QUINT-UPS/ 24DC/12DC/5/24DC/10

Uninterruptible power supply

Data sheet
105568_en_01

1 Description

The QUINT-UPS uninterruptible power supply (UPS) is used to ensure that power for critical electrical loads continues to be supplied in the event of disturbances in the power supply network, e.g., due to mains breakdown or failure.

In doing so, the UPS switches to battery operation without interruption so that connected loads continue to be consistently supplied.

When mains power is restored, the UPS automatically returns to normal operation. The connected loads are again supplied via the power supply network and the battery is charged.

Features

- UPS with two separate load outputs for simultaneous use of two different voltage levels
- Output 1: 24 V DC/10 A nominal output voltage
- Output 2: 12 V DC/5 A nominal output voltage

IQ technology: optimum use of the buffer time and preventive monitoring of the power storage

- Detects the current state of charge (SOC) and the remaining runtime of the power storage
- Detects the current state of health (SOH) of the power storage and warns of failure at an early stage

Intelligent battery management

- Detects the connected battery type automatically and maximizes the remaining service life of the power storage via an optimally adapted charging characteristic

Intelligent battery charging

- Adapts the charging current, thereby ensuring the fastest possible recharging and availability

Extensive signaling and parameterization

- Floating relay contacts, data port, storage and parameterization with IFS-CONFSTICK-L memory module

Substantial power reserve

- For mains and battery operation
- POWER BOOST static power reserve
- Dynamic power reserve with SFB (selective fuse breaking) technology

Make sure you always use the latest documentation.
It can be downloaded from the product at phoenixcontact.net/products.

2 Table of contents

3 Ordering data

Description	Type	Order No.	Pcs. / Pkt.
Uninterruptible power supply with IQ technology for DIN rail mounting, input: 24 V DC, output: 24 V DC/10 A and 12 V DC/5 A, including mounted universal DIN rail adapter UTA 107/30	QUINT-UPS/ 24DC/12DC/5/24DC/10	2320461	1

Accessories	Type	Order No.	Pcs. / Pkt.
Power storage device, lead AGM, VRLA technology, 24 V DC, 1.3 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA/24DC/ 1.3AH	2320296	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 3.4 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA/24DC/ 3.4AH	2320306	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 7.2 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA/24DC/ 7.2AH	2320319	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 12 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA/24DC/12AH	2320322	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 38 Ah, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA/24DC/38AH	2320335	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 13 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA-WTR/24DC/13AH	2320416	1
Power storage device, lead AGM, VRLA technology, 24 V DC, 26 Ah, tool-free battery replacement, automatic detection, and communication with QUINT UPS-IQ	UPS-BAT/VRLA-WTR/24DC/26AH	2320429	1
Power storage device, LI-ION technology, 24 V DC, 120 Wh, for ambient temperatures of -20°C ... 58°C, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/LI-ION/24DC/120WH	2320351	1
Maintenance-free power storage based on double-layer capacitor, 24 V DC, 10 kJ, automatic detection and communication with QUINT UPS-IQ	UPS-CAP/24DC/10A/10KJ	2320377	1
Maintenance-free power storage based on double-layer capacitor, 24 V DC, 20 kJ, automatic detection and communication with QUINT UPS-IQ	UPS-CAP/24DC/20A/20KJ	2320380	1
Configuration software for QUINT UPS IQ and TRIO UPS uninterruptible power supplies (available for free under Downloads).	UPS-CONF	2320403	1
Used for communicating between industrial PCs and Phoenix Contact devices with the 12-pos. IFS data port, such as QUINT UPS or TRIO UPS.	IFS-USB-DATACABLE	2320500	1
Data cable for communication between devices with a D-SUB 9 RS-232 connection and Phoenix Contact devices with the 12-pos. IFS data port such as QUINT UPS-IQ or TRIO UPS.	IFS-RS232-DATACABLE	2320490	1
Data cable for communication, e.g., between Phoenix Contact type ILC 1xx Inline controllers and Phoenix Contact devices with the 12-pos. IFS data port, such as QUINT UPS-IQ UPS or TRIO UPS	IFS-MINI-DIN-DATACABLE	2320487	1
Data cable with open cable ends for communication, e.g., between a Phoenix Contact Inline communication terminal (IB IL RS UNI-PAC, 2700893) and Phoenix Contact devices with the 12-pos. IFS data port, such as QUINT UPS-IQ or TRIO UPS	IFS-OPEN-END-DATACABLE	2320450	1
Multi-functional memory block with handle for the INTERFACE system; for easy storage and back up of the configuration.	IFS-CONFSTICK-L	2901103	1
Universal DIN rail adapter	UTA 107/30	2320089	25
Universal wall adapter	UWA 182/52	2938235	1
Assembly adapter for QUINT-PS... power supply on S7-300 rail	QUINT-PS-ADAPTERS7/1	2938196	1

Our range of accessories is being continually extended, our current range can be found in the download area.

4 Technical data

Input data (24 V DC mains operation)	
Input voltage	24 V DC
Nominal input voltage	18 V DC ... 30 V DC
Current consumption	16 A (Maximum, mains operation)
Current consumption	104 mA (No load, mains operation)
Current consumption	4 A (Charging, mains operation)
Choice of suitable fuses	16 A ... 20 A (Characteristic B)
General input data	
Activation threshold	1 V/0.1 s
Output data (24 V DC mains operation)	
Nominal output voltage	24 V DC
Output voltage range (depends on the input voltage)	18 V DC ... 30 V DC ($U_{OUT} = U_{IN}$ - 0.5 V DC)
Nominal output current I_N	10 A (-25 °C ... 60 °C)
SFB Technology (12 ms)	60 A (-25 °C ... 60 °C)
POWER BOOST I_{BOOST} (continual)	15 A (-25 °C ... 40 °C)
Output data (12 V DC mains operation)	
Nominal output voltage	12 V DC
Nominal output current I_N	5 A (-25 °C ... 60 °C)
POWER BOOST I_{BOOST} (continual)	7.5 A (-25 °C ... 40 °C)
Output data (24 V DC battery operation)	
Nominal output voltage	24 V DC
Output voltage range (depends on the input voltage)	19.2 V DC ... 27.6 V DC ($U_{OUT} = U_{BAT}$ - 0.5 V DC)
Nominal output current I_N	10 A (-25 °C ... 60 °C)
SFB technology (15 ms)	65 A (-25 °C ... 60 °C)
POWER BOOST I_{BOOST} (continual)	15 A (-25 °C ... 60 °C)
Output data (12 V DC battery operation)	
Nominal output voltage	12 V DC
Nominal output current I_N	5 A (-25 °C ... 60 °C)
POWER BOOST I_{BOOST} (continual)	7.5 A (-25 °C ... 60 °C)
General output data	
Total power $P_{12V} + P_{24V}$	max. 360 W
Efficiency 24 V DC	> 98 % (Mains operation, with charged power storage)
Efficiency 12 V DC	> 93 % (Mains operation, with charged power storage)
Power storage device connection	
Nominal voltage U_N	24 V DC
End-of-charge voltage	24 V DC ... 29 V DC (temperature compensated)
Temperature compensation (preset)	42 mV/K
Nominal capacity range	1.3 Ah ... 140 Ah
Charge current	2.88 A
Battery presence check (cyclic) all	60 s

Device combinations	
UPS connection in parallel	yes
UPS connection in series	no
Power storage device connection in parallel	yes, 15 (observe line protection)
Power storage device connection in series	no

Status and diagnostic indicator POWER IN OK	
Status indication	LED green

Status and diagnostic indicators/signal outputs Alarm	
Switching output	Relay (floating)
Max. switching voltage	≤ 30 V AC/DC
Continuous load current	≤ 100 mA
Status display	LED (red)

Status and diagnostic indicators/signal outputs Battery Charge	
Switching output	Relay (floating)
Max. switching voltage	≤ 30 V AC/DC
Continuous load current	≤ 100 mA
Status display	LED bar graph (red/green)

Status and diagnostic indicators/signal outputs Battery Mode	
Switching output	Relay (floating)
Max. switching voltage	≤ 30 V AC/DC
Continuous load current	≤ 100 mA
Status display	LED (yellow)

Status and diagnostics indicators/signal inputs $I<I_N$	
Switching input	Digital input
Input voltage	+ 24 V DC
Input current	100 mA

Remote control	
Version 1 : Output R1 to input R2	Plug-in bridge (plugged in by default)
Version 2 : Input R2	+ 24 V DC
Input current R2	200 mA

Interfaces	
Data interface (configuration and communication)	IFS (Interface system data port)

Housing	
Degree of protection	IP20
Hood version	Galvanized sheet steel, free from chrome (VI)
Dimensions W/H/D (normal mounting position/delivered condition)	35 mm / 130 mm / 125 mm
Dimensions W / H / D (X-axis rotated 270°)	123 mm / 130 mm / 39 mm

Mounting	
Mounting position	horizontal DIN rail NS 35, EN 60715
Assembly instructions	Can be aligned: horizontal 5 mm, vertical 50 mm

General data	
Weight	0.6 kg
MTBF (IEC 61709, SN 29500)	> 652000 h (40°C)
Protection class	III

Input connection data	
Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	16 ... 12
Stripping length	7 mm
Screw thread	M4
Tightening torque	0.5 Nm ... 0.6 Nm

Output connection data	
Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	16 ... 12
Connection method	7 mm
Screw thread	M4
Tightening torque	0.5 Nm ... 0.6 Nm

Output connection battery	
Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	16 ... 12
Stripping length	7 mm
Screw thread	M4
Tightening torque	0.5 Nm ... 0.6 Nm

Signal connection data	
Connection method	Pluggable screw connection
Conductor cross section, solid	0.2 mm² ... 2.5 mm²
Conductor cross section, stranded	0.2 mm² ... 2.5 mm²
Conductor cross section AWG/kcmil	24 ... 12
Stripping length	7 mm
Screw thread	M4
Tightening torque	0.5 Nm ... 0.6 Nm

Ambient conditions	
Ambient temperature (operation)	-25 °C ... 70 °C
Ambient temperature (storage/transport)	-40 °C ... 85 °C
Derating	60 °C ... 70 °C (2.5%/K)
Max. permissible relative humidity (operation)	≤ 95 % (25°C, non-condensing)
Vibration (operation)	< 15 Hz, amplitude ±2.5 mm (according to IEC 60068-2-6) 15 Hz ... 150 Hz, 2.3g t_v = 90 min.
Shock	30g in each direction, according to IEC 60068-2-27
Climatic class	3K3 (in acc. with EN 60721)

Standards

Electrical safety (of information technology equipment - Safety - Part 1)	EN 60950-1/VDE 0805 (SELV)
Electronic equipment for use in electrical power installations	EN 50178/VDE 0160 (PELV)

Approvals

UL approvals	UL Listed UL 508 UL/C-UL Recognized UL 60950

Current approvals/permissions for the product can be found in the download area under phoenixcontact.net/products.

Conformance with EMC Directive 2004/108/EC		
Noise immunity according to EN 62040-2-2006		
	EN 61000-6-2 requirement	**Tested**
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test intensity 2)	8 kV (Test intensity 4)
Housing air discharge	8 kV (Test intensity 3)	15 kV (Test intensity 4)
Comments	Criterion B	Criterion A
Electromagnetic HF field EN 61000-4-3		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 1 GHz
Test field strength	10 V/m	20 V/m
Frequency range	1.4 GHz ... 2 GHz	1 GHz ... 2 GHz
Test field strength	3 V/m	10 V/m
Frequency range	2 GHz ... 2.7 GHz	2 GHz ... 3 GHz
Test field strength	1 V/m	3 V/m
Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Output	2 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 3 - asymmetrical)
Signal	1 kV (Test intensity 3 - asymmetrical)	2 kV (Test intensity 4 - asymmetrical)
Comments	Criterion B	Criterion A
Surge current loads (surge) EN 61000-4-5		
Input	0.5 kV (Test intensity 1 - symmetrical) 0.5 kV (Test intensity 1 - asymmetrical)	1 kV (Test intensity 2 - symmetrical) 2 kV (Test intensity 3 - asymmetrical)
Output	0.5 kV (Test intensity 1 - symmetrical) 0.5 kV (Test intensity 1 - asymmetrical)	1 kV (Test intensity 2 - symmetrical) 2 kV (Test intensity 3 - asymmetrical)
Signal	1 kV (Test intensity 2 - asymmetrical)	1 kV (Test intensity 2 - asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
Input/Output/Signal	asymmetrical	asymmetrical
Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
Voltage	10 V (Test intensity 3)	10 V (Test intensity 3)
Comments	Criterion A	Criterion A

Key	
Criterion A	Normal operating behavior within the specified limits.
Criterion B	Temporary impairment to operational behavior that is corrected by the device itself.

