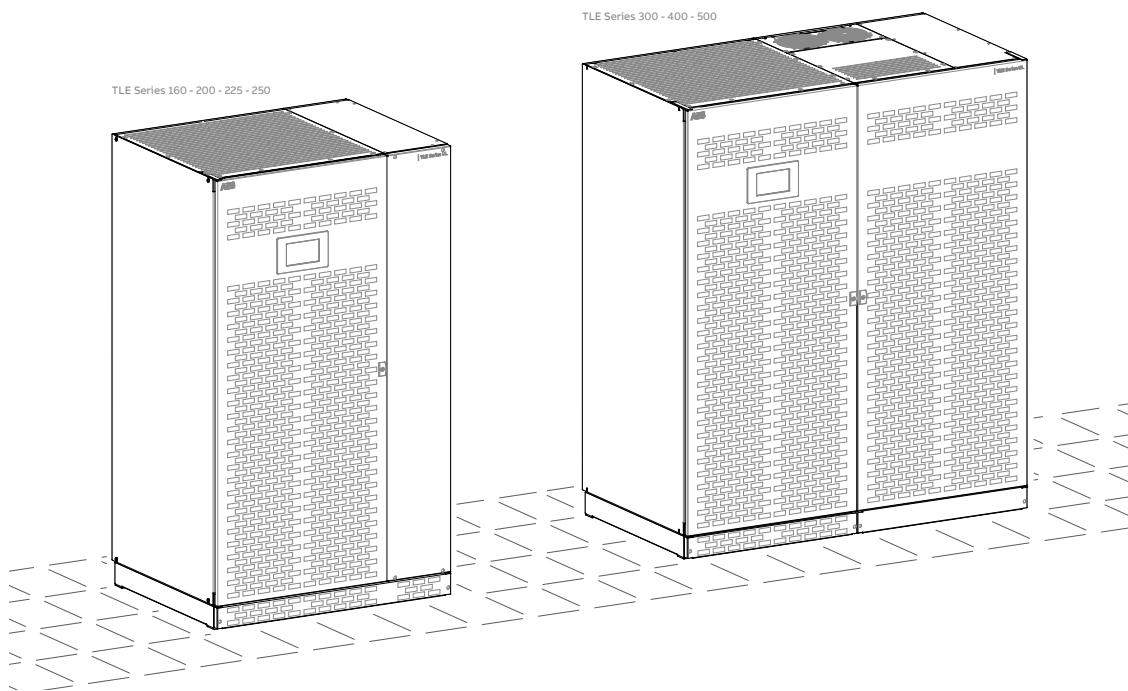


UPS INSTALLATION GUIDE

TLE Series

160 to 500 kVA UL S2B



Model	TLE Series 160 - 200 - 225 - 250 - 300 - 400 - 500 UL S2B
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The illustrations and plans describing the equipment are intended as general reference only and are not necessarily complete in every detail.

The content of this publication may be subject to modification without prior notice.

Dear Customer,

We thank you for selecting our products and are pleased to count you amongst our very valued customers at **ABB**.

We trust that the use of the **TLE Series 160 to 500** Uninterruptible Power Supply System, developed and produced to the highest standards of quality, will give you complete satisfaction.

Please read carefully the Installation Guide, which contains all the necessary information and describes all you need to know about the installation of the UPS.

Thank you for choosing **ABB!**



Start-up and commissioning!

An ABB Global Services Field Engineer must perform start-up and commissioning of the UPS. Please contact ABB Service Center at least two weeks prior to schedule start-up and commissioning at 1-800-292-3739.

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ABB Service Center



To get important information on all equipment warranties, please contact the ABB Service Center or request service follow-up or by scanning the QR code.

<http://new.abb.com/ups/service-ups>

Preface

Congratulations on your choice of a SG Series 160 to 500 Uninterruptible Power Supply (UPS). It will keep you away from any trouble due to unexpected power problems.

This Installation Guide describes how to prepare the installation site, and it provides weight and dimensions and procedures for moving, installing and connecting the UPS.

Please refer to the accompanying User Manual, which describes the function of the UPS module, the purpose and location of the switches, the meaning of the system events related to the front panel indication and provides procedures for starting and stopping the equipment.

While every care has been taken to ensure the completeness and accuracy of this manual, ABB assumes no responsibility or liability for any losses or damages resulting from the use of the information contained in this document.

**Note!**

TLE Series 160 to 500 is a Category C3 UPS Product (according to IEC 62040-2).

This is a product for commercial and industrial application in the second environment – installation restrictions or additional measures may be needed to prevent disturbances.

We recommend that this manual be kept next to the UPS for future references.

If any problems are encountered with the procedures contained in this manual, please contact your ABB Service Center before you proceed.

This document shall not be copied or reproduced without the permission of ABB.

Due to technical improvements, some of the information contained in this manual may be changed without notice.

Safety instructions

Carefully read the safety instructions contained on the following page before the installation, start-up and maintenance of the UPS, options and Battery.

Pay attention to the rectangular boxes included in the text:

They contain important information and warning concerning electrical connections and personnel safety.

RPA

Redundant Parallel
Architecture

Parallel System secured with “RPA – Redundant Parallel Architecture”

When included in the text, this symbol refers to operation needed only for the RPA Parallel System.

Table of content

Page

1	Safety rules	6
1.1	Safety symbols and warnings	8
1.2	Cyber security	8
2	Layout	9
2.1	Layout TLE Series 160 - 200 - 225 - 250	9
2.2	Layout TLE Series 300 - 400 - 500.....	11
3	Environment	13
3.1	Recycling instructions.....	13
4	Installation	14
4.1	Transport	14
4.1.1	Dimensions and weights TLE Series 160 to 500	15
4.2	Delivery	16
4.3	Storage	16
4.3.1	Storage of the UPS.....	16
4.3.2	Storage of Battery.....	16
4.4	Place of installation	17
4.4.1	UPS location.....	17
4.4.2	Battery location	20
4.5	Ventilation and cooling.....	21
4.6	Unpacking	22
4.7	Electrical wiring	24
4.7.1	Utility input connection	24
4.7.2	Input/output over current protection and wire sizing.....	25
4.7.3	Data for Input/output and Battery over current protection and wire sizing.....	26
4.7.4	Installation requirements	29
4.8	Wiring connection	32
4.8.1	TLE Series 160 - 200 - 225 - 250 - Power connection with Common Input Utility.....	35
4.8.2	TLE Series 160 - 200 - 225 - 250 - Power connection with Dual Input Utility	37
4.8.3	TLE Series 300 - 400 - 500 - Power connection with Common Input Utility	40
4.8.4	TLE Series 300 - 400 - 500 Power connection with Dual Input Utility.....	42
4.8.5	Use of TLE Series 160 to 500 in eBoost™ Operation Mode.....	45
4.8.6	Use of TLE Series 160 to 500 as Frequency Converter	46
4.9	RPA Parallel System connection.....	47
4.9.1	Power wiring of Parallel Units	47
4.9.2	Parallel Control Bus connection.....	48
4.9.3	Control bus cable location	50
4.10	“EPO - Emergency Power OFF” command connection.....	52
5	Connectivity interface	54
5.1	Serial port J35µP - RS232 (Sub D, Female 9 pin)	55
5.2	Customer interface board.....	56
5.2.1	Connector J1 – RJ45 8P8C	57
5.2.2	X1 terminal block - Output signals on voltage-free contacts.....	57
5.2.3	X1 terminal block - Programmable input free contacts.....	57
5.2.4	X2 terminal block – “EPO - Emergency Power Off”	58
5.2.5	X1 terminal block - Gen Set Signaling (GEN ON)	58
5.2.6	X1 terminal block - AUX External Maintenance Bypass.....	59
5.2.7	X1 terminal block - eBoost/IEMi control signal	59
6	Notes	60
6.1	Notes Form	60

1 Safety rules

Save these instructions!

This manual contains important instructions for models TLE Series 160 to 500 that should be followed during installation and maintenance of the UPS and Battery.

General

- Move the UPS in an upright position in its original package to the final destination room.
To lift the cabinets, use a forklift or lifting belts with spreader bars.
- Check for sufficient floor and elevator loading capacity.
- Check the integrity of the UPS equipment carefully.
If you notice visible damage, do not install or start the UPS.
Contact your ABB Service Center immediately.
- **WARNING! RISK OF ELECTRICAL SHOCK!**
Do not remove covers, there are no user serviceable parts inside.
- After switching off takes 5 minutes for the DC capacitors to discharge because a lethally high voltage remains at the terminals of the electrolytic capacitors.
- UPS's and Battery system require a 12 months periodic maintenance to operate reliably and safely.
This should be performed by qualified service personnel. The UPS contains its own energy source (Battery).
- The field-wiring outlets may be electrically live, even when the UPS is disconnected from the Utility.
- Dangerous voltages may be present during Battery operation.
- The Battery must be disconnected during maintenance or service work.
- This UPS contains potentially hazardous voltages.
- Be aware that the Inverter can restart automatically after the Utility voltage is restored.
- End user must follow applicable regional occupational safety codes/regulations during installation, operation and equipment maintenance. This may require additional field marking or labelling defining appropriate level of PPE (Personal Protection Equipment) to reduce the risk of Arc-flash related injuries.
Contact our ABB Service Center for product specific information.

Installation

- This UPS must be installed and connected only by trained personnel.
- Verify accurately during Commissioning and Maintenance of the UPS, for the following:
Damaged components, squeezed wires and cables, or not correctly inserted plugs.
- After removing the sidewalls of the UPS, make sure that all earth connections when reassembling, are correctly reattached.
- This UPS is intended for use in a controlled indoor environment free of conductive contaminants and protected against animals intrusion.
- **WARNING! HIGH LEAKAGE CURRENT TO GROUND:**
Ground connection is essential before connecting to AC input!
- Switching OFF the Unit does not isolate the UPS from the Utility.
- Do not install the UPS in an excessively humid environment or near water.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- The Unit must be placed in a sufficiently ventilated area; the ambient temperature should not exceed 104°F (40°C).
- Optimal Battery life is obtained if the ambient temperature does not exceed 77°F (25°C).
- It is important that air can move freely around and through the Unit. Do not block the air vents.
- Avoid locations in direct sunlight or near heat sources.

Storage

- Store the UPS in a dry location; storage temperature must be within -13°F (-25°C) to 131°F (+55°C).
- The optimal temperature for Battery storage is 68°F (20°C) to 77°F (25°C) and shall never exceed the range -4°F (-20°C) to 104°F (40°C).
- If the Unit is stored for a period exceeding 3 months, the Battery must be recharged periodically (time depending on storage temperature).

Battery

- The Battery-voltage is dangerous for person's safety.
- When replacing the Battery, use the same number, voltage (V) and capacity (Ah).
- Proper disposal or recycling of the Battery is required.
Refer to your local codes for disposal requirements.
- Never dispose of Battery in a fire: they may explode.
- Do not open or mutilate Battery: their contents (electrolyte) may be extremely toxic.
If exposed to electrolyte, wash immediately with plenty of water.
- Avoid charging in a sealed container.
- Never short-circuit the Batteries.
When working with Batteries, remove watches, rings or other metal objects and only use insulated tools.
- In case of air shipment, the cables +/- going to the Battery fuses/terminals shall be disconnected and isolated.

Safety instructions when working with Battery



Danger!

**External Battery must be installed and connected to the UPS by Qualified Service Personnel.
Installation Personnel must read this entire section before handling the UPS and Battery.**

Full voltage and current are always present at the Battery terminals.

The Battery used in this system can provide dangerous voltages, extremely high currents and a risk of electric shock.

If the terminals are shorted together or to ground they may cause severe injury.

You must be extremely careful to avoid electric shock and burns caused by contacting Battery terminals or shorting terminals during Battery installation.

Do not touch uninsulated Battery terminals.

A qualified service person, who is familiar with Battery systems and required precautions, must install and service the Battery.

The installation must conform to national and local codes.

Keep unauthorized personnel away from the Battery.

The qualified service person must take these precautions:

- 1 Wear protective clothing, such as rubber gloves and boots and protective eye wear.
Battery contain caustic acids and toxic materials and can rupture or leak if mistreated.
Remove rings and metal wristwatches or other metal objects and jewellery.
Do not carry metal objects in your pockets where the objects can fall into the Battery cabinet. High energy through conductive materials could cause severe burns.
- 2 Tools must have insulated handles and must be insulated so that they will not short Battery terminals.
Do not allow a tool to short between individual or separate Battery terminals or to the cabinet or rack.
Do not lay tools or metal parts on top of the Battery and do not lay them where they could fall onto the Battery or into the cabinet.
- 3 Disconnect charging source prior to connecting or disconnecting Battery terminals.
Install the Battery as shown on the drawing provided with the Battery.
When connecting cables, never allow a cable to short across a Battery's terminals, the string of Battery, or to the cabinet or rack.
- 4 Align the cables on the Battery terminals so that the cable lug will not contact any part of the cabinet or rack, even if the Battery is moved.
Keep the cable away from any sharp metal edges.
- 5 Install the Battery cables in such a way that the UPS or Battery cabinet doors cannot pinch them.
- 6 Do not connect the Battery terminal to Ground.
If any Battery terminal is inadvertently grounded, remove the source of the ground.
Contacting any part of a grounded Battery can cause a risk of electric shock.
- 7 Determine if Battery is inadvertently grounded. If inadvertently grounded, remove source from ground.
Contact with any part of a grounded Battery can result in electrical shock.
The likelihood of such shock can be reduced if such grounds are removed during installation and maintenance.
- 8 To reduce the risk of fire or electric shock, install the Battery in a temperature and humidity controlled indoor area, free of contaminants.
- 9 Battery system chassis ground (earth) must be connected to the UPS chassis ground (earth).
If you use conduits, this ground conductor must be routed in the same conduit as the Battery conductors.
- 10 Where conductors may be exposed to physical damage, protect the conductors in accordance with all applicable codes.
- 11 If you are replacing the Battery or repairing Battery connections, shut OFF the UPS and remove the Battery fuses.

1.1 Safety symbols and warnings

Safety warnings

The text of this manual contains some warnings to avoid risk to the persons and to avoid damages to the UPS system and the supplied critical loads.

The non-observance of the warnings reminding hazardous situations could result in human injury and equipment damages.

Please pay attention to the meaning of the following warnings and symbols.

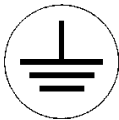
Throughout this manual the following symbols are defined:



Warning, if instruction is not followed injury or serious equipment damage may occur!



**Caution, internal parts have dangerous voltage present.
Risk of electric shock!**



**PE (Earth) – GND (Ground)
Protective Grounding terminal:
A terminal which must be connected to earth ground prior to making any other connection to the equipment.**



A terminal to which or from which an alternating (sine wave) current or voltage may be applied or supplied.



A terminal to which or from which a direct current or voltage may be applied or supplied.



This symbol indicated the word “phase”.



This symbol indicates the principal ON/OFF switch in the on position.



This symbol indicates the principal ON/OFF switch in the off position.

1.2 Cyber security



UPS must be protected in a Security Restricted Area.

UPS must be installed in a location/room with mechanical lock.

Limit access to authorized personnel only and it shall stay under Authorized Personnel Operator to manage the accesses.

2 Layout

2.1 Layout TLE Series 160 - 200 - 225 - 250

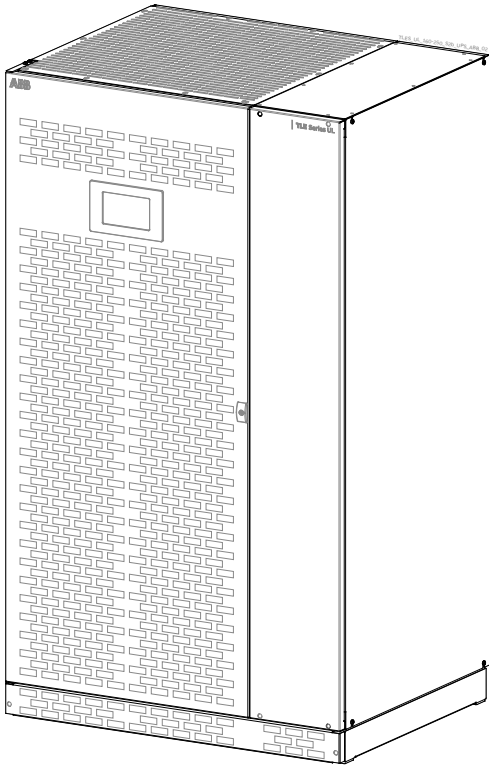


Fig. 2.1-1 TLE Series 160 - 200 - 225 - 250 - General view



Fig. 2.1-3 Control Panel

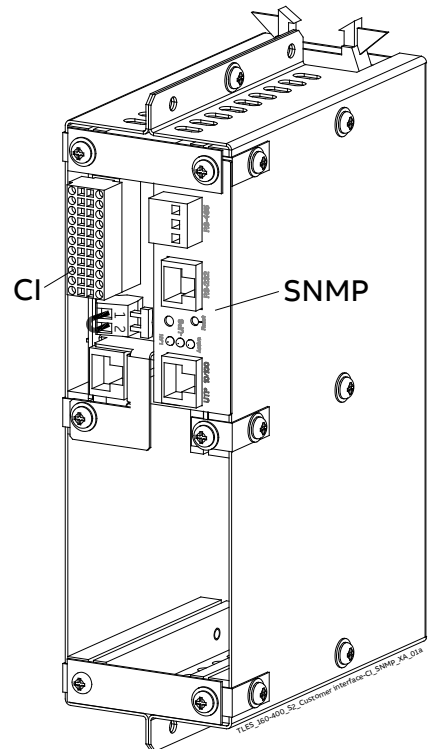
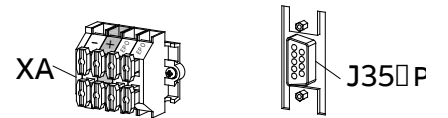


Fig. 2.1-4 Connectivity Rack

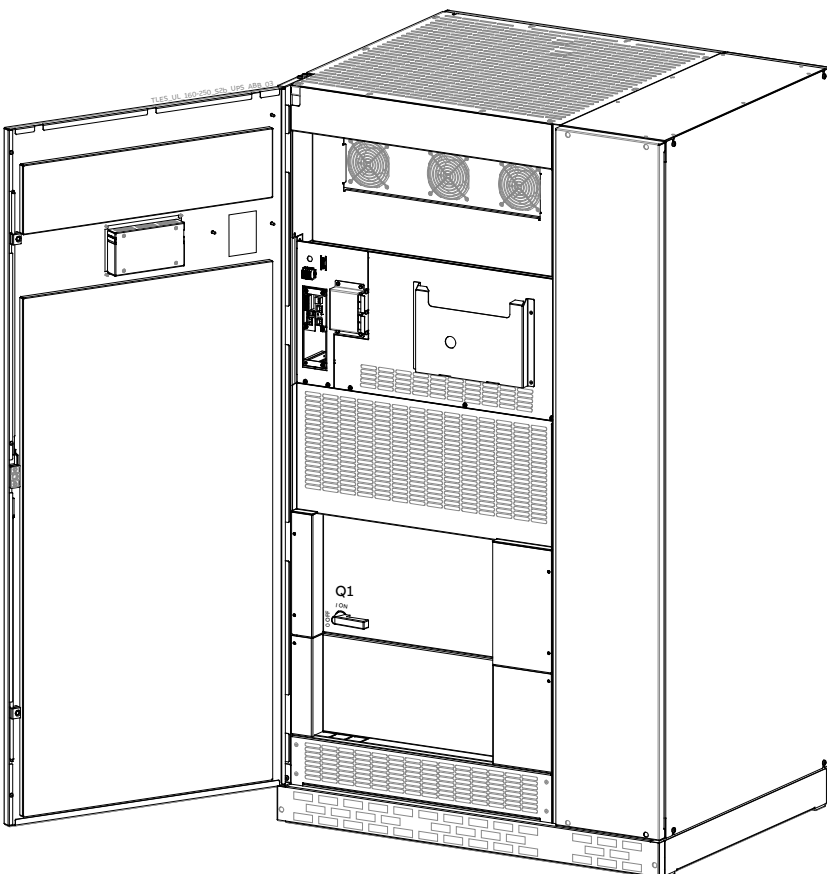


Fig. 2.1-2 TLE Series 160 - 200 - 225 - 250 - General view with open doors

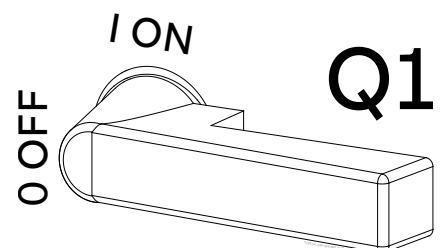


Fig. 2.1-5 Q1 - UPS Output switch

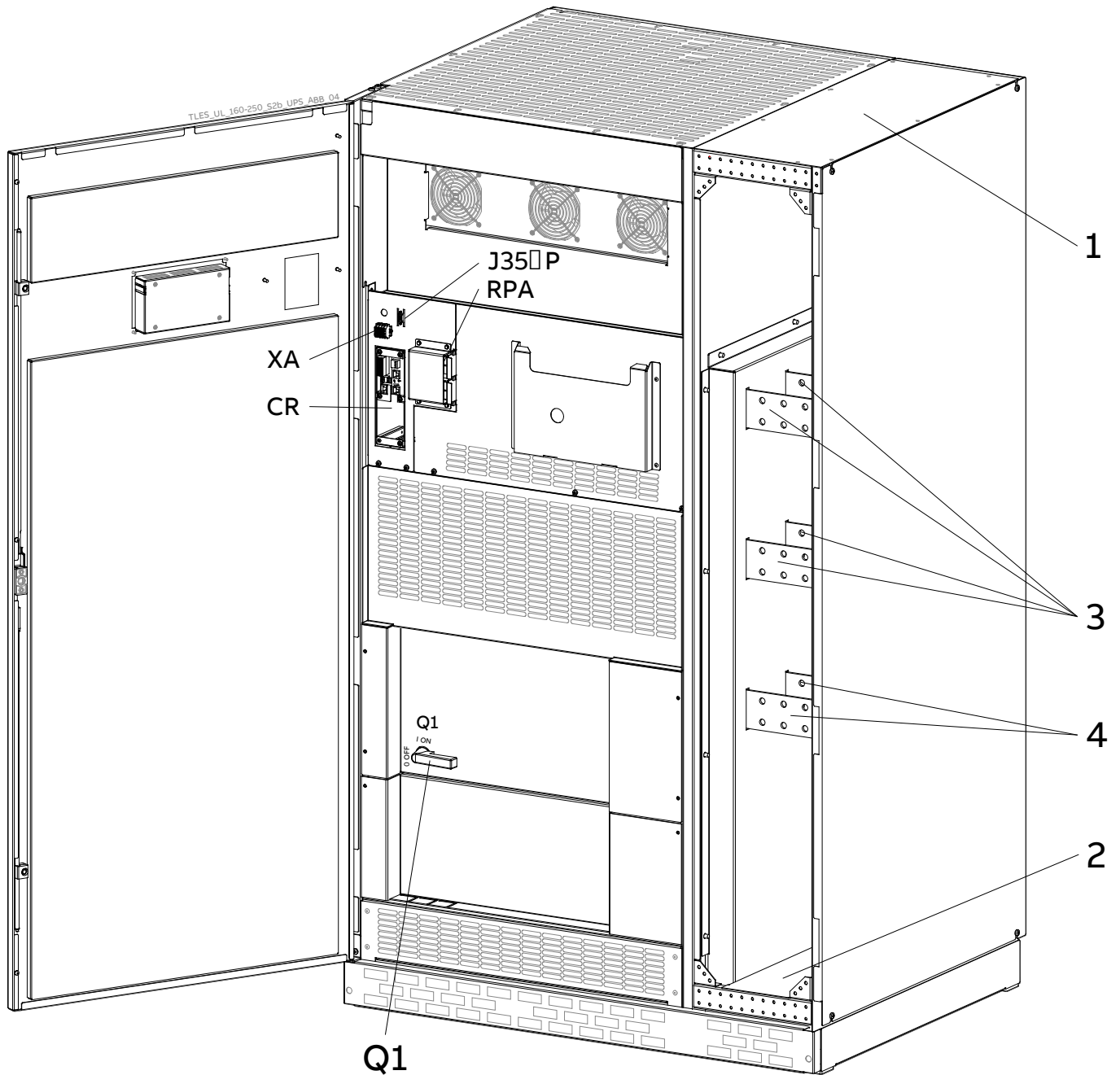


Fig. 2.1-6 TLE Series 160 - 200 - 225 - 250 - General view without protection panels

- 1** Opening for top cable entry (*)
- 2** Opening for bottom cable entry (*)
- 3** Bus bars for Utility input and Load output connection
- 4** Bus bars for external Battery connection
- CI** Customer Interface Board (see Fig. 2.1-4)
- CR** Connectivity Rack
- J35µP** Serial port RS232 for IMV protocol
- Q1** UPS Output switch
- RPA** RPA board (Redundant Parallel Architecture) for Parallel System (option)
- SNMP** 3-ph SNMP/WEB plug-in adapter (option - see Fig. 2.1-4)
- XA** Terminals for “EPO - Emergency Power Off” connection and 24Vdc for external Battery switch
- *)** Remove this panel or provide means to capture metal filings from cutting conduit entry holes

