

QUINT4-UPS/1AC/1AC/1KVA

Uninterruptible power supply

Data sheet
107563_en_00

© PHOENIX CONTACT 2018-05-02



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.

- Worldwide use, thanks to wide-range input
- Online UPS with pure sine wave voltage at output
- Parallel connection possible for increased performance and redundancy
- Optimum use of the buffer time and preventive battery monitoring
- Maximum energy efficiency
- Extensive signaling and parameterization
- Flexible configuration

Technical data (short form)

Nominal input voltage	100 V AC , 110 V AC , 120 V AC , 130 V AC
	200 V AC , 210 V AC , 220 V AC , 230 V AC , 240 V AC
Input voltage range	90 V AC ... 264 V AC
Frequency range	45 Hz ... 65 Hz
Current consumption (for nominal values) typical *	10.5 A (120 V AC) / 5.5 A (230 V AC)
Nominal output voltage (U _N) *	120 V AC / 230 V AC
Nominal output current (I _N) *	8.3 A (120 V AC) / 4.3 A (230 V AC)
Degree of efficiency (Nominal load) (with charged energy storage device)	92 % (120 V AC) 94 % (230 V AC)
MTBF (IEC 61709, SN 29500)	217546 h (230 V AC, at 40 °C)
Ambient temperature (operation)	-25 °C ... 60 °C (> 50 °C Derating: 2.5 %/K)
Dimensions W/H/D	290 mm / 130 mm / 125 mm
Weight	5 kg
Battery technology	VRLA, VRLA-WTR, LI-ION
Nominal voltage (Energy storage)	2x 24 V DC
Nominal capacity range	3.4 Ah ... 200 Ah

* for further information, see the section on device connection



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

2	Table of contents	
1	Description	1
2	Table of contents	2
3	Ordering data	3
4	Technical data	5
5	Safety and installation notes	11
6	Structure	13
7	Mounting and removing	16
8	Device connection	18
9	Device operation	22
10	Method of operation.....	26
11	Signaling.....	27
12	Interfaces.....	31
13	Parallel operation.....	32
14	Derating.....	34

3 Ordering data

Description	Type	Order No.	Pcs./Pkt.
Uninterruptible power supply with IQ technology for DIN rail mounting. Input: 120/230 V AC, output: 120/230 V AC/ 1 kVA. Provides information regarding the state of charge, remaining runtime, and service life of the rechargeable battery module at any time, thereby increasing system availability.	QUINT4-UPS/1AC/1AC/ 1KVA	2320283	1
Accessories			
Used for communication between an industrial PC and Phoenix Contact devices with USB-Mini-B connection.	MINI-SCREW-USB-DATACABLE	2908217	1
Fuse, nominal current: 25 A,	FUSE 25A/58V TAC ATO	1021340	2
2-piece universal wall adapter for securely mounting the power supply in the event of strong vibrations. The profiles that are screwed onto the side of the power supply are screwed directly onto the mounting surface. The universal wall adapter is attached on the left/right.	UWA 130	2901664	1
Patch cable, CAT6A, 4-pair, shielded, connection not crossed (Line), assembled at both ends with RJ45/IP20 connectors; outer sheath material: PUR; length: 1 m	VS-IP20/10G-IP20/10G-94F/1	1418866	1
Energy 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
Energy 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
Energy 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
Energy 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
Energy 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
Energy 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

Accessories	Type	Order No.	Pcs./Pkt.
Energy storage device, LI-ION technology, 24 V DC, 120 Wh, for ambient temperatures of -20°C ... 60°C, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/LI-ION/24DC/120WH	2320351	1
Energy storage device, LI-ION technology, 24 V DC, 924 Wh, for ambient temperatures of -25 °C ... 60 °C, automatic detection and communication with QUINT UPS-IQ	UPS-BAT/LI-ION/24DC/924WH	2908232	1



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

4 Technical data

Input data

Nominal input voltage	100 V AC , 110 V AC , 120 V AC , 130 V AC 200 V AC , 210 V AC , 220 V AC , 230 V AC , 240 V AC
Input voltage range	90 V AC ... 264 V AC
Frequency range	45 Hz ... 65 Hz
Current consumption (for nominal values) typical *	10.5 A (120 V AC) / 5.5 A (230 V AC)
Permissible backup fuse	20 A (120 V AC, Listed breaker) / B16 (230 V AC)
Activation threshold	Can be configured using UPS-CONF software

* for further information, see the section on device connection

Output data

Power factor (cos phi)	0.9
Crest factor	2.8
Switch-over time	0 ms
Classification according to IEC 62040-3	VFI-SS-111

Output data (mains operation)

