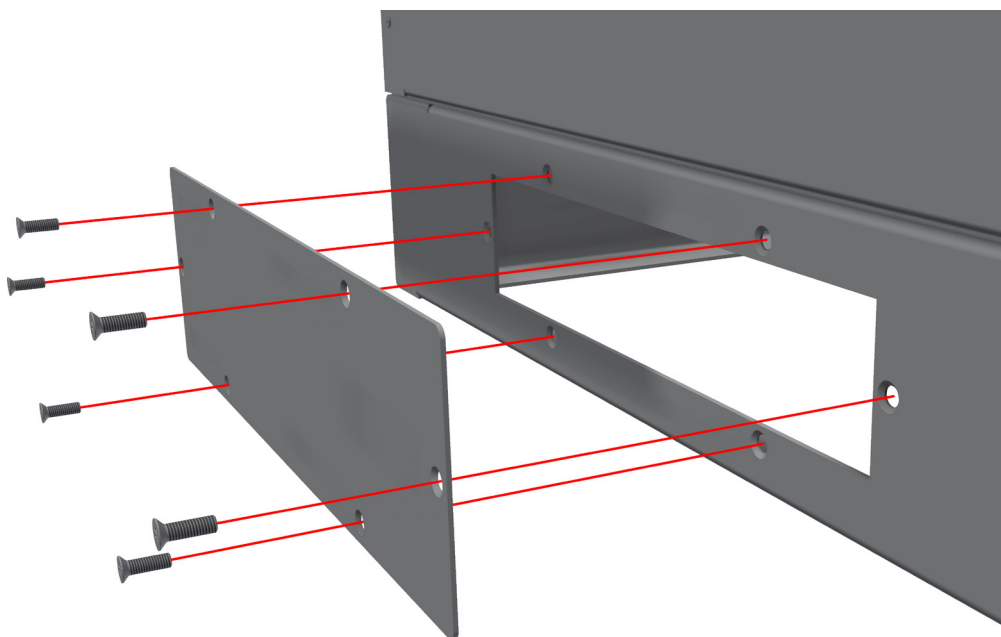


Figure 3.1 Plinth covers

3.4 Cable trunks

Cable trunks dimensions should be considered based on the number of the routed cables. For 20pcs of 5x35mm² flexible cables are perforated trunks suggested with min. dimensions of 400x110 (mm).

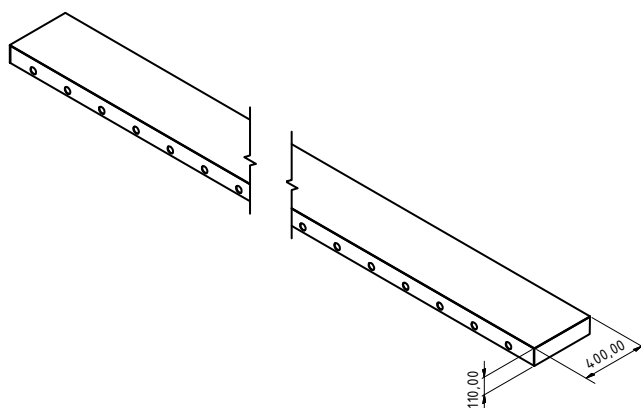


Figure 3.2 Cable trunk

NOTE:

Dimensions of cable trunks may differ.

3.5 Distribution cabinets

Types and dimensions of distribution cabinets may differ based on manufacturer. Dimensions should be considered based on the number, type and cross section of the input/output cables.

4 Electrical installation

For safety reason, before you start installation, ensure all external power sources are disconnected, as well as internal battery and load fuses/breakers. To avoid injuries caused by high leakage/touch current you must always start installation by connecting earthing wire (PE), before you connect other AC input wires (phases, neutral).

4.1 Preparation

Remove plastic cover(s).

Number and types of covers may differ. Follow instructions in installation guide for each cabinet.

4.2 Phase distribution adjustment

For an even distribution of the phases, it is necessary to evenly distribute the door feeding cables.

4.2.1 TN-S network systems

NOTE:

This adjustment is available only for systems with terminals capable to fix 1.5mm² cables.

NOTE:

This adjustment is available for both, Air condition and Fan-Filter cabinets as well.

Splitting the cables

In case that phase cables are connected into one ferrule, split them and crimp new ferrules (1.5mm² for door feeding cable, 35mm² for phase cable -X2:7).

NOTE:

Do not split the cables, if the cabinet is supposed to be part of "L1" cabinets.

NOTE:

In case, that cables are already split, skip this step and follow instructions in chapter below.

NOTE:

Crimping material is not supplied.

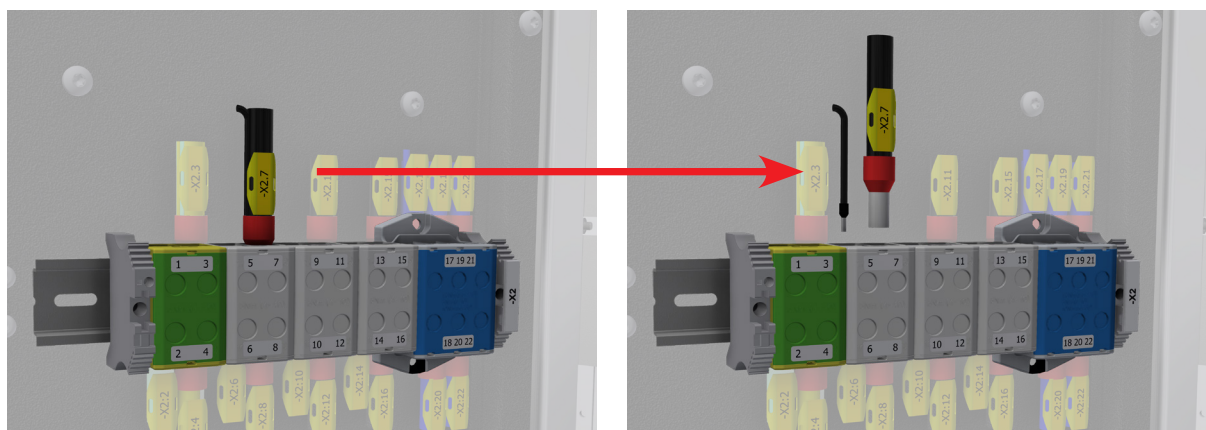


Figure 4.1 Splitting the cables

Distribution of the cables

Evenly distribute the door feeding cables to all phases, depending on the number of cabinets in the multicabinet installation. For example: If there are 9 cabinets in the installation, connect door feeding cable as follows:

- in three “L1 cabinets” group, check if the both cables are connected to the terminal -X2:7, in the second variant check if door feeding phase cable (black, 1.5mm²) is connected to the terminal -X2:5 from factory,
- in three “L2 cabinets” group, connect cables to the phase L2 (terminal -X2:9), using torque T6,
- and in last three “L3 cabinets” group, connect cables to the phase L3 (terminal -X2:13) using torque T6.

NOTE:

It is recommended to mark the cables after connection to the different terminals.