2.2 Layout TLE Series 300 - 400 - 500

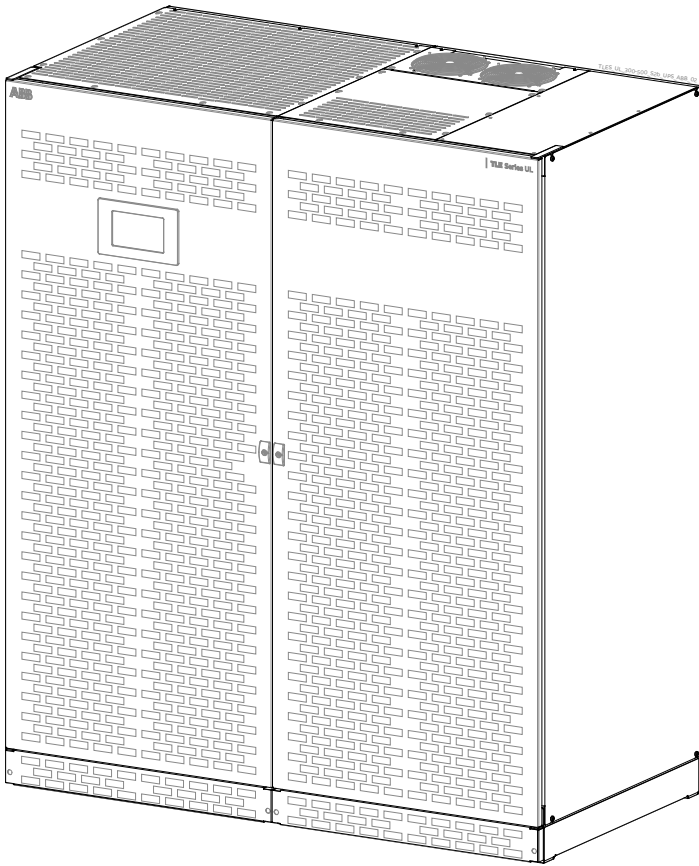


Fig. 2.2-1 TLE Series 300 – 400 - 500 - General view

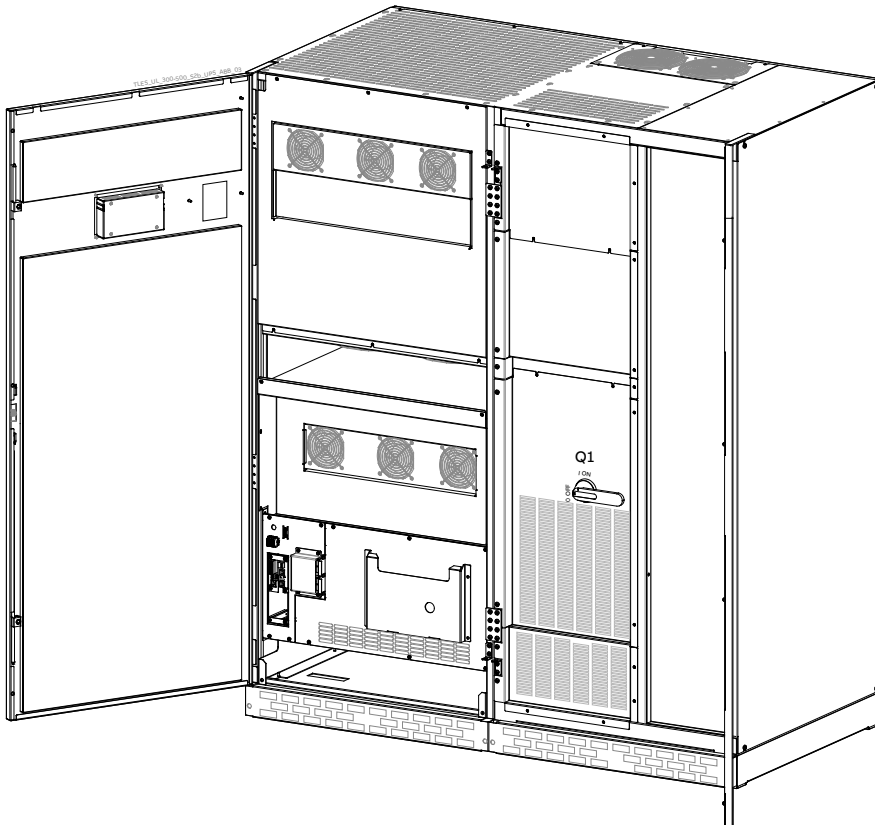


Fig. 2.2-2 TLE Series 300 – 400 - 500 - General view with open doors



Fig. 2.2-3 Control panel

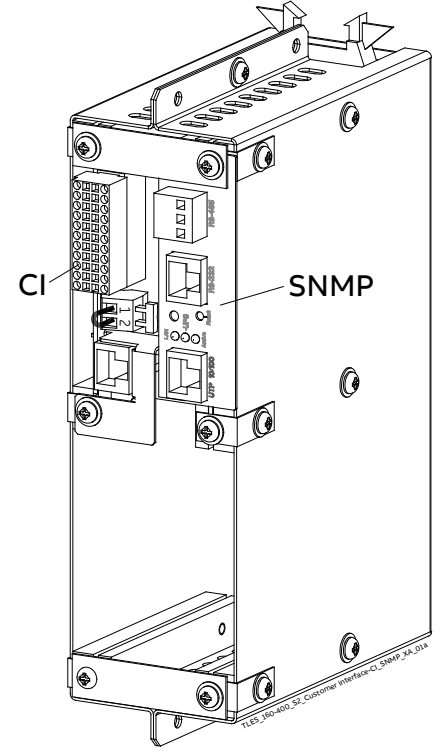
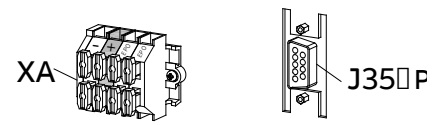


Fig. 2.2-4 Connectivity Rack

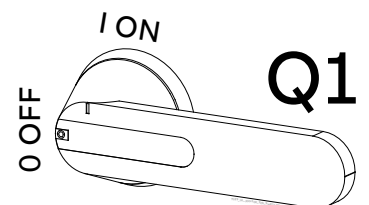


Fig. 2.2-5 Q1 - UPS Output switch

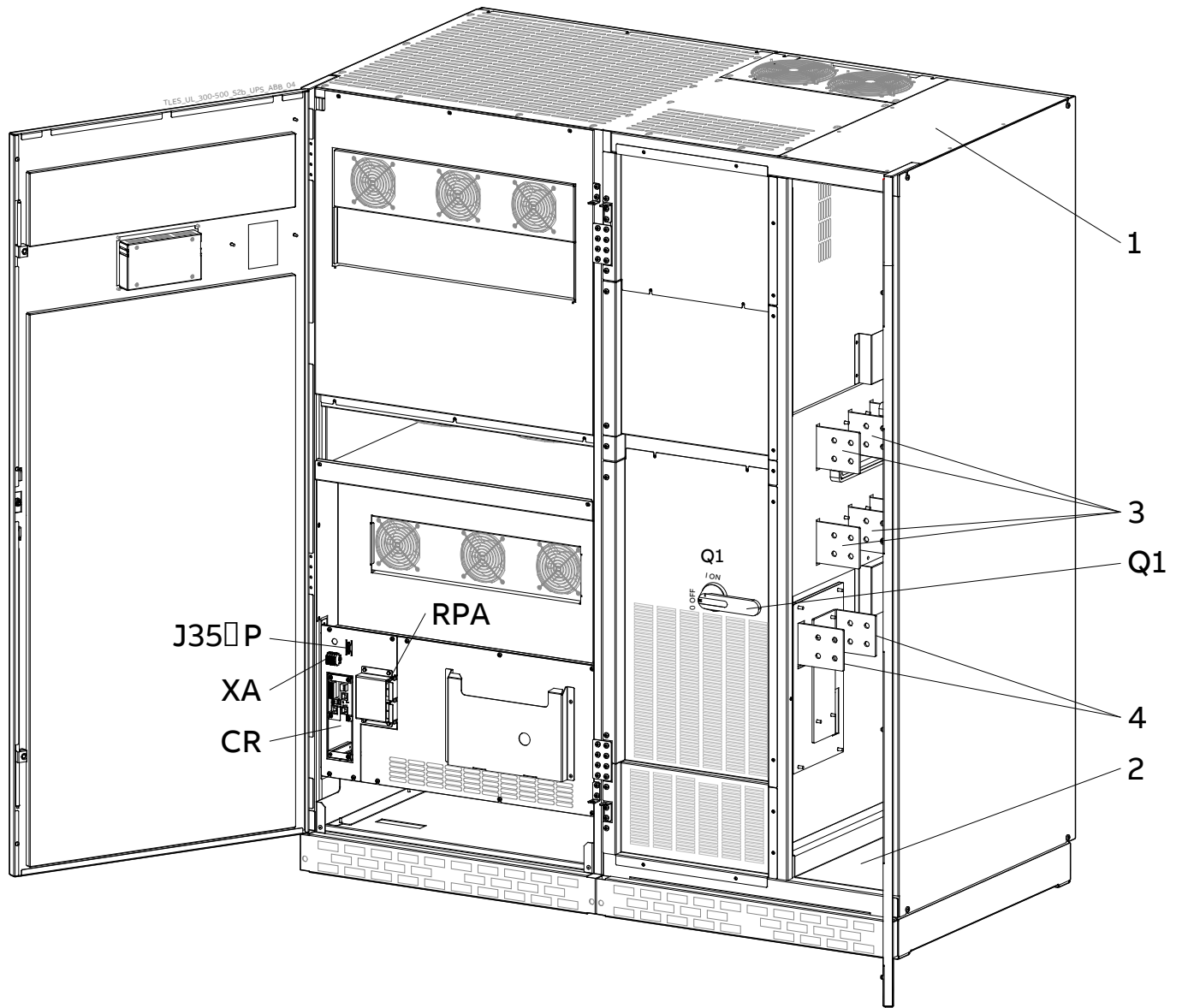


Fig. 2.1-6 TLE Series 300 – 400 - 500 - General view without protection panels

- 1** Opening for top cable entry (*)
- 2** Opening for bottom cable entry (*)
- 3** Bus bars for Utility input and Load output connection
- 4** Bus bars for external Battery connection
- CI** Customer Interface Board (see Fig. 2.2-4)
- CR** Connectivity Rack
- J35µP** Serial port RS232 for IMV protocol
- Q1** UPS Output switch
- RPA** RPA board (Redundant Parallel Architecture) for Parallel System (option)
- SNMP** 3-ph SNMP/WEB plug-in adapter (option - see Fig. 2.2-4)
- XA** Terminals for “EPO - Emergency Power Off” connection and 24Vdc for external Battery switch
- *)** Remove this panel or provide means to capture metal filings from cutting conduit entry holes

3 Environment

3.1 Recycling instructions

**Note!**

This product has been designed to respect the environment, using materials and components respecting eco-design rules.

It does not contain CFCs (Carbon Fluor Clorid) or HCFCs (Halogen Carbon Fluor Clorid).

**Packing material recycling!**

ABB, in compliance with environment protection, uses only environmentally friendly material at the end of its service life, must be recovered conforming to the local applicable regulations.

UPS packing materials must be recycled in compliance with all applicable regulations.

**Recycling at the end of service life!**

ABB, in compliance with environment protection recommends to the User that the UPS equipment, at the end of its service life, must be recovered conforming to the local applicable regulations.

**Battery disposal!**

Leads contained in the Batteries is a dangerous substance for the environment, therefore it must be correctly recycled by specialized companies.



4 Installation

4.1 Transport

The UPS is packaged on a pallet suitable for handling with a forklift.

The UPS must be moved in **upright position**.

Do not tilt cabinets **more than +/- 10°** during handling.

Move the UPS in its original package to the final destination site.

Do not stack other packages on top: This could damage the UPS.

Forklift

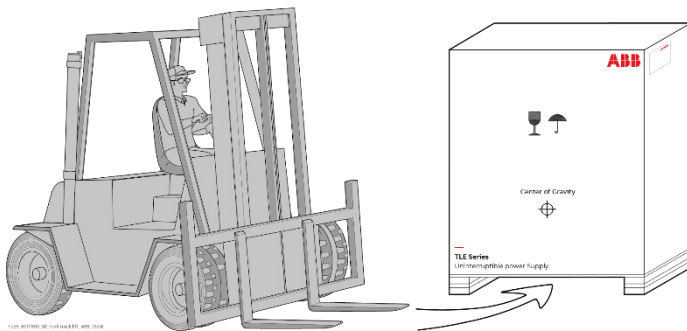


Fig. 4.1-1 Position of the forklift when moving the unpacked UPS

Forklift

The UPS must be lifted with a forklift in upright position.

Take note of the **Center of Gravity** marked on the package.

Crane

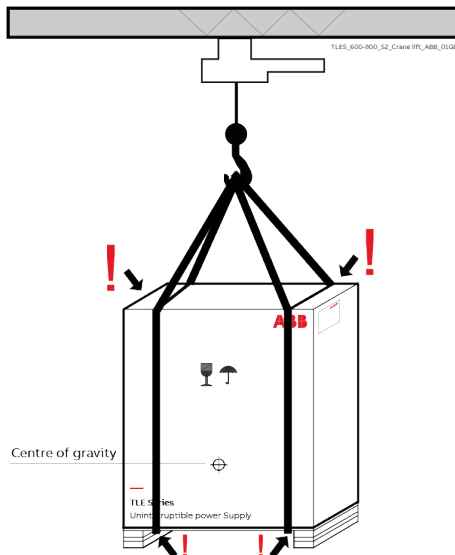


Fig. 4.1-2 Position of the carrying belts when moving the unpacked UPS

Warning!

Check for sufficient floor and elevator loading capacity.

Transport UPS only in upright position.

Do not stack other package on top of the UPS.



Crane

If the UPS has to be lifted by crane, use suitable carrying belts taking note of the **Center of Gravity** marked on the package.

Take all necessary precautions to avoid damage to the cabinet while hoisting the UPS.

Warning!
 When loading / unloading and when moving the UPS, it is forbidden:



When loading / unloading and when moving the UPS, pay attention to:



4.1.1 Dimensions and weights TLE Series 160 to 500

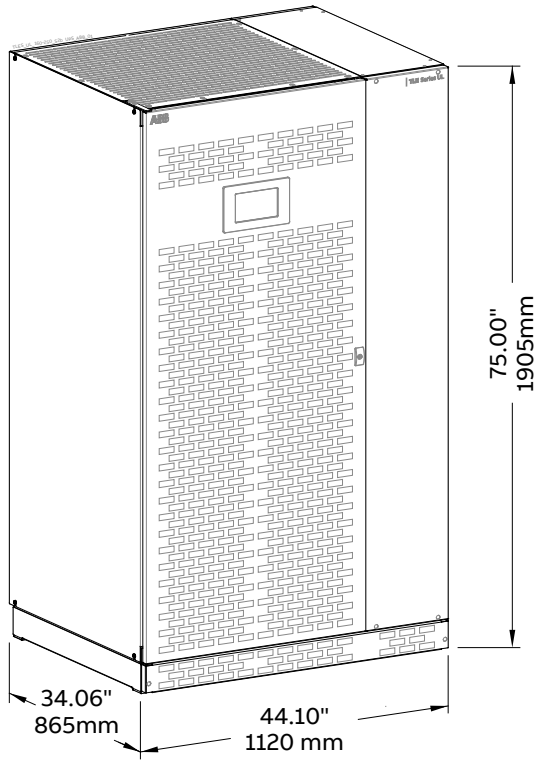


Fig. 4.1.1-1 TLE Series 160 - 200 - 225 - 250 - UPS cabinet dimensions

TLE Series 160 - 200 - 225 - 250

Dimensions and weights

Dimensions (W x D x H)	44.10 x 34.06 x 75.00 inches 1120 x 865 x 1905 mm
------------------------	--

Weight	1345 lbs 610 kg
--------	--------------------

Floor loading	129 lbs/sq.ft 630 kg/m ²
---------------	--

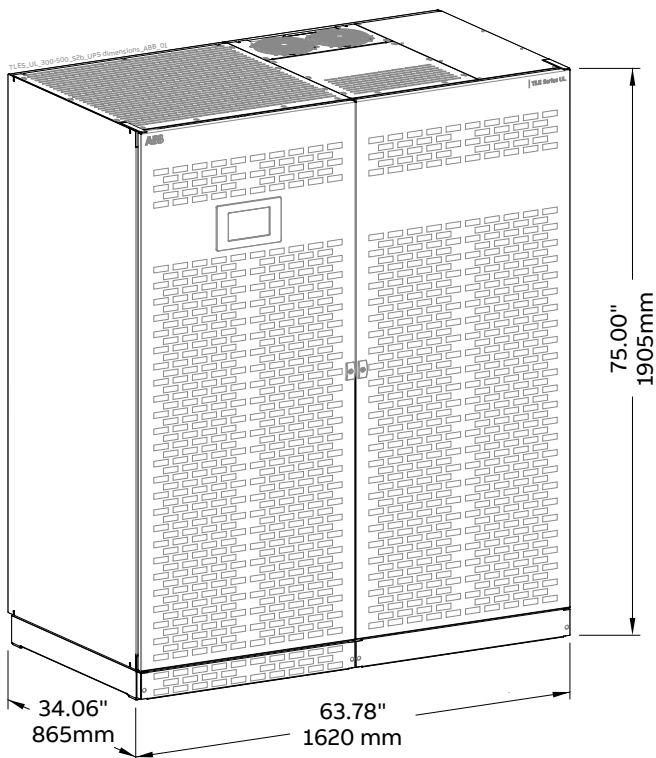


Fig. 4.1.1-1 TLE Series 300 - 400 - 500 - UPS cabinet dimensions

TLE Series 300 - 400 - 500

Dimensions and weights

Dimensions (W x D x H)	63.78 x 34.06 x 75.00 inches 1620 x 865 x 1905 mm
------------------------	--

Weight	2756 lbs 1280 kg
--------	---------------------

Floor loading	187 lbs/sq.ft 914 kg/m ²
---------------	--



Note!

The weight of each single piece is marked outside the package!

4.2 Delivery

When delivered, inspect the **package integrity** and **the physical conditions of the cabinets** carefully.

In case of any damage sustained during transport, immediately inform the carrier and contact your local **ABB Service Center**.

A **detailed report** of the damage is necessary for any insurance claim.



Note!

A damaged UPS must never be installed or connected to Utility or Battery!

4.3 Storage

4.3.1 Storage of the UPS



The equipment is carefully packed for transport and storage so that it is in a perfect condition when eventually installed.

Never leave an UPS outside the building and do not store the UPS one on top of the other.

It is advisable to store the UPS in its original package in a dry, dust-free room, away from chemical substances, and with a temperature range not exceeding **-13°F (-25°C)** to **131°F (55°C)**.

In case the Battery is included please refer to Section 4.3.2.

Some important functions of the UPS, such as the customized functions, are defined by parameters stored in a **RAM memory**.

A small backup Battery located on the Control Unit board supplies the RAM.

If the storage time of the UPS exceeds **1 year**, these functions **should be verified** by an authorized Service Center before putting the UPS into operation.

4.3.2 Storage of Battery

When the delivery includes a maintenance free Battery, keep in mind that they are subject to self-discharge and therefore you must recharge the Battery.

The storage time without Battery recharge depends on the temperature of the storage site.

The optimal room temperature for Battery storage is **68°F (20°C)** to **77°F (25°C)** and shall never exceed the range **-4°F (-20°C)** to **104°F (40°C)**.



Recharge stored maintenance free Battery every:

6 months when the storage temperature is 68°F (20°C)

3 months when the storage temperature is 86°F (30°C)

2 months when the storage temperature is 95°F (35°C)

4.4 Place of installation

4.4.1 UPS location

Note!



UPS installation and connection must be performed only by an ABB Service Technician!

If optional cabinets and accessories are included with the UPS, please refer to those accompanying manuals for installation and operating instructions.

The UPS is intended for use in electrical rooms.

Do not locate or stock easily flammable materials in the same room as the UPS.

It is important to have a clean, dust-free environment provided with proper ventilation and air-conditioning to keep the ambient temperature within the specified operating range.

The recommended air inlet temperature is from **68°F (20°C) to 77°F (25°C) (max. 104°F / 40°C)**. Refer to Section 4.5.

Check for **sufficient floor load capacity** before installing the UPS and the Battery. Refer to Section 4.1.1.

For Battery installation follow the local codes and the recommendation of the Battery supplier.

Note!



Operation at temperatures higher than 77°F (25°C) will reduce Battery life.

Potential consequences are explained in the User Manual to Section 9.1.4: read and understand them.

The TLE Series 160 to 500 UPS can radiate radio frequency energy. Although some RFI filtering is inherent to the UPS there is no guarantee that the UPS will not influence sensitive devices such as cameras and monitors that are positioned close by. If interference is expected, the UPS should be moved away from the sensitive equipment.

Positioning of the UPS TLE Series 160 to 500

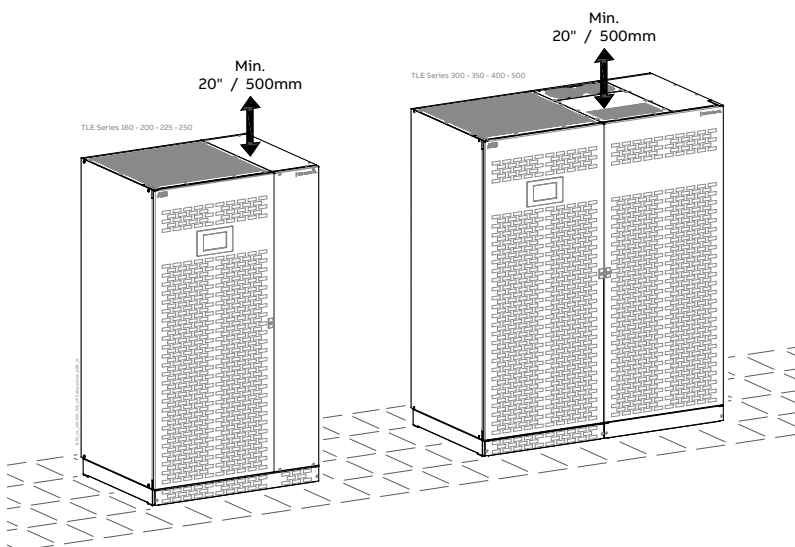


Fig. 4.4.1-1 TLE Series 160 to 500 - Positioning of the UPS

The rear panel of the UPS may be mounted flush to a wall or other structure.

Clearance around the front of the unit should be sufficient to enable free passage of personnel with the doors fully open, and to allow sufficient airflow to the door vents. **Check Section 110-26(A) of the NEC code for specific requirements.**

To guarantee proper cooling air exhaust, the **mandatory minimum clearance** between ceiling and top of the UPS is **20" (500 mm)**.

A single-phase power outlet (120Vac) should be provided near the UPS for connection of power tools, test equipment or connectivity devices.

This outlet must be grounded.

TLE Series 160 to 500 Opening for input and output cable connections

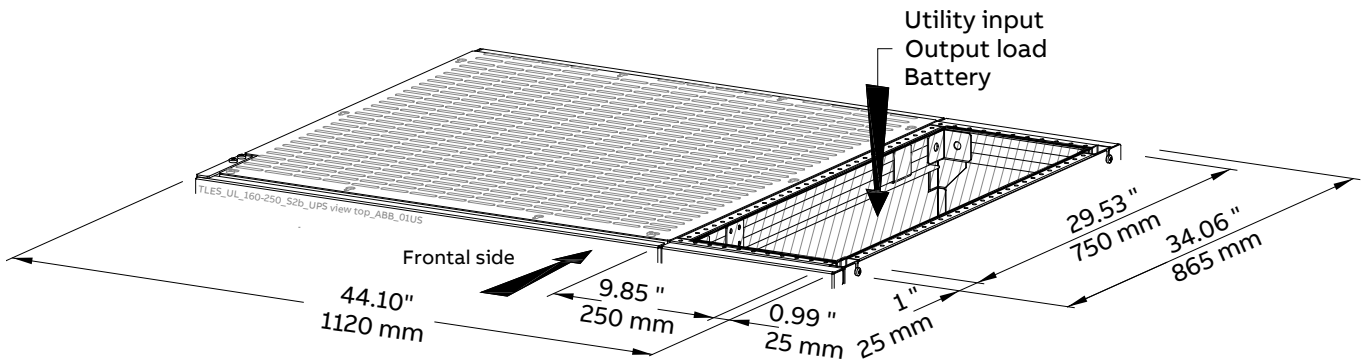


Fig. 4.4.1-2 TLE Series 160 - 200 - 225 - 250 – Openings on top of the cabinet for input and output cables connections

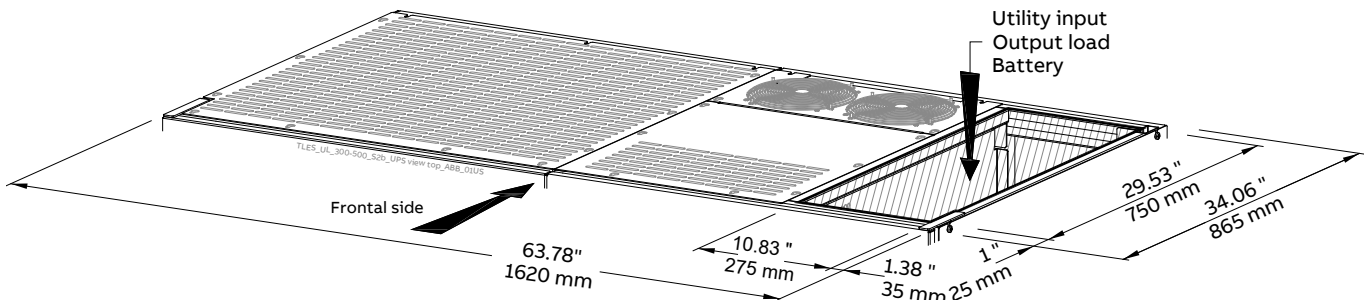


Fig. 4.4.1-3 TLE Series 300 - 400 - 500 – Openings on top of the cabinet for input and output cables connections

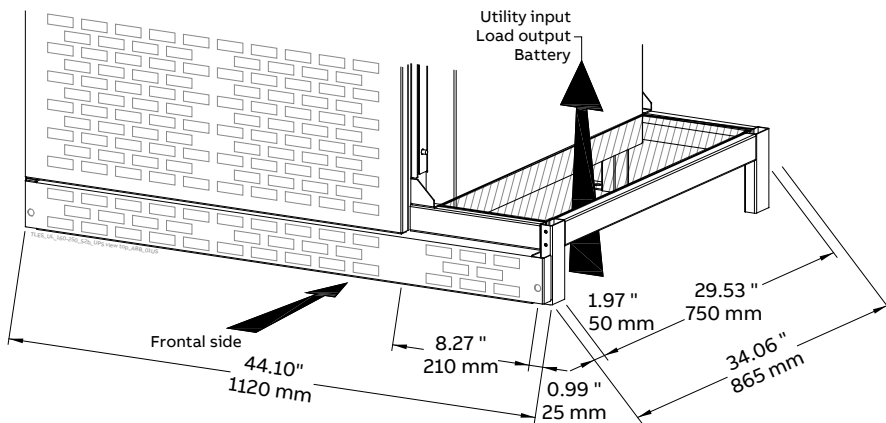


Fig. 4.4.1-4 TLE Series 160 - 200 - 225 - 250 – Openings on bottom of the cabinet for input & output cables connections

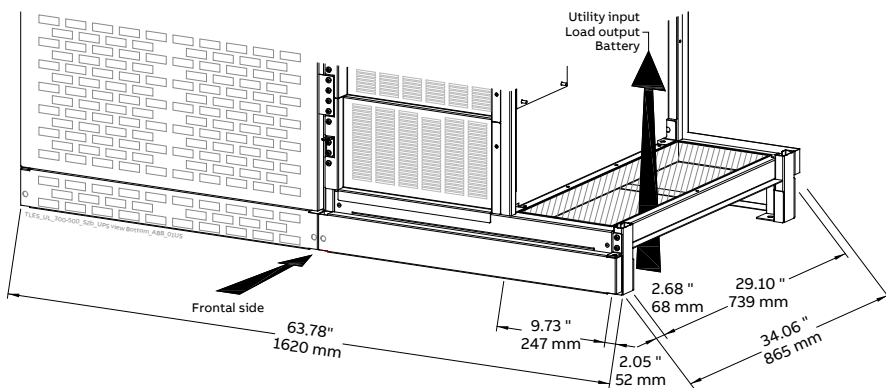


Fig. 4.4.1-5 TLE Series 300 - 400 - 500 – Openings on bottom of the cabinet for input & output cables connections

TLE Series 160 to 500 openings are provided on the top (*) and the bottom (*) of the UPS for the connection of input and output cables.
 Pay attention to the position of these openings, when choosing the placement of the UPS.
 These openings are covered with a protective plate. *) Please remove the plate before drilling any holes.

Fixing of the UPS cabinet TLE Series 160 to 500 on the floor

The UPS cabinet is free standing and normally does not require to be bolted to the floor.

The UPS cabinet can be fixed however to the floor by bolting it with the supporting blocks to the floor.