All technical specifications are nominal values and refer to a room temperature of 25 °C and 70 % relative humidity at 100 m above sea level.

5 Safety regulations and installation notes

EXPLOSION HAZARD!

Only remove equipment when it is disconnected and not in the potentially explosive area.

DANGER

Never carry out work on live parts!
The housing can become very hot, depending on the ambient temperature and load!

CAUTION:

Before startup please ensure:

The connection must be carried out by a competent person and protection against electric shock guaranteed.

It must be possible to switch off power to device according to EN 60950.

All feed lines are sufficiently protected and dimensioned!

All output lines are dimensioned according to the maximum output current of the device or separately protected!

Sufficient convection must be guaranteed.

Observe mechanical and thermal limits.

NOTE: Danger if used improperly

Uninterruptible power supplies are installable devices. Installation and startup may only be carried out by qualified personnel. The relevant country-specific regulations must be observed.

CAUTION: Risk of injury

Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).

Do not dispose of used batteries in the household waste! Dispose of these according to the currently valid national regulations.

They can also be returned to Phoenix Contact or the manufacturer.

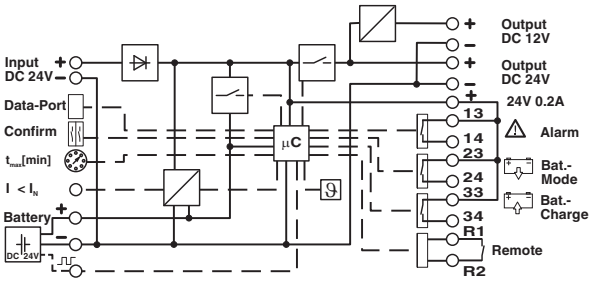
CAUTION: Risk of injury

Use the device with the power storage devices recommended in the table of accessories, e.g., UPS-BAT... or UPS-CAP.... When using power storage devices other than UPS-BAT... or UPS-CAP..., make sure that the corresponding parameters for the charging characteristic are adapted and maintained.

Phoenix Contact accepts no liability or responsibility for possible for any consequential damage.

Provide a switch/circuit breaker close to the device at the DC input and at the battery terminals, which are labeled as the disconnecting device for these devices.

6 Basic circuit diagram



Element	Meaning
µC	Microprocessor
	Decoupling
	Charging unit
	Switch
	Temperature sensor
	Selector switch
	Switch
	Floating switch contact
	Button for write/read function
Data-Port	IFS data interface
Digital IN I < I_N	Digital signal input I < IN
Battery DC 24V	Battery/power storage
Remote R1 R2	Remote contact

7 Structure

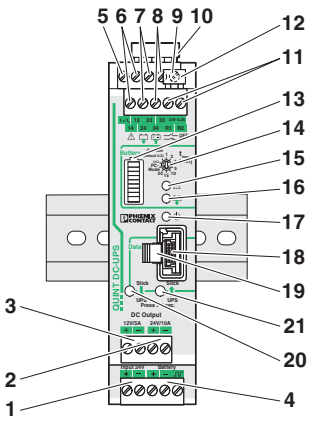


Figure 1 Position of the function elements (part 1)

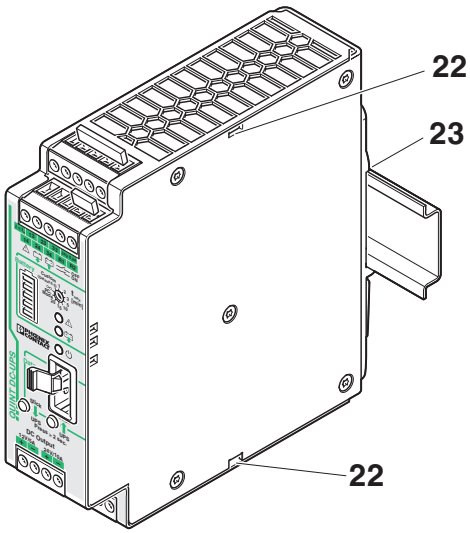


Figure 2 Position of the function elements (part 2)

No.	Connection terminal blocks and function elements
1	Connection terminal blocks for DC input (Input 24 V)
2	Connection terminal blocks for DC output (Output 24 V / 10)
3	Connection terminal blocks for DC output (Output 12 V / 5 A)
4	Power storage device connection terminal blocks (plus/minus/communication cable)
5	Digital input $I < I_N$ (fast battery charging)
6	Floating relay contact 13/14: alarm
7	Floating relay contact 23/24: battery mode
8	Floating relay contact 33/34: battery charge
9	Connection terminal block, +24 V DC (max. 0.2 A) voltage output for supplying floating relay contacts 13/14, 23/24, 33/34
10	Plug-in bridge, 4-pos., for supplying the floating relay contacts with device-side + 24 V DC potential (plugged in by default)
11	Battery mode remote shutdown
12	Plug-in bridge, 2-pos., remote shutdown battery operation ON (plugged in by default)
13	LED bar graph display
14	Rotary selector switch for setting the switchover threshold (buffer mode)
15	Red LED indicator: alarm
16	Yellow LED indicator: battery mode (battery operation)
17	Green LED indicator: power in OK
18	Data port
19	Locking clips
20	Buttons for write function: parameter data from QUINT-UPS -> IFS-CONFSTICK
21	Buttons for write function: parameter data from IFS-CONFSTICK -> QUINT-UPS
22	Strain relief for connecting cable
23	Universal DIN rail adapter

8 Installation

8.1 Convection

NOTE: enable convection

To enable sufficient convection, we recommend a minimum vertical gap to other modules of 50 mm. A horizontal gap of 5 mm is recommendable.

The device can be snapped onto all DIN rails in accordance with EN 60715 and should be mounted in the normal mounting position (connection terminal blocks on top and bottom).

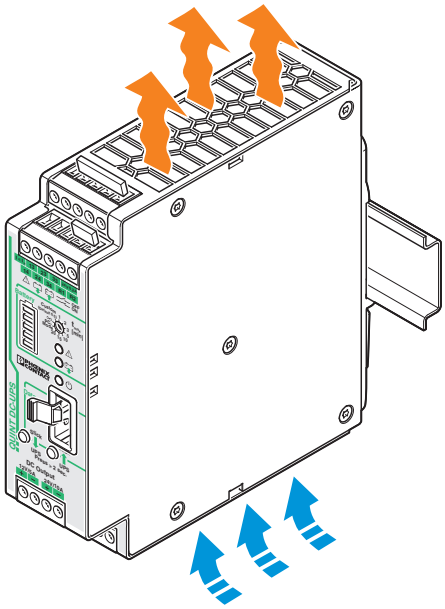


Figure 3 Convection

8.2 Mounting on a DIN rail

Assembly

Position the module with the DIN rail guide on the upper edge of the DIN rail, and snap it in with a downward motion.

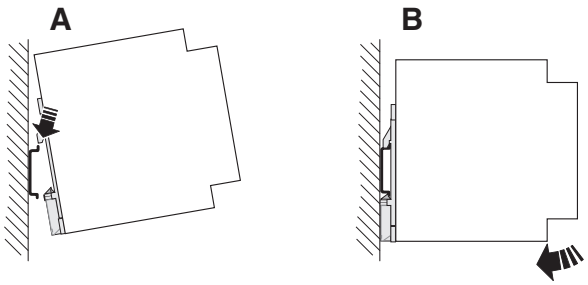


Figure 4 Assembly

Removing

Pull the snap lever open with the aid of a screwdriver and slide the module out at the lower edge of the DIN rail.

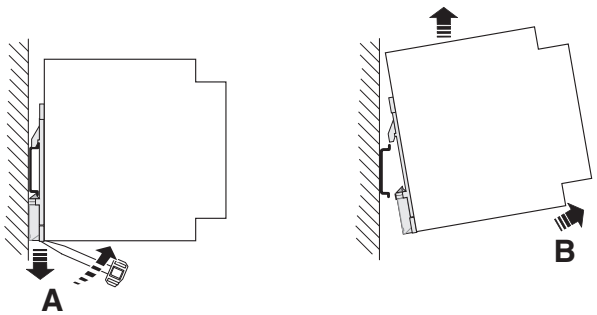


Figure 5 Removal

8.3 Mounting position

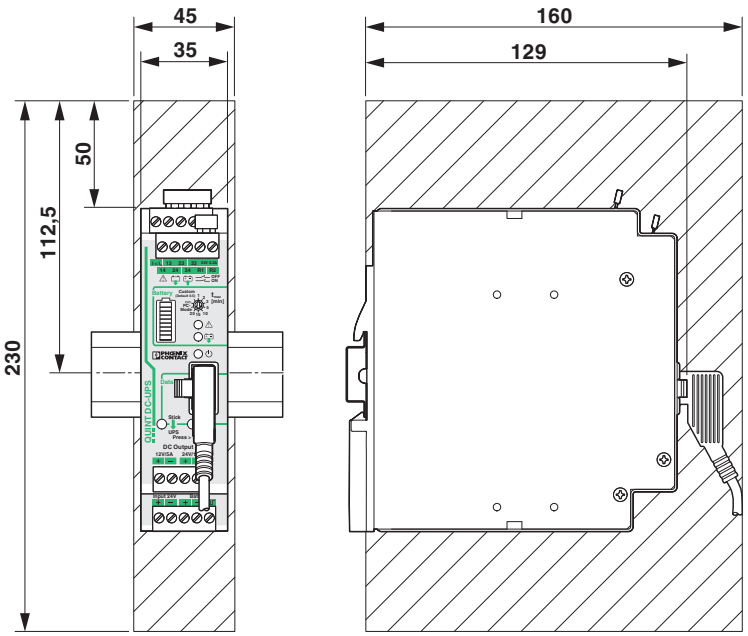


Figure 6 Installation dimensions and locked areas

8.4 Dimensional drawing

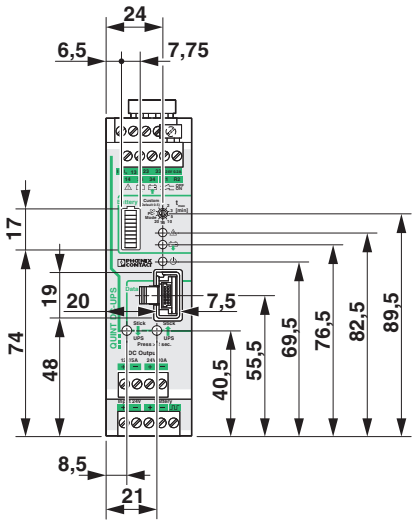


Figure 7 Operating elements

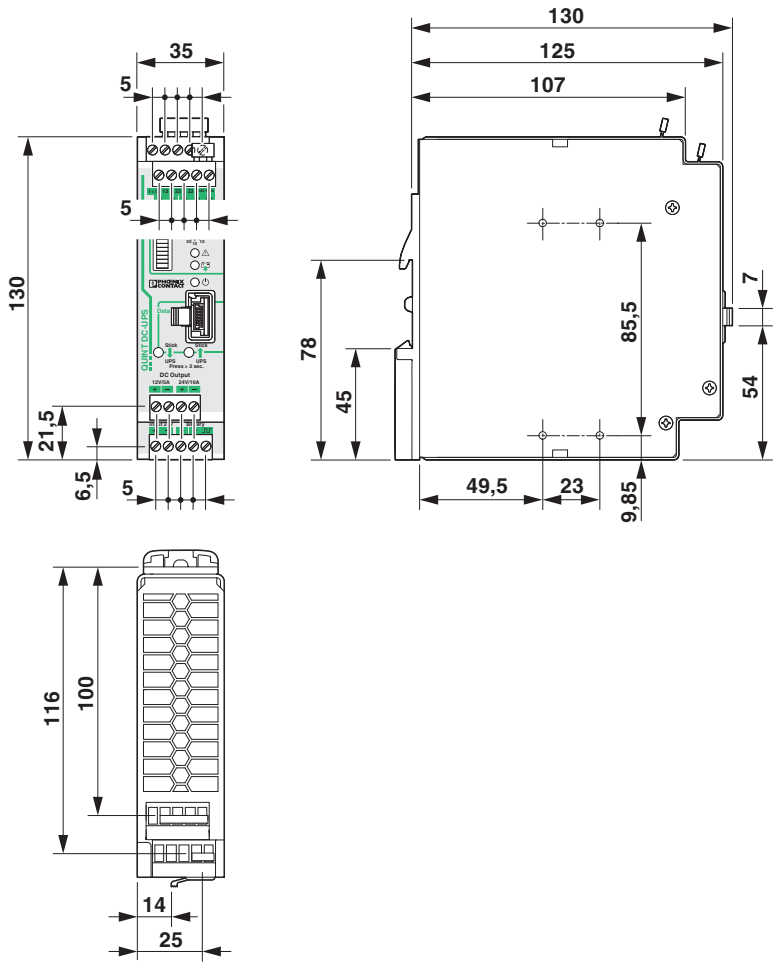


Figure 8 Connection terminal blocks and housing

9 Installation of individual components

Installation of uninterruptible power supply units must correspond to EN 60950 regulations.