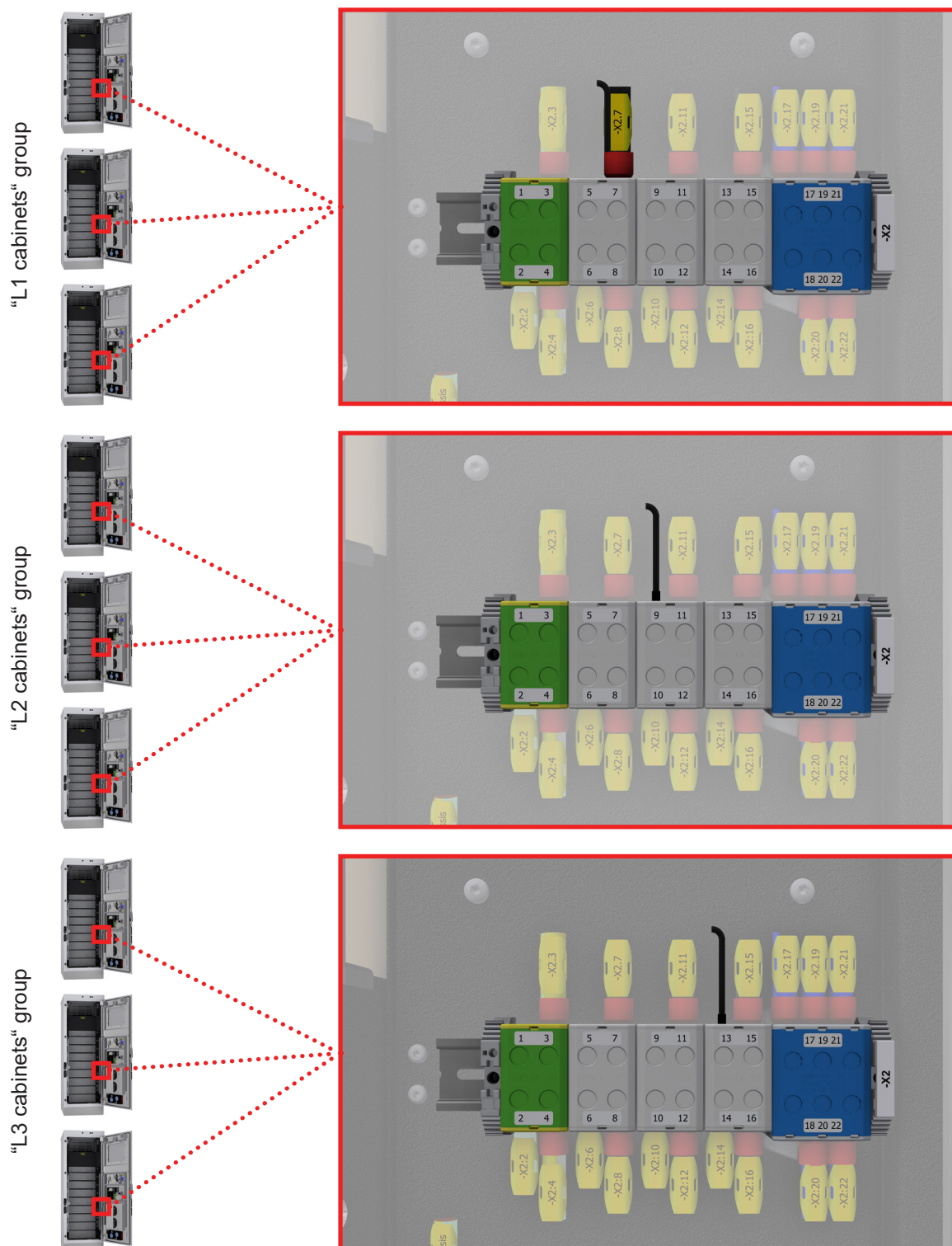


Figure 4.2 Distributing the cables for TN-S network systems

4.2.2 IT network systems

NOTE:

This procedure assumes, that the IT distribution kit is already installed according to the installation manual for PowerShaper 2.0 systems *DN 14483_Installation guide_PowerShaper 2.0*.

NOTE:

This adjustment is available only for systems with terminals capable to fix 1.5mm² cables.

NOTE:

This adjustment is available for both, Air condition and Fan-Filter cabinets as well.

Splitting the cables

In case that both cables (1.5mm², 35mm²) are connected into one ferrule, split them and crimp new 35mm² ferrule.

NOTE:

Do not split the neutral cables (-X2:17), if the cabinet is supposed to be part of “L1-L2” cabinets.

NOTE:

It is recommended to mark the cables after connection to the different terminals.



Figure 4.3 Splitting the cables

Distribution of the cables

Evenly distribute the door feeding cables to all phases, depending on the number of cabinets in the multicabinet installation. For example: If there are 9 cabinets in the installation, connect door feeding cable as follows:

- in “L1-L2 cabinets” group, check if the both neutral cables (blue, 1.5mm², 35mm²) are connected to terminal -X2:17 from factory and crimp door feeding phase cable (black, 1.5mm²) with cable -X2:7 using torque T6,
- in “L1-L3 cabinets” group, crimp door feeding phase cable (black, 1.5mm²) with cable -X2:7 and neutral cable (blue, 1.5mm²) with cable -X2:19 using torque T6,
- and in the “L2-L3 cabinets” group, crimp door feeding phase cable (black, 1.5mm²) with cable -X2:11 and neutral cable (blue, 1.5mm²) with cable -X2:19 using torque T6.