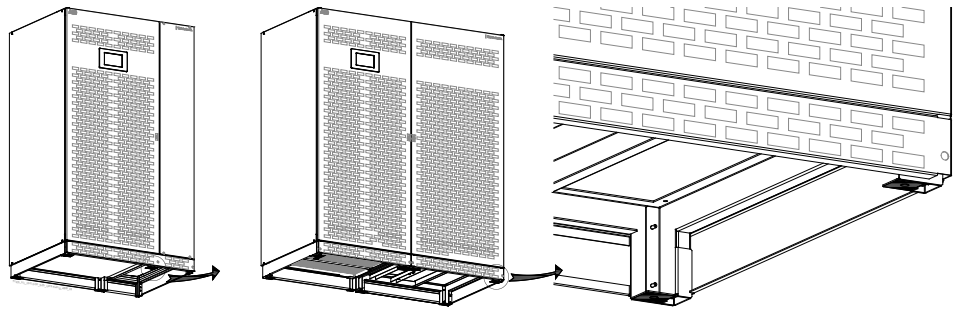


Fig. 4.4.1.6 TLE Series 160 to 500 – Fixing of the UPS cabinet on the floor

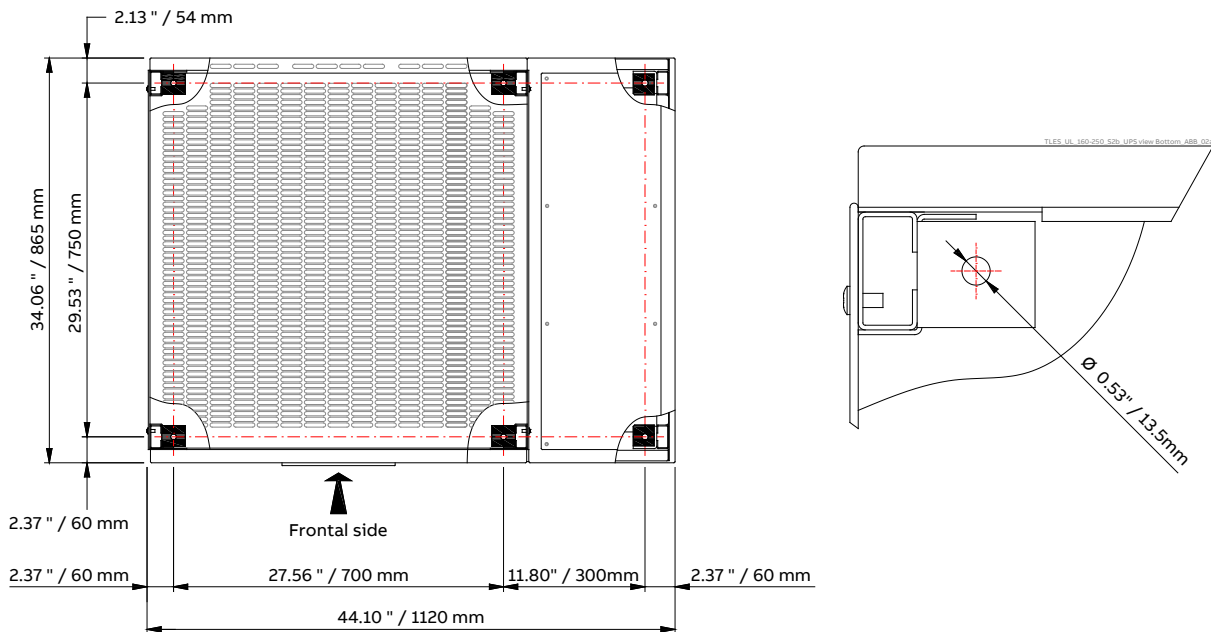


Fig. 4.4.1-7 TLE Series 160 - 200 - 225 - 250 – UPS cabinet floor fixing points

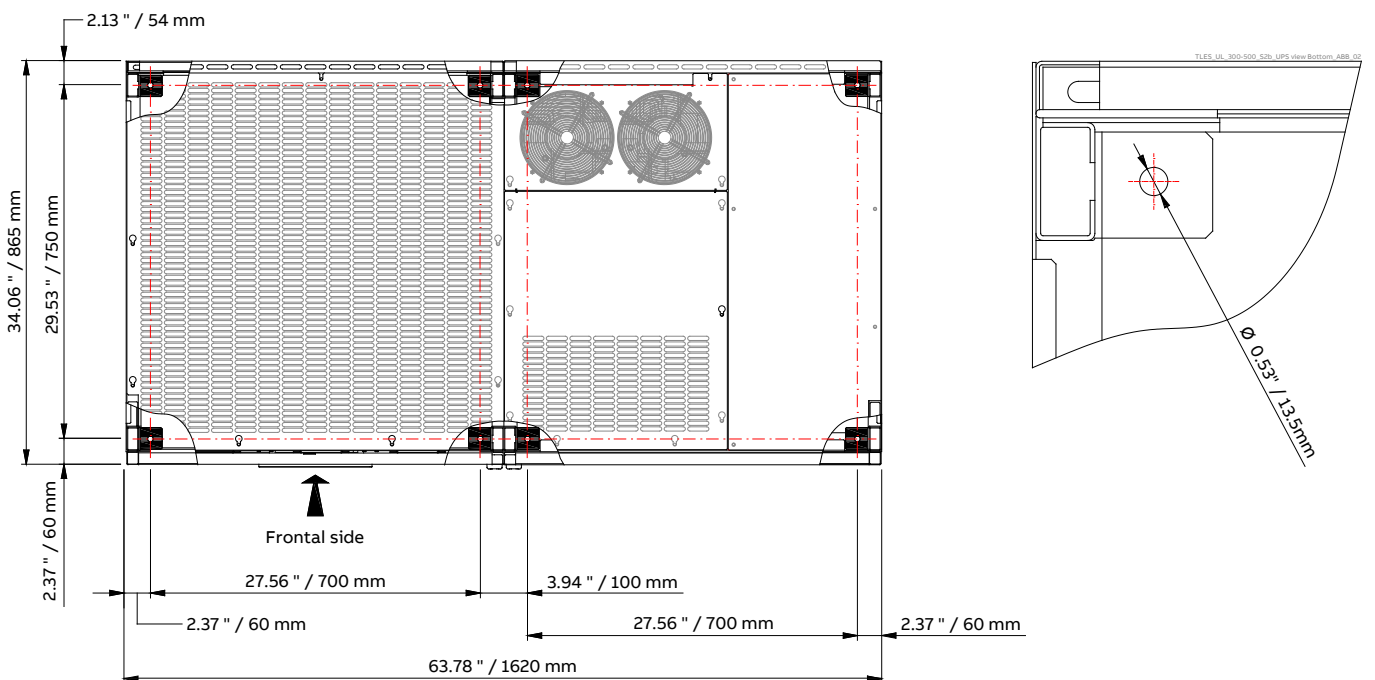


Fig. 4.4.1-8 TLE Series 300 - 400 - 500 – UPS cabinet floor fixing points

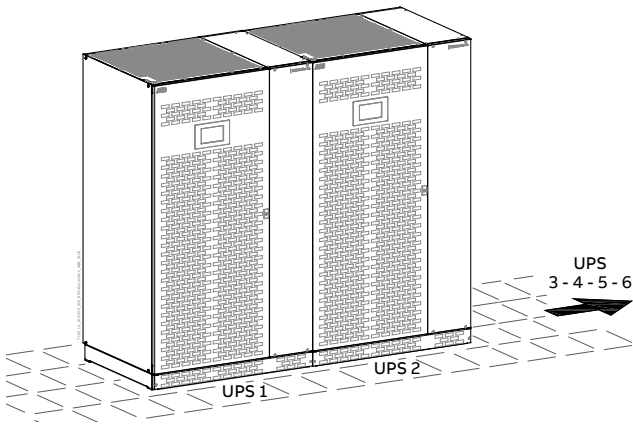


Fig. 4.4.1-9 TLE Series 160 - 200 - 225 - 250 RPA Parallel System disposition

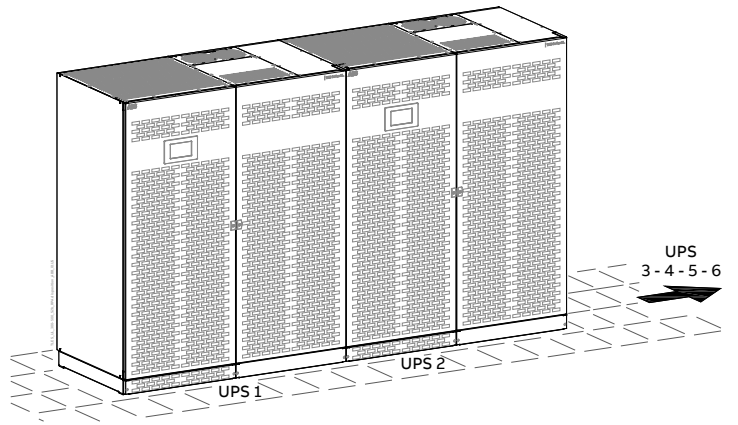


Fig. 4.4.1-10 TLE Series 300 - 400 - 500 RPA Parallel System disposition



In case of RPA Parallel System, try to place the UPS modules in sequence of their numbers (marked on the packing).

If the units are positioned “side by side”, the side panels must be mounted on all units.

Remove the side air inlet grids on the intermediate units to run the control bus cable connections.

4.4.2 Battery location

Battery require a well-ventilated room with controlled temperature to obtain reliable operation.

The Battery can be installed immediately adjacent to the UPS (left or right side) or remotely from the UPS. If the Battery is installed remotely from the UPS, a wall mounted DC disconnect device must be installed within line-of-site to both the UPS and the Battery.

The optimal room temperature for Battery location is **68°F (20°C)** to **77°F (25°C)** and shall never exceed the range - **4°F (-20°C)** to **104°F (40°C)**.

The life of valve-regulated Battery will be reduced by 50% for each additional **18°F (10°C)** that the Battery ambient temperature is above **77°F (25°C)**.

The Battery system associated with larger UPS is usually either rack mounted or installed in multiple Battery cabinets.

Installation and assembly must be made according to the local standards and Battery system manufacturer's recommendations.

The Battery circuit breaker or Battery fuse box must be mounted as near as possible to the Battery.

Warning!

Battery installation and connection must be performed by Qualified Personnel only.

Read all safety instructions before proceeding with the installation (see Chapter 1).

Battery discharging and/or charging activities may cause the emission of hydrogen gas; therefore, the room requires proper ventilation and fresh air.

Comply with the UL1778-CSAC22.2no170.3 UPS safety standard, ANSI/IEEE P1184 Guide for Batteries for Uninterruptible Power Supply Systems and applicable codes and governmental regulations.



4.5 Ventilation and cooling

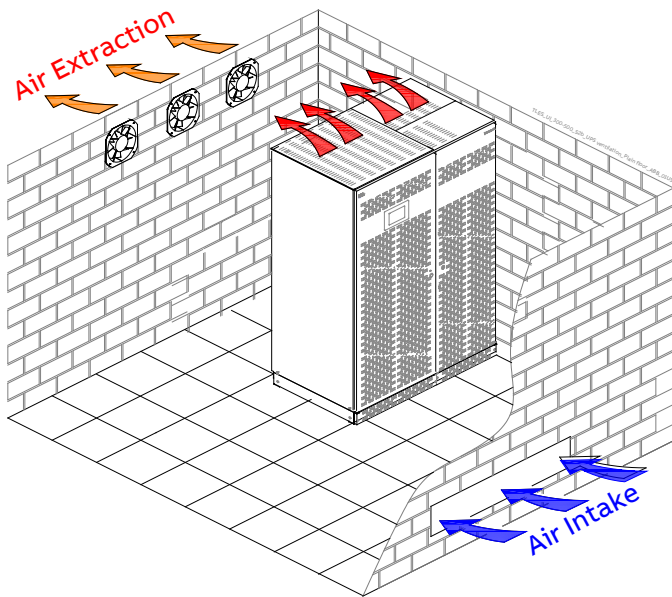


Fig. 4.5-1 Installation on plain floor

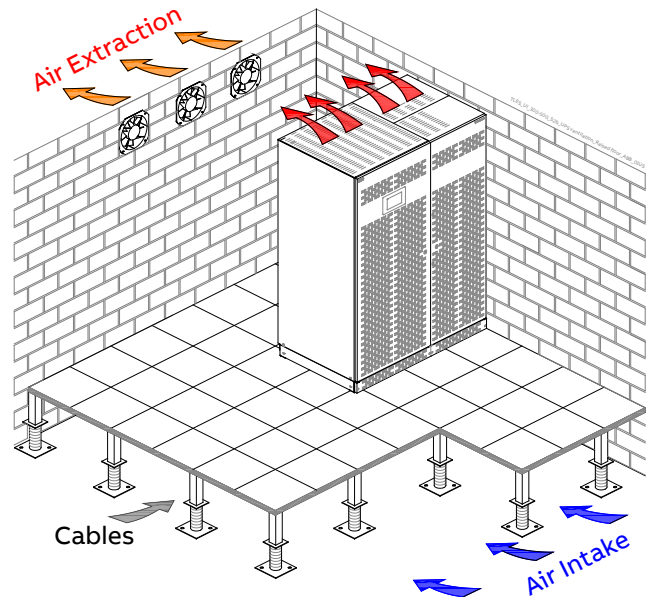


Fig. 4.5-2 Installation on raised floor

The heat produced by the UPS is transferred to the environment by its ventilation.

Air inlets for UPS ventilation are located on the front of the UPS, while air outlets are on top of the cabinet.

A suitable ventilation or cooling system must be installed to extract the heat from the UPS room.

Note!



Do not put anything on the top of the cabinet.

20" (500mm) of air clearance from the top must be left free of any object for a sufficient exhausted air exchange, proper cooling, service access and safety.

Air filtering systems could be required when the UPS operates in a dirty environment.

In order to prevent overheating of the UPS, the available air intake flow rate must exceed the total air exhaust flow rate requirement of the UPS system.

Contact your **ABB Service Center** for appropriate solutions.

The below table indicates the heat dissipation at full Load at **PF = 1** and charged Battery, up to **3280 ft (1000 m)** altitude, for cooling air **77°F (25°C)** to **86°F (30°C)**.

UPS model	Losses			Cooling air flow	
	VFI		eBoost™ (option)	VFI	
	PF = 0.9	PF = 1	PF = 1	PF = 0.9	PF = 1
TLE Series 160	20137 BTU/hr	5.9 kW	6826 BTU/hr	1013 CFM	2.0 kW
TLE Series 200	25256 BTU/hr	7.4 kW	8532 BTU/hr	1270 CFM	2.5 kW
TLE Series 225	27986 BTU/hr	8.2 kW	10922 BTU/hr	1408 CFM	3.2 kW
TLE Series 250	31741 BTU/hr	9.3 kW	10239 BTU/hr	1597 CFM	3.0 kW
TLE Series 300	32765 BTU/hr	9.6 kW	12799 BTU/hr	1648 CFM	3.8 kW
TLE Series 400	48123 BTU/hr	14.1 kW	18089 BTU/hr	2421 CFM	5.3 kW
TLE Series 500	63823 BTU/hr	18.7 kW	20819 BTU/hr	3210 CFM	6.1 kW

Note!



Even when eBoost™ Operating Mode option is available, the ventilation and cooling system shall be rated as for operation in VFI mode.

4.6 Unpacking

Move the equipment in it’s original packing, carton box or wooden case, until the place of installation and remove the packing and the transport sockets only just before installing the UPS.

Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.



White color = without any anomaly
Red color = anomaly evidence

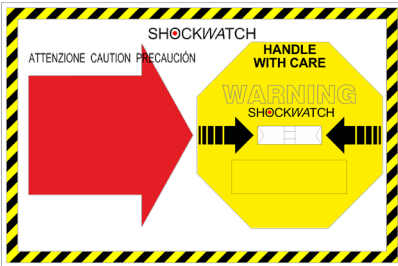


Fig. 4.6-1 ShockWatch device

The package of the TLE Series 160 to 500 is equipped with ShockWatch (indicator for shock) and TiltWatch (indicator for overthrow) on the outside.

These devices indicate an eventual shock or overthrow during transport.

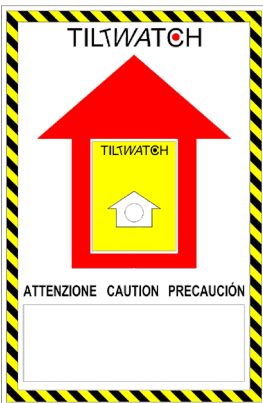


Fig. 4.6-2 TiltWatch device



Note!

Whenever these devices show a possible anomaly, the UPS shall not be commissioned before consulting an ABB Service Centre.



Note!

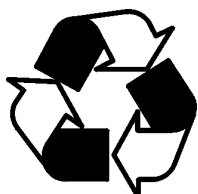
Be aware of the heavy weight of the UPS, pay attention when moving the UPS cabinet.
Take care not to damage the UPS when moving by forklift.



A damaged UPS must never be installed or connected to Utility or Battery!
In case of any damage sustained during the transport, immediately inform the shipping agent!
A detailed report of the damage is necessary for any indemnity claim.

Included in the delivery you can find the following parts:

- An accessory bag.
- Air inlet grids, which must be mounted on the bottom of the cabinet UPS with the screws included.
- Control Bus cables for inter-connecting the UPS modules (only for the RPA Parallel System).
- The documentation includes the “Installation Guide & User Manual” and the “UPS Safety Rules”.



Packing material recycling

ABB, in compliance with environment protection, use only environmentally friendly material.
UPS packing materials must be recycled in compliance with all applicable regulations.

Anti-humidity & corrosion devices

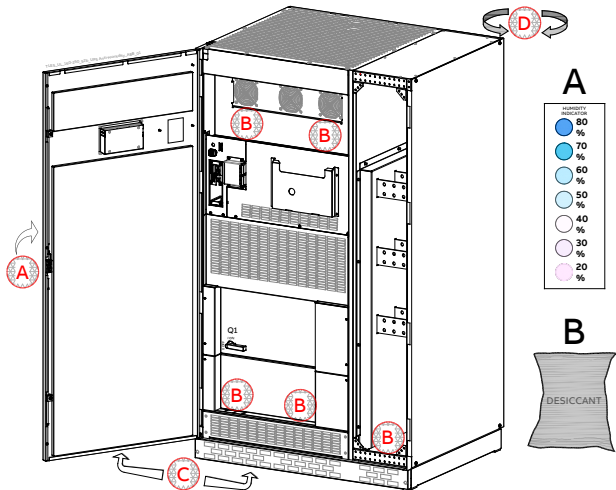


Fig. 4.6-3 TLE Series 160 - 200 - 225 - 250
Location of the “Anti-Humidity & Corrosion devices”

The package of the TLE Series 160 to 500 includes “Anti-Humidity & Corrosion devices” against the formation of humidity and corrosion during the transportation and the storage of the UPS.

TLE Series 160 - 200 - 225 - 250

“Anti-Humidity & Corrosion devices” components:

- A Humidity indicator
- B Desiccant bag (5 pcs.)
- C VCI foil base
- D PE stretch foil

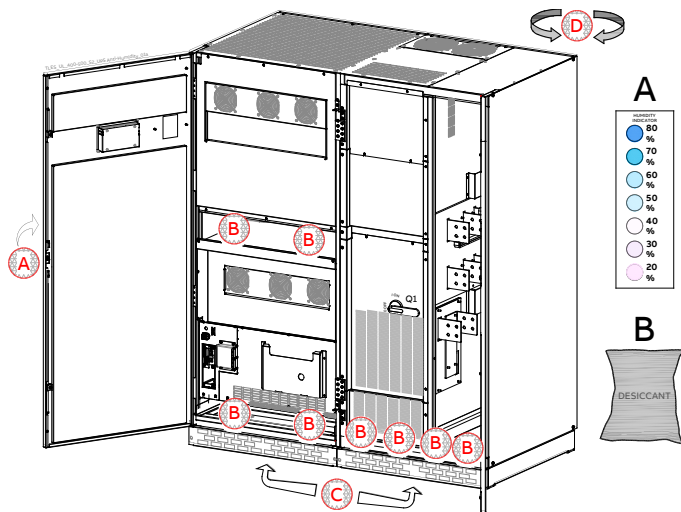


Fig. 4.6-4 TLE Series 300 - 400 - 500
Location of the “Anti-Humidity & Corrosion devices”

Warning!

It’s **mandatory to remove** the “Anti-Humidity & Corrosion devices” during the unpacking of the UPS!



Humidity indicator

Before removing the devices “C - VCI foil base” & “D - PE stretch foil”, check the status of the “A - Humidity indicator”.

10% to 70%:

The UPS can be commissioned.

80%:

The UPS shall not be commissioned.

Please contact your ABB Service Centre.

TLE Series 300 - 400 - 500

“Anti-Humidity & Corrosion devices” components:

- A Humidity indicator
- B Desiccant bag (5 pcs.)
- C VCI foil base
- D PE stretch foil

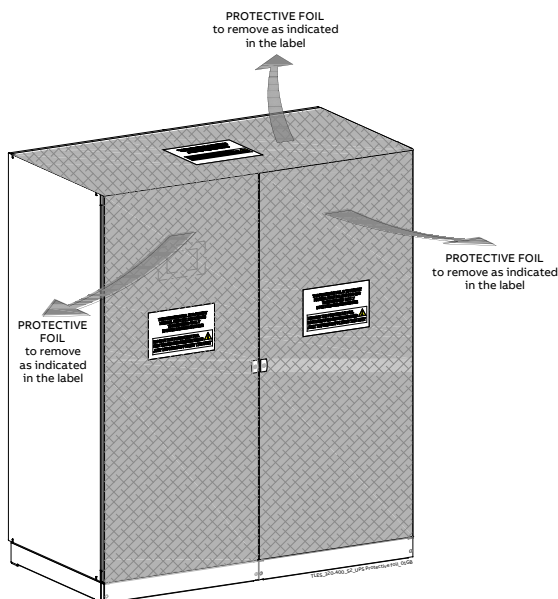


Fig. 4.6-5 Location of the “Protective Foil”

Protective foil

TLE Series 160 to 500 is provided with a “Protective Foil”, on the roof and door/front panels, to prevent material from falling into UPS.

Warning!

It’s **mandatory to remove** the “Protective Foil” but only just before the first start-up of the UPS as indicated in the appropriate label!

The removal of the “Protective Foil” should be performed only by an ABB Service Technician!



Packing material recycling!

ABB, in compliance with environment protection, uses only environmentally friendly material.

UPS packing materials must be recycled in compliance with all applicable regulations.



4.7 Electrical wiring



Warning!

UPS installation and connection must be performed only by an ABB Service Technician!

Refer to the “Safety prescriptions - Installation” described on Chapter 1.

It is the responsibility of the installation technician to ensure that all local and national electric codes are adhered to.

4.7.1 Utility input connection



Note!

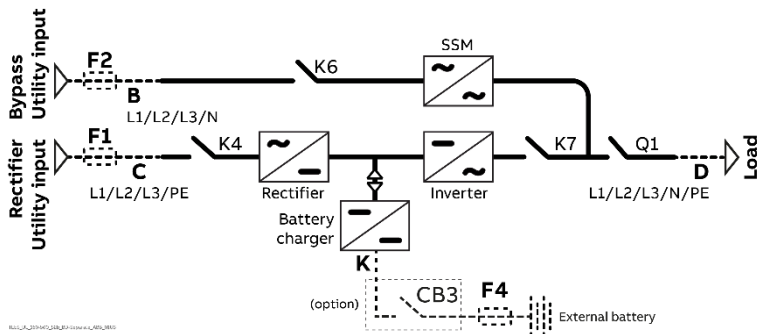
Ensure that the AC and DC external isolators are OFF and locked out to prevent their inadvertent operation.

Do not apply power to the equipment prior to the commissioning by an ABB Service Technician.

Before any other input connection, connect and check the grounding wire.

The UPS has available input terminations for the Rectifier and Bypass. The unit may be powered from a Common Input source or Dual Input sources if desired.

Dual Input Utility Configuration Rectifier & Bypass



The Bypass and Rectifier use different power sources (F1 and F2 inputs).

In this case, when the Rectifier-input fuses are opened, the Automatic Bypass is supplied by the other connection.

Fig. 4.7.1-1 Dual Input Utility Rectifier & Bypass



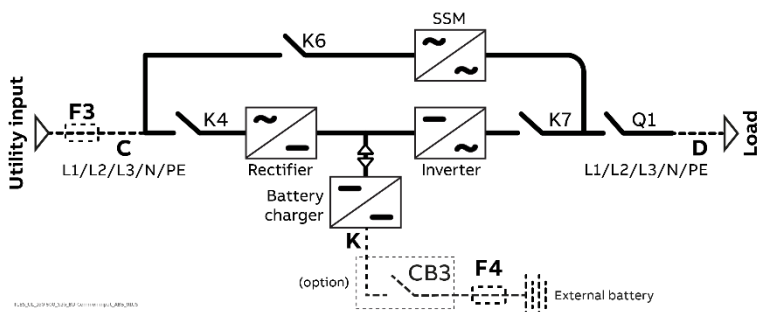
Note!

Always verify that the received UPS is as per the configuration ordered.

While installing UPS dual source, the interconnection links BR1, BR2 and BR3 must be removed. See Fig. 4.8.2-3 & Fig. 4.8.4-3.

Connect a single input Neutral to Bypass Utility (inside the UPS, common Neutral for Bypass and Rectifier).

Common Input Utility Rectifier & Bypass



The **same power source** is to be used for both Bypass supply and Rectifier input (input F3).

Bear in mind that when the Utility fuses are opened there is a supply failure to the Rectifier as well as to the Automatic Bypass.

Fig. 4.7.1-2 Common Input Utility Rectifier & Bypass



Note!

In this case, the interconnection links BR1, BR2 and BR3 on the input bus bars must remain connected.

4.7.2 Input/output over current protection and wire sizing

The cabling of the UPS system has to be sized according to the UPS power rating.

Sizing of circuit Breakers, Fuses and cables for Input Utility, output load and Battery must meet the requirements of local and national electrical codes.

Before connecting the UPS, verify that the Utility Voltage and Frequency, the Output Load Voltage and Frequency and Battery Data (cells number, floating voltage, autonomy) are according to the required data.

The protection of the UPS Utility input must be exclusively with 3 pole breakers.

In 4-wire distributions (3-phase, 4-wire plus ground):

- Disconnection of the Neutral is not permitted.
The UPS needs the connection of the Neutral to the input, to guarantee the function in TN mode (Neutral-Earth).
- Caution when using Four-Pole Circuit Breakers as protection to the UPS Load.
A potential problem exists for situations with non-linear Loads, causing the Neutral Current to be higher than the Phase Current.

Avoid to run the input cables in parallel with the output cables to prevent them from noise induction.

The Three-Phase Utility Power supply must be symmetrical with respect to Ground (wye-connected and grounded solidly), due to the existence of voltage surge protection devices inside the UPS.

The connection of the Battery to the UPS must be protected with fuses or similar devices according to technical specifications and in accordance with local standards.

Note!



If you use ELCB breaker (Earth Limiting Circuit Breaker) to protect the input connections, consider the high leakage current generated by the noise suppression capacitors.

If these ELCB breakers are strictly necessary, we suggest using the largest type suitable for non-linear current and for delayed operations.

Specific prescriptions apply for 3-wire (3-phase plus ground) distributions; refer to the specific section for details.

To ensure the circuit selectivity in case of **Short-Circuit in the Load equipment**, special care must be taken in choosing the **Fuse or Circuit Breaker ratings** installed in the output distribution circuits.

Due to the relatively low short-circuit capability of the UPS Inverter, a short-circuit in the Load will cause an immediate transfer to Utility.

The largest fuse in the output distribution should be **at least 1.6 time** smaller than the Fuses supplying the Bypass line.

If circuit selectivity is required while the Load is fed from the Inverter (Bypass Utility not available), the Largest Fuse or Circuit Breaker should be rated at no more than **20%** of the UPS Output Current Rating.

Note!



The delivery and installation of fuses and input/output connections of the UPS are at the customer's expense, unless agreed otherwise.

4.7.3 Data for Input/output and Battery over current protection and wire sizing

Note!

- Please read the safety precautions at the front of this guide carefully, and thoroughly review the Battery manufacturers installation and maintenance manual before connecting the Battery to the UPS.
- Remote Battery cabinet is external and not provided with UPS.
- For Battery and AC input and output circuits the disconnect device is not provided inside the UPS. It shall be part of the building installation.
- Protect Battery and AC input and output circuits with an appropriate UL489 Branch Circuit Protection (DC fuse or circuit breaker), using the current data in the chart below.
- Minimum Battery cable requirement is based on the current data below.
- The maximum available fault current from the Battery supply is: 20kA.
- The minimum breaker voltage rating is 540V.