Provide a switch/circuit breaker close to the uninterruptible power supply at the DC input and at the battery terminals, which are labeled as the disconnecting device for these devices.

If used in environments in accordance with Class I, Division 2, the switch between the uninterruptible power supply and the battery must be Ex-approved.

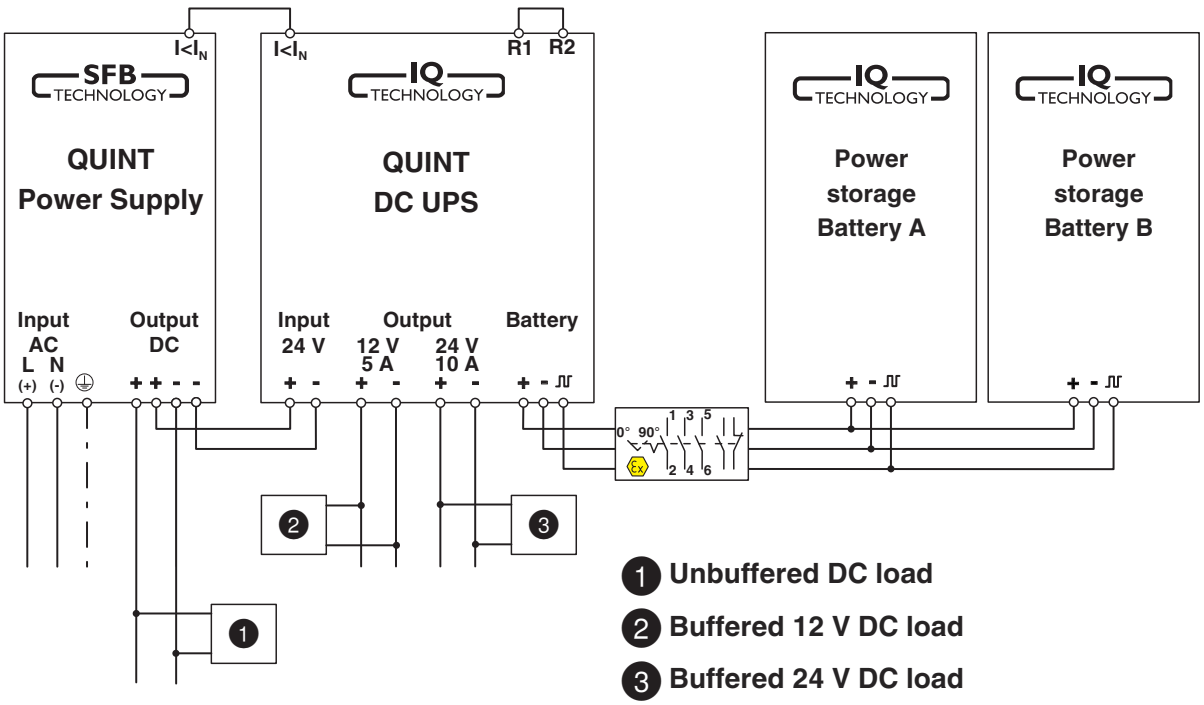


Figure 9 Schematic design

10 Device connection terminal blocks

10.1 DC input (Input 24 V)

The supply voltage is connected via the "Input 24 V" connection terminal blocks.

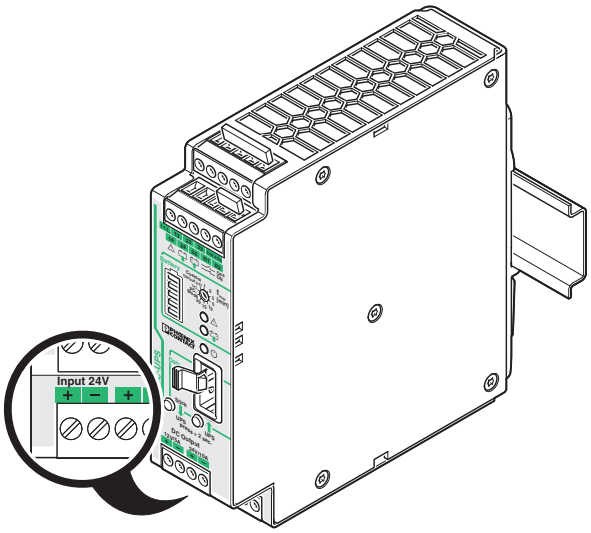


Figure 10 Connection terminal block, 24 V input

If loads must not be supplied in the event of a mains breakdown or failure, they must be connected directly to the output of the power supply as unbuffered DC load.

10.2 DC output (DC Output)

Buffered output voltage is connected via the “DC Output” connection terminal blocks. The two separate load outputs can be supplied with two different voltage levels.

The maximum total power of the uninterruptible power supply must not exceed 360 W.

DC output (DC Output), 12 V/5 A

If a constant output voltage of 12 V DC is applied to the connection terminal blocks, they provide a maximum nominal current of 5 A.

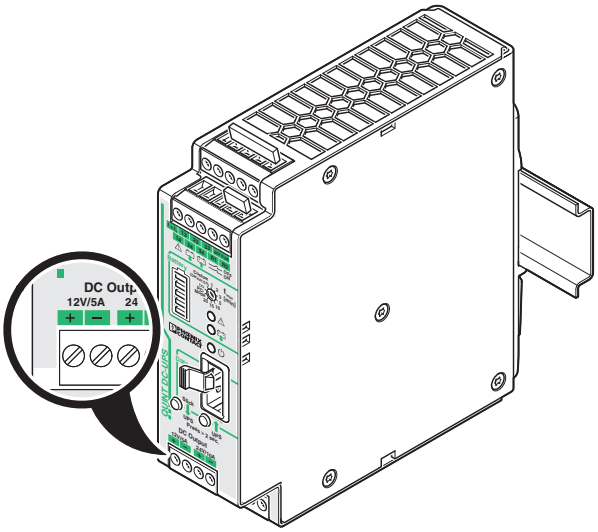


Figure 11 Connection terminal block, DC output, 12 V/5 A

DC output (DC Output), 24 V/10 A

Depending on the input voltage at a maximum nominal current of 10 A, the connection terminal blocks provide the 18 ... 30 V DC supply voltage of the load.

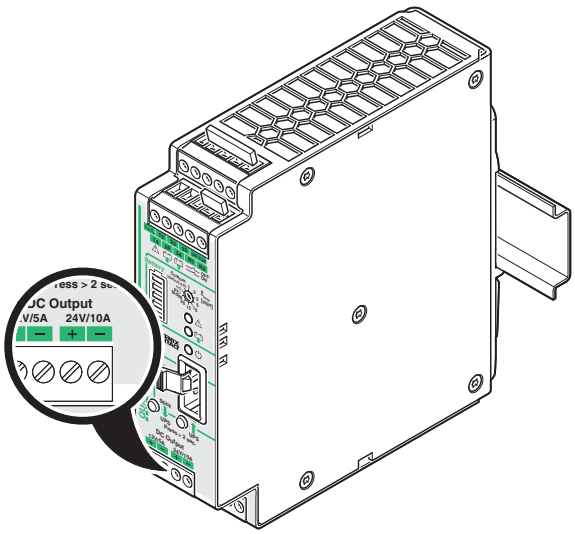


Figure 12 Connection terminal block, DC output, 24 V/10 A

10.3 Battery +/-/signal

The power storage is connected via the “Battery” connection terminal blocks. In order to use the IQ technology of the power storage, a communication cable should also be connected between the uninterruptible power supply and the power storage used in IQ technology. Optimum use of the buffer time and preventive battery monitoring are ensured by the IQ technology, for example.

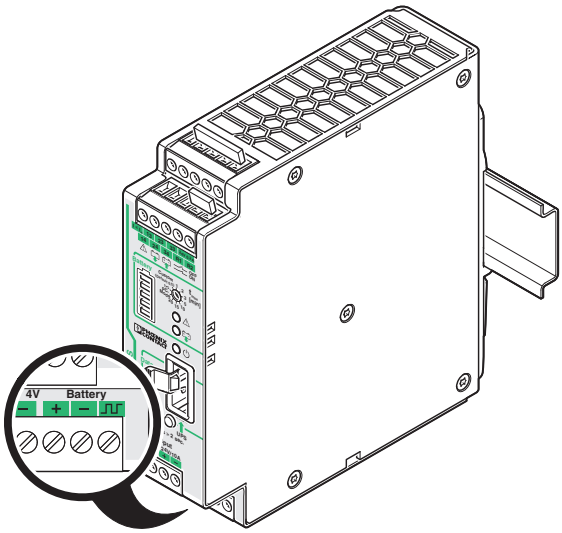


Figure 13 Connection terminal blocks, DC battery

Our range of accessories is being continually extended, our current range of power storage devices with IQ technology can be found in the download area at phoenixcontact.net/products

10.4 Remote shutdown R1, R2 (remote operation)

The connection terminal blocks are bridged with a plug-in bridge by default. Remote shutdown of the uninterruptible power supply units is deactivated. Should the supply voltage fail or be undershot, the UPS switches over to battery mode.

If the plug-in bridge is not plugged in, the UPS shuts down in the event of the mains supply voltage failing or being undershot.

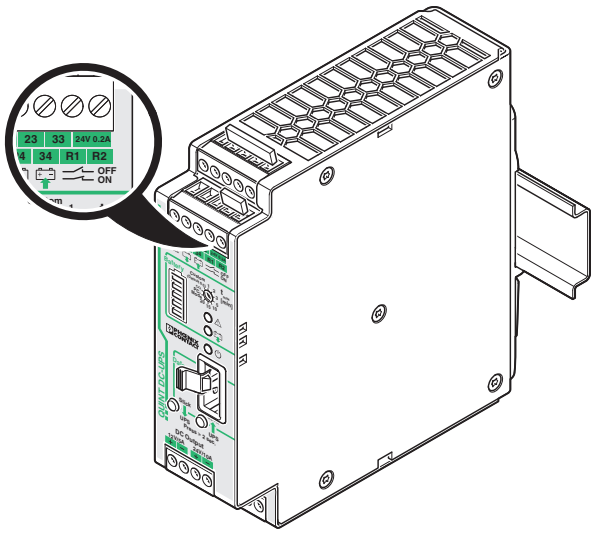


Figure 14 Connection terminal blocks R1, R2

Remote shutdown is deactivated

UPS in function (delivery state)

– The "R1" and "R2" terminal points are short circuited (delivery with plug-in bridge) OR 24 V DC is present at terminal point "R2".
– In the event of a voltage supply failure, the UPS switches over to battery mode.