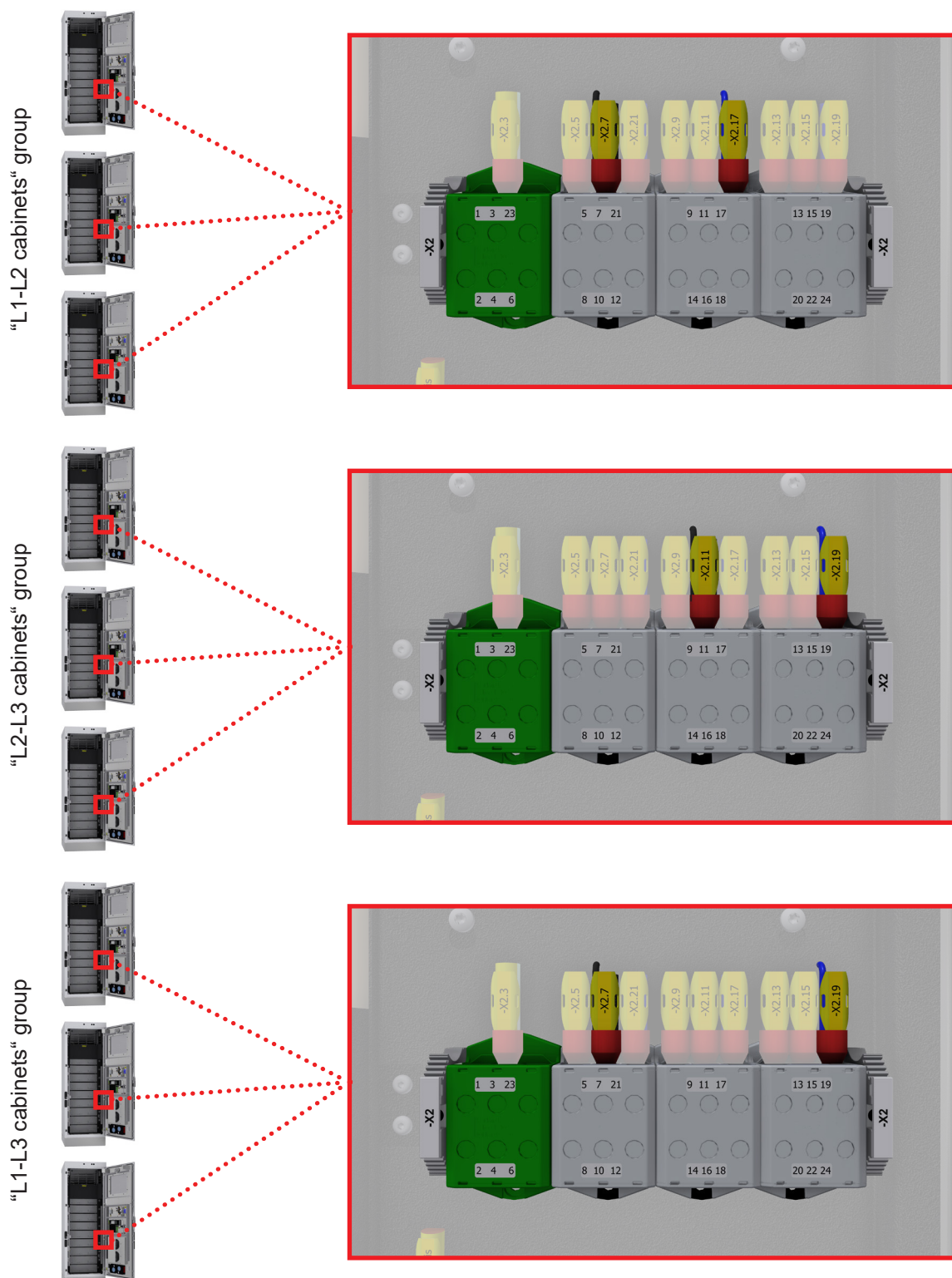


Figure 4.4 Distributing the cables for IT network systems

4.3 Protective bonding

It is necessary to interconnect cabinets and cable trunk(s) chassis with main earthing point in the distribution, to ensure equal potential throughout the installation thus preventing a hazardous potential difference occurring between such parts in the event of a fault.

4.3.1 Cabinets

Connect bonding cable from main earthing point to the bonding point on the bottom of the cabinet with M6 lug. Route the cable through the plinth cover on the side of cabinet to the cable trunk, using the cable glands and connect it to the main earthing point in the distribution cabinet.

NOTE:

Connect the bonding cable to the earthing busbar (Variant B) if the access to the bonding point in Variant A is limited. If the earthing busbar is not installed, it is necessary to order it separately.

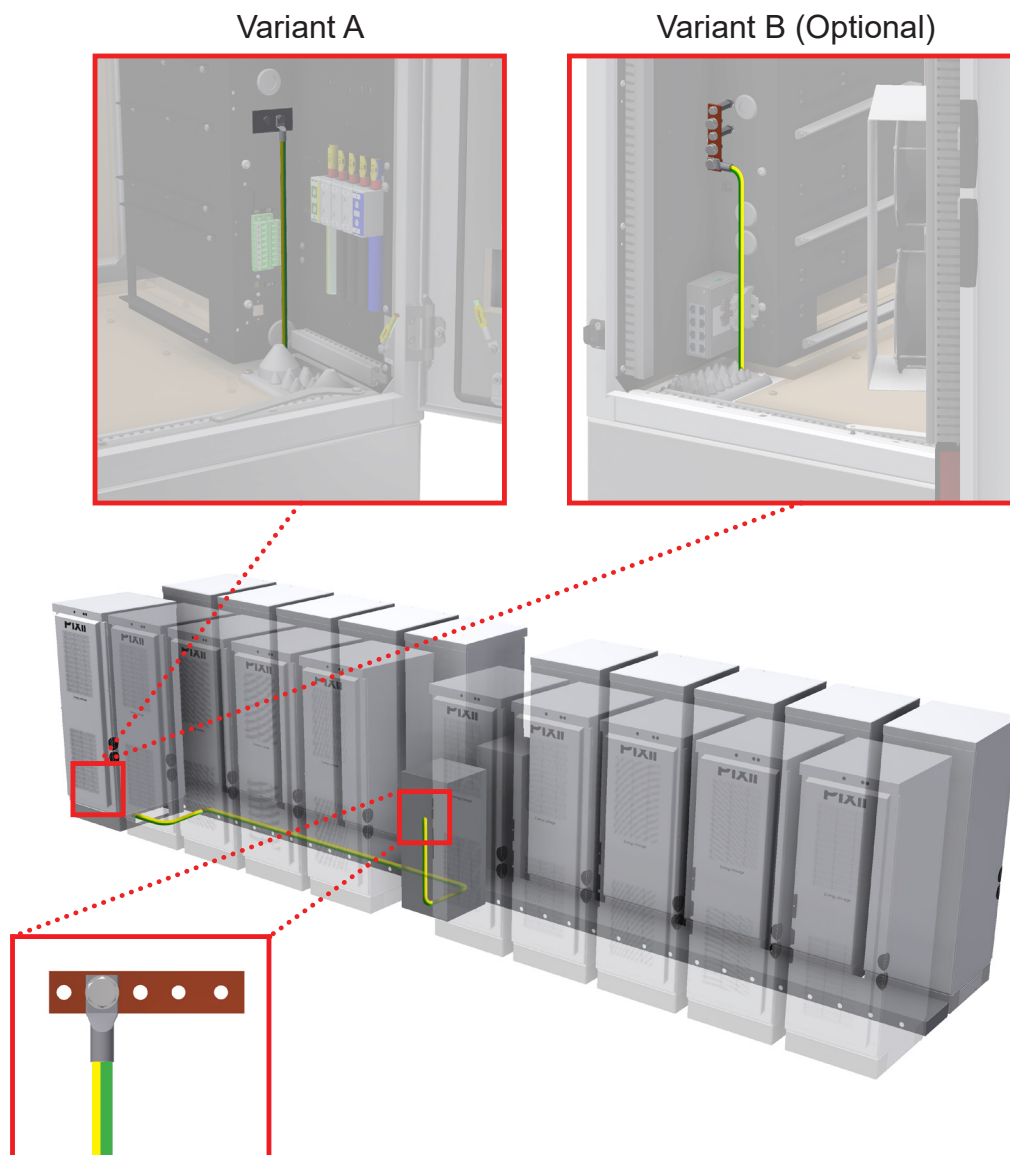


Figure 4.5 Cabinets protective bonding

NOTE:

Connection steps are same for all cabinets.

NOTE:

Each group of cabinets should be connected to separate distribution cabinet.

NOTE:

Do NOT interconnect bonding busbars in cabinets. Use separate bonding cable from distribution cabinet to each power cabinet.