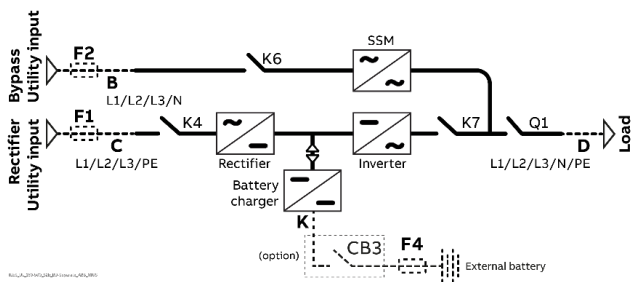


Fig. 4.7.3-1 Dual Input Utility Rectifier & Bypass

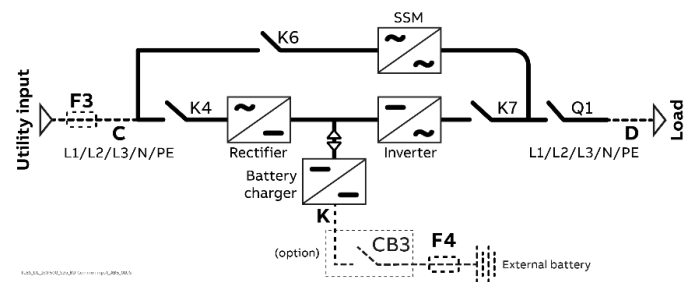


Fig. 4.7.3-2 Common Input Utility Rectifier & Bypass

The AC values below are current ratings per phase.

These maximum and nominal ratings should be considered when choosing the appropriate AC over current protection device.

NEC (National Electric Code) Section 210-20 a rule must be applied.

DC current rating is the nominal Battery discharge current which the UPS allows (see Fig. 4.7.3-1 & Fig. 4.7.3.2).

UPS rating	AC Input Rectifier		AC Input Bypass	AC Input		DC Input
	Nom.	F1 Max.	F2	Nom.	F3 Max.	F4
TLE Series 160	202 A	230 A	193 A	202 A	230 A	392 A
TLE Series 200	252 A	285 A	240 A	252 A	285 A	488 A
TLE Series 225	285 A	310 A	271 A	285 A	310 A	545 A
TLE Series 250	315 A	345 A	301 A	315 A	345 A	605 A
TLE Series 300	378 A	430 A	361 A	378 A	430	727 A
TLE Series 400	504 A	555 A	481 A	504 A	569 A	968 A
TLE Series 500	630 A	690 A	601 A	630 A	690 A	1210 A

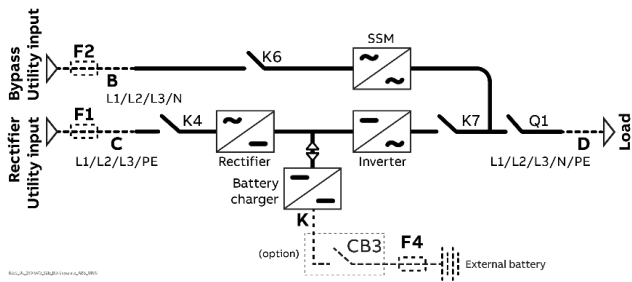


Fig. 4.7.3-3 Dual Input Utility Rectifier & Bypass

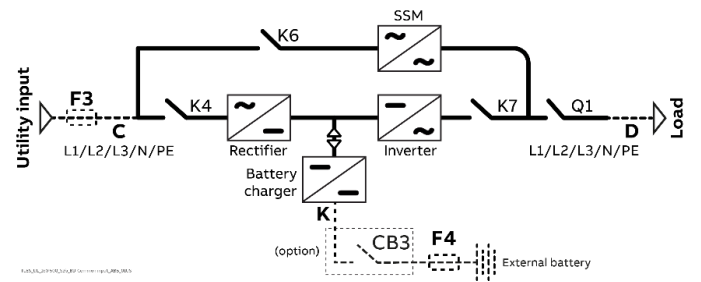


Fig. 4.7.3-4 Common Input Utility Rectifier & Bypass

Size of Branch Circuit Over Current Protection - All Models: - "CAUTION - To reduce the risk of fire, only connect UPS to a circuit provided with (See below) maximum amperes branch circuit over current protection in accordance with the NEC (National Electric Code), NSI / NFPA 70

UPS rating	F1 - AC Input Rectifier		F2 - AC Input Bypass		F3 - AC Input		F4 - DC Input	
	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated	80% Rated	100% Rated
TLE Series 160	300 A	250 A	250 A	200 A	300 A	250 A	400 A	400 A
TLE Series 200	350 A	300 A	300 A	250 A	350 A	300 A	500 A	500 A
TLE Series 225	400 A	350 A	350 A	300 A	400 A	350 A	600 A	600 A
TLE Series 250	450 A	350 A	400 A	350 A	450 A	350 A	600 A	600 A
TLE Series 300	600 A	450 A	500 A	400 A	600 A	450 A	800 A	800 A
TLE Series 400	700 A	600 A	600 A	500 A	700 A	600 A	1000 A	1000 A
TLE Series 500	900 A	700 A	800 A	700 A	900 A	700 A	1200 A	1200 A

Wiring!

Wire sizing according to

NEC Section 210-20 (a) Table 310-16

Use 167°F (75°C) copper or aluminum wire.

Wiring requirements:

- AC Input Rectifier **3-Phase, 4 wire plus Ground**
- AC Input Bypass **3-Phase, 4 wire plus Ground**
- AC Output **3-Phase, 4 wire plus Ground**
- DC Input **2 wire (positive and negative) plus Ground.**



Maximum recommended cable size

UPS rating	Rectifier Input	Bypass Input	DC Input	AC Output	GND
TLE Series 160	2 x 3/0 AWG	2 x 2/0 AWG	2 x 300 kcmil	2 x 2/0 AWG	1 x 3 AWG
TLE Series 200	2 x 4/0 AWG	2 x 3/0 AWG	2x 400 kcmil	2 x 3/0 AWG	1 x 2 AWG
TLE Series 225	2 x 300 kcmil	2 x 2/0 AWG	2 x 600 kcmil	2 x 2/0 AWG	1 x 1 AWG
TLE Series 250	2 x 350 kcmil	2 x 300 kcmil	2 x 600 kcmil	2 x 300 kcmil	1 x 1 AWG
TLE Series 300	3 x 300 kcmil	2x 400 kcmil	3 x 500 kcmil	2x 400 kcmil	1 x 1/0 AWG
TLE Series 400	4 x 4/0 AWG	4 x 3/0 AWG	4 x 400 kcmil	4 x 3/0 AWG	1 x 2/0 AWG
TLE Series 500	4 x 350 kcmil	4 x 300 kcmil	4 x 600 kcmil	4 x 300 kcmil	1 x 3/0 AWG

NEC Section 210-20 (a)

Table 310-16. Allowable Ampacities of Insulated Conductors Rated 0 Through 2000 Volts, 140°F Trough 194°F (60°C Trough 90°C) Not More than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 86°F (30°C).

Temperature Rating of Conductor (See table 310-13)						
Size	140°F (60°C)	140°F (60°C)	194°F (90°C)	140°F (60°C)	167°F (75°C)	194°F (90°C)
	Types TW, UF	Types FEPW, RH, RHW, THHW, THW, THWN, XHHW, USE, ZW	Types TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, USE-2, XHH, XHHW, XHHW-2, ZW-2	Types TW, UF	Types RH, RHW, THHW, THW, THWN, XHHW, USE	Types TBS, SA, SIS, THHN, THHW, THW-2, THWN-2, RHH, RHW-2, USE-2, XHH, XHHW, XHHW-2, ZW-2
AWG or kcmil	Copper			Aluminum or Copper-Clad Aluminum		
18	---	---	14	---	---	---
16	---	---	18	---	---	---
14	20	20	25	---	---	---
12	25	25	30	20	20	25
10	30	35	40	25	30	35
8	40	50	55	30	40	45
6	55	65	75	40	50	60
4	70	85	95	55	65	75
3	85	100	110	65	75	85
2	95	115	130	75	90	100
1	110	130	150	85	100	115
1/0	125	150	170	100	120	135
2/0	145	175	195	115	135	150
3/0	165	200	225	130	155	175
4/0	195	230	260	150	180	205
250	215	255	290	170	205	230
300	240	285	320	190	230	255
350	260	310	350	210	250	280
400	280	335	380	225	270	305
500	320	380	430	260	310	350
600	355	420	475	285	340	385
700	385	460	520	310	375	420
750	400	475	535	320	385	435
800	410	490	555	330	395	450
900	435	520	585	355	425	480
1000	455	545	615	375	445	500
1250	495	590	665	405	485	545
1500	520	625	705	435	520	585
1750	545	650	735	455	545	615
2000	560	665	750	470	560	630

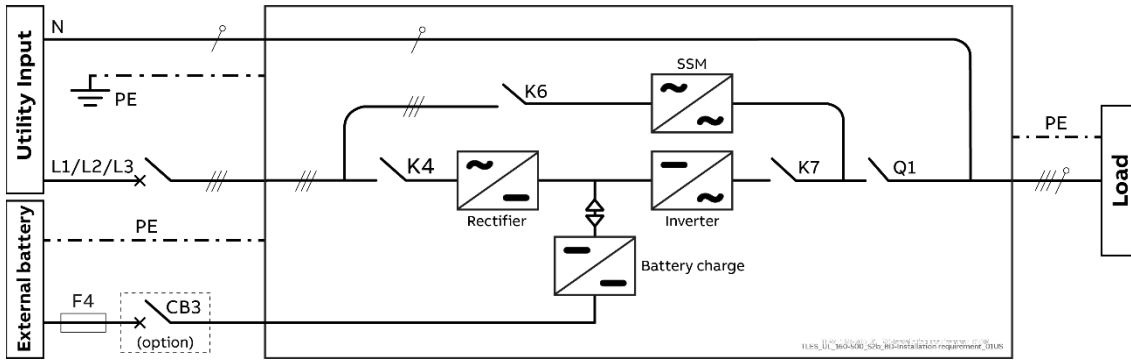
CORRECTION FACTORS

Ambient Temperature	For ambient temperatures other than 86°F (30°C), multiply the allowable ampacities shown above by the appropriate factor below					
70 – 77°F (21 – 25°C)	1.08	1.05	1.04	1.08	1.05	1.04
79 – 86°F (26 - 30°C)	1.00	1.00	1.00	1.00	1.00	1.00
88 – 95°F (31 - 35°C)	0.91	0.94	0.96	0.91	0.94	0.96
97 – 104°F (36 - 40°C)	0.82	0.88	0.91	0.82	0.88	0.91
106 – 113°F (41 - 45°C)	0.71	0.82	0.87	0.71	0.82	0.87
115 – 122°F (46 - 50°C)	0.58	0.75	0.82	0.58	0.75	0.82
124 – 131°F (51 - 55°C)	0.41	0.67	0.76	0.41	0.67	0.76

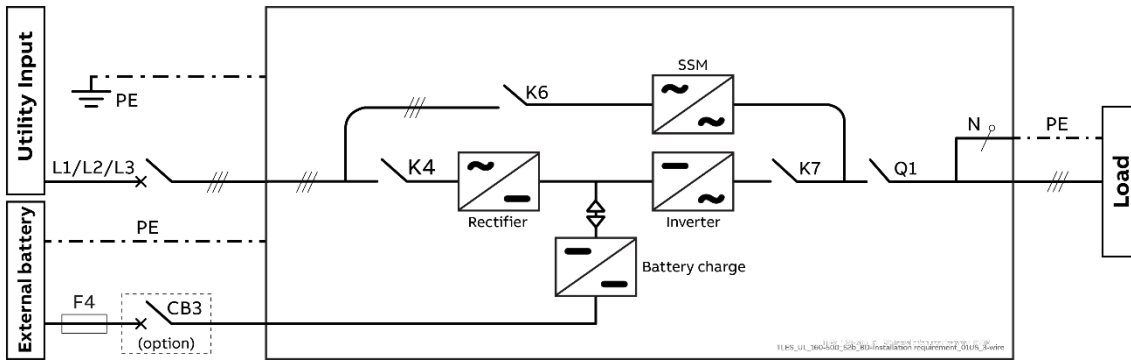
4.7.4 Installation requirements

Typical examples for the connection of the TLE Series 160 to 500.

Single UPS with Common Input Utility for Rectifier & Bypass.

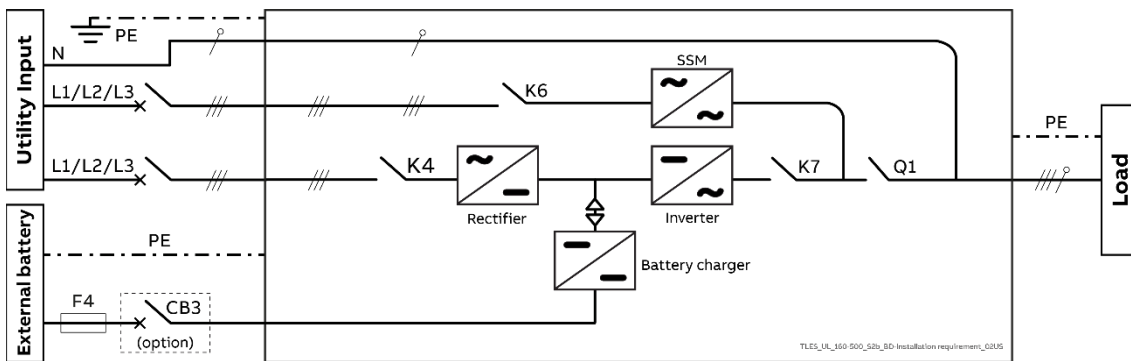


Single UPS with Common Input Utility for Rectifier & Bypass, 3-wire distribution (3-phase plus ground)

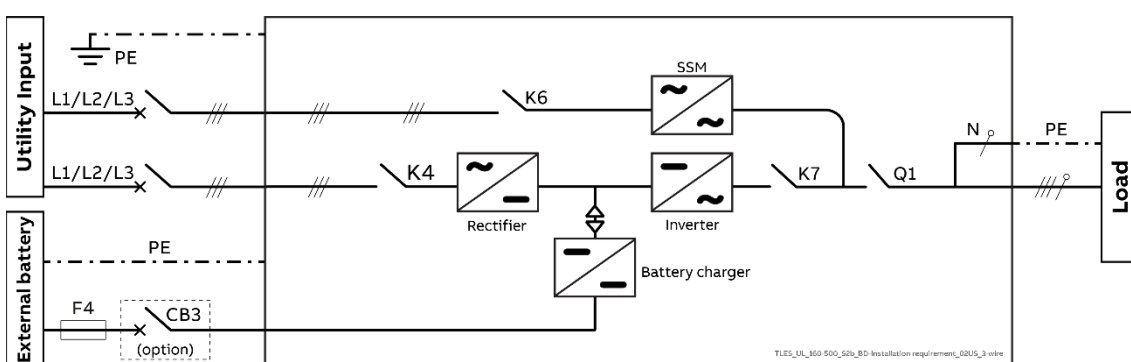


Single UPS with Dual Input Utility for Rectifier & Bypass

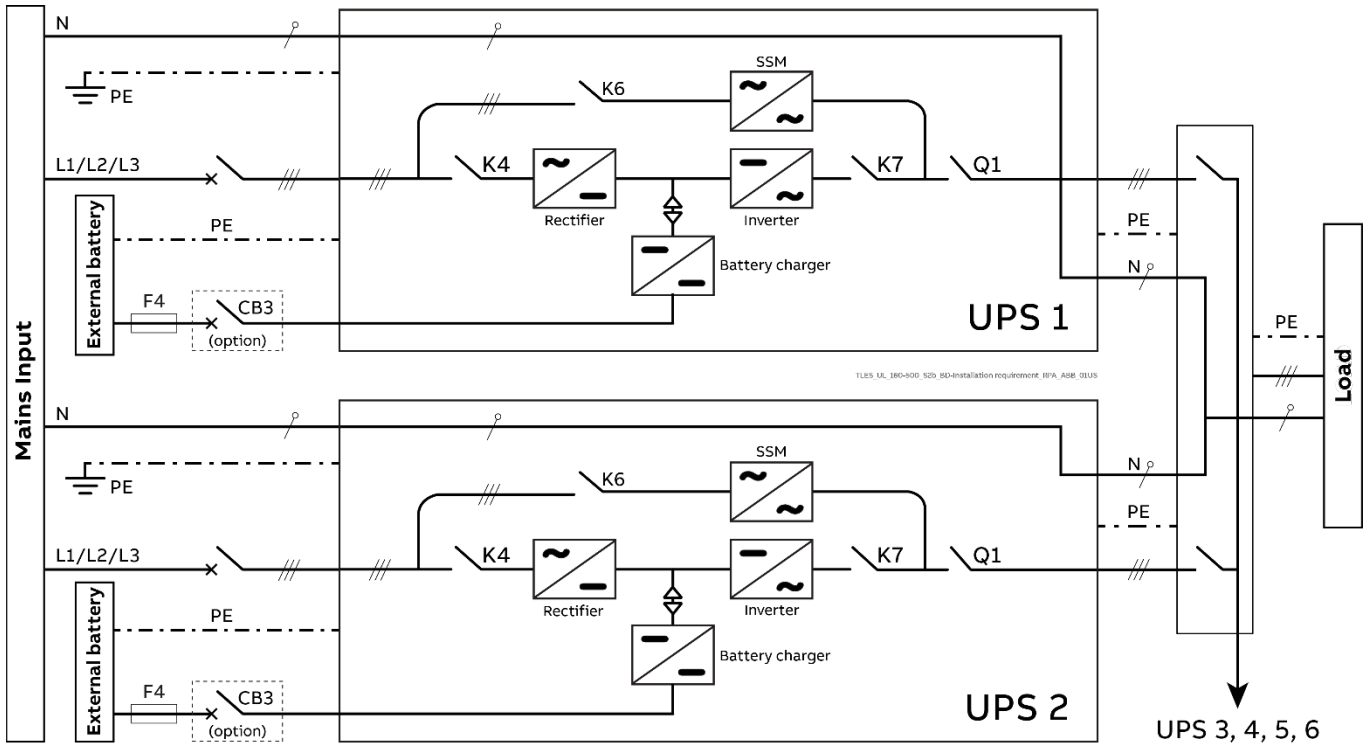
(Connect a single input Neutral to Bypass Utility (inside the UPS, common Neutral for Bypass and Rectifier))



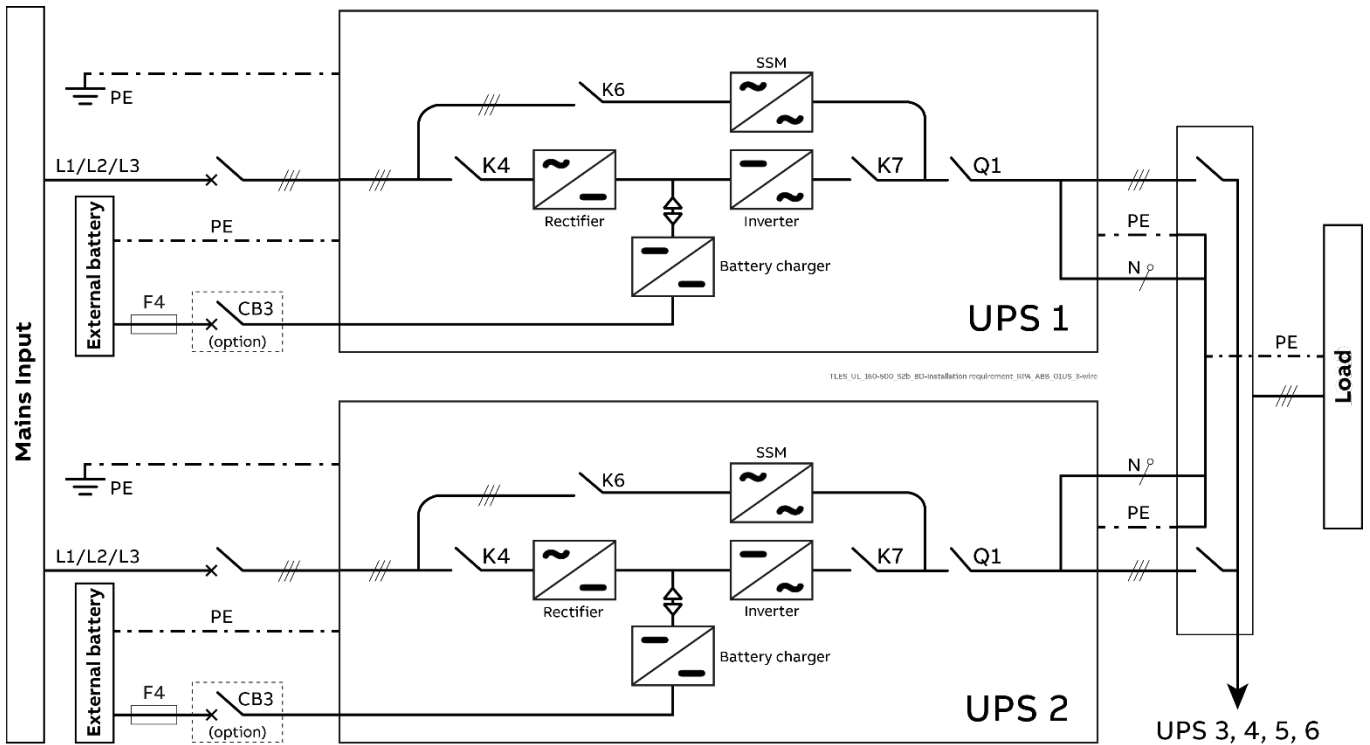
Single UPS with Dual Input Utility for Rectifier & Bypass, 3-wire distribution (3-phase plus ground)



UPS RPA Parallel System with Common Input Utility Rectifier & Bypass

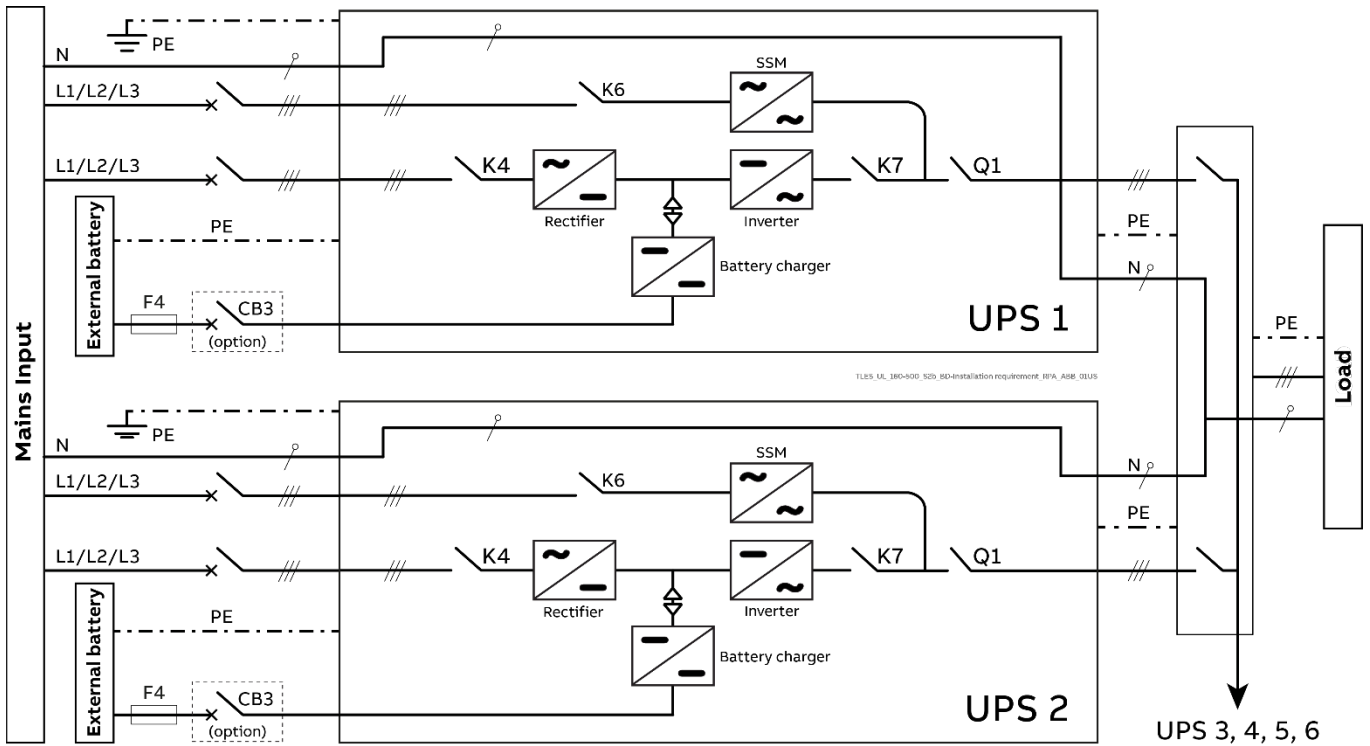


UPS RPA Parallel System with Common Input Utility Rectifier & Bypass, 3-wire distribution (3-phase plus ground)

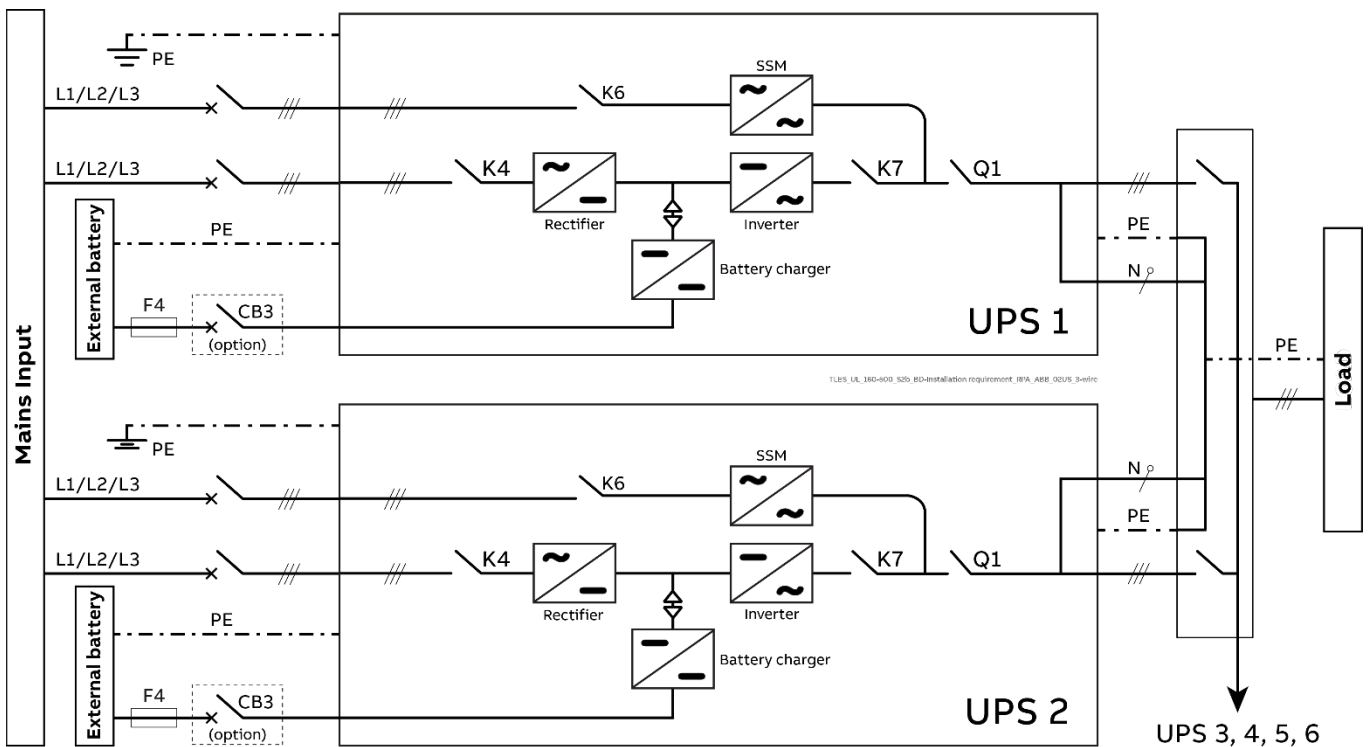


UPS RPA Parallel System with Dual Input Utility for Rectifier & Bypass

(Connect a single input Neutral to Bypass Utility (inside the UPS, common Neutral for Bypass and Rectifier))



UPS RPA Parallel System with Dual Input Utility for Rectifier & Bypass 3-wire distribution (3-phase plus ground)



4.8 Wiring connection

Note!