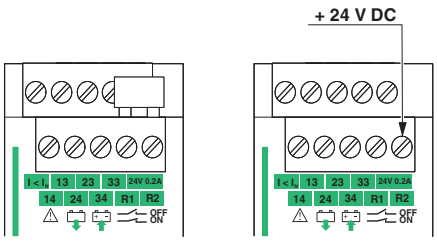


Figure 15 Remote shutdown is deactivated

10.5 Remote shutdown (remote operation) activated

– The "R1" and "R2" terminal points are not short circuited.
– In the event of a voltage supply failure, the UPS does not switch over to battery mode. The device switches off.

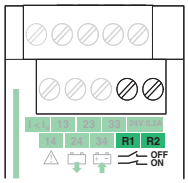
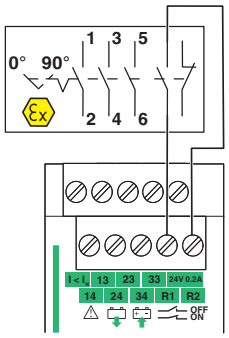


Figure 16 Remote shutdown active

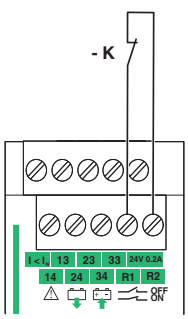
Example 1

The remote shutdown can be used to suppress the buffering of selective machine shutdowns. In doing so, the auxiliary contact of the main switch is connected to R1 and R2 connection terminal blocks.



Example 2

End the buffering at a specific time (e.g., following shutdown of another machine part). Remote shutdown can be activated with a relay (N/C contact).



10.6 Setting the buffer time

You can set the time for exiting battery mode via the rotary selector switch on the front of the device. For this purpose use a screwdriver.

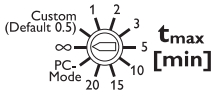


Figure 17 Buffer time selector switch

t_{max} [min] setting	Meaning
1, 2, 3, 5, 10, 15, 20	The UPS switches off after the set buffer time.
Custom (default 0.5)	The UPS switches off after the individual buffer time set via UPS-CONF. If a buffer time is not set, the UPS shuts down after 30 seconds.
∞ (unlimited, delivery state)	Buffering with the total stored power. A warning is generated as soon as the power storage device only has 10 % charge (default).
PC mode	In PC mode, it is possible to continue working with a PC after a mains failure, perform a controlled shutdown and restart automatically.

11 Signaling

Various LED indicators are available for visual function monitoring of uninterruptible power supply. In addition, three floating relay outputs can be used to forward this data to a higher-level control system. Digital switching input $I < I_N$ supports the fast battery charging function in conjunction with a QUINT POWER power supply.

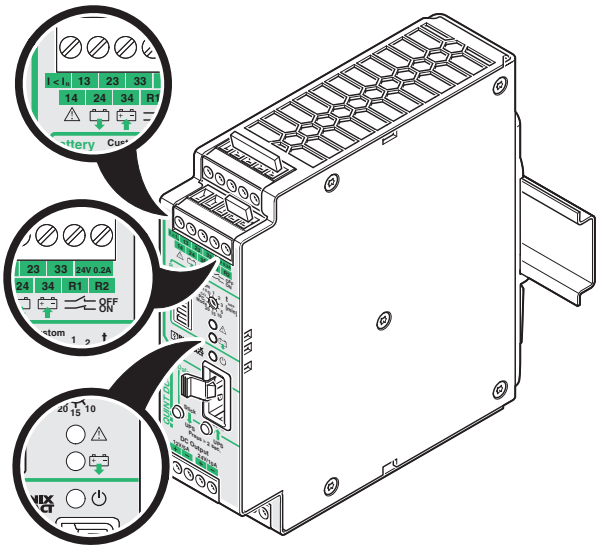


Figure 18 LED indicators and signal outputs

LED test

When starting the uninterruptible power supply unit for the first time, a test is automatically performed on the LED indicators and the LED bar graph display.

The LEDs indicate the following states:

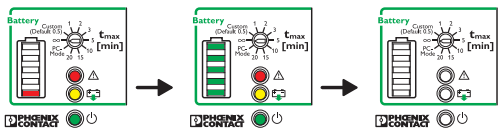


Figure 19 LED indicators

Following the LED test, the current device status of the uninterruptible power supply unit is displayed.

11.1 LED bar graph display

The LED bar graph display consists of five individual segments and displays the SOC (state of charge) of the power storage device. In this case, each segment corresponds to 20 % of the total capacity.

Depending on the type of power storage device used, i.e. whether it is equipped with IQ technology or not, the display varies according to charging or discharging.

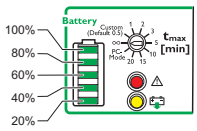


Figure 20 LED bar graph display

11.2 IQ power storage devices

In mains operation of the uninterruptible power supply, supplying the loads connected to the DC outputs of the UPS is of paramount importance. The power storage is charged using the power reserve of the UPS.

Charging a new, unknown IQ power storage device

- As the state of charge (SOC) of the power storage device is still unknown when installing it for the first time, it is essential that the device is fully charged once. For example, in doing so, the capacity of the power storage device is determined. The bar graph will exhibit an unstable curve until the device has been fully charged for the first time.

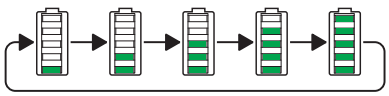


Figure 21 Charging a new IQ power storage device (unknown SOC)

The charging time of the power storage device depends on the capacity and energy supplied by the uninterruptible power supply unit. The maximum charging time can last up to several hours.

Charging known IQ power storage devices

- The power storage device has already been fully charged once and its properties have been determined. The individual segments of the LED bar graph display are illuminated based on the current state of charge (SOC) of the power storage device. The current charging state is indicated by permanently illuminated segments. The charging process is indicated by the flashing upper segment.

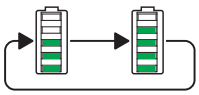


Figure 22 IQ power storage device is charged (SOC is known)

Discharging IQ power storage devices

In battery operation of the uninterruptible power supply, the loads connected to the DC outputs are supplied by the power stored in the power storage.

The charging state of the power storage device is indicated by means of the LED bar graph display. In this case, a distinction is made between the following states:

- A new power storage device that has not yet been fully charged. As the power storage device is still unknown when installing it for the first time, the state of charge must be determined. As such, it is essential that the power storage device is fully charged once.

Figure 23 New power storage device (unknown SOC)

- The power storage device has already been fully charged once and its properties have been determined. The individual segments of the LED bar graph are controlled based on the current state of charge of the power storage device.

Figure 24 Power storage device is discharged (SOC is known)

- Should the capacity of the connected power storage device drop to below 10 % of the determined capacity during battery mode discharge, the lower segment of the LED bar graph display will be illuminated in red.

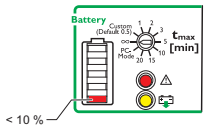


Figure 25 Power storage device capacity < 10%

11.3 Standard power storage devices (without IQ technology)

In mains operation of the uninterruptible power supplies, the loads connected to the DC outputs are supplied by the UPS. In addition, the connected power storage is charged by the UPS.

The current charging state of the power storage device is indicated by means of the LED bar graph display. The lower segment of the LED bar graph display flashes green.

Figure 26 Charge standard power storage device

Discharging power storage devices

In battery operation of the uninterruptible power supply, the loads connected to the DC outputs are supplied by the power stored in the power storage.

When the UPS is operated in battery mode with the power storage device without IQ technology, the LED bar graph display is not illuminated.

11.4 LED indicators

Mains operation or battery mode

The UPS is operated with a mains voltage of 24 V DC.

In mains operation, the loads connected to the outputs of the uninterruptible power supply are supplied by the mains.

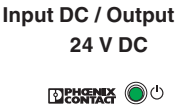


Figure 27 LED indicator in mains or battery operation

Battery operation

In battery operation, the loads connected to the DC outputs of the uninterruptible power supply are supplied by the power storage. In battery operation, the corresponding yellow LED indicator is activated.

In battery mode, the corresponding yellow LED indicator is activated.

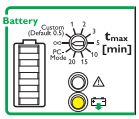


Figure 28 LED indicator battery mode active

Alarm (power storage device disrupted in mains operation)

The LED indicator alarm is permanently illuminated in red. In addition, the lower segment of the LED bar graph display flashes red.

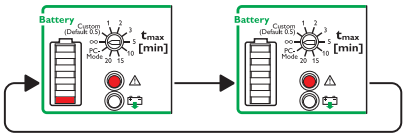


Figure 29 LED indicator alarm active

Check the connecting cables between the uninterruptible power supply unit and the power storage device.

Replace the power storage device while monitoring the polarity. Then perform an initialization. In doing so, the battery presence check is automatically performed and the uninterruptible power supply automatically detects the power storage device used. This functionality is only supported by power storage devices with IQ technology.

When using the UPS-BAT... power storage device and a connected communication cable, the current life expectancy (SOH, State of Health) is determined via the IQ technology. An alarm is signaled in the following cases:

- The adjustable threshold "remaining life expectancy" is reached.
- Different types of battery technology were connected that cannot be charged simultaneously, e. g. VRLA and LI-ION.
- The presence check is negative.
- The quality check is negative.

When using power storage devices other than UPS-BAT..., an alarm is signaled if it is not present or if the quality of the power storage device is no longer sufficient for supplying the load in the event of a mains failure.

If the lower LED bar graph display segment does not flash, the alarm indicates overload or service mode.

11.5 LED bar graph display with communication cable installed between the UPS and the power storage device

The current charging state and the remaining runtime of the power storage device is determined during startup of the UPS. As such, the LED indicator lights up from bottom to top during this process (charging the battery in mains operation) or from top to bottom (discharging the battery in battery mode).

When the power storage device is fully charged and the charging state is determined, this is displayed by the bar graph.

Depending on the charging state and the size of the power storage device, charging can range from a few minutes to hours.

11.6 LED bar graph display without communication cable between the UPS and the power storage device

If a communication cable is not connected between the UPS and the power storage device, the individual segments of the LED bar graph display will be illuminated as follows during startup.

The lower segment of the LED bar graph display is activated.

- Flashing green: power storage device is being charged
- Permanent red light: battery problem
- Off: power storage device is not being charged

11.7 Floating relay outputs

The current device status is forwarded to the higher-level control system via three floating N/O contacts.

Alarms, warnings and/or operating states can be individually assigned to the battery mode and battery charge via the UPS-CONF configuration software. In addition to this, the current device status can be conveniently displayed on your PC by using UPS-CONF configuration software combined with an IFS communication cable.

By default, each relay contact is wired to the 24 V DC/200 mA internal device potential via the 4-pos. plug-in bridges.

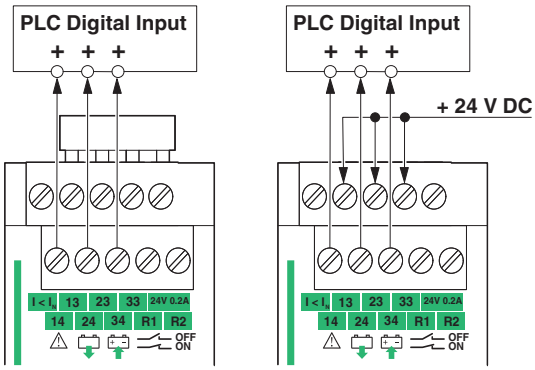


Figure 30 Floating relay contacts

The free configuration software, along with accompanying documentation, can be found in the device download area at phoenixcontact.net/products

NOTE

Assignment between the LED indicator and the active signal output is identical in the default settings. If necessary, the corresponding signal output can be set in addition to the LED indicator.

The UPS-CONF configuration software can be used to individually change the assignment and control of the active signal output.

When individually parameterizing the signal outputs, ensure that a logical combination is used.

11.8 Digital signal input I < I_N (fast battery charging function)

The adaptive current management of the charging unit charges the power storage considerably faster when the I < I_N input of the UPS is connected to the corresponding I < I_N output of the power supply. This ensures shorter recharging times and the power storage is available with full capacity much more quickly.

At the same time, the module supplies sufficient power for buffered DC loads. As long as the upstream connected power supply unit has sufficient power reserves, charging continues with high current. If the load requires a higher current, this is supplied at the highest priority. In this case the power storage device is charged more slowly.

The fast battery charging function is only available when the power supply unit makes a static power reserve available with corresponding signal contact, e. g., QUINT POWER with POWER BOOST and preventive function monitoring.