4.3.2 Cable trunks

Connect cable trunks with PE bonding cables to the main earthing point in the distribution cabinet.

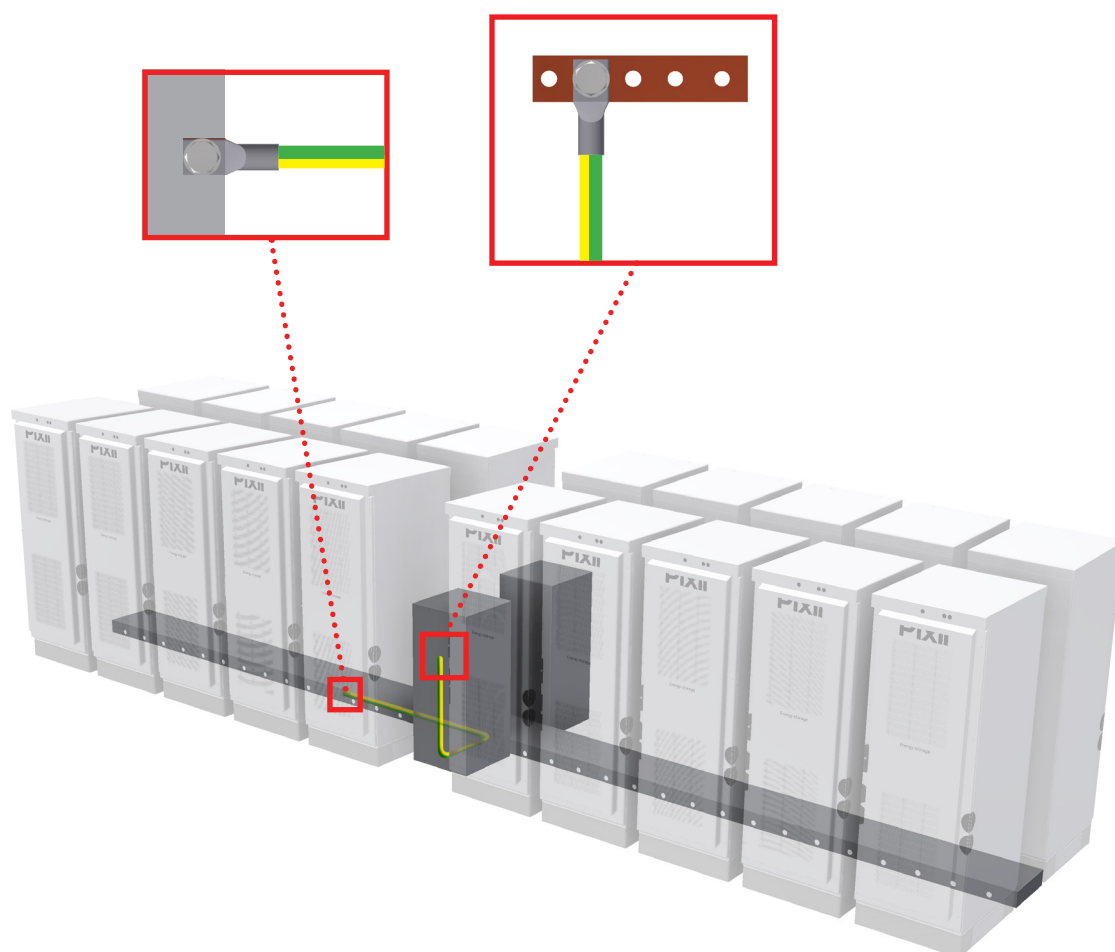


Figure 4.6 Cable trunks bonding

NOTE:

Each cable trunk section should be connected to separate distribution cabinet.

4.3.3 Distribution cabinets

Connect all distribution cabinets to the same central earth point.

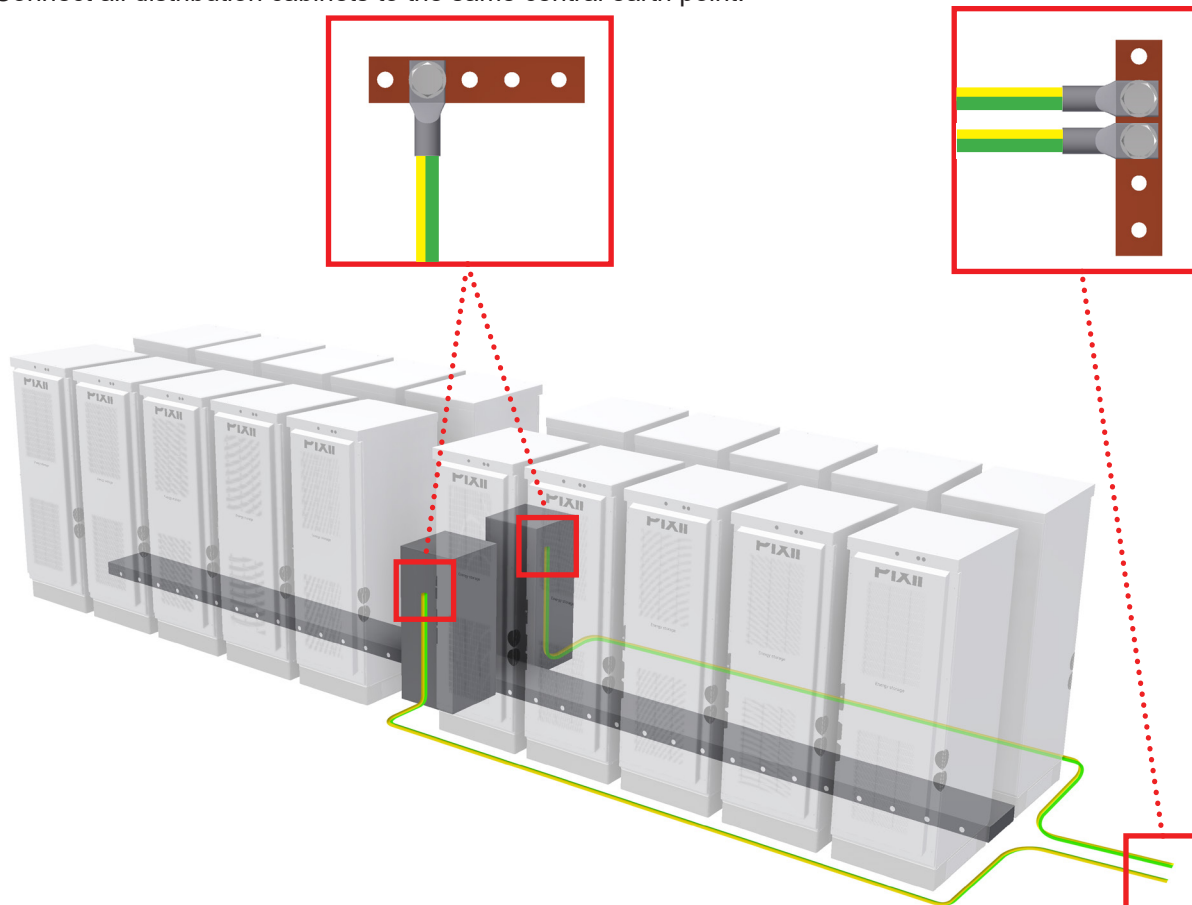


Figure 4.7 Distribution cabinets bonding

4.4 Connecting the cabinets

Connect Gateways from all cabinets to the ethernet switch located in switch cabinet SWC1-4.