Nominal output voltage (U_N) *	120 V AC / 230 V AC
Frequency	60 Hz \pm 5 % (At an input frequency of 55 Hz to < 65 Hz) 50 Hz \pm 5 % (At an input frequency of 45 Hz to < 55 Hz)
Nominal output current (I_N) *	8.3 A (120 V AC) , 4.3 A (230 V AC)
Form of output voltage	Pure sine (In online operation)

* for further information, see the section on device connection

Output data (battery operation)

Nominal output voltage (U_N) *	120 V AC / 230 V AC
Frequency	60 Hz \pm 5 % (At an input frequency of 55 Hz to < 65 Hz) 50 Hz \pm 5 % (At an input frequency of 45 Hz to < 55 Hz)
Nominal output current (I_N) *	8.3 A (120 V AC) , 4.3 A (230 V AC)
Form of output voltage	Pure sine

* for further information, see the section on device connection

Connection data input / output / battery

Connection method	Screw connection
Conductor cross section, solid	0.2 mm ² ... 6 mm ²
Conductor cross section, flexible	0.2 mm ² ... 4 mm ²
Conductor cross section AWG/kcmil	30 ... 10
Stripping length	8 mm
Tightening torque	0.5 Nm ... 0.6 Nm

Energy storage	
Battery technology	VRLA, VRLA-WTR, LI-ION (See section "Ordering data")
Charge characteristic curve	IU ₀ U
Nominal voltage	2x 24 V DC
Nominal capacity range	3.4 Ah ... 200 Ah
Charging voltage maximum	58 V (temperature compensated)
Charge current maximum	5 A
Status and diagnostic indicators/signal outputs Alarm	
Switching output	Transistor output, active
Output voltage	24 V
Continuous load current	≤ 20 mA
Status display	LED (red)
Status and diagnostic indicators/signal outputs Battery Mode	
Switching output	Transistor output, active
Output voltage	24 V
Continuous load current	≤ 20 mA
Status display	LED (yellow)
Status and diagnostic indicators/signal outputs AC OK	
Switching output	Transistor output, active
Output voltage	24 V
Continuous load current	≤ 20 mA
Status display	LED (green)
Status and diagnostic indicators/signal outputs Ready	
Switching output	Transistor output, active
Output voltage	24 V
Continuous load current	≤ 20 mA
Signal connection data	
Connection method	Push-in connection
Conductor cross section, solid	0.2 mm ² ... 1.5 mm ²
Conductor cross section, flexible	0.2 mm ² ... 1.5 mm ²
Conductor cross section AWG/kcmil	30 ... 12
Stripping length	8 mm
Remote control (Remote)	Digital control input (configurable)
Low signal	Connection to SGnd with < 2.7 kΩ
High signal	Open (> 35 kΩ between remote and SGnd)
Battery-operated start (bat. start)	Low active digital control inputs
Low signal	Connection to SGnd with < 2.7 kΩ
High signal	Open (> 200 kΩ between bat. start and SGnd)

Interface

USB classification MINI-USB type B, lockable

Device combinations

Connection in parallel Yes, 2

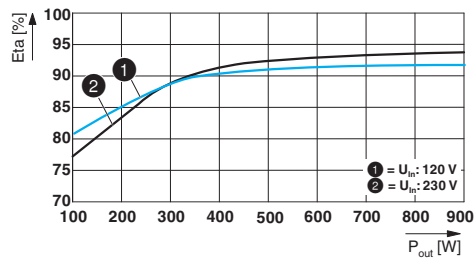
Connection in series No

Power dissipation

	120 V AC	230 V AC
Maximum power dissipation in no-load condition	typ. 17 W	typ. 25 W
Power loss nominal load max.	typ. 79 W	typ. 55 W

Efficiency (Nominal load)

	120 V AC	230 V AC
	92 %	94 %



General data

Overvoltage category EN 60950-1

II

MTBF

217546 h (230 V AC, at 40 °C)

Degree of protection

IP20

Protection class

I

Side element version

Aluminum plate, DIN EN 573-3

Hood version

Sheet steel, DIN EN ISO2081 coat - Fe/Zn 18/B/TopCoat transparent blue

Dimensions W/H/D (normal mounting position/delivered condition)

290 mm / 130 mm / 125 mm

Weight

5 kg

Ambient conditions

Ambient temperature (operation) -25 °C ... 60 °C (> 50 °C Derating: 2.5 %/K)

Ambient temperature (storage/transport) -40 °C ... 85 °C (with charged energy storage device)

Max. permissible relative humidity (operation) ≤ 95 %

Installation height ≤ 3000 m (> 2000 m, observe derating)

Degree of pollution 2

Vibration (operation) 5 Hz ... 100 Hz, 0.7g (EN 60068-2-6)

Shock 15g in all directions (EN 60068-2-27)