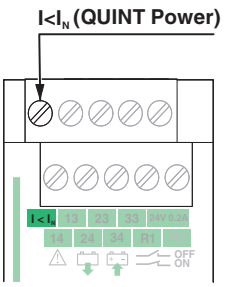


Figure 31 Signal input I<IN

12 Function

In mains operation (DC input voltage present), the output voltage corresponds to the applied input voltage. In the event of supply voltage failure, battery operation is activated without interruption.

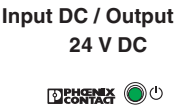


Figure 32 LED indicator mains mode

12.1 SOC application example

Task:

An industrial PC and an actuator must be continuously supplied with 24 V DC and 12 V DC.

Previous solution:

The UPS is buffered with a 3.4 Ah power storage and supplies 12 V DC or 24 V DC and a load of 180 W for 20 minutes under optimum conditions.

Problem:

Can the power storage device actually bridge this time? Charging state, performance, and remaining runtime of the battery are unknown.

Solution with IQ technology:

The intelligent UPS determines all relevant battery states. This ensures the transparency required to guarantee the stability of the supply and optimum use of the battery at all times.

The intelligent battery management detects the current charging state of the connected battery and uses this to calculate the remaining runtime.

The QUINT UPS-IQ also signals whether the buffer time is actually 20 minutes. As soon as an adjustable threshold value is reached, the active switching output or the configuration software generates a warning message or the industrial PC is shut down. The industrial PC works for as long as possible and is only shut down if absolutely necessary.

12.2 SOH/SOF application example

Task:

Electrical loads in remote systems widely separated from each other must be continuously supplied with 24 V DC.

Previous solution:

The user invests in a new battery every two years assuming that the system is reliably protected by this.

Problem:

Is the power storage device really 100% available for two years? Could the battery have aged more quickly as a result of higher ambient temperatures and not be able to deliver sufficient performance?

Solution with IQ technology:

The remaining life expectancy of the battery is known. This allows servicing to be planned. If the battery is replaced at the ideal time, costs are also avoided that would occur by replacing the battery too early or after failure. It is particularly important for applications that are widely separated from each other to ascertain whether the battery will continue to work reliably for another two years or only for another two months.

12.3 Charging characteristic

When the recommended UPS-BAT... or UPS-CAP... power storage is used, the intelligent battery management of the UPS adapts itself to the respective connected storage technology. For battery-based power storage devices, this is lithium or lead (VRLA – Valve Regulated Lead Acid), for example. This means that an optimum charging characteristic for the storage technology used is always ensured.

The UPS is equipped with an integrated charging unit. Charging is performed according to the current battery state. By measuring the current temperature at the battery, temperature-compensated charging takes place.

No additional settings need to be made to the charging parameters thanks to automatic detection.

Intelligent battery management ensures fast availability and maximum service life of the power storage device.

If the communication cable between the UPS and the power storage device is interrupted, the temperature detected in the UPS module is used temporarily to ensure temperature compensation.

Temperature recording only takes place in the UPS module when using power storage devices other than the UPS-BAT. Furthermore, adjustment and adherence to the charging parameters is necessary.

13 Interfaces

The uninterruptible power supply is equipped with an interface for data transmission.

1. Interface: data port

13.1 Data port

The uninterruptible power supply unit is equipped with a data port for data transmission. A data cable is required for communicating with a PC or a higher-level controller.

IFS-USB-DATACABLE

The uninterruptible power supply unit is connected to the USB PC connection with data cable IFS-USB-DATACABLE (Order No. 2320500) via the data port.

The data cable can be used to parameterize and monitor the UPS. The data cable is electrically isolated.

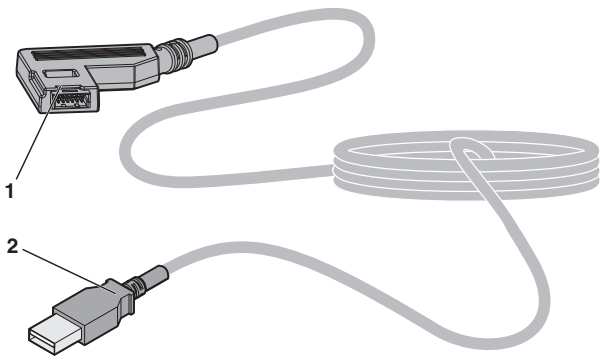


Figure 33 IFS-USB-DATACABLE

No.	Designation
1	IFS plug
2	USB plug type A
	Cable length: 3 m

IFS-RS232-DATACABLE

The uninterruptible power supply unit is connected to the serial RS-232 connection of a data transmission device, such as a modem, with data cable IFS-RS232-DATACABLE (Order No. 2320490) via the data port.

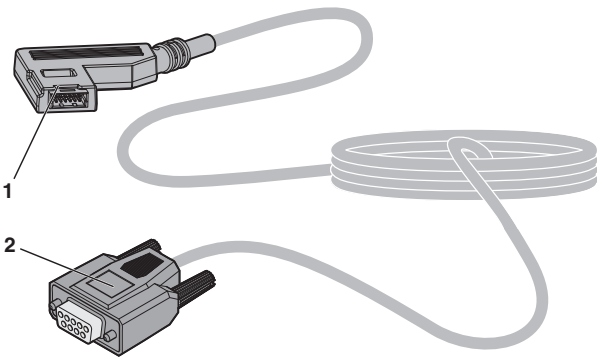


Figure 34 IFS-RS232-DATACABLE

No.	Designation
1	IFS plug
2	9-pos. D-SUB plug
	Cable length: 2 m

Ethernet connection is possible by connecting via an FL-COMSERVER (e.g., Order No. 2313452).

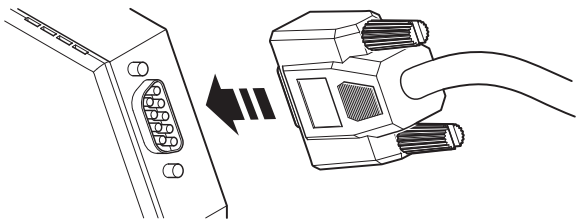


Figure 35 FL COMSERVER connection

The data cable between the modem and the UPS is necessary for parameterization and monitoring. It contains the interface electronics and electrical isolation.

IFS-MINI-DIN-DATACABLE

The uninterruptible power supply is connected, for example, to Phoenix Contact type ILC 1xx controllers with data cable IFS-MINI-DIN-DATACABLE (Order No. 2320487) via the data port.

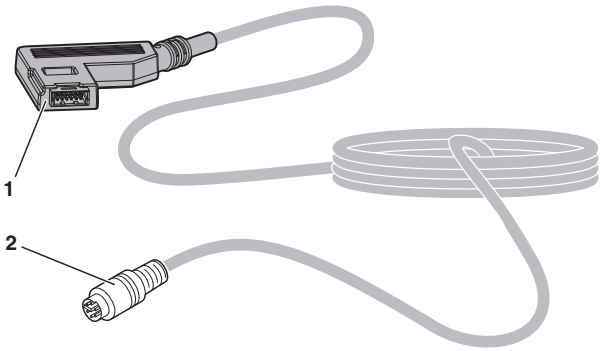


Figure 36 IFS-MINI-DIN-DATACABLE

No.	Designation
1	IFS plug
2	6-pos. MINI-DIN plug
	Cable length: 2 m

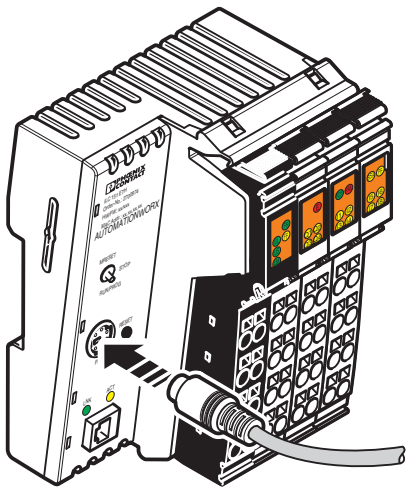


Figure 37 Connection to an ILC 1xx controller

The uninterruptible power supply is connected, for example, to a Phoenix Contact IB IL RS UNI-PAC Inline communication terminal (Order No. 2700893) with data cable IFS-OPEN-END-DATACABLE (Order No. 2320450) via the data port.

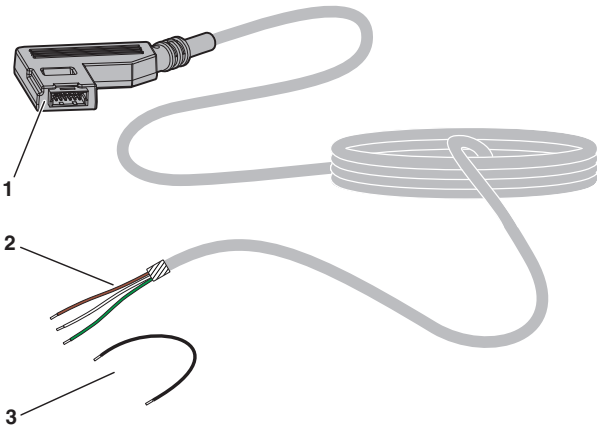


Figure 38 IFS-OPEN-END-DATACABLE

No.	Designation
1	IFS plug
2	Data cable (open signal lines), ready for connection, assembled
3	Wire jumper, ready for connection, assembled
	Cable length: 2 m

Figure 39 Connection to communication terminal IB IL RS UNI-PAC

13.2 IFS-CONFSTICK-L

The IFS-CONFSTICK-L is a multi-functional memory block for easy storage and backup of configuration and parameter data. You can copy the parameterization of one UPS to another UPS of the same type using the IFS-CONFSTICK.

13.3 Transfer parameter data from UPS to IFS-CONFSTICK-L

1. Insert the IFS-CONFSTICK-L carefully into the data port of the UPS while observing the plug-in direction.

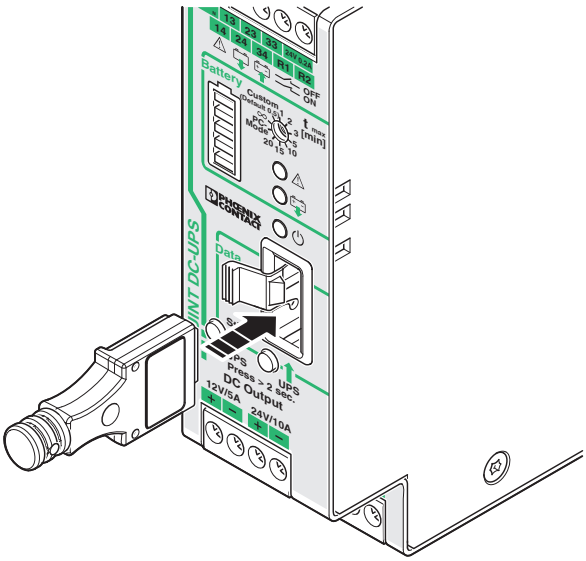


Figure 40 Insert IFS-CONFSTICK-L

2. Press the "UPS -> Stick" button and hold for at least 2 seconds.

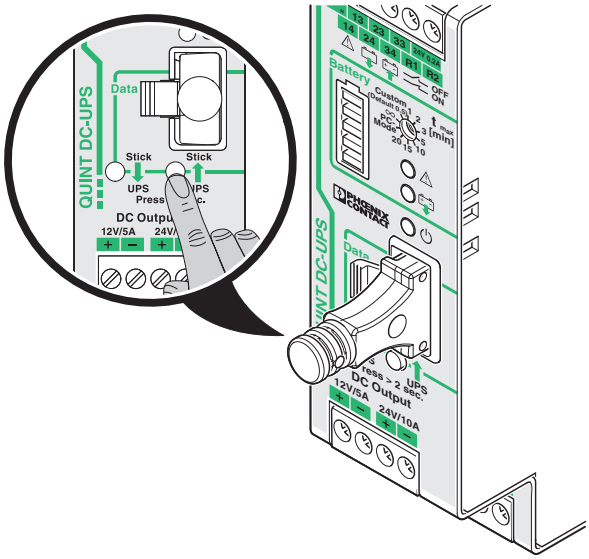


Figure 41 Start parameter transmission

3. The parameter transmission is started. The three LED status indicators will be cyclically illuminated during the transmission.