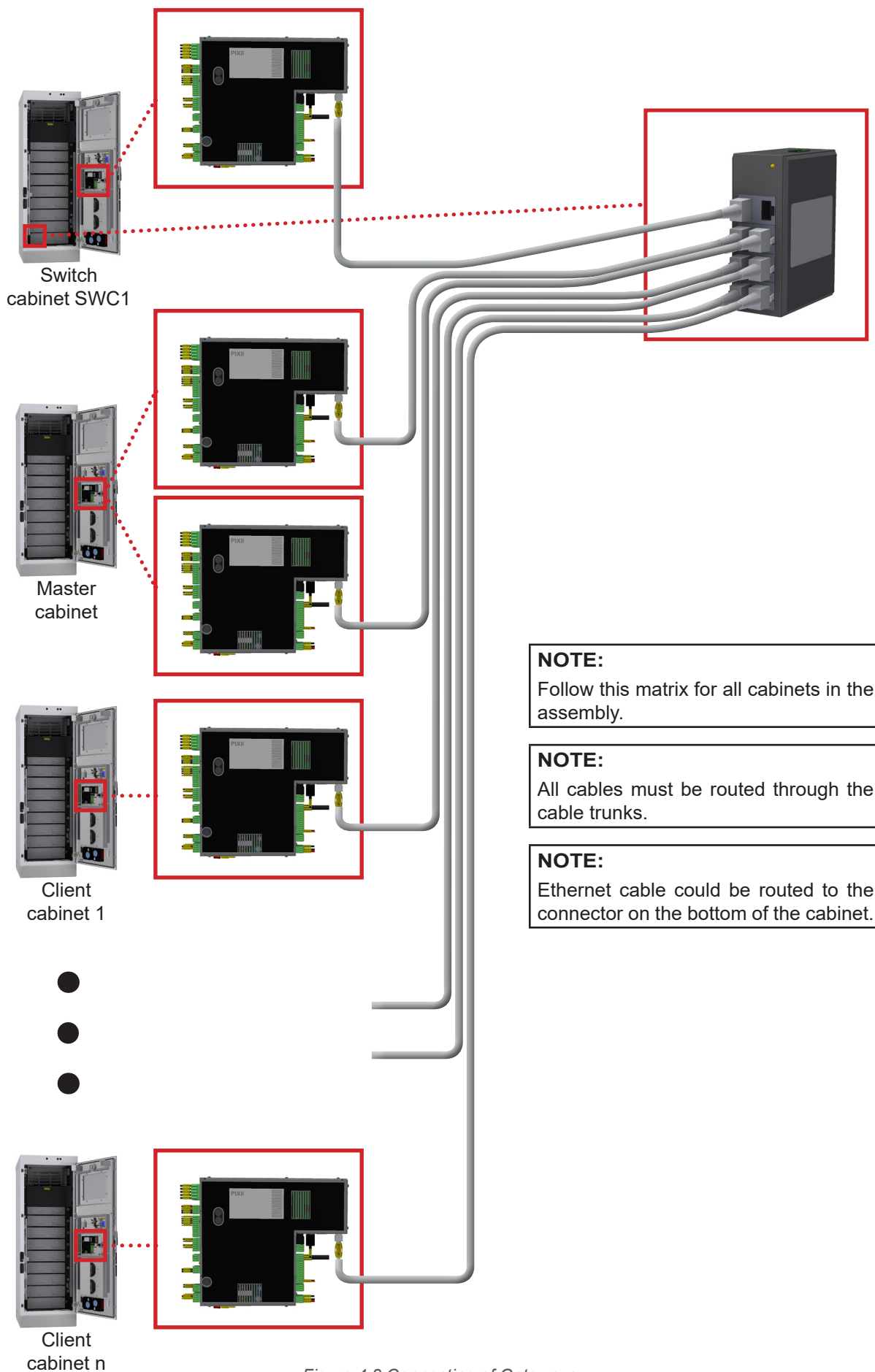


Figure 4.8 Connecting of Gateways

4.5.3 Switch cabinets

Option 1

Connect all switch cabinets SWC1-x with customer device.