UPS installation and connection must be performed only by an ABB Service Technician!

Refer to the “Safety prescriptions - Installation” described on Chapter 1.

In case of UPS equipped with options or customized parts not covered by this manual, please consult the appropriate technical documentation before proceeding with electrical connections.

Carefully read the following recommendations before proceeding:

- Ensure that the AC and DC external isolators are Off and prevent their inadvertent operation.
- Do not close any external isolators prior to the commissioning of the equipment.
- The input/output cables must be connected in clockwise phase rotation for both Bypass and Rectifier Input Bars if separate, taking care to avoid risk of short circuit between different poles.
- The grounding and neutral connection of the electrical system must be in accordance with local regulations.
- In case of additional cabinets containing Batteries, input/ output transformers, etc., their ground terminals must be connected to the UPS main ground terminal.
- Once the power cables have been connected, re-install the internal safety shields and close the cabinets by re-installing all external panels.

TLE Series 160 - 200 - 225 - 250 Access to the bus bars for the cable connections

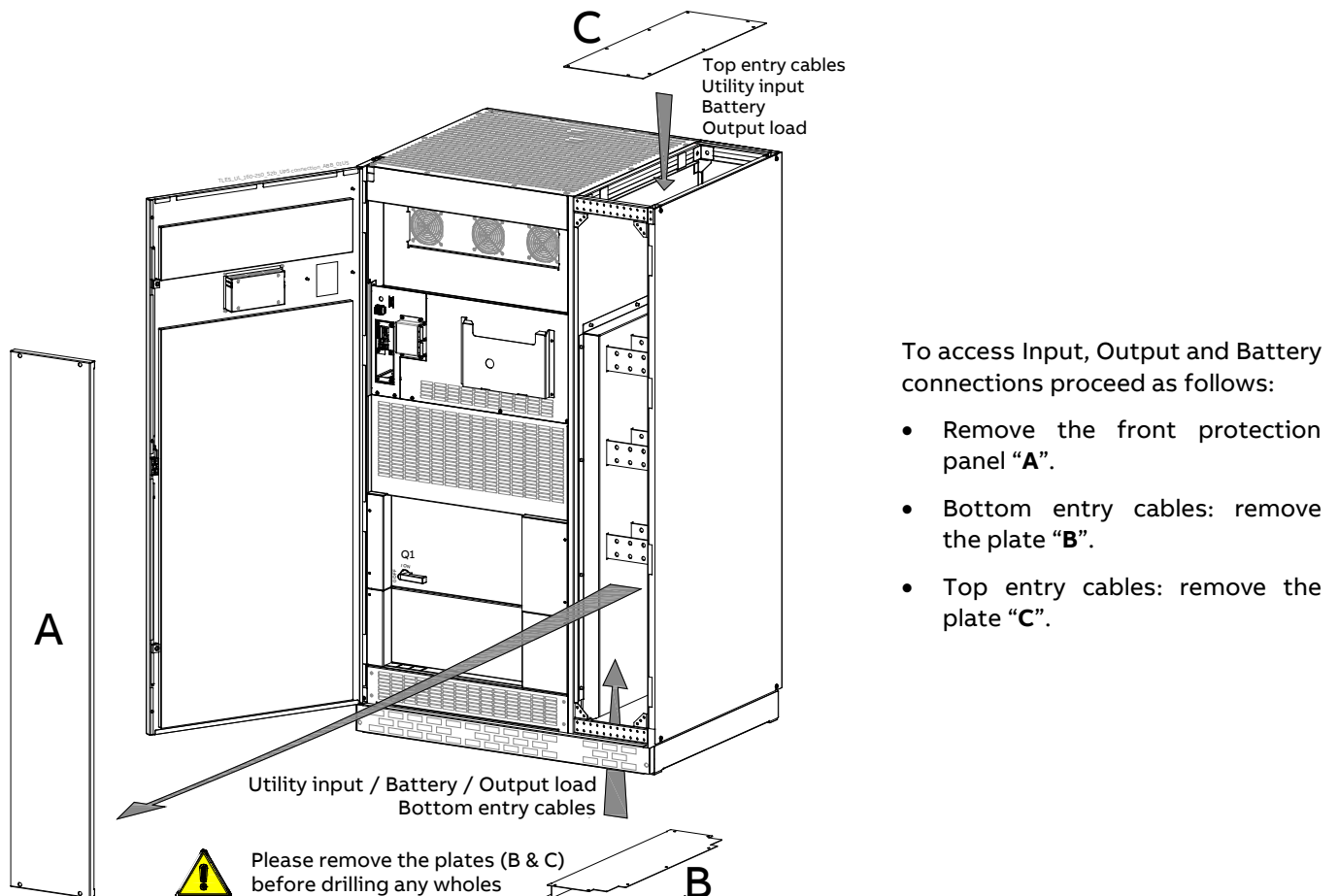


Fig. 4.8-1 TLE Series 160 - 200 - 225 - 250 - Access to connection bus bars



Note!

For UPS correct operation, the input Utility phase rotation must be clock-wise.

Please remove the plates “B and C” before drilling any wholes.

TLE Series 300 - 400 - 500 Access to the bus bars for the cable connections

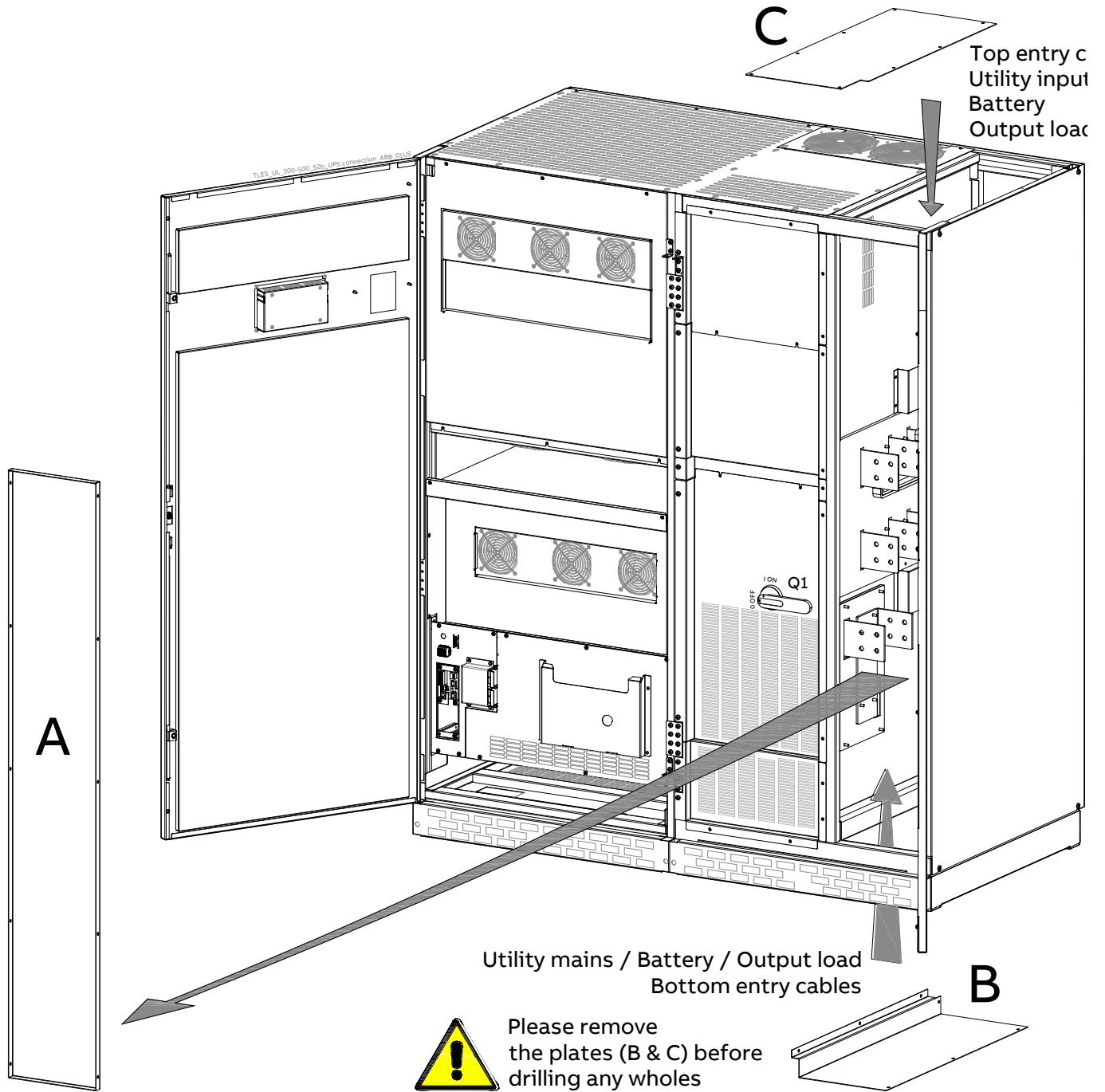


Fig. 4.8-2 TLE Series 300 - 400 - 500 - Access to connection bus bars

To access Input, Output and Battery connections proceed as follows:

- Remove the front protection panel “A”.
- Bottom entry cables: remove the plate “B”.
- Top entry cables: remove the plate “C”.



Note!

For UPS correct operation, the input Utility phase rotation must be clock-wise.
Please remove the plates “B and C” before drilling any wholes



Note!

Panel “A, B and C” should never be removed or replaced with power applied to the UPS. These panels are in close proximity to 480V live buss bars.

Always disconnect the Rectifier, Bypass, Load and Battery sources from the UPS before removing or replacing these panels. If not serious injury or death could occur!

TLE Series 300 - 400 - 500 - Connection bus bars configuration for the top cable entry or bottom cable entry

The configuration of the TLE Series 300 - 400 - 500 is with top cable entry as standard (see Fig. 4.8-3). It is possible to configure the bus bars with bottom cable entry (see Fig. 4.8-4).

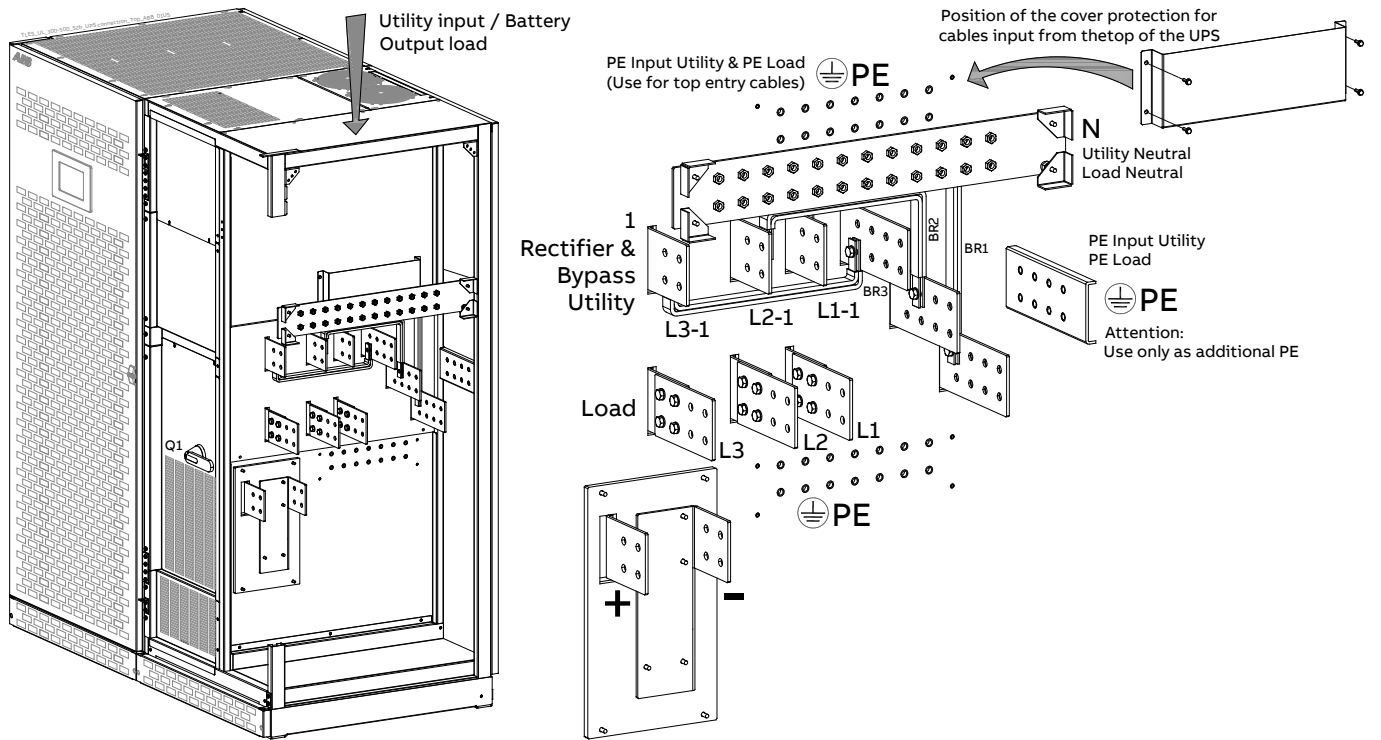


Fig. 4.8-3 TLE Series 300 - 400 - 500 - Configuration bus bars with top cable entry (standard)

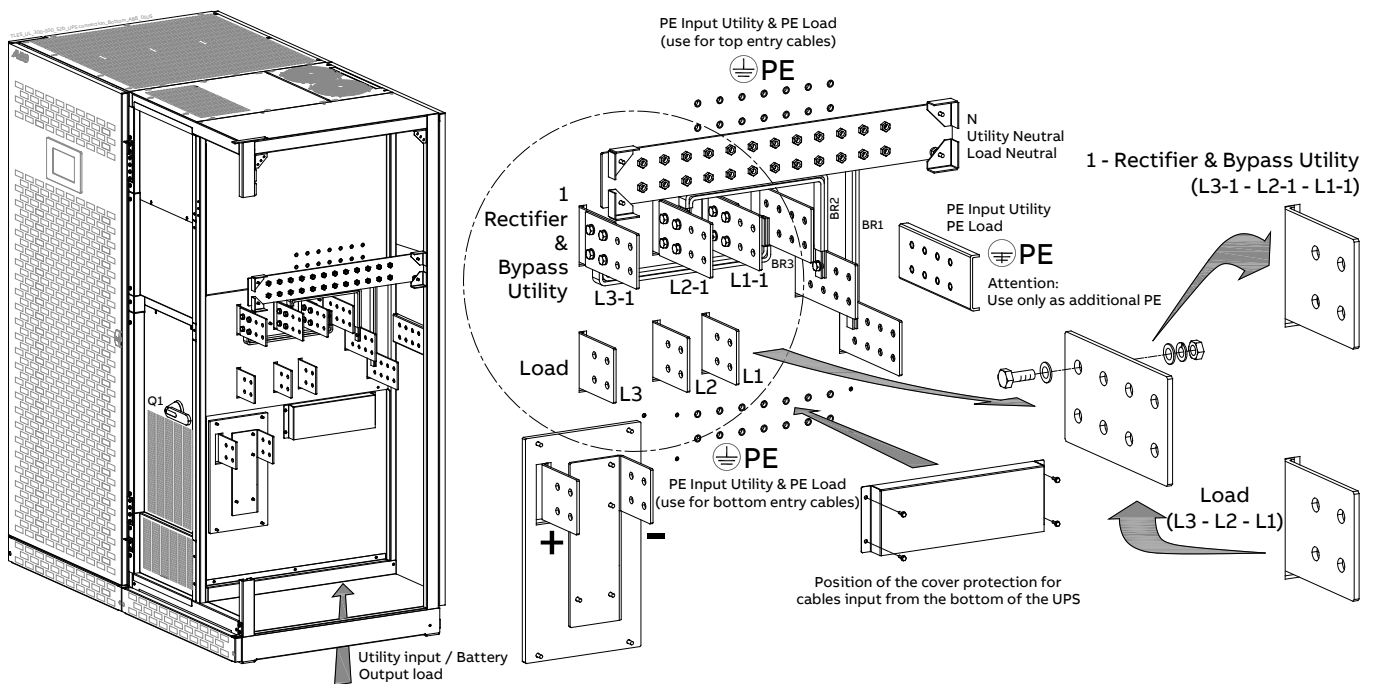


Fig. 4.8-4 TLE Series 300 - 400 - 500 - Configuration bus bars with bottom cable entry

4.8.1 TLE Series 160 - 200 - 225 - 250 - Power connection with Common Input Utility

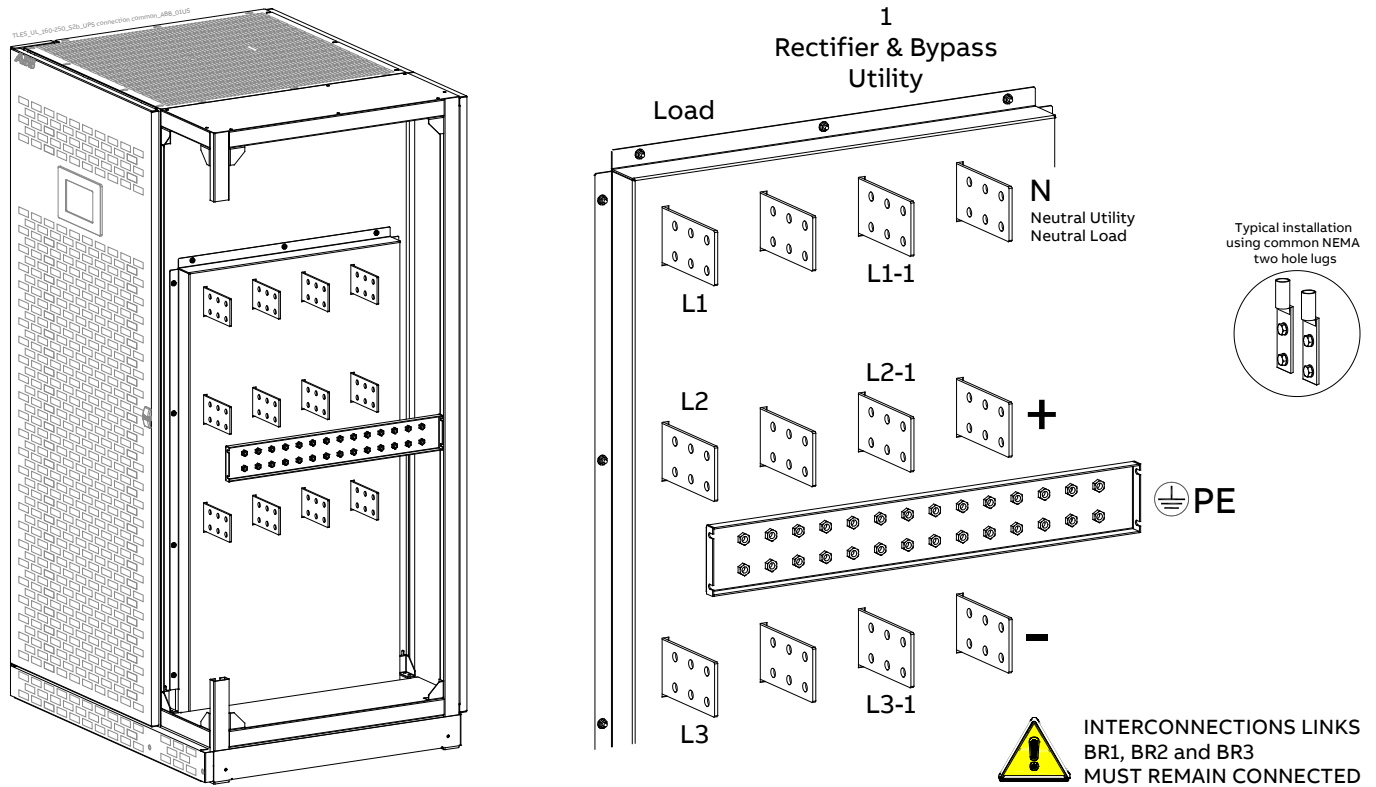


Fig. 4.8.1-1 TLE Series 160 - 200 - 225 - 250 - Power connection with Common Input Utility

Power connection cables are connected to bus bars using **M10 bolts**.
 The bolts of the connection cables must be tightened with a torque wrench at **355 Lb-in / 40 Nm**.

Common Input Utility - Rectifier / Bypass

L1-1	Rectifier + Bypass Phase A (L1)		
L2-1	Rectifier + Bypass Phase B (L2)	N	Neutral
L3-1	Rectifier + Bypass Phase C (L3)	PE	Ground

 **Note!**
 The interconnection links **BR1, BR2 and BR3** must remain connected.

Output Load

L1	Load phase A (L1)	L2	Load phase B (L2)	L3	Load phase C (L3)
N	Neutral	PE	Ground		

External Battery connection

- +** Positive pole of the Battery
- Negative pole of the Battery
- PE** External Battery Ground



Before closing the “External Battery Fuses”, verify for correct polarity of the Battery connection!

 **Note!**
 To meet standards concerning electromagnetic compliance, the connection between the UPS and external Battery must be done by using a shielded cable or suitable shielded (steel) conduit!

Note!



This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

The UPS cannot be operated from a mid-point or end-point grounded delta supply source.

If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded

If the Load requires a Neutral, a Bypass Source Neutral MUST BE PROVIDED.

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground with a ground bonding jumper.

For single module applications install the ground bonding jumper directly at the UPS output.

Cable size for this connection shall be per National Electric Code and applicable local regulations, but not less than AWG 1.

Attention!



With this configuration, Load can only be connected phase-phase.

Absolutely no Load Connection permitted to the Neutral of the output transformer.

DO NOT install both a source Neutral and a bonding jumper!

RPA
Redundant Parallel Architecture

RPA Parallel System

In an RPA Parallel System configuration, it is most important to connect the Neutrals of the UPS outputs together.

The output distribution cabinet must contain a Neutral Bus (see Fig .4.8.1-2).

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground in the Output Distribution Cabinet.

Wire Neutral Conductors from the UPS to the output distribution cabinet (common point of connection) and solidly connect to ground with a ground bonding jumper.

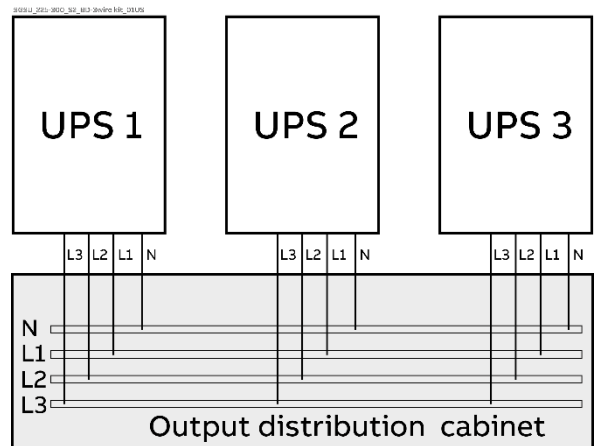


Fig. 4.8.1-2 RPA Parallel System

Cable size for the ground bonding jumper shall be per National Electric Code and applicable local regulations, but not less than AWG 1.

Please consider the following when applying Ground Fault Circuit Interrupters (GFCIs) in 3-wire distribution:

- During transfers to and from bypass, circulating current may flow between the two AC sources (UPS inverter and Bypass Utility). In 3-wire distribution the current flows through the ground path. In order to prevent tripping in such circumstances, proper adjustment of the GFCI is required. Particularly, the time delay should be set to at least 300ms.
- With the Neutral to ground bonding jumper installed, the UPS ground current has been verified to be less than or equal to 5% of the maximum rated input current of the unit in compliance with international safety regulations. This shall be accounted for in GFCIs settings.

Note!



Failure to properly adjust the GFCI settings could compromise the power delivery to the critical load!

4.8.2 TLE Series 160 - 200 - 225 - 250 - Power connection with Dual Input Utility



Note!
Connect a single input Neutral to Bypass Utility (inside the UPS, common Neutral for Bypass and Rectifier).

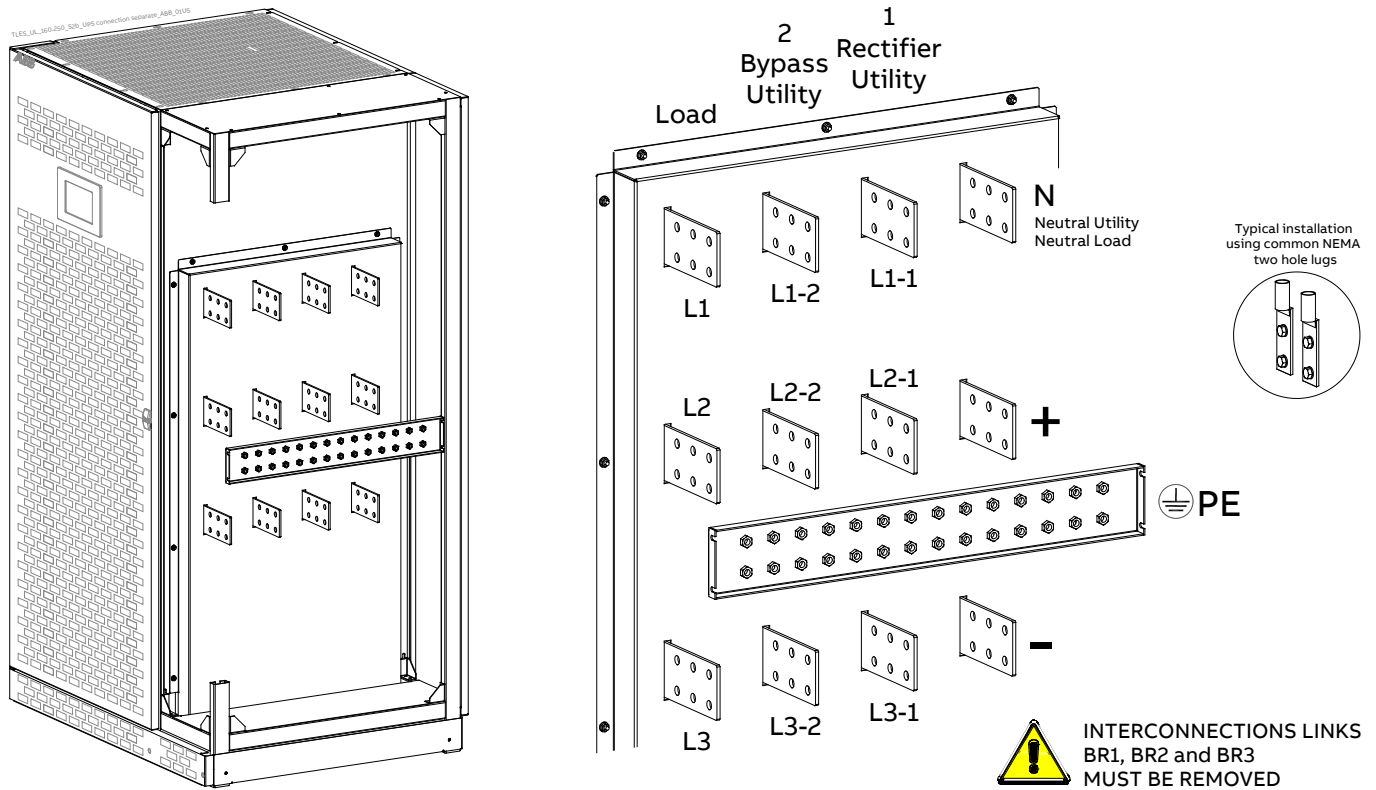


Fig. 4.8.2-1 TLE Series 160 - 200 - 225 - 250 - Power connection with Dual Input Utility

Power connection cables are connected to bus bars using **M10 bolts**.
The bolts of the connection cables must be tightened with a torque wrench at **355 Lb-in / 40 Nm**.