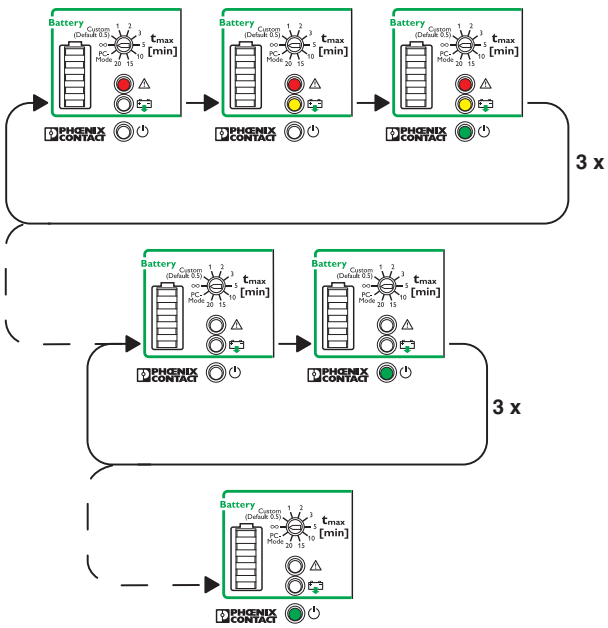


Figure 42 Write parameter data active

4. An error-free transmission is represented by a flashing green LED indicator. An inaccurate transmission is represented by a red LED indicator.

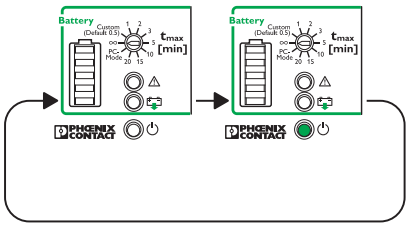


Figure 43 Transmission successful

5. Once the signaling time has elapsed, all LED indicators are switched off and the current device status is displayed.

13.4 Transferring IFS-CONFSTICK-L parameters to the UPS

1. Insert the IFS-CONFSTICK-L carefully into the data port of the UPS while observing the plug-in direction.

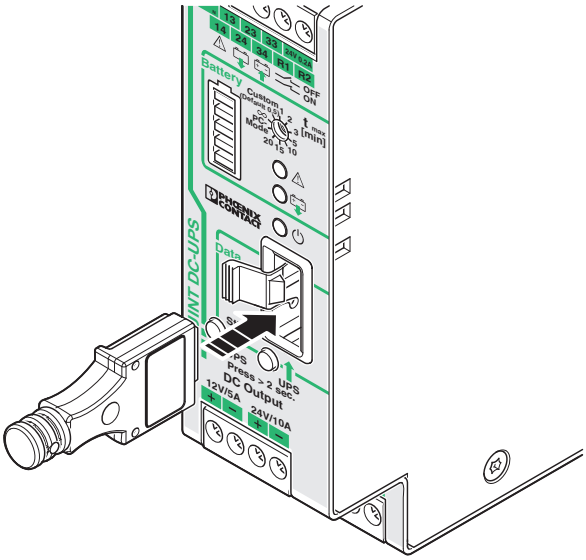


Figure 44 Insert IFS-CONFSTICK-L

2. Press the “Stick -> UPS” button and hold down for at least 2 seconds.

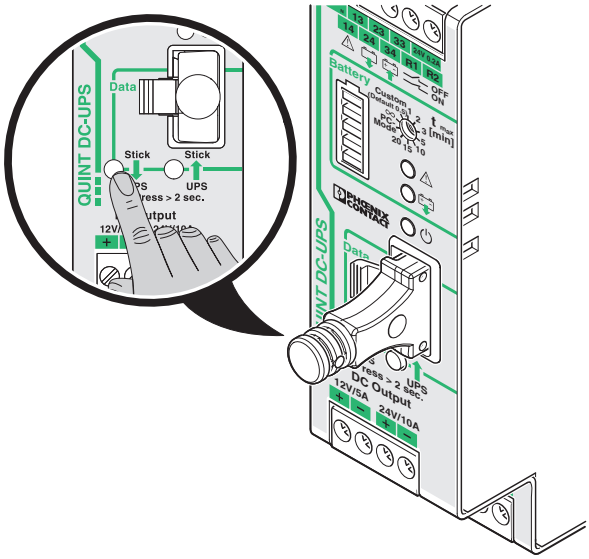


Figure 45 Start parameter transmission

3. The parameter transmission is started. The three LED status indicators will be cyclically illuminated during the transmission.

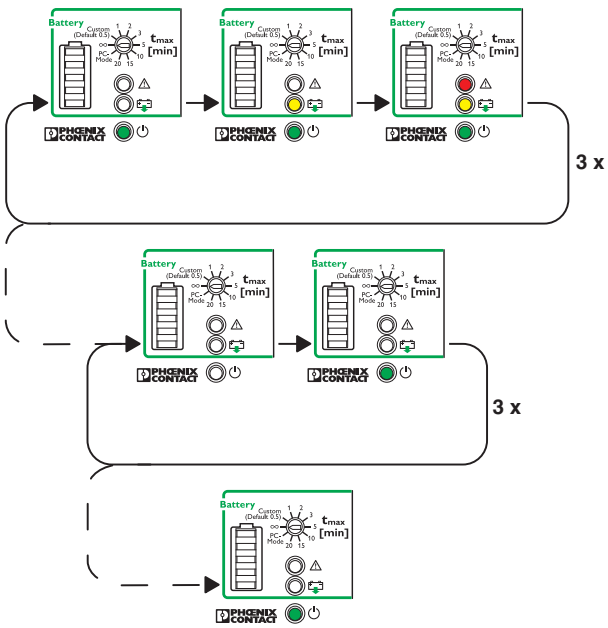


Figure 46 Write parameter data active

4. An error-free transmission is represented by a flashing green LED indicator. An inaccurate transmission is represented by a red LED indicator.

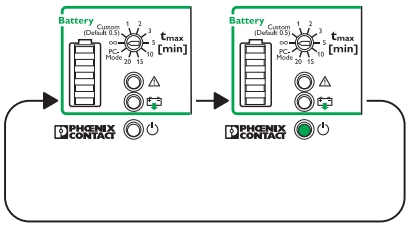


Figure 47 Transmission successful

5. Once the signaling time has elapsed, all LED indicators are switched off and the current device status is displayed.

14 Derating

14.1 Temperature-dependent derating

At an ambient temperature of up to +40 °C, the UPS supplies the I_{BOOST} continuous output current in mains operation. In battery mode and mains operation, the device supplies the I_N nominal output current up to an ambient temperature of +60 °C. In the case of ambient temperatures above +60 °C, the output power must be decreased by 2.5 % per Kelvin temperature increase.

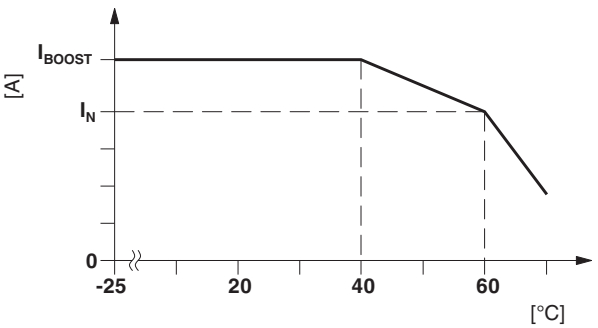


Figure 48 Derating diagram

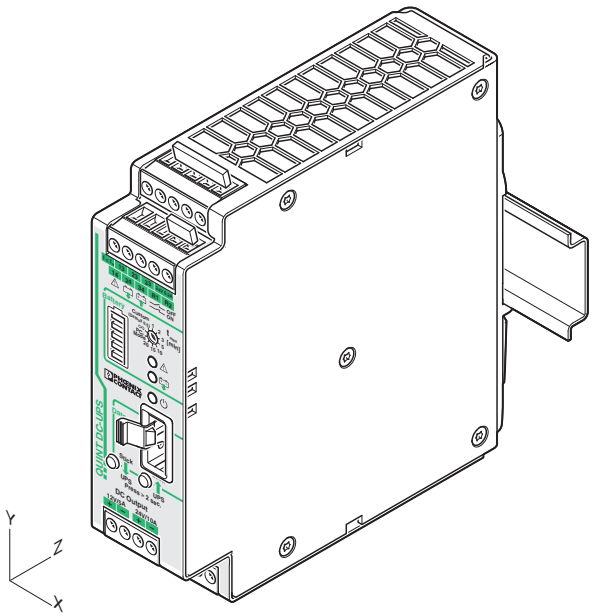
14.2 Position-dependent derating

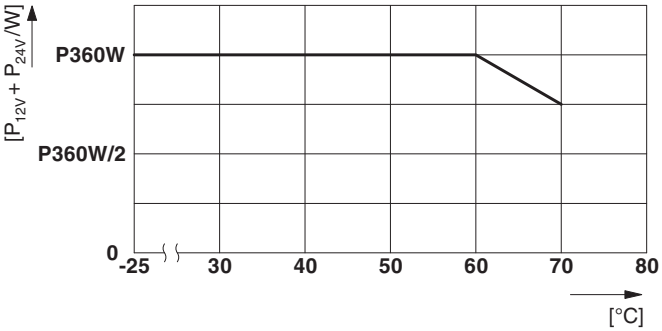
The uninterruptible power supply unit can be snapped onto all DIN rails according to EN 60715. It should be mounted horizontally in the normal mounting position (with the input terminals facing downward).

When installing in a different mounting position, derating should be adhered to.

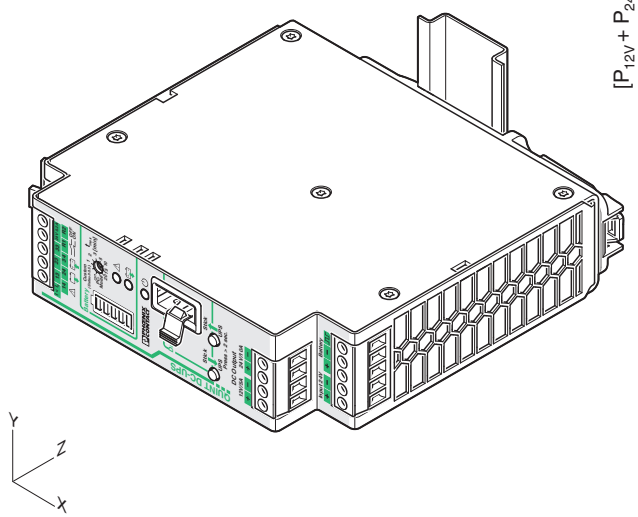
The characteristic curve can be used to determine the maximal output power to be drawn for each ambient temperature for different mounting positions.