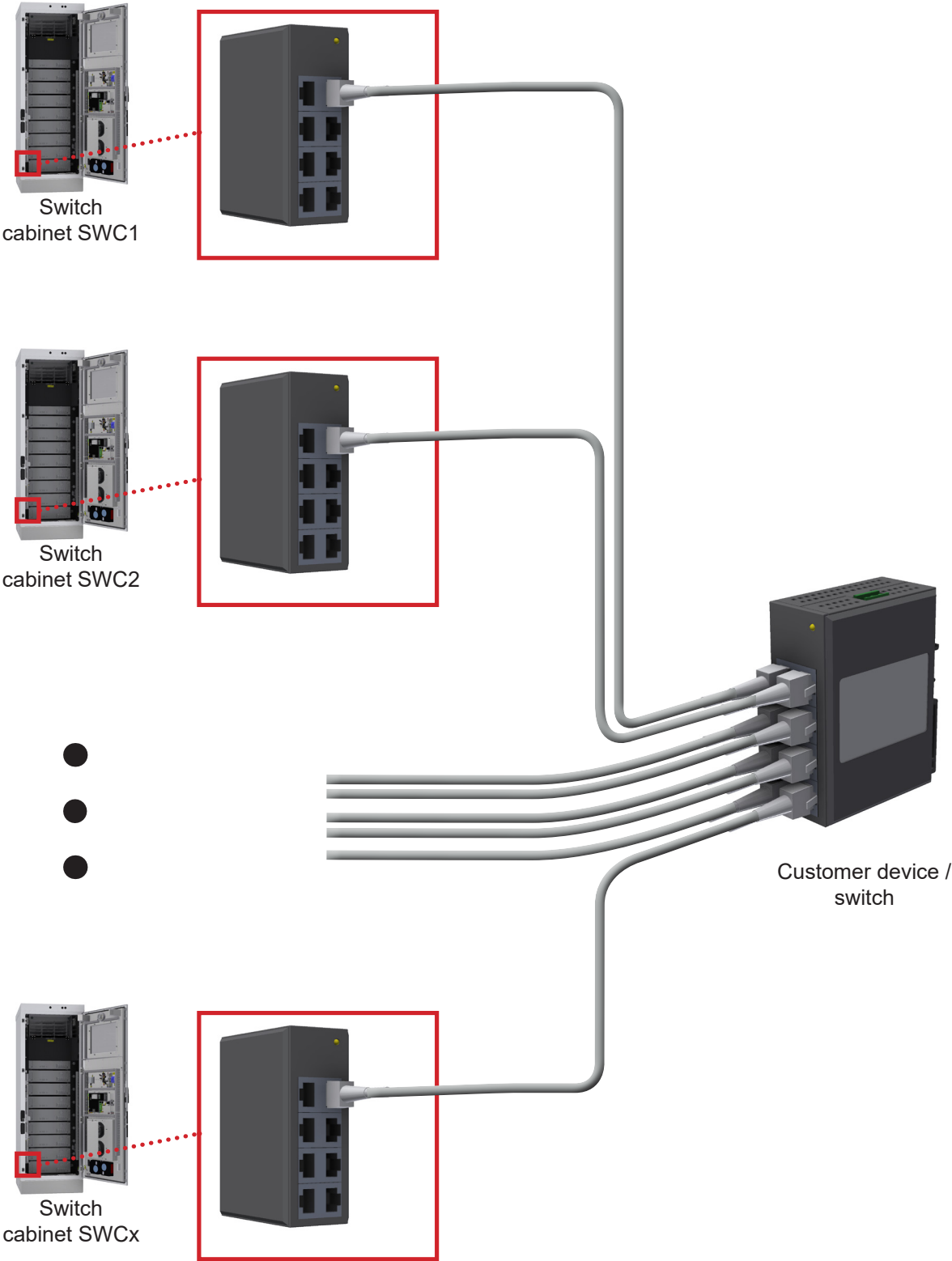


Figure 4.12 Connecting of Switch cabinets (Option 1)

Option 2

Connect switch cabinets SWC1-x to each other and then to the customer device.

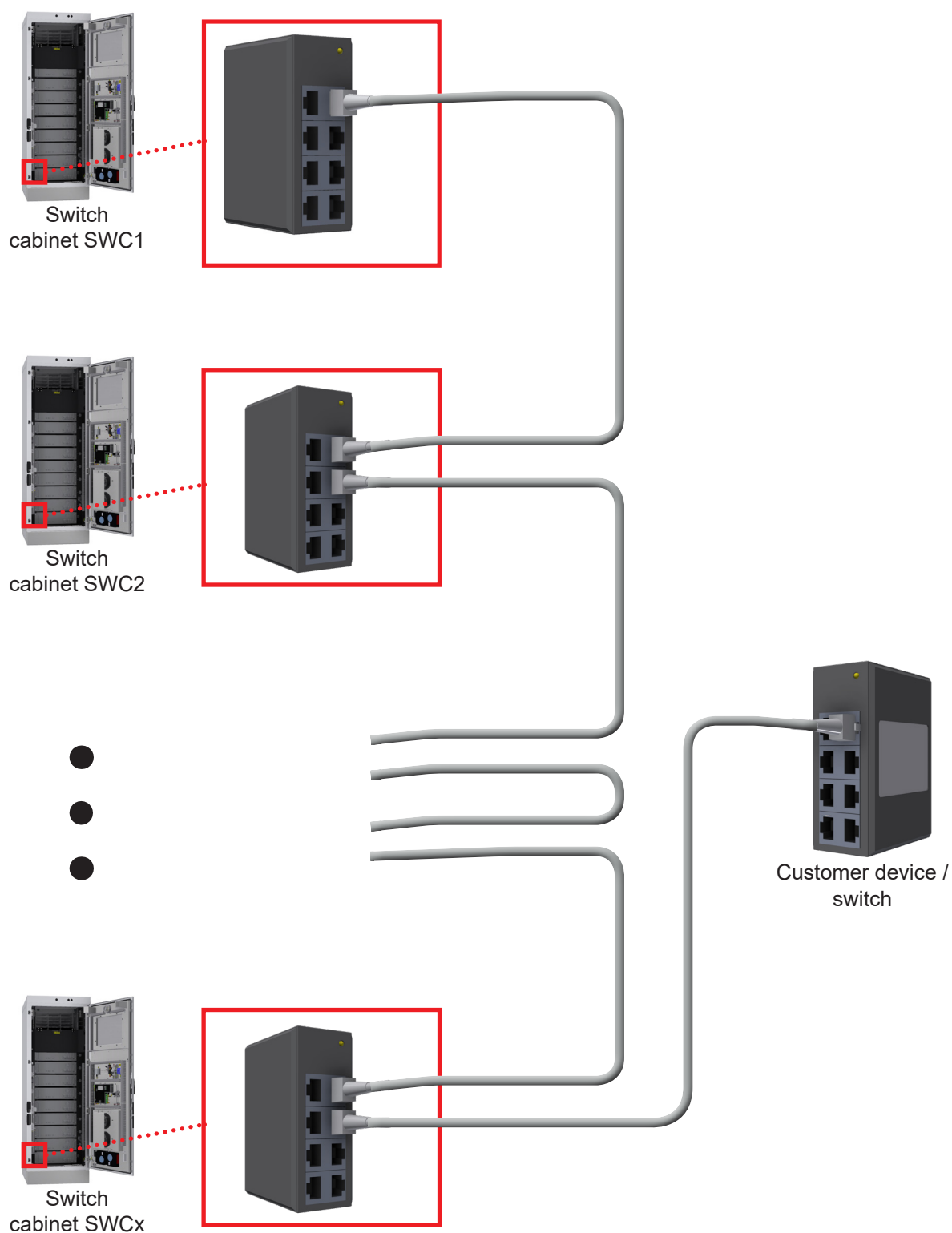


Figure 4.13 Connecting of Switch cabinets (Option 2)

4.6 Site with local network / internet

1. Remove power cable from 4G router in all cabinets.



Figure 4.14 Removing power cable from 4G router

2. Connect local network / internet cable to the switch in master cabinet and follow steps in chapter "4.5.3 Switch cabinets" on page 19