Dual Input Utility - Rectifier / Bypass

L1-1	Rectifier phase A (L1)	L1-2	Bypass phase A (L1)
L2-1	Rectifier phase B (L2)	L2-2	Bypass phase B (L2)
L3-1	Rectifier phase C (L3)	L3-2	Bypass phase C (L3)
PE	Ground	N	Neutral



Note!
The interconnection links BR1, BR2 and BR3 on the input bus bars must be removed (see Fig. 4.8.2-3).

Output Load

L1	Load phase A (L1)	L2	Load phase B (L2)	L3	Load phase C (L3)
N	Neutral	PE	Ground		

External Battery connection

+	Positive pole of the Battery
-	Negative pole of the Battery
PE	External Battery Ground



Before closing the “External Battery Fuses”, verify for correct polarity of the Battery connection!



Note!
To meet standards concerning electromagnetic compliance, the connection between the UPS and external Battery must be done by using a shielded cable or suitable shielded (steel) conduit!

Note!



This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

The UPS cannot be operated from a mid-point or end-point grounded delta supply source.

If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded

If the Load requires a Neutral, a Bypass Source Neutral MUST BE PROVIDED.

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground with a ground bonding jumper.

For single module applications install the ground bonding jumper directly at the UPS output.

Cable size for this connection shall be per National Electric Code and applicable local regulations, but not less than AWG 1.

Attention!



With this configuration, Load can only be connected phase-phase.

Absolutely no Load Connection permitted to the Neutral of the output transformer.

DO NOT install both a source Neutral and a bonding jumper!



RPA Parallel System

In an RPA Parallel System configuration, it is most important to connect the Neutrals of the UPS outputs together.

The output distribution cabinet must contain a Neutral Bus (see Fig .4.8.2-2).

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground in the Output Distribution Cabinet.

Wire Neutral Conductors from the UPS to the output distribution cabinet (common point of connection) and solidly connect to ground with a ground bonding jumper.

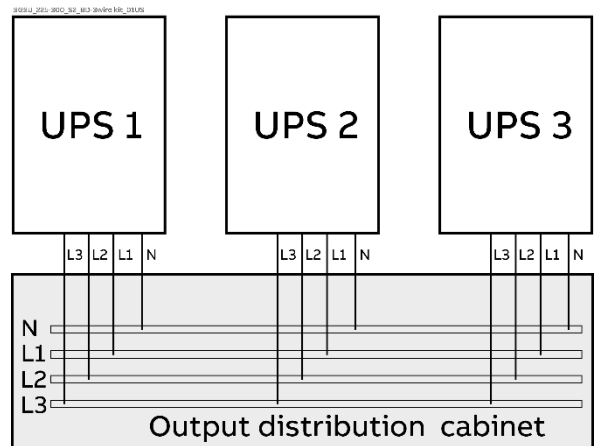


Fig. 4.8.2-2 RPA Parallel System

Cable size for the ground bonding jumper shall be per National Electric Code and applicable local regulations, but not less than AWG 1.

Please consider the following when applying Ground Fault Circuit Interrupters (GFCIs) in 3-wire distribution:

- During transfers to and from bypass, circulating current may flow between the two AC sources (UPS inverter and Bypass Utility). In 3-wire distribution the current flows through the ground path. In order to prevent tripping in such circumstances, proper adjustment of the GFCI is required. Particularly, the time delay should be set to at least 300ms.
- With the Neutral to ground bonding jumper installed, the UPS ground current has been verified to be less than or equal to 5% of the maximum rated input current of the unit in compliance with international safety regulations. This shall be accounted for in GFCIs settings.

Note!



Failure to properly adjust the GFCI settings could compromise the power delivery to the critical load!

TLE Series 160 - 200 - 225 - 250 - Installation notices in case of power connection with Dual Input Utility

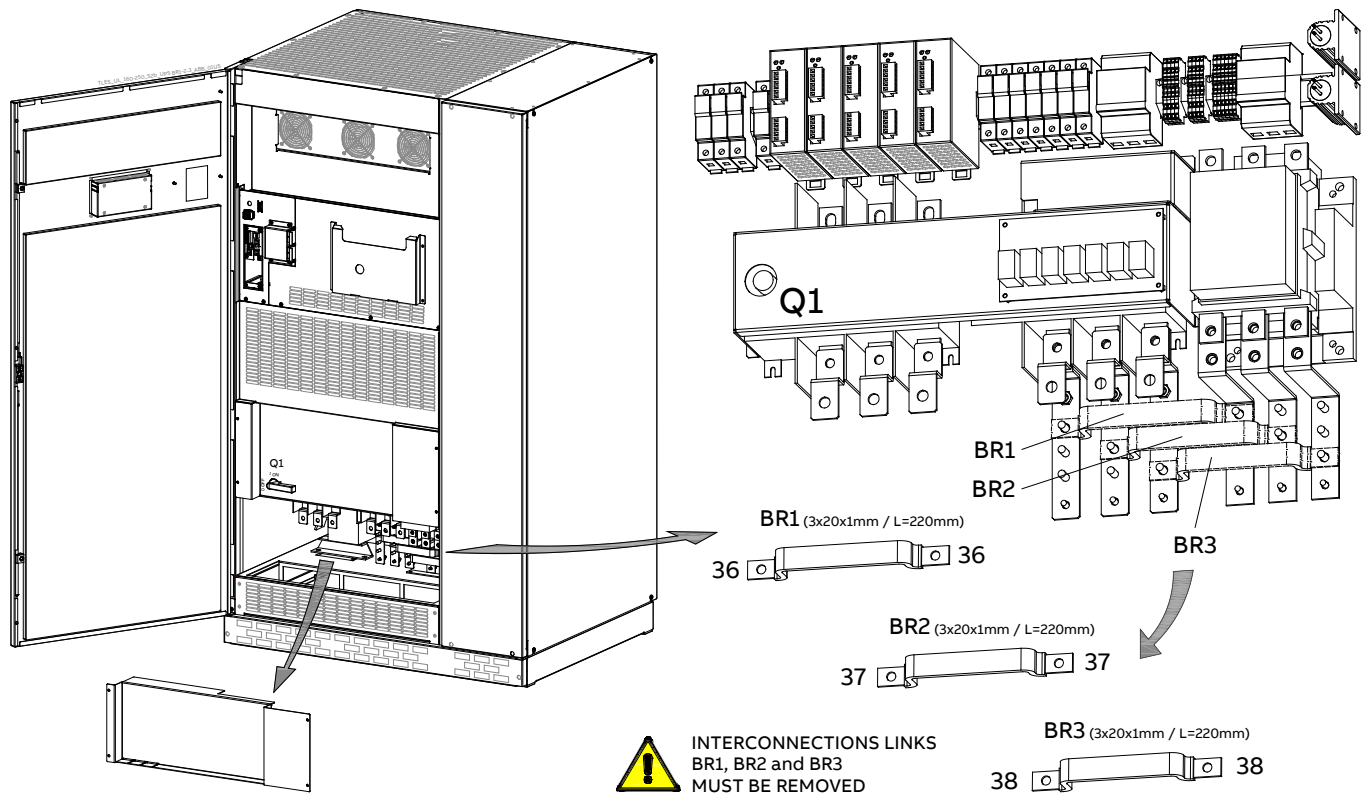


Fig. 4.8.2-3 TLE Series 160 - 200 - 225 - 250 - Interconnection links BR1, BR2 and BR3



For Dual Input Utility, Bypass and Rectifier, the interconnection links BR1, BR2 and BR3 must be removed (see Fig. 4.8.2-3).

4.8.3 TLE Series 300 - 400 - 500 - Power connection with Common Input Utility

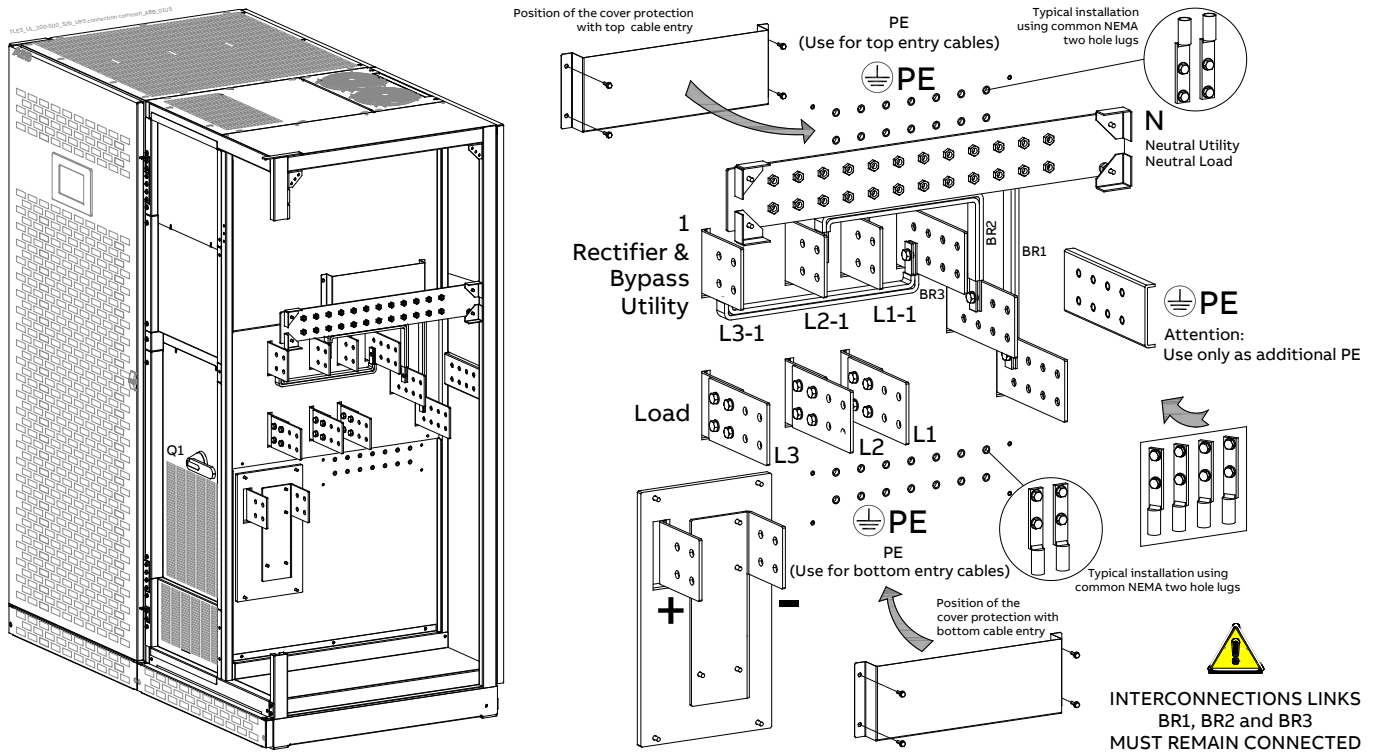


Fig. 4.8.3-1 TLE Series 300 - 400 - 500 - Power connection with Common Input Utility

Power connection cables are connected to bus bars using **M10 bolts**.
 The bolts of the connection cables must be tightened with a torque wrench at **355 Lb-in / 40 Nm**.

Common Input Utility - Rectifier / Bypass

L1-1	Rectifier + Bypass Phase A (L1)		
L2-1	Rectifier + Bypass Phase B (L2)	N	Neutral
L3-1	Rectifier + Bypass Phase C (L3)	PE	Ground



Note!
 The interconnection links **BR1, BR2 and BR3** must remain connected (see Fig. 4.8.3-1).

Output Load

L1	Load phase A (L1)	L2	Load phase B (L2)	L3	Load phase C (L3)
N	Neutral	PE	Ground		

External Battery connection

- +** Positive pole of the Battery
- Negative pole of the Battery
- PE** External Battery Ground



Before closing the “External Battery Fuses”, verify for correct polarity of the Battery connection!



Note!
 To meet standards concerning electromagnetic compliance, the connection between the UPS and external Battery must be done by using a shielded cable or suitable shielded (steel) conduit!

Note!



This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

The UPS cannot be operated from a mid-point or end-point grounded delta supply source.

If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded

If the Load requires a Neutral, a Bypass Source Neutral MUST BE PROVIDED.

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground with a ground bonding jumper.

For single module applications install the ground bonding jumper directly at the UPS output.

Cable size for this connection shall be per National Electric Code and applicable local regulations, but not less than AWG 3/0.

Attention!



With this configuration, Load can only be connected phase-phase.

Absolutely no Load Connection permitted to the Neutral of the output transformer.

DO NOT install both a source Neutral and a bonding jumper!

RPA
Redundant Parallel Architecture

RPA Parallel System

In an RPA Parallel System configuration, it is most important to connect the Neutrals of the UPS outputs together.

The output distribution cabinet must contain a Neutral Bus (see Fig .4.8.3-2).

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground in the Output Distribution Cabinet.

Wire Neutral Conductors from the UPS to the output distribution cabinet (common point of connection) and solidly connect to ground with a ground bonding jumper.

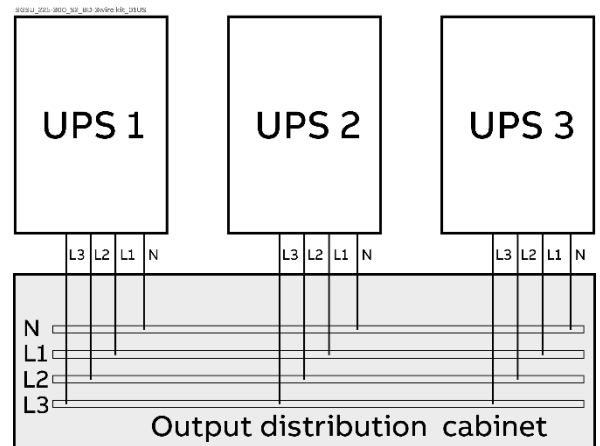


Fig. 4.8.3-2 RPA Parallel System

Cable size for the ground bonding jumper shall be per National Electric Code and applicable local regulations, but not less than AWG 3/0.

Please consider the following when applying Ground Fault Circuit Interrupters (GFCIs) in 3-wire distribution:

- During transfers to and from bypass, circulating current may flow between the two AC sources (UPS inverter and Bypass Utility). In 3-wire distribution the current flows through the ground path. In order to prevent tripping in such circumstances, proper adjustment of the GFCI is required. Particularly, the time delay should be set to at least 300ms.
- With the Neutral to ground bonding jumper installed, the UPS ground current has been verified to be less than or equal to 5% of the maximum rated input current of the unit in compliance with international safety regulations. This shall be accounted for in GFCIs settings.

Note!



Failure to properly adjust the GFCI settings could compromise the power delivery to the critical load!

4.8.4 TLE Series 300 - 400 - 500 Power connection with Dual Input Utility



Note!

Connect a single input Neutral to Bypass Utility (inside the UPS, common Neutral for Bypass and Rectifier).

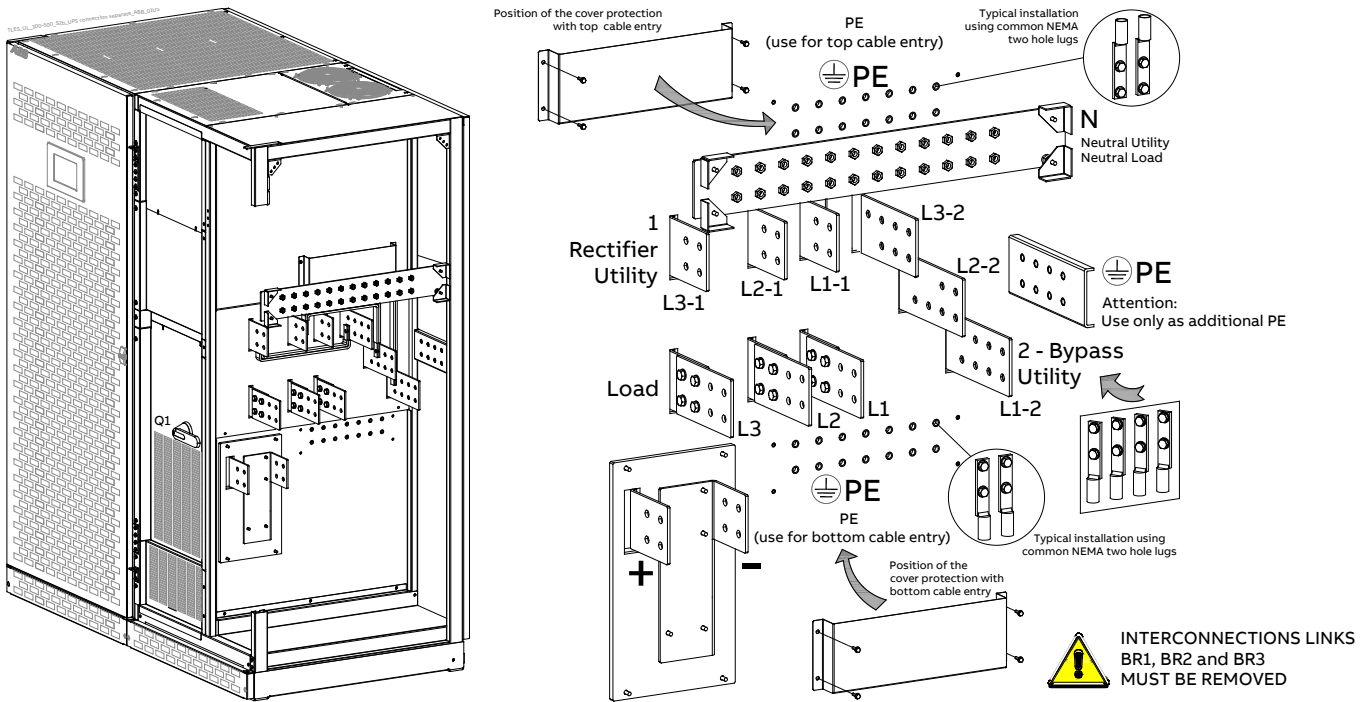


Fig. 4.8.4-1 TLE Series 300 - 400 - 500 - Power connection with Dual Input Utility

Power connection cables are connected to bus bars using **M10 bolts**.
The bolts of the connection cables must be tightened with a torque wrench at **355 Lb-in / 40 Nm**.

Dual Input Utility - Rectifier / Bypass

L1-1	Rectifier phase A (L1)	L1-2	Bypass phase A (L1)
L2-1	Rectifier phase B (L2)	L2-2	Bypass phase B (L2)
L3-1	Rectifier phase C (L3)	L3-2	Bypass phase C (L3)
PE	Ground	N	Neutral



Note!

The interconnection links **BR1, BR2 and BR3** on the input bus bars **must be removed** (see Fig. 4.8.4-3).

Output Load

L1	Load phase A (L1)	L2	Load phase B (L2)	L3	Load phase C (L3)
N	Neutral	PE	Ground		

External Battery connection

+	Positive pole of the Battery
-	Negative pole of the Battery
PE	External Battery Ground



Before closing the “External Battery Fuses”, verify for correct polarity of the Battery connection!



Note!

To meet standards concerning electromagnetic compliance, the connection between the UPS and external Battery must be done by using a shielded cable or suitable shielded (steel) conduit!

Note!



This UPS is only designed to operate in a wye-configured electrical system with a solidly grounded neutral.

The UPS cannot be operated from a mid-point or end-point grounded delta supply source.

If the UPS is equipped with an input bypass transformer, the secondary of the transformer must be wye-configured with neutral solidly grounded

If the Load requires a Neutral, a Bypass Source Neutral MUST BE PROVIDED.

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground with a ground bonding jumper.

For single module applications install the ground bonding jumper directly at the UPS output.

Cable size for this connection shall be per National Electric Code and applicable local regulations, but not less than AWG 3/0.

Attention!



With this configuration, Load can only be connected phase-phase.

Absolutely no Load Connection permitted to the Neutral of the output transformer.

DO NOT install both a source Neutral and a bonding jumper!

RPA
Redundant Parallel Architecture

RPA Parallel System

In an RPA Parallel System configuration, it is most important to connect the Neutrals of the UPS outputs together.

The output distribution cabinet must contain a Neutral Bus (see Fig .4.8.4-2).

If no Neutral Connection is available with the Bypass Input (3-wire input + ground) and the Load does not require a Neutral, solidly connect the Output Neutral of the UPS to ground in the Output Distribution Cabinet.

Wire Neutral Conductors from the UPS to the output distribution cabinet (common point of connection) and solidly connect to ground with a ground bonding jumper.

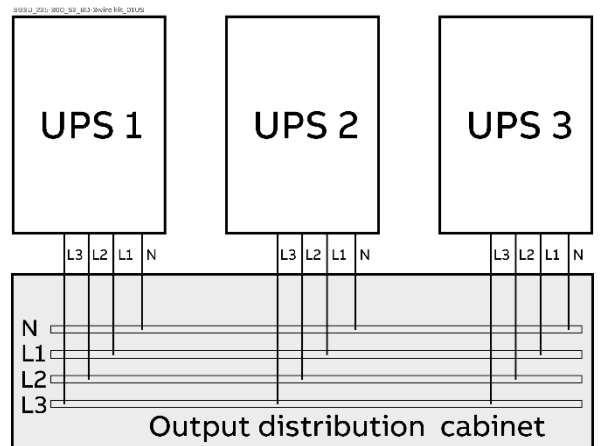


Fig. 4.8.4-2 RPA Parallel System

Cable size for the ground bonding jumper shall be per National Electric Code and applicable local regulations, but not less than AWG 3/0.

Please consider the following when applying Ground Fault Circuit Interrupters (GFCIs) in 3-wire distribution:

- During transfers to and from bypass, circulating current may flow between the two AC sources (UPS inverter and Bypass Utility). In 3-wire distribution the current flows through the ground path. In order to prevent tripping in such circumstances, proper adjustment of the GFCI is required. Particularly, the time delay should be set to at least 300ms.
- With the Neutral to ground bonding jumper installed, the UPS ground current has been verified to be less than or equal to 5% of the maximum rated input current of the unit in compliance with international safety regulations. This shall be accounted for in GFCIs settings.

Note!



Failure to properly adjust the GFCI settings could compromise the power delivery to the critical load!

TLE Series 300 -400 - 500 - Installation notices in case of power connection with Dual Input Utility

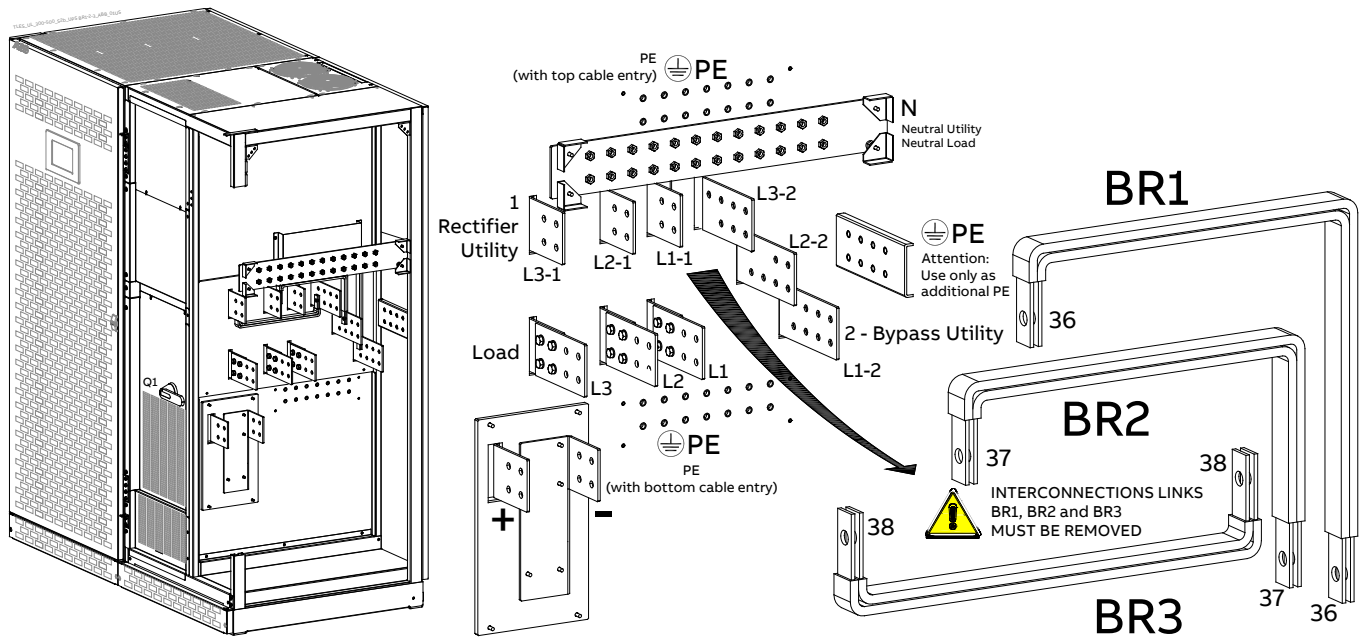


Fig. 4.8.4-3 TLE Series 300 - 400 - 500 - Interconnection links BR1, BR2 and BR3



For Dual Input Utility, Bypass and Rectifier, the interconnection links BR1, BR2 and BR3 must be removed (see Fig. 4.8.4-3).

4.8.5 Use of TLE Series 160 to 500 in eBoost™ Operation Mode

Note!



For systems intended to be operated in eBoost™ Operation Mode, the installation shall be protected with suitable surge protection devices (SPDs) on the AC bus feeding the UPSs.

Please contact your ABB Service Centre for more information.

Note!

In eBoost™ Operation Mode the Inverter output filter is placed in parallel with the Load and combined with the Load current it contributes to the UPS input characteristic.



As the Inverter output filter exhibits a predominantly capacitive characteristic, it may provide some degree of reactive power compensation when combined with lagging power factor loads.

Conversely, depending on the load type and level, the UPS input characteristic may exhibit a leading power factor in eBoost™ Operation Mode.

Please contact your ABB Service Centre for more information.

Note!



If an emergency generator set supplies the UPS in case of Utility Failure and the system is intended to be operated in eBoost™ Operation Mode, eBoost operation shall be prevented during generator operation.

This can be accomplished by either installing a “GENERATOR ON” signal (refer to Section 5.2.5) or an “eBoost/IEMi CONTROL” signal (refer to Section 5.2.7).

Please contact your ABB Service Centre for more information.

4.8.6 Use of TLE Series 160 to 500 as Frequency Converter

Note!
The UPS needs the connection of the Neutral at the input Bus Bars.
Permanently running the UPS without Bypass supply requires a change of internal wiring to be performed by an ABB Service Technician only.

When the TLE Series 160 to 500 is utilized for **different output frequency compared to the input frequency**, the Automatic Bypass function is disabled, therefore the Load cannot be transferred to Utility in case of overload, short circuit, or inverter failure.

In situations where the UPS needs to be powered down for maintenance purposes, the critical Load must also be powered down during this time.

When the set-up parameters of the UPS are set for frequency converter, the **eBoost™ Operation Mode** is automatically disabled.

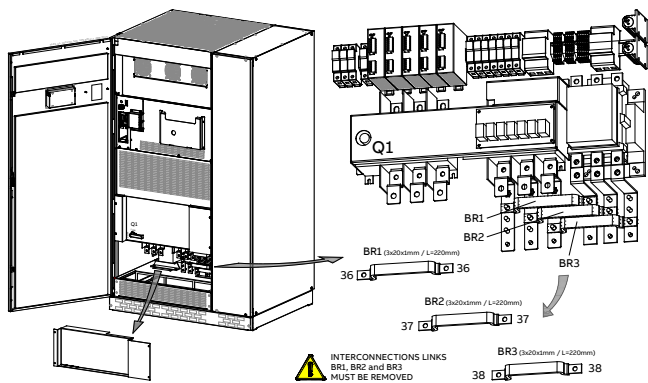


Fig. 4.8.6-1 TLE Series 160 - 200 - 225 - 250 Interconnection links BR1, BR2 and BR3

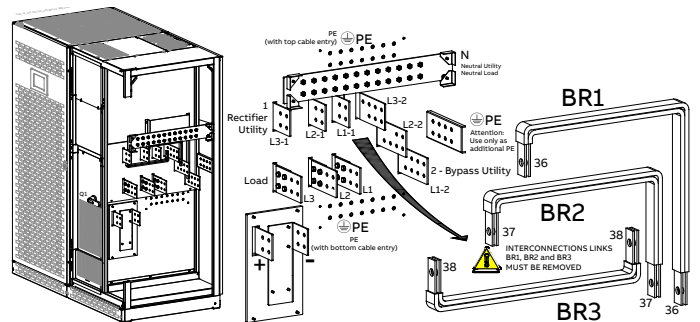


Fig. 4.8.6-2 TLE Series 300 - 400 - 500 Interconnection links BR1, BR2 and BR3

In order to avoid improper operation, only the Rectifier input should be powered (**L1-1, L2-1 and L3-1** / Fig. 4.8.2-1 & 4.8.4.1), therefore the interconnection links **BR1, BR2 and BR3**, on the input bus bars, **must be removed**. See pictures above and Fig. 4.8.6-1 and 4.8.6-2.