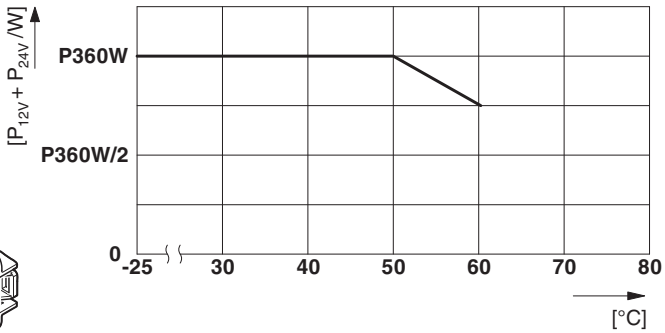
Normal mounting position



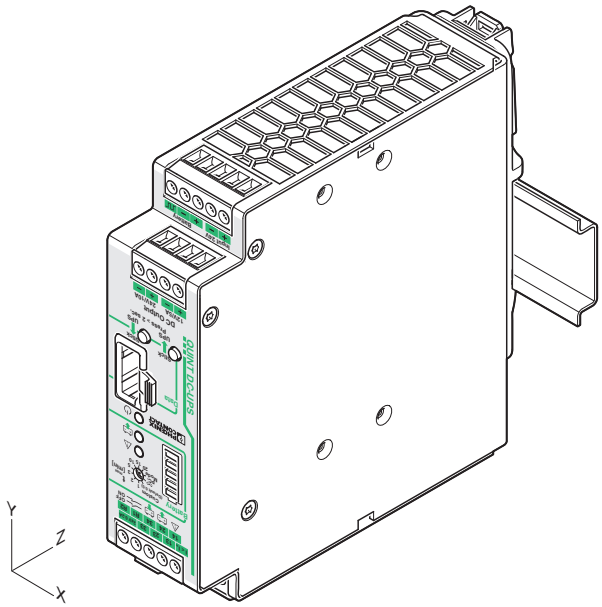


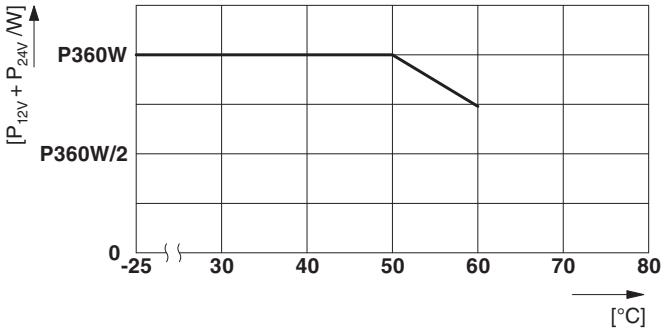
Rotated mounting position 90° X-axis



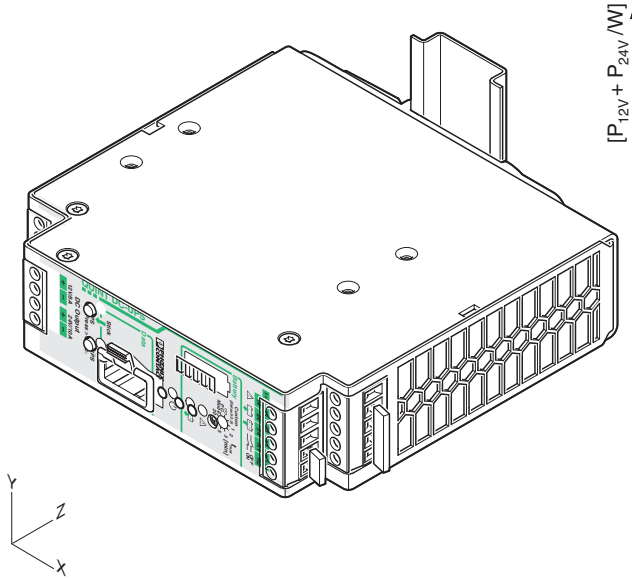


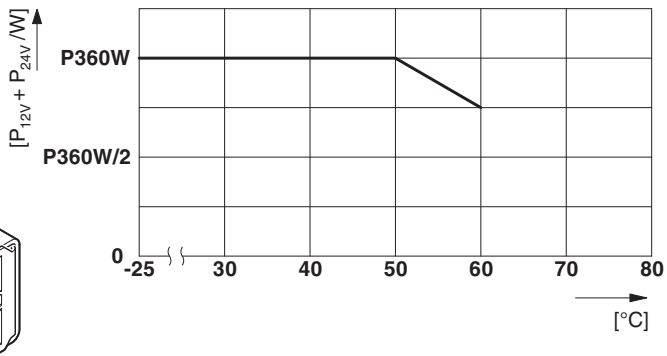
Rotated mounting position 180° X-axis



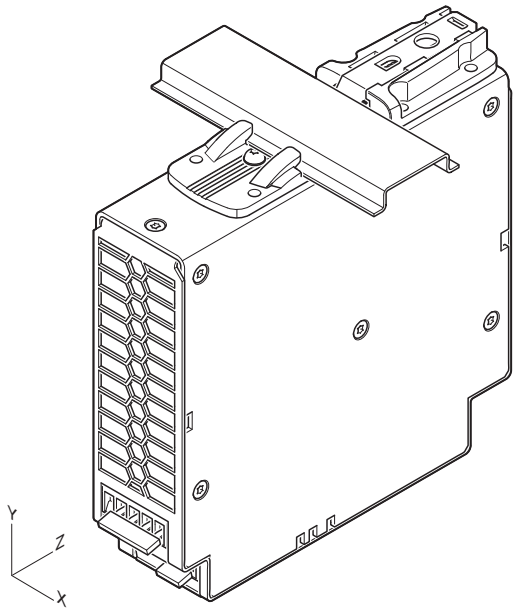


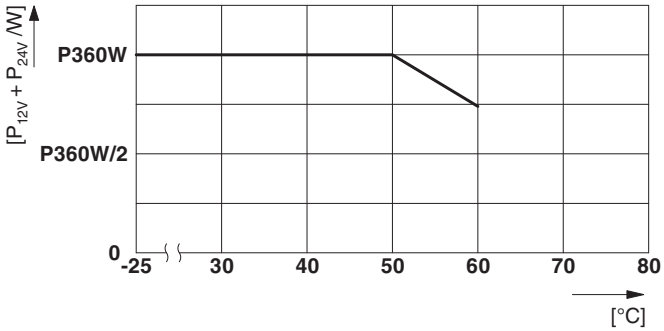
Rotated mounting position 270° X-axis



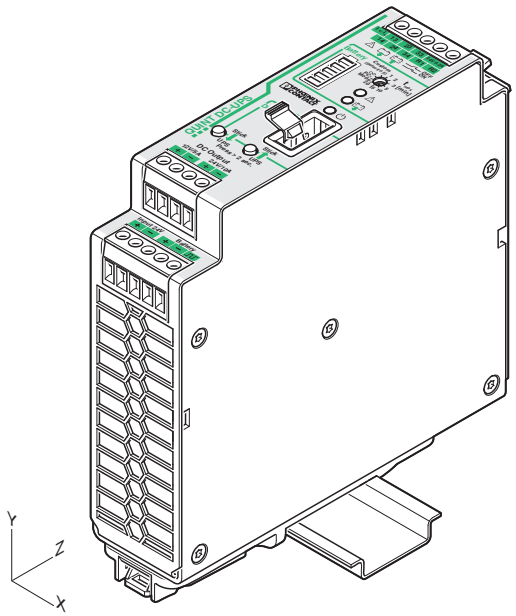


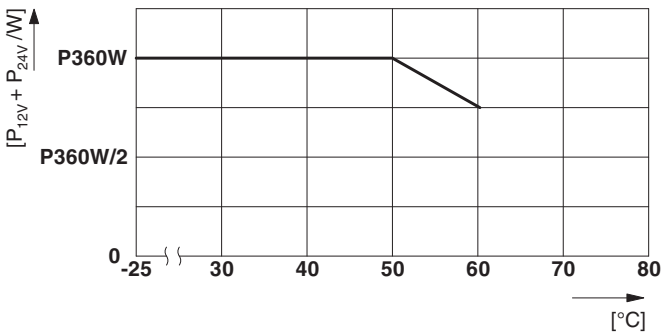
Rotated mounting position 90° Z-axis





Rotated mounting position 270° Z-axis





15 Service mode

When working in a system, it may be necessary to switch the uninterruptible power supply unit over to service mode.

In this operating mode, DC battery connection terminal blocks are deactivated using software. The active signal output is always activated when the unit is switched over to service mode.

The following options are available for switching to service mode:

– Button on the front of the UPS
– UPS-CONF software
– Service stick (IFS-CONFSTICK-L including service formatting, see UPS-CONF user manual)

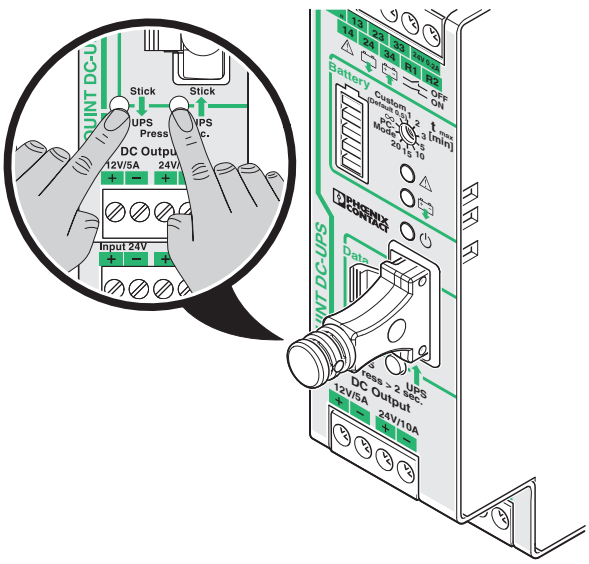
Further information can be found in the UPS-CONF user manual at phoenixcontact.net/products

15.1 Power storage device replacement

To switch to UPS service mode, press and hold the two buttons on the front of the UPS for longer than 6 seconds.

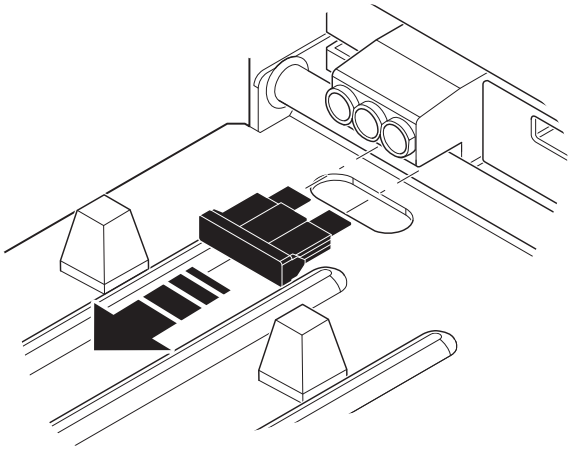
- The red LED indicator alarm is illuminated

The battery charger is deactivated in this operating mode. Charging and buffer operation are not possible.

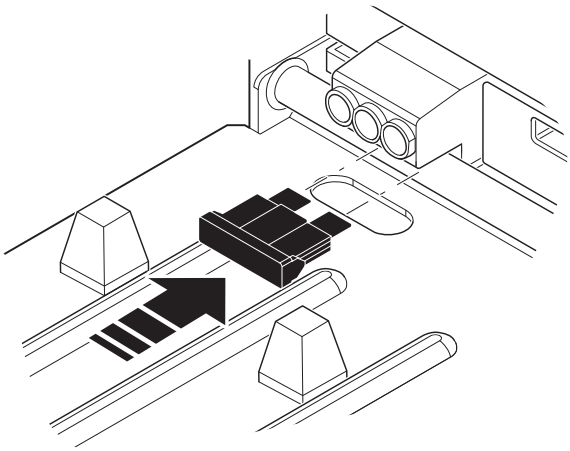


- You may need to remove the existing fuse, depending on the power storage device used
- Disconnect the connecting cables from the power storage device

Ensure that the power storage device can continue charging.



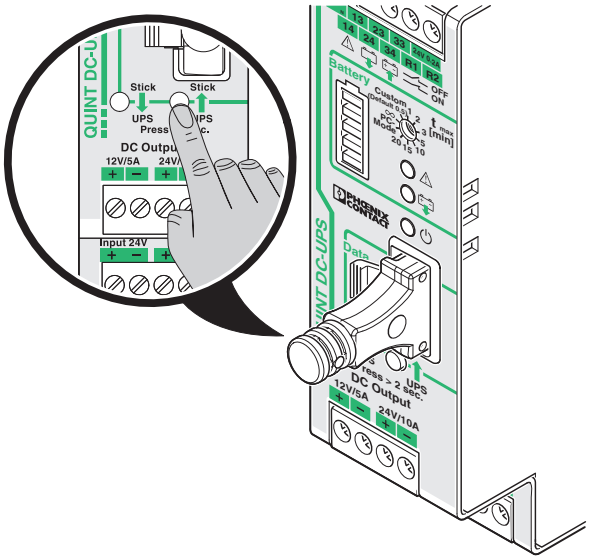
- Connect the new power storage device while observing the polarity.
- Plug in the fuse required, depending on the power storage device used



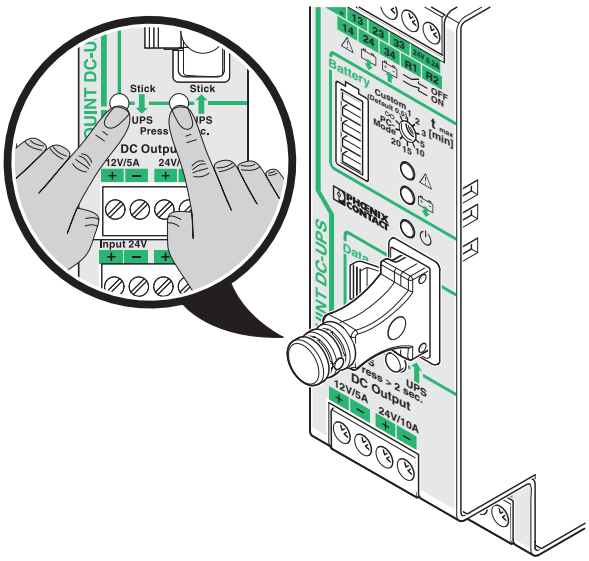
- Press one button on the front of the UPS for longer than 6 seconds. The battery presence check is started and the properties of the new power storage device are determined.