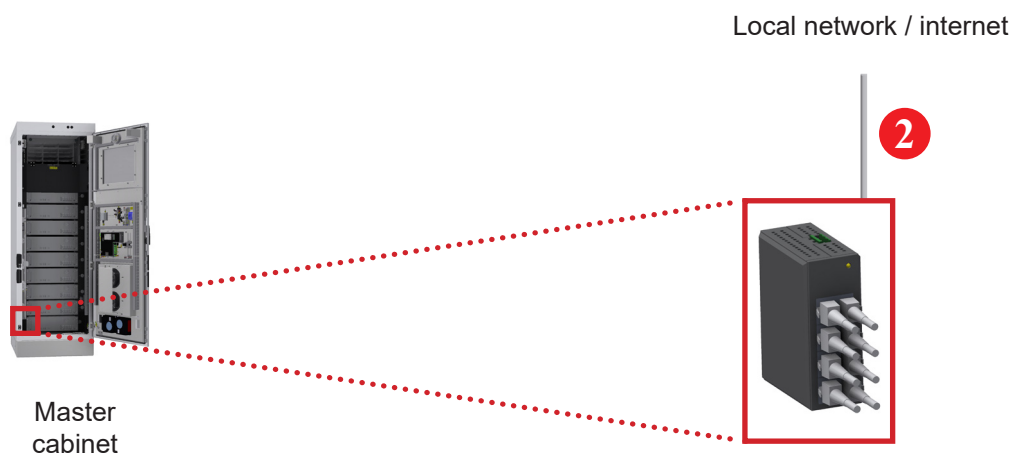


Figure 4.15 Connecting the local network / internet

4.7 Site without local network / internet

1. Remove power cables from all 4G routers in all client cabinets.

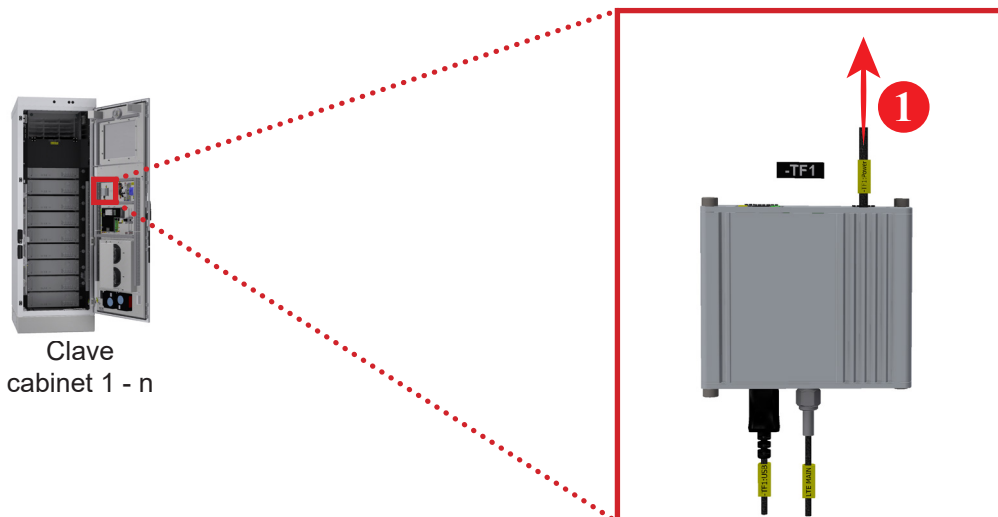


Figure 4.16 Removing the power cable

2. Remove USB cable from 4G router in master cabinet.

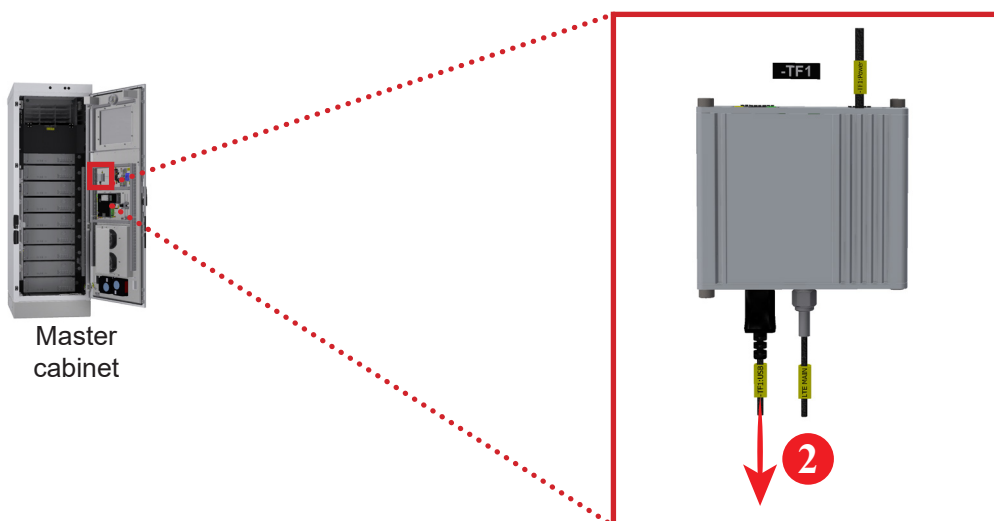


Figure 4.17 Removing the USB cable

3. Connect 4G router to the switch using ethernet cable in master cabinet.

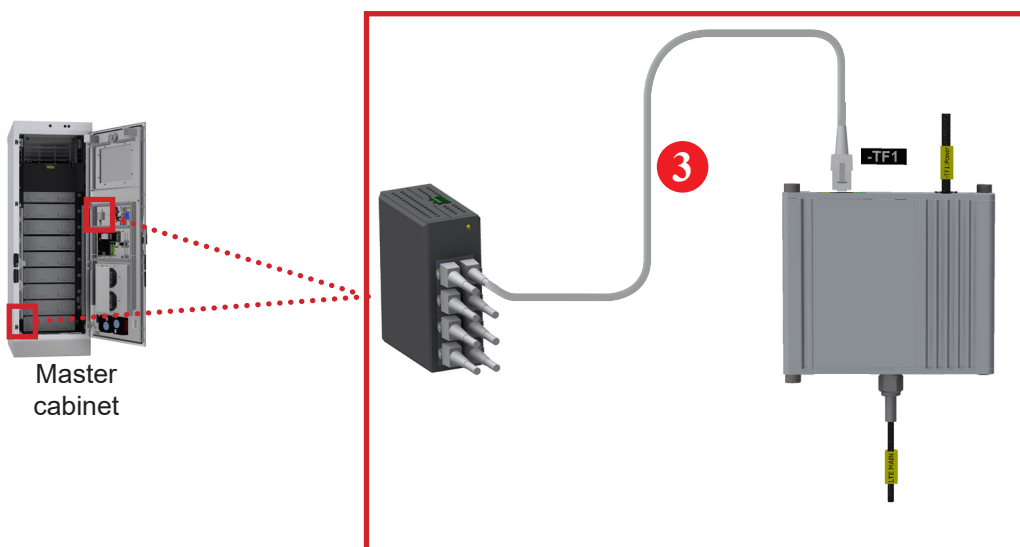
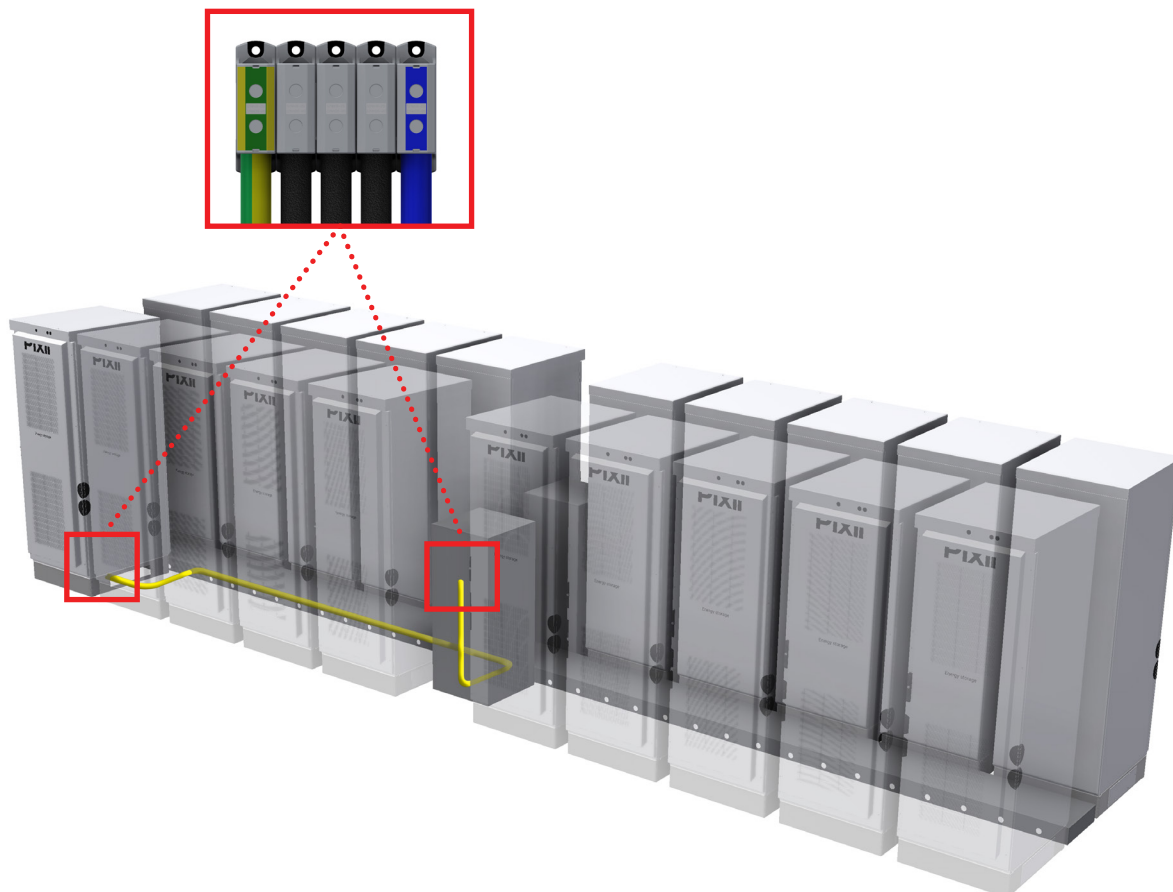