Climatic class 3K3 (EN 60721)

Approvals

UL approvals

UL/C-UL Recognized UL 1778



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

Electromagnetic compatibility		
Noise emission		
CE basic standard	Minimum normative requirements	Higher requirements in practice (covered)
Noise emission	EN 62040-02 (Class C2)	--
Conducted noise emission	EN 62040-02 (Class C2)	--
Harmonic currents	EN 61000-3-2 (Class A)	0 kHz ... 2 kHz
Flicker EN 61000-3-3	not required	not required
Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial)		
CE basic standard	Minimum normative requirements	Higher requirements in practice (covered)
Electrostatic discharge EN 61000-4-2		
Housing contact discharge	4 kV (Test Level 2)	6 kV (Test Level 3)
Housing air discharge	8 kV (Test Level 3)	8 kV (Test Level 3)
Comments	none	Criterion A
Electromagnetic HF field EN 61000-4-3		
Frequency range	80 MHz ... 1 GHz	80 MHz ... 6 GHz
Test field strength	10 V/m	10 V/m
Comments	Criterion A	Criterion A
Fast transients (burst) EN 61000-4-4		
Input	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
DC input	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Output	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Signal	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Signal USB	2 kV (Test Level 3 - asymmetrical)	2 kV (Test Level 3 - asymmetrical)
Comments	Criterion B	Criterion A (B for USB)
Surge voltage load (surge) EN 61000-4-5		
Input/Output	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - asymmetrical)	1 kV (Test Level 2 - symmetrical) 2 kV (Test Level 3 - asymmetrical)
Signal	1 kV (Test Level 2 - asymmetrical)	1 kV (Test Level 2 - asymmetrical)
Comments	Criterion B	Criterion A
Conducted interference EN 61000-4-6		
Frequency range	0.15 MHz ... 80 MHz	0.15 MHz ... 80 MHz
Voltage	10 V	10 V

Immunity according to EN 61000-6-1 (residential), EN 61000-6-2 (industrial)		
CE basic standard	Minimum normative requirements	Higher requirements in practice (covered)
Comments	Criterion A	Criterion A
Power frequency magnetic field EN 61000-4-8		
Frequency range	50 Hz , 60 Hz	50 Hz , 60 Hz
Test field strength	30 A/m	100 A/m
Comments	Criterion B	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 and refer to a room temperature of 25 °C and 70% relative humidity at 2000 m above sea level.

5 Safety and installation notes

5.1 Symbols used

Instructions and possible hazards are indicated by corresponding symbols in this document.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety measures that follow this symbol to avoid possible personal injuries.

There are different categories of personal injury that are indicated by a signal word.



WARNING

This indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

This indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

The following symbols are used to indicate potential damage, malfunctions, or more detailed sources of information.



NOTE

This symbol together with the signal word NOTE and the accompanying text alert the reader to a situation which may cause damage or malfunction to the device, hardware/software, or surrounding property.



This symbol and the accompanying text provide the reader with additional information or refer to detailed sources of information.

5.2 Safety and warning notes



WARNING: Danger to life by electric shock!

- Only skilled persons may install, start up, and operate the device.
- Never carry out work when voltage is present.
- Establish connection correctly and ensure protection against electric shock.
- Connect the protective conductor device terminal block ⊕ with ground.
- Operation of the device is only permitted in mains network systems with grounded neutral conductor. This mainly complies with the TN-C-S mains network type. National regulations must be observed.
- Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).
- This unit receives power from more than one source - Disconnection of AC source and the energy storage devices is required to de-energize this unit before servicing.
- Keep flames, embers or sparks away from the module.
- When connecting the batteries, observe the polarity and do not short circuit the pole terminals.
- Provide a switch/circuit breaker close to the device at the AC input, AC output and at the battery terminals, which are labeled as the disconnecting device for this device.
- Do not disconnect the fuse and / or battery connection under hazardous location conditions.
- Use copper cables for operating temperatures of >75 °C.



CAUTION: Hot surface

The housing can become very hot depending on the ambient temperature and load of the power supply (T > 65 °C).