Power storage device data can only be automatically determined for power storage devices with IQ technology.

- The LED bar graph display flashes cyclically



- Press and hold down both buttons on the front of the UPS for longer than 6 s to exit the service mode. The red LED indicator alarm is deactivated.



16 PC mode in UPS-CONF

In "PC mode", the UPS function follows a chronological sequence that can be parameterized via UPS-CONF configuration software. In this way, it can be adjusted to each individual application.

The following components are required for the PC mode function:
Data cable IFS-XXX-DATACABLE (Order No. 2320XXX)
Configuration software UPS-CONF (Order No. 2320403)
Communication cable between the UPS and the power storage device with IQ technology

In the event of a mains failure, one PC can continue to work, perform a controlled shutdown, and restart automatically.

1. Delay time

Delay time is calculated automatically from the current remaining battery life minus the time required by the PC to shut Delay time is calculated automatically from the current remaining battery life minus the time required by the PC / IPC to shut-down. Alternatively, a fixed delay time may be chosen.

Example: setting is 10 minutes - if mains power has not returned within 10 minutes, a corresponding alarm is signaled.

2. Program start

After the delay time has expired, it is possible to start a program.

Example: a software backup starts which ensures successive backup of system data.

In the “PC Mode” setting on the UPS rotary selector switch, the UPS functionality follows a chronological sequence that can be parameterized via configuration software and is therefore individually optimized for the respective application.
Menu: Settings > Time setting

3. PC shutdown

The time required to shut down the PC or industrial PC is set here.

4. PC idle time

The output voltage is interrupted during the reset time and the PC automatically restarted only if the PC is shut down and the mains returned in the mean time.

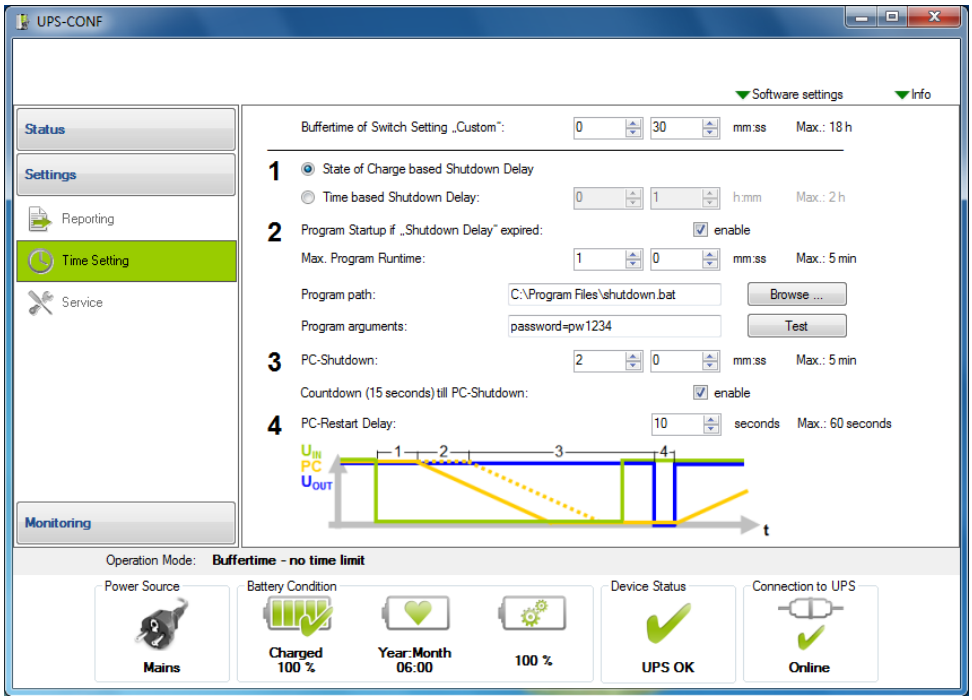


Figure 49 UPS-CONF user interface

17 Application example

Parallel connection of the power storage devices

To increase the buffer time, a maximum of 15 power storage devices can be switched in parallel. It is recommended to keep the number as low as possible and use power storage devices with a higher capacity if required.

After discharging the power storage, the required recharging time depends on the maximum charging current that the uninterruptible power supply can provide.

If possible, install at a cool location e. g., at the bottom of the control cabinet to ensure optimum function. For this, the following cabling design is advantageous.

Use a suitable fuse.

The required fuse value of the backup fuse must not exceed the nominal fuse value of an individual power storage device.

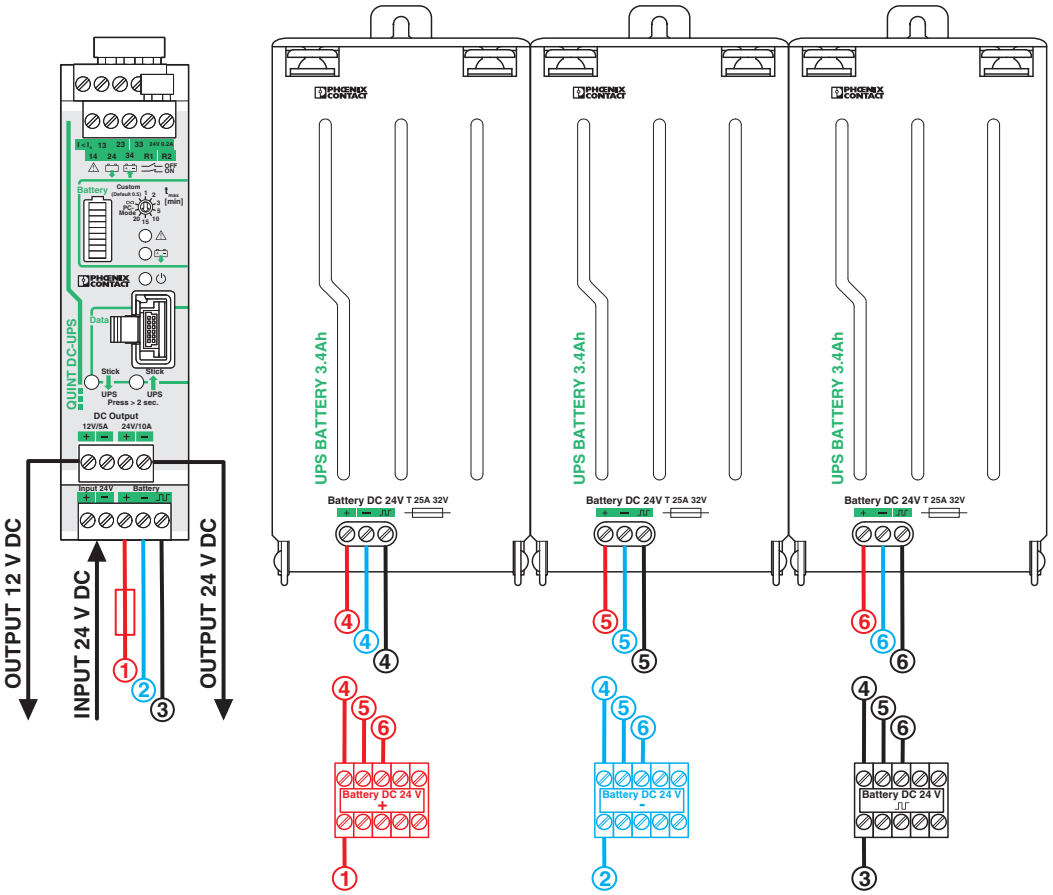


Figure 50 Parallel connection of the power storage devices in the control cabinet with modular terminal blocks (example)

The power storage device should always be wired with the same cable cross sections and cable lengths.

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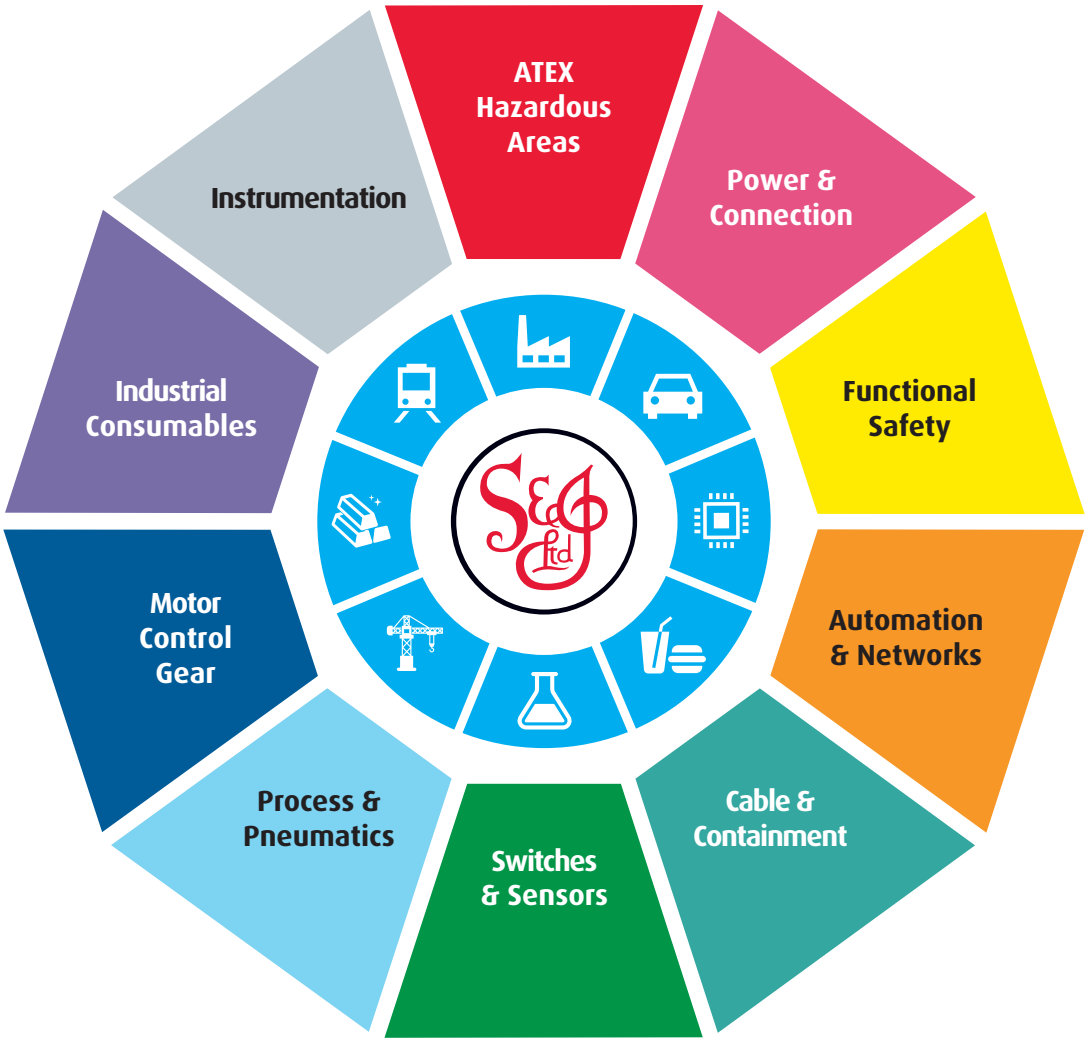

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