Special care must be taken in choosing the **fuse ratings** installed in the output distribution (**max. 20% of the UPS rated current**).

Avoid high inrush current due to transformer magnetization or motor starting.

Note!
Only an ABB Service Technician may change a unit from Frequency Converter into a normal UPS (with Bypass) or a normal UPS to a Frequency Converter (with Bypass).



4.9 RPA Parallel System connection



Warning!

This operation must be performed only by an ABB Service Technician before the initial start-up (ensure that the UPS installation is completely powered down).

4.9.1 Power wiring of Parallel Units

To guarantee good Load sharing between the units of an RPA Parallel System, we recommend that the cable length from the input distribution board (5) to the output distribution board (9) is equal for each unit (a+b = c+d = e+f = g+h = i+l = m+n = o+p = q+r).

Tolerance: +/-10%.

The AC input power of the Bypass must be the same for all units of the RPA Parallel System - no phase shift allowed between units.

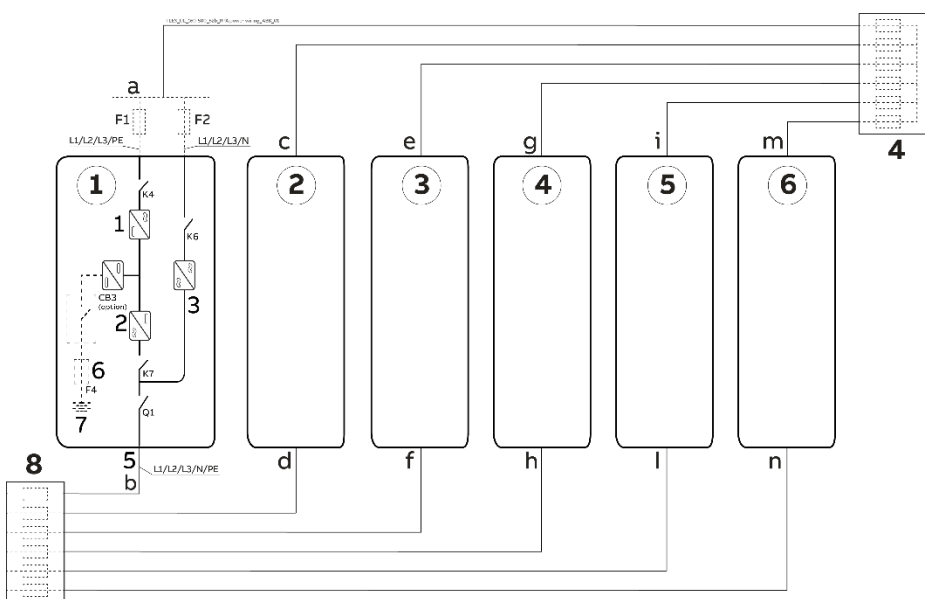


Note!

It is strongly recommended that no transformers, automatic circuit breakers or fuses should be inserted between the unit's output and the Load common bus bars.

However, it is recommended that a disconnection or isolation switch is installed in order to totally isolate a unit if needed.

Verify that power wiring and control wiring run in separate conduits or cable trays.
The power wiring requires two separate conduits: one for input and one for output cables.



- 1 = Rectifier
- 2 = Inverter
- 3 = Automatic Bypass
- 4 = Input Utility Distribution
- 5 = Unit Output Load
- 6 = External Battery Fuse
- 7 = External Battery
- 8 = Common bus bar and Output Load Distribution
- ① = UPS number 1
- ② = UPS number 2
- ③ = UPS number 3
- ④ = UPS number 4
- ⑤ = UPS number 5
- ⑥ = UPS number 6

Fig. 4.9.1-1 Power wiring of RPA Parallel System

4.9.2 Parallel Control Bus connection

In case of Parallel System, the communication between the units takes place through the **Control Bus Cables**.

Each Parallel Unit contains the two boards “P13/P14 – IM0222 – Bus Interface Board” (mounted on top of the board “P12 – IM0196 – RPA Board”) on which four connectors J1A - J2A and J1B - J2B are allocated. All the parallel units are connected to the same control bus.

This connection allows:

- The microprocessors of each unit to communicate with each other.
- The oscillators of each unit to be locked together.
- The regulation loops to compare the output current of each unit in order to equally share the Load current.

For increased reliability, this connection is made with redundant cables.

In this way, communication is maintained between units in case one of the control cables should fail or be accidentally damaged or disconnected.

The standard length of the control bus cable between two parallel units is **40 ft / 12m**.

The maximal overall length of bus connection, between the first and the last unit, should not exceed **295 ft / 90m**.

Verify that control wiring run in an individual separate steel conduit.



Note!

Under no circumstance should the control bus cable connecting J1A - J2A (1/2/3/4/5) and J1B - J2B (1/2/3/4/5) be connected or disconnected after the system has been powered ON.

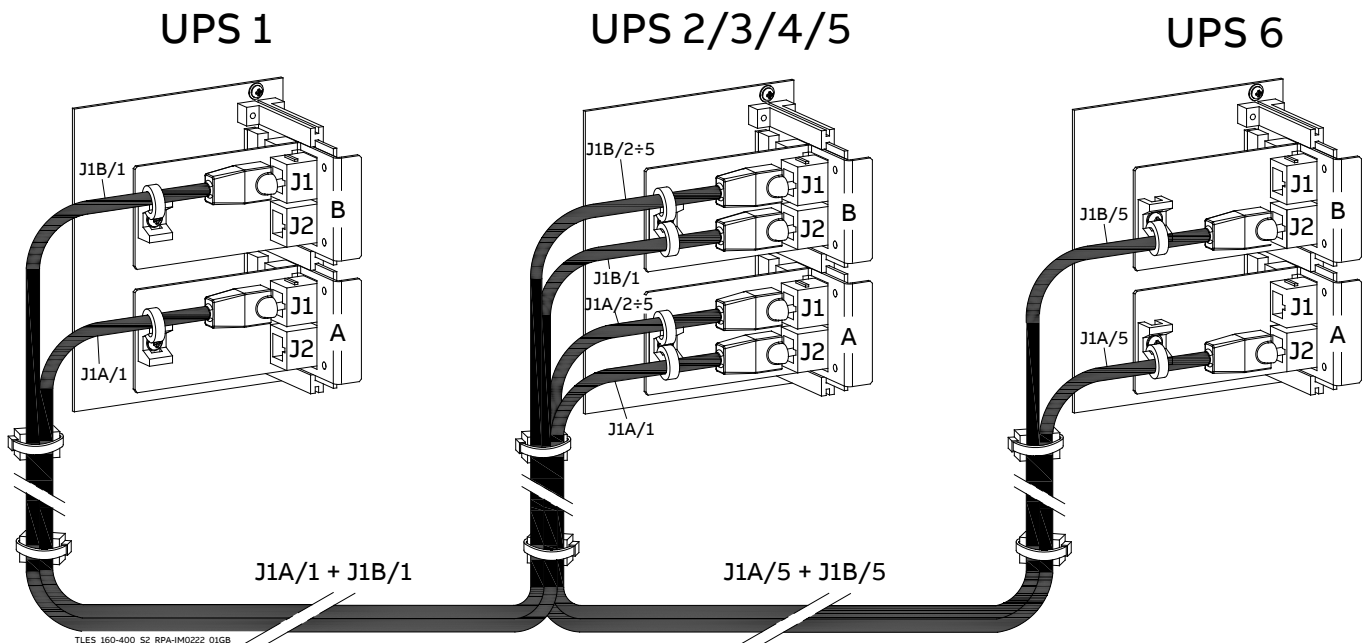
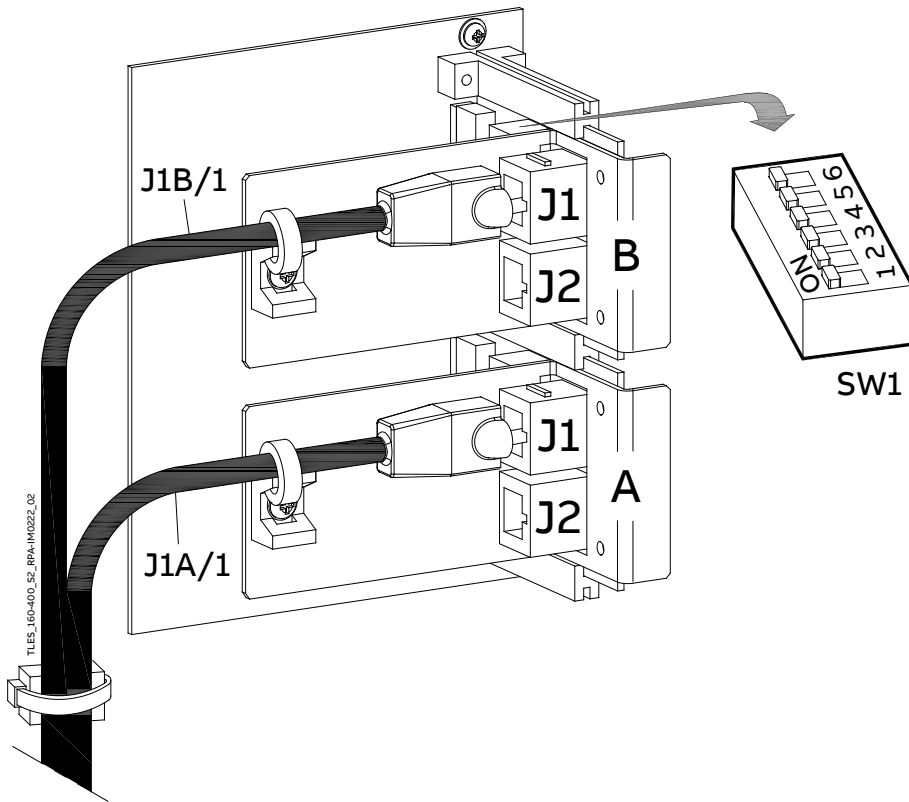


Fig. 4.9.2-1 RPA System - Control bus connection

It is important to place the units in sequence of their assigned number.

A unit number from **1** to **6** is defined by the setting of parameters and displayed on the panel (**1** to **6**).

This number is also marked inside and outside the packaging.

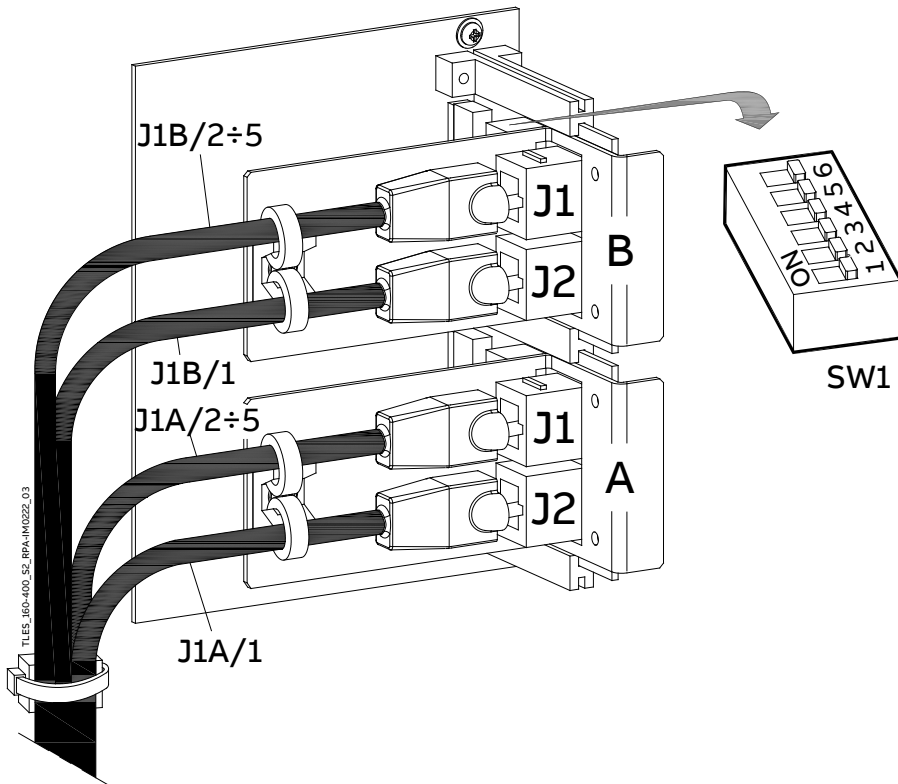


Note!

Final units, first and last, of an RPA Parallel System.

On the two boards P13/P14 – IM0222 – Bus Interface Board, of the first and last units of a Parallel System, the switches SW1-1/2/3/4/5/6 **must be in position ON** (see Fig. 4.9.2-2).

Fig. 4.9.2-2 Bus connection on first and last units



Note!

Intermediate units of an RPA Parallel System.

On the two boards P13/P14 – IM0222 – Bus Interface Board, of the intermediate units of a Parallel System, the switches SW1-1/2/3/4/5/6 **must be in position OFF** (see Fig.4.9.2-3).

Fig. 4.9.2-3 Bus connection on intermediate units

4.9.3 Control bus cable location

Warning!



This installation must be performed and verified by an ABB Service Technician before the initial start-up.

Ensure that the ups installation is completely powered down.

Keep SELV cables separated from high voltage cables.

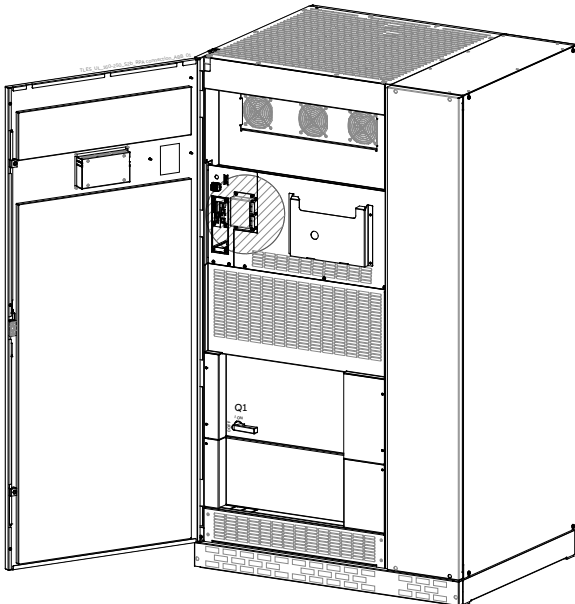


Fig.4.9.3-1 TLE Series 160 - 200 - 225 - 250
View electronic module on intermediate unit

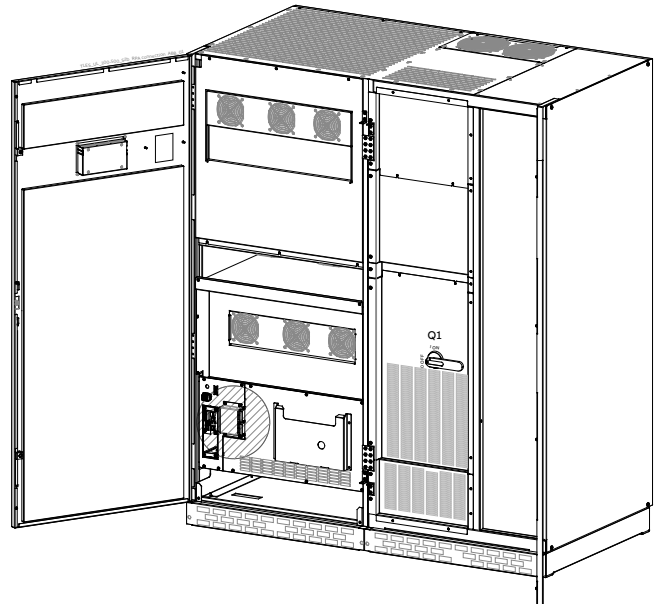


Fig. 4.9.3-2 TLE Series 300 - 400 - 500
View electronic module on intermediate unit

Access to the control bus connection

The communication bus cable connectors are placed on the two boards “P13/P14 – IM0222 – Bus Interface Board”. See Fig. 4.9.3-1 and 4.9.3-2.

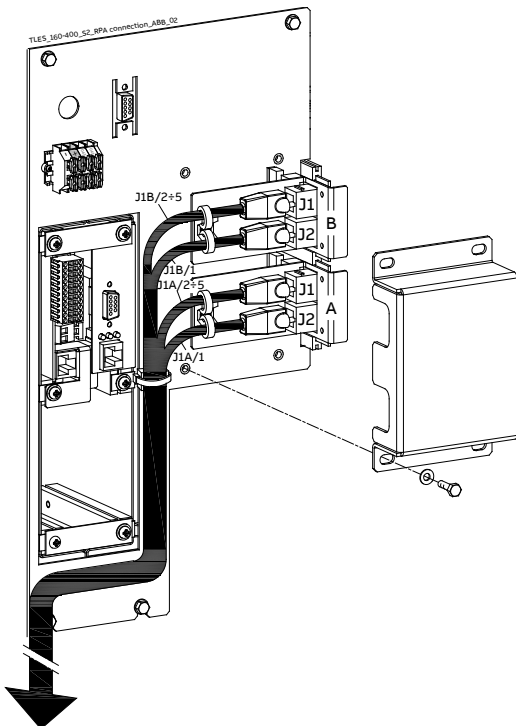


Fig. 4.9.3-3 View electronic module on intermediate unit

Control bus cables connection

- Plug the cables **J1A – J2A** (1/2/3/4/5) and **J1B – J2B** (1/2/3/4/5) on the connectors **J1A – J2A** and **J1B – J2B** placed on the two boards “P13/P14 – IM0222 – Bus Interface Board”.
- Fix the communication bus cables **J1A – J2A** (1/2/3/4/5) and **J1B – J2B** (1/2/3/4/5) with the provided cable clamps “A”.

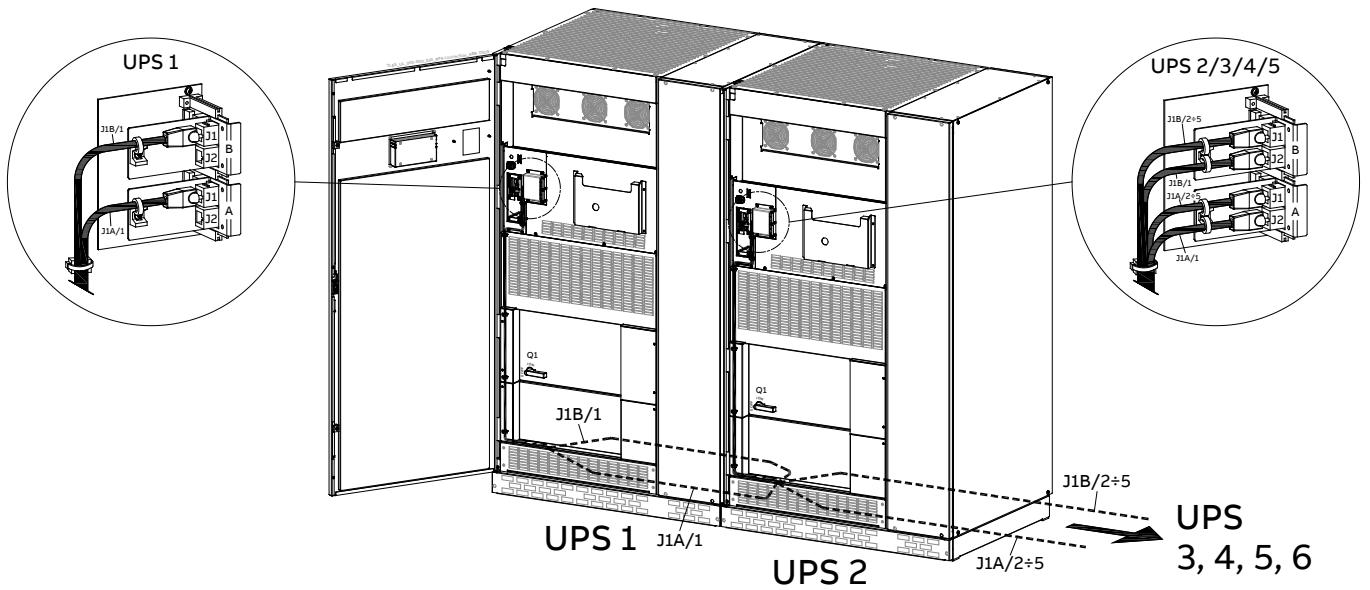


Fig. 4.9.3-4 TLE Series 160 - 200 - 225 - 250 - Control Bus cable routing and connection

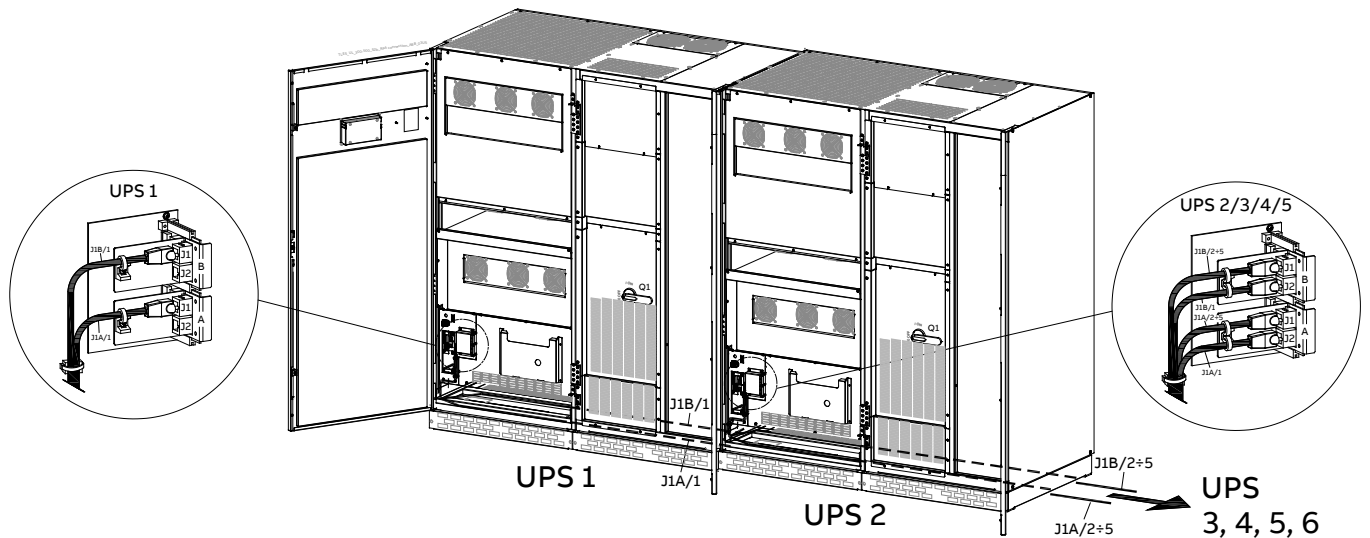


Fig. 4.9.3-5 TLE Series 300 - 400 - 500 - Control Bus cable routing and connection

Control bus cables routing

Place and fix the cables **J1A – J2A (1/2/3/4/5)** and **J1B – J2B (1/2/3/4/5)** inside the UPS cabinets in the position illustrated in the drawing Fig. 4.9.3-4 and 4.9.3-5.

Note!



Pay attention when cabling and routing the communication bus cables **J1A – J2A (1/2/3/4/5)** and **J1B – J2B (1/2/3/4/5)** inside the UPS cabinet.

In case one unit must be removed from the Parallel System, the communication bus cables must be taken out the UPS cabinet without disconnecting them from the two boards “P13/P14 – IM0222 – Bus Interface Board”.

For reliability reasons, the cables **J1A – J2A (1/2/3/4/5)** and **J1B – J2B (1/2/3/4/5)** connecting the units should be run in separated protected conduits (as indicated in Fig. 4.9.3-4 and 4.9.3-5) separated from the power cables.

It is important that the cable J1A – J2A (1/2/3/4/5) must be the same length as cable J1B – J2B (1/2/3/4/5).



Warning!

Connection and commissioning of an additional UPS to an existing Parallel System must be performed only by an ABB Service Technician.

4.10 “EPO - Emergency Power OFF” command connection

Warning!



The connection of an emergency button EPO (Emergency Power Off) must be performed only by an ABB Service Technician when the UPS is completely powered down!

Note!

The reliability of the system depends on this contact NC (Normally Closed)!

An Emergency button (Normally Closed voltage-free contact) can be connected on terminals **XA / EPO-1, EPO-2**.
Max. rating XA terminals: **AWG 14 (2.5mm²)**.

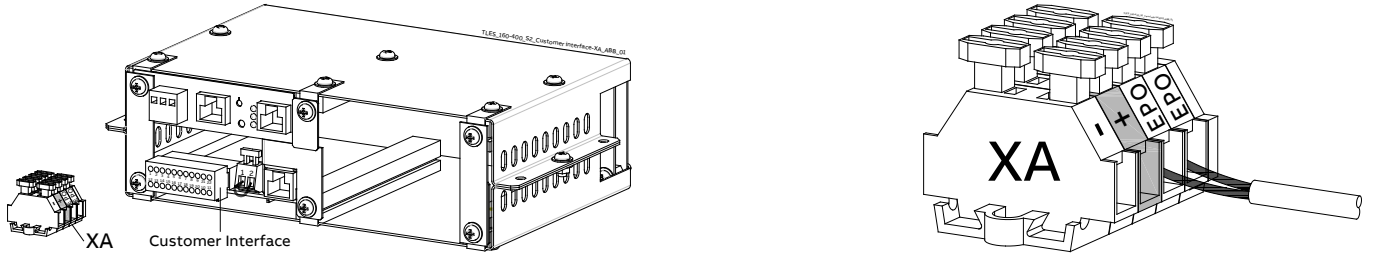


Fig. 4.10-1 XA terminal block for EPO command connection

When opened, this contact causes the immediate opening of the **Contactors K6 and K7** as well as the shut-down of **Rectifier, Inverter and Static-Switch**.



Note!

This procedure could imply a Load shut-down.
Keep SELV cables separated from high voltage cables.

RPA

Redundant Parallel Architecture

In a Parallel System a separate NC (Normally Closed) contact must be connected individually to each unit.