Figure 4.18 Connecting the 4G router

4.8 TN-S network

1. Connect input cable from distribution cabinets (DSC1-x) to each cabinet in assembly.
 - Connect PE wire.
 - Conductor (CU) min. 35mm²
 - Connect phase wires (L1, L2, L3) and neutral wire (N).
 - Conductor (CU) min. 35mm²



NOTE:

Location and type of terminals may differ. Follow detailed instructions in installation guide for each cabinet.

NOTE:

All cables must be routed through the cable trunks.

NOTE:

Input cable rating depends on the power of the whole system and local regulations.

NOTE:

Connection steps are same for all cabinets.

NOTE:

In case of IT network, additional installation kit is required. For more information see document *14483_Installation guide_PoweShaper 2.0*, chapter *IT/TT (230Vac) network*.

4.9 Input cable

Connect input cable to the distribution cabinet.

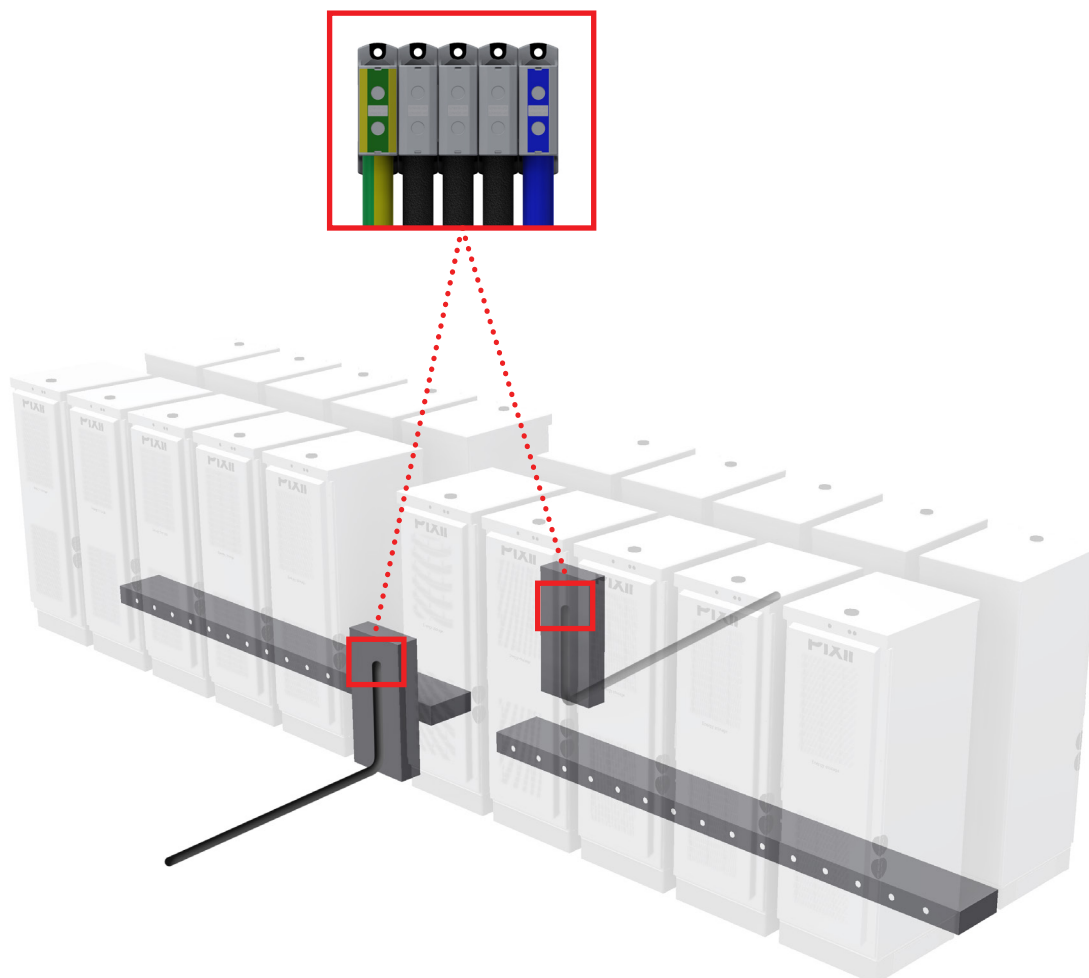


Figure 4.19 Installation of input cable

NOTE:

Input cable rating depends on the power of the whole system and local regulations.

NOTE:

Input must be protected by protective device (fuse/breaker).

5 Maintenance

To ensure that the system lifetime will be reached, regular inspections of the system are required. To be within warranty terms of the product the owner must follow the complete maintenance procedure. This procedure can be adapted based on local conditions and regulations. Pixii recommends a complete system maintenance at least once a year, except for filters and air condition unit that may need more frequent inspection based on local environmental conditions.

Only authorized and qualified persons are allowed to perform system maintenance. These persons must be familiar with the system and must follow all precautions described in this manual. Below is a non-exhaustive list of points for general consideration. Do not limit the evaluation to only those points.

NOTE:

For repair and replacement use only original Pixii parts and in accordance with technical specification provided by Pixii. Use of non-original parts may void the warranty provided by Pixii.

NOTE:

For more information follow instructions in Installation guide for each system.

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