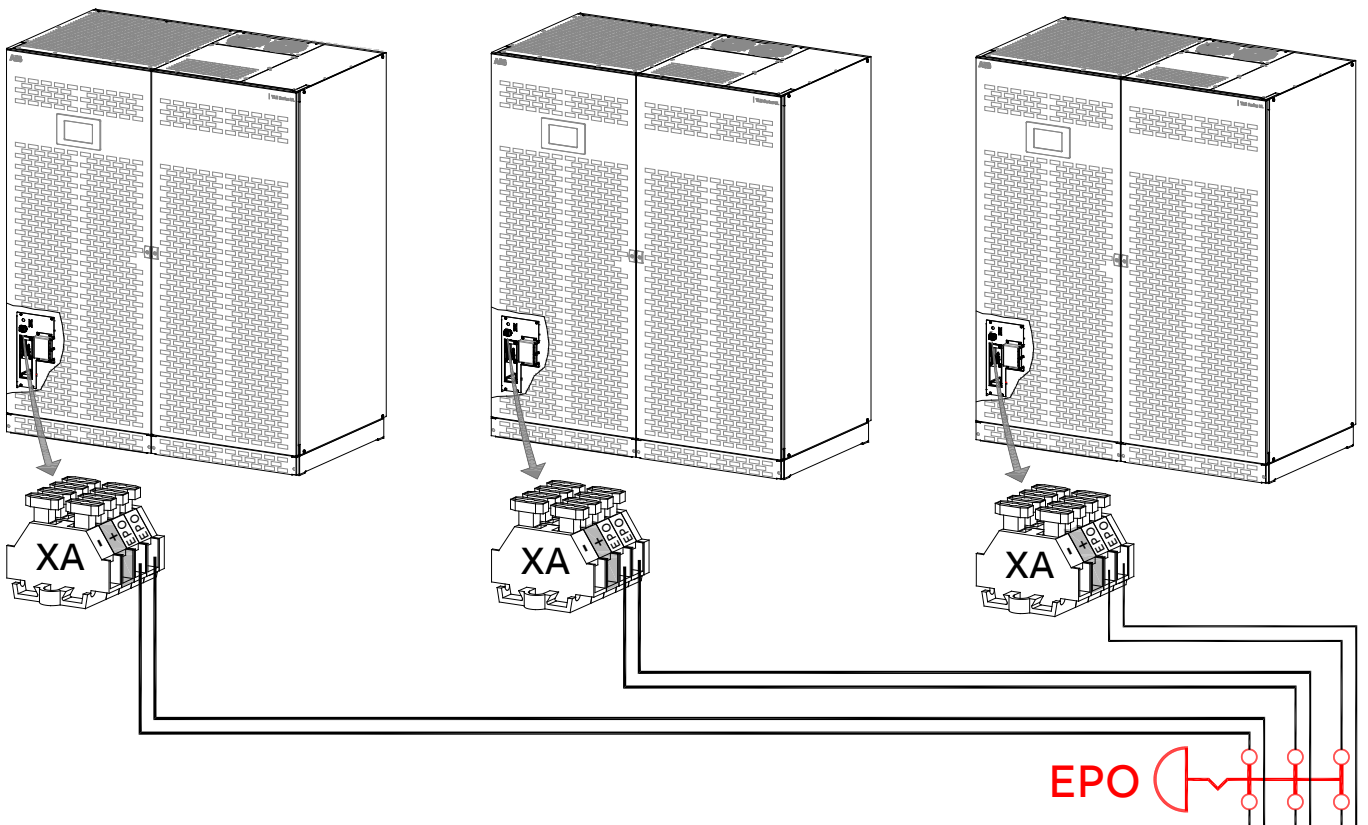


Fig. 4.10-2 XA “EPO - Emergency Power Off” – RPA Parallel System connection schematics

Note!



To operationalize this function, in case that the UPS was provided with one or more cards “P4 - Customer Interface” (max. 3 - see Chapter 5), there must be on each card the following:

- Remove the cable short-circuiting terminals X2 / 1, 2 (see Fig. 4.10-3).
- Remove the Jumper JP2 (see Fig. 4.10-3).

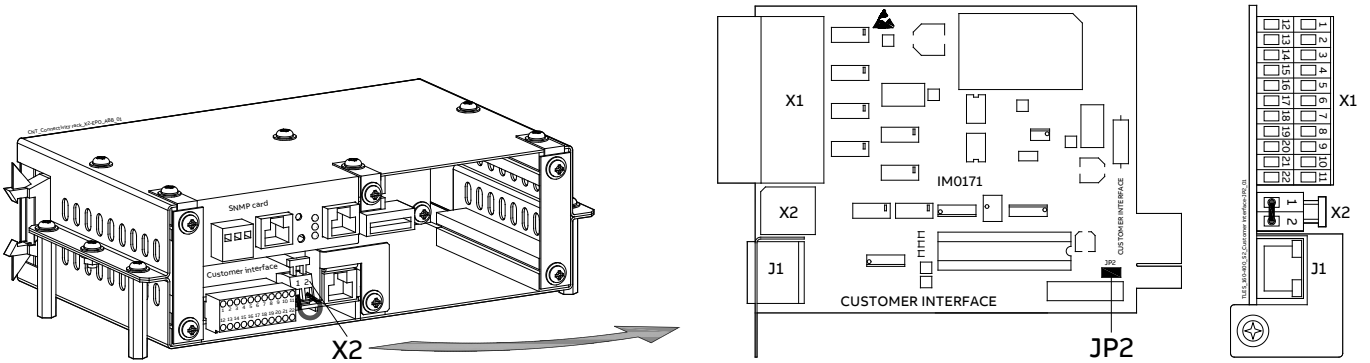


Fig. 4.10-3 X2 terminal block and Jumper JP2 on the Customer Interface Board

When the “EPO - Emergency Power Off” has been activated, the system must be restored as follows:

- Realize the push-button “EPO - Emergency Power Off” (contact on XA / EPO-1, EPO-2 is closed again).
- Perform the “Inverter OFF” command from the screen:
 Commands 1 / Inverter / OFF.
 (see User Manual to Section 6.5).



In case of a Parallel System perform the “Inverter OFF” command from the screen “Commands 1 / Inverter / OFF” of each unit connected on the Parallel Bus and having its switch “Q1 - UPS Output” closed.

5 Connectivity interface

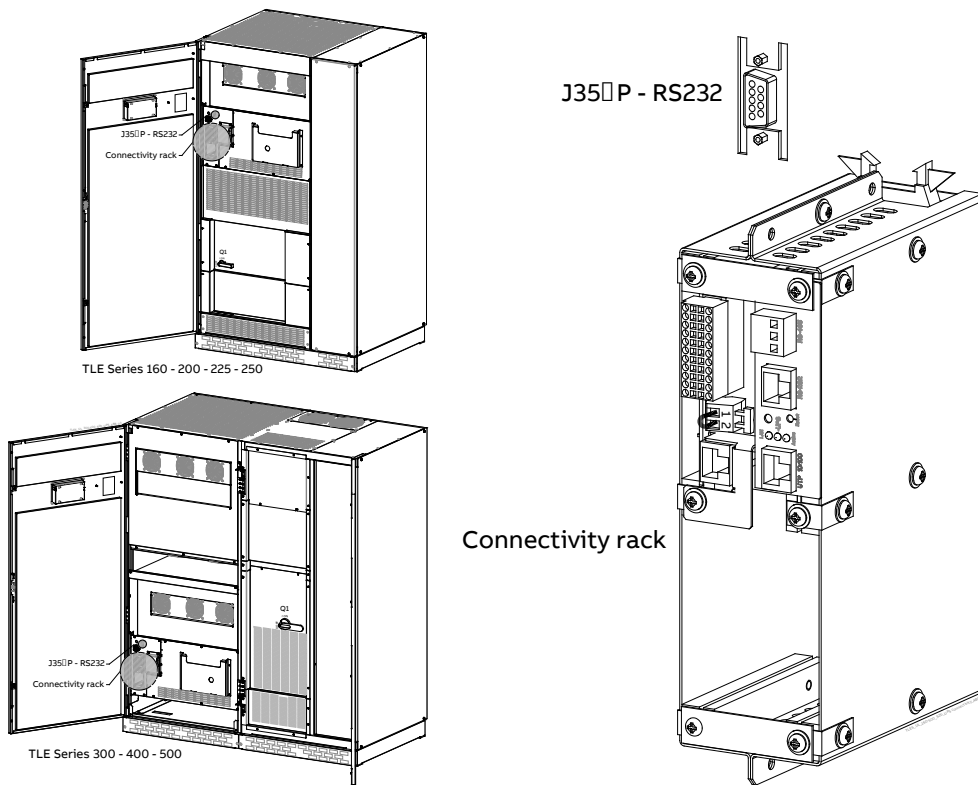


Fig. 5-1 TLE Series 160 to 500 - Connectivity rack and Serial port J35µP – RS232

TLE Series 160 to 500 has the following equipment's:

Serial Port J35µP - RS232 (see Section 5.1).

Customer Interface board (see Section 5.2).

Connectivity rack ready for the installation of four connectivity boards.

Possible connectivity configurations with TLE Series 160 to 500

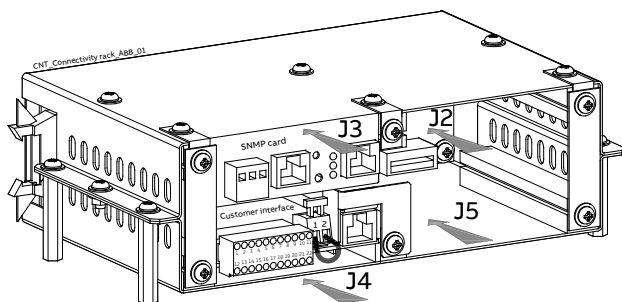


Fig. 9-2 Connectivity Slots

For a **Single UPS** it's possible to install the following connectivity boards:

- max. 3 "Customer Interface" boards;
- max. 2 "3-ph SNMP/WEB Plug-in Adapter" boards.

For a **Parallel System** (max. 6 UPS) it's possible to install the following connectivity boards:

- max. 3 "Customer Interface" boards for each UPS;
- max. 2 "3-ph SNMP/WEB Plug-in Adapter" boards for RPA Parallel System.

Note!

The installation of any option board must be performed only by an ABB Service Technician.

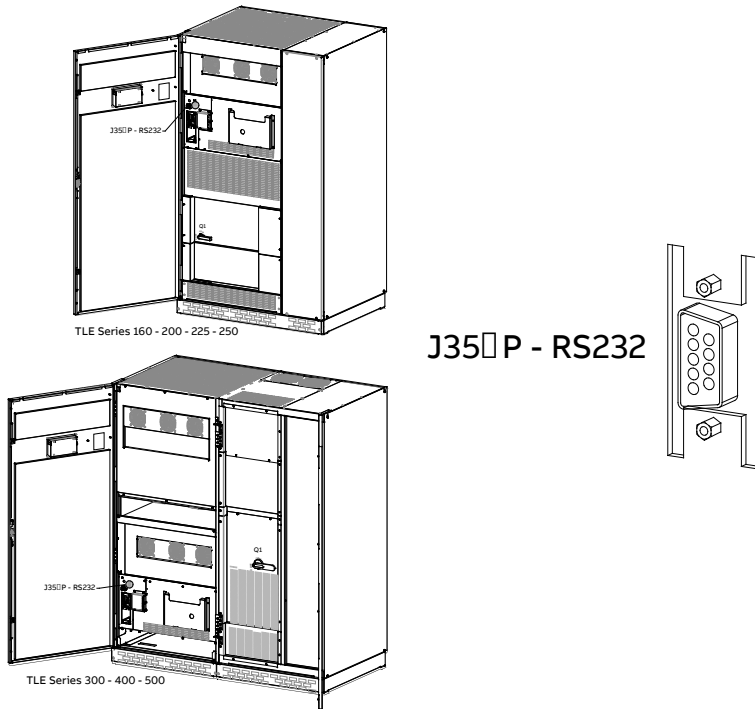
Prior to the installation, connection and cabling of any option board the UPS must be completely powered down and all the power sources that will be connected to the option board must be de-energized.



Option board shall be connected only to Safety Extra Low Voltage circuits (SELV for IEC-UL-CSA60950-1): voltage up to 30Vac / 42.4Vpk or 60Vdc maximum and galvanically separated from AC Mains supply.

Keep SELV cables separated from high voltage cables.

5.1 Serial port J35μP - RS232 (Sub D, Female 9 pin)



Serial Port J35μP - RS232 for IMV protocol

Total remote management of the system using software iUPSGuard, Data Protection or ABB Service Software for system protection and management of the UPS systems.

Fig. 5.1-1 TLE Series 160 to 500 - Serial Port J35μP – RS232

Connection of a serial printer

From the display panel it is possible to select printing of measurements, alarms and parameters (see User Manual - Section 6.4 – SETUP / PRINTER).

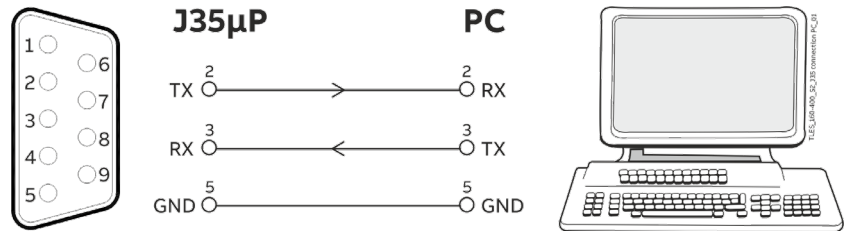


Fig. 5.1-2 Serial port J35μP connection to PC with RS232 1:1 cable DB9m – DB9f

RPA

Redundant Parallel Architecture

The serial port J35μP - RS232 is enabled on all the units of the RPA Parallel System.

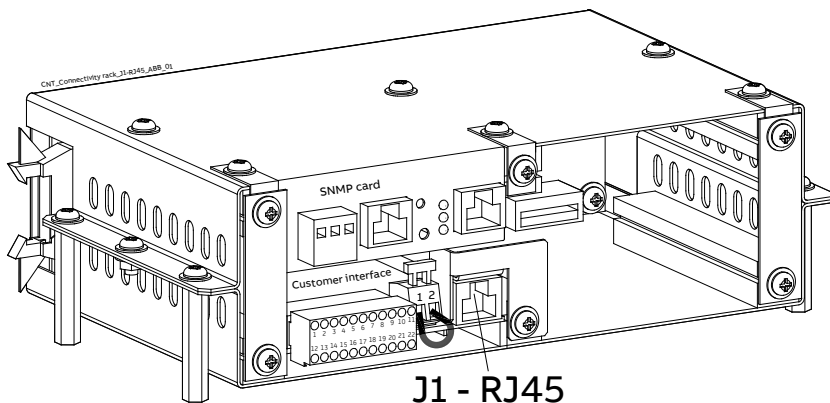


Fig. 5.1-3 Connector J1 – RJ45 8P8C



Note!

The serial port J35μP - RS232 is enabled also in case the J1- RJ45 connector of the “P4 - Customer Interface” (see Section 5.2.1) is already connected.

5.2 Customer interface board

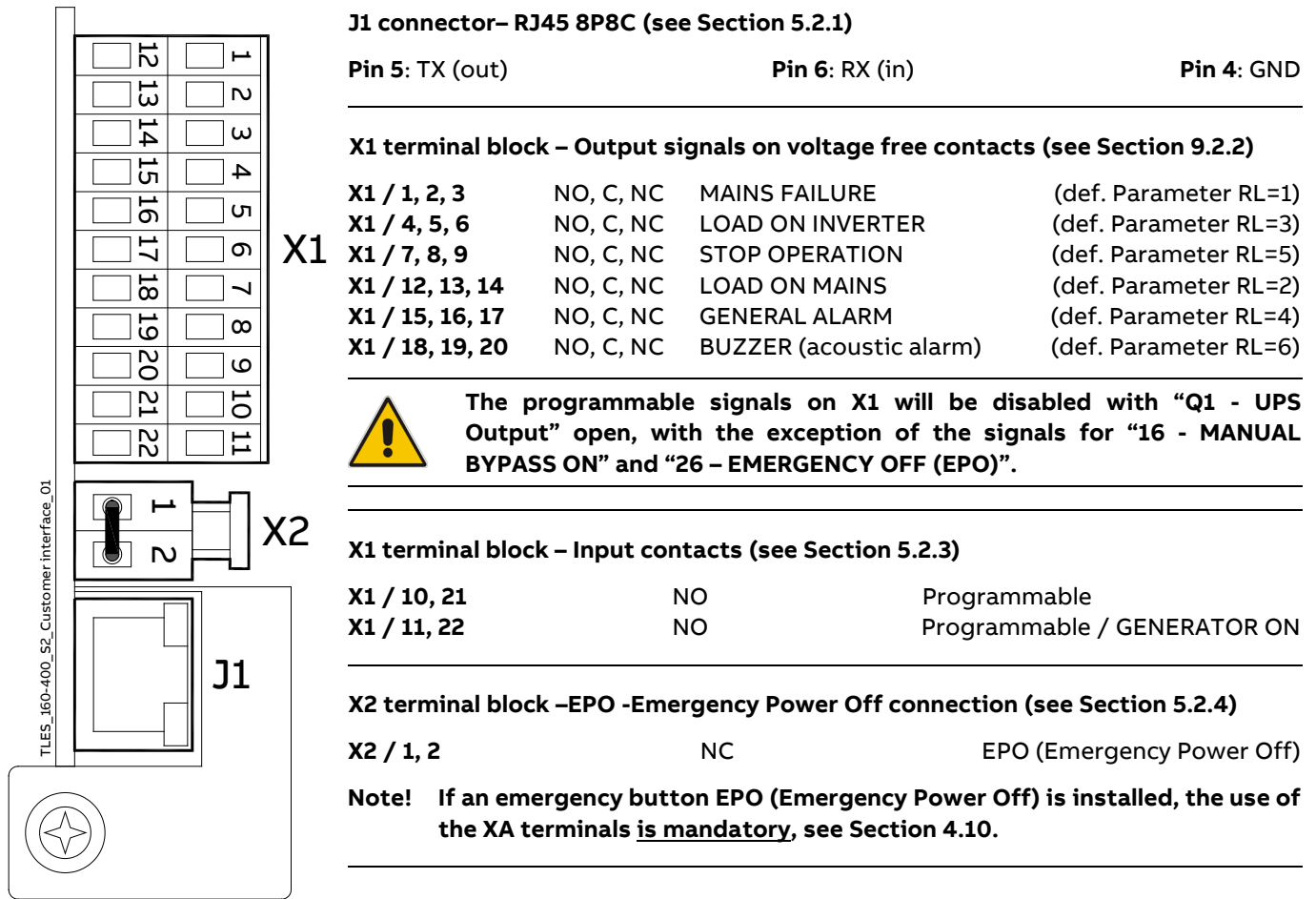


Fig. 5.2-1 Customer Interface Board **NO** = Normally Open **C** = Common **NC** = Normally Closed

Output signals on voltage-free contacts

On terminals X1, 6 of the following 27 signals can be selected from the display, entering with the appropriate “Service Code”.

- 0- NO SIGNAL
- 1- BUZZER
- 2- GENERAL ALARM
- 3- LOAD ON MAINS
- 4- STOP OPERATION
- 5- LOAD ON INVERTER
- 6- MAINS FAILURE
- 7- DC OVERVOLTAGE
- 8- LOW BATTERY
- 9- OVERLOAD
- 10- OVERTEMPERATURE
- 11- INVERTER-BYPASS NOT SYNCHR.
- 12- BYPASS LOCKED
- 13- BYPASS MAINS FAILURE
- 14- RECTIFIER MAINS FAILURE
- 15- BATTERY DISCHARGE
- 16- MANUAL BYPASS ON
- 17- RECTIFIER ON
- 18- INVERTER ON
- 19- BOOST CHARGE
- 20- BATTERY EARTH FAULT
- 21- BATTERY FAULT
- 22- RELAY INPUT 1
- 23- RELAY INPUT 2
- 24- RELAY OUTPUT ON
- 25- RELAY OUTPUT OFF
- 26- EMERGENCY OFF (EPO)
- 27- eBoost/IEMi MODE

Programmable functions on input contacts

Some UPS functions can be activated with parameters when an external Normally Open (NO) contact is closed on:

X1/10, 21 or X1/11, 22

Selectable functions by changing parameters (“Service Code” required) are:

- 0 - NO FUNCTION
- 1 - INVERTER ON
- 2 - INVERTER OFF
- 3 – PRINT ALL
- 4 - STATUS RELAY
- 5 - GENERATOR ON
- 6 - EXTERNAL BYPASS
- 7 - BATTERY FUSES OR EXTERNAL K3 (See Alarm 4104 - Battery Fuses)
- 8 - eBoost/IEMi CONTROL

Voltage free contacts:

Max. 24Vac / 1A or 60Vdc / 0,5A
IEC-UL-CSA 60950-1 (SELV circuit)
Min. Signal Level: 5Vdc / 5mA

5.2.1 Connector J1 – RJ45 8P8C

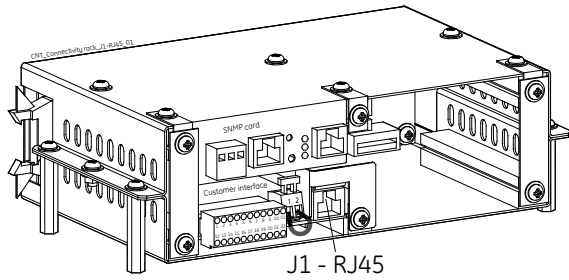


Fig. 5.2.1-1 Connector J1 – RJ45 8P8C

Total remote management of the system using software iUPSguard, Data Protection or Service Software for system protection and management of the UPS systems.

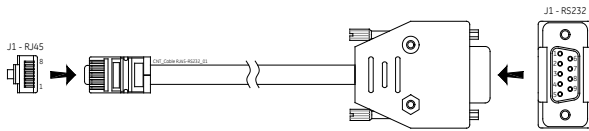


Fig. 5.2.1-2 RJ45 –RS232 adaptation cable

TLE Series 160 to 500 is supplied with an adaptation cable for a serial port RS232 / sub DB9 connection.



The connector J1 – RJ45 is enabled on all the units of the Parallel System.

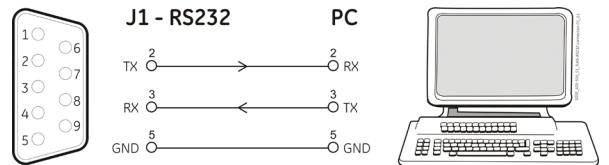


Fig. 5.2.1-3 Connector J1 to PC with RJ45 –RS232 adaptation cable

5.2.2 X1 terminal block - Output signals on voltage-free contacts

The Customer Interface board provides **6 voltage free relay contacts** giving some UPS critical alarms and operation mode.

These signals are available on terminal blocks **X1**. Max. rating terminals: **AWG 18 (1mm²)**.

The meaning of the alarms on the free contacts in standard configuration (default) is the following:

X1 / 1, 2, 3	(NO, C, NC)	MAINS FAILURE	(def. Parameter RL=1)
X1 / 4, 5, 6	(NO, C, NC)	LOAD ON INVERTER	(def. Parameter RL=3)
X1 / 7, 8, 9	(NO, C, NC)	STOP OPERATION	(def. Parameter RL=5)
X1 / 12, 13, 14	(NO, C, NC)	LOAD ON MAINS	(def. Parameter RL=2)
X1 / 15, 16, 17	(NO, C, NC)	GENERAL ALARM	(def. Parameter RL=4)
X1 / 18, 19, 20	(NO, C, NC)	BUZZER (ACOUSTIC ALARM)	(def. Parameter RL=6)

In case different alarms or operating status are required, they can be configured on the same terminals via software from the Control Panel.

The configuration can be changed in parameters mode by an ABB Service Technician using the appropriate "Service Code".



Note!

The programmable signals on X1 will be disabled with "Q1 - UPS Output" open, with the exception of the signals for "16 - MANUAL BYPASS ON" and "26 – EMERGENCY ON (EPO)"!

5.2.3 X1 terminal block - Programmable input free contacts

Some programmable UPS functions (indicated in Section 9.2), can be activated by closing an external contact, if connected, on:

X1 / 10, 21 User Input 1 (default = Not used)

X1 / 11, 22 User Input 2 (default = GENERATOR ON)

5.2.4 X2 terminal block – “EPO - Emergency Power Off”



Note!

If an emergency button EPO (Emergency Power Off) is installed, the use of the XA terminals is mandatory (see Section 5.10).

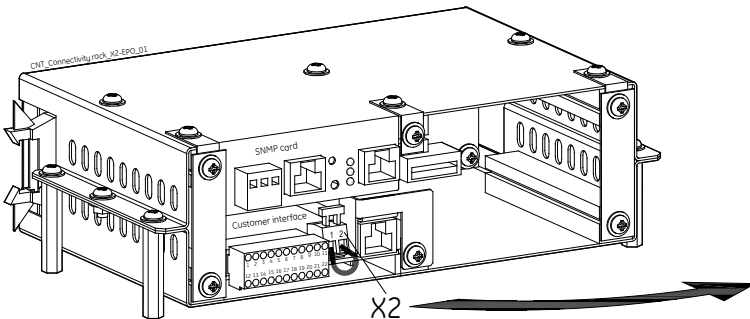


Fig. 5.2.4-1 X2 terminals in the Customer Interface

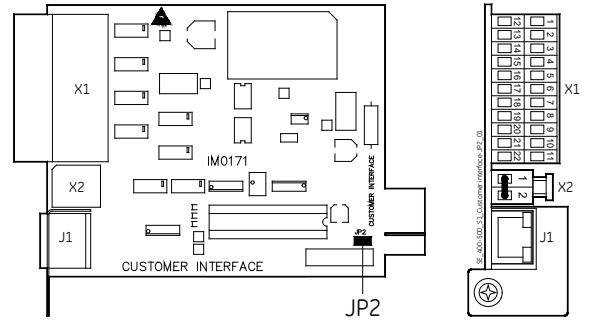


Fig. 5.2.4-2 Jumper JP2 on the Customer Interface

Note!



To activate the connection of an emergency button “EPO - Emergency Power Off” on the terminals XA / EPO-1, EPO-2, performed on each card “P4 – Customer Interface” the following operation:

- Remove the cable short-circuiting terminals X2 / 1, 2 (see Fig. 5.2-4-1).
- Remove the Jumper JP2 (see Fig. 5.2-4-2).

5.2.5 X1 terminal block - Gen Set Signaling (GEN ON)

If an emergency generator set supplies the UPS in case of Utility Failure and the generator is considerably unstable in frequency, it should be suitable to install the signal “**GENERATOR ON**” on X1 / 11, 22. See Fig. 5.2-1 / X1.

Since the Parameter for of the reading of the Generator function is “Service Code” protected, call the nearest ABB Service Centre for it's activation.

When this contact closes, it changes certain (programmable) functions such as:

- Enabling or disabling of synchronization and consequently the Load transfer to generator.
- Reduction or elimination or delay of Battery recharging during the generator operation.

Additionally, when the “**GENERATOR ON**” input contact is closed, the UPS will inhibit eBoost™ Operation Mode and revert to double-conversion operation.

It is advised to contact your ABB Service Center for further details.



In a Parallel System a separate NO (Normally Open) contact must be connected to each individual unit.

5.2.6 X1 terminal block - AUX External Maintenance Bypass

If the UPS system is equipped with an external Maintenance Bypass Switch, it is possible to connect a NO (Normally Open) voltage-free aux. contact from the External Bypass Switch to the programmable input **X1 / 10, 21**, making the UPS operate as if the internal switch “**Q2 – Bypass Manual**” has closed.

This function can be activated by changing a dedicated parameter (“Service Code” required).

When this NO (Normally Open) contact closes, the output Inverter Contactor **K7** it is automatically opened and the Load transfer back to Inverter will be inhibited.

RPA

 Redundant Parallel
Architecture

In a Parallel System, the input on the Customer Interface of each unit must be connected to a separate AUX contact of the External Maintenance Bypass Switch.

5.2.7 X1 terminal block - eBoost/IEMi control signal

The UPS operation in either eBoost or IEMi operating modes can be controlled via a NO (Normally Open) contact by installing the “**eBoost/IEMi CONTROL**” signal, routed to the programmable function contacts (see Section 5.2.3).

When this contact closes, eBoost or IEMi operation mode is inhibited.

The Parameter for the activation of such function is “Service Code” protected.

Contact your ABB Service Center for its activation.

This function is particularly useful for controlling eBoost or IEMi operation following critical conditions on either the load side or the input Utility, including generator operation when the “GENERATOR ON” signal has not been installed.

RPA

 Redundant Parallel
Architecture

When using the “eBoost/IEMi control” function on the programmable user relays of the Customer Interface X1 terminals in a Parallel System, a separate NO (Normally Open) contact must be connected to each individual unit.



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