NOTE

- Observe the national safety and accident prevention regulations.
- Assembly and electrical installation must correspond to the state of the art.
- The uninterruptible power supply is a built-in device. The protection class IP20 of the device is meant to be applied in a clean and dry environment.
- The device must be installed in a control cabinet that can be locked and only opened by specialist staff.
- Horizontal mounting position (normal mounting position)
- Observe mechanical and thermal limits.
- Ensure sufficient convection (minimum gap above/below: 50 mm). Housing can become hot.
- Ensure that the primary-side wiring and secondary-side wiring are the correct size and have sufficient fuse protection.
- You can find the connection parameters, such as the necessary stripping length for the wiring with and without ferrule, in the associated table.
- Protect the device against foreign bodies penetrating it, e.g., paper clips or metal parts.
- Depending on the ambient temperature and load on the uninterruptible power supply, the housing can become hot.
- To reduce the risk of fire, replace only with same type and rating of fuse.
- To reduce the risk of fire, connect the device only to a circuit provided with the maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70. See the values in the technical data.
- The uninterruptible power supply is maintenance-free. Repairs may only be carried out by the manufacturer. The warranty no longer applies if the housing is opened.
- The uninterruptible power supply may only be used for its intended use.
- Improper use invalidates the device protection.
- Before transporting the uninterruptible power supply, always disconnect the battery connecting cable from a battery contact or remove the DC fuse in the battery compartment.



More follows

- Use current-limited source or suitable fuse.
- Use ferrules for flexible cables.
- The switching outputs are active outputs according to SELV. These may only be operated on permitted SELV circuits.
- This equipment is an open-type device meant to be installed in an enclosure suitable for the environment that is only accessible with the use of a tool.
- Keep these instructions in a safe place – this data sheet contains important safety notes which must be observed during installation and maintenance of the device.

6 Structure

6.1 Function elements

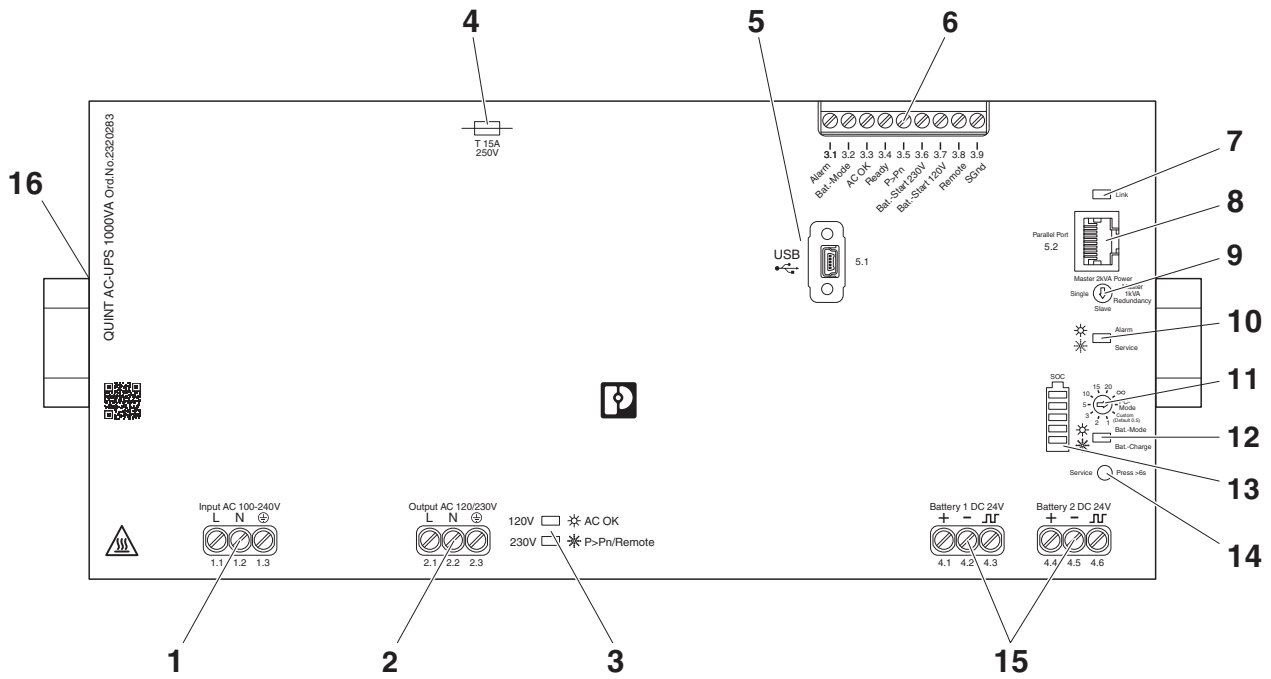


Figure 1 Position of the function elements

Key

No.	Designation
1	Connection terminal blocks for AC input
2	Connection terminal blocks for AC outputs
3	LED AC OK and LED remote
4	Bypass fuse
5	USB interface
6	Signaling connection terminal blocks
7	LED parallel run
8	Communication interface parallel run
9	Rotary selector switch parallel run mode
10	LED alarm / service
11	Rotary selector switch
12	LED bat. mode / bat. charge
13	Bar graph for displaying the current charging state of the energy storage device
14	Service mode button
15	Battery terminal blocks
16	2x base latch (rear side of the device)

6.2 Device dimensions and keep-out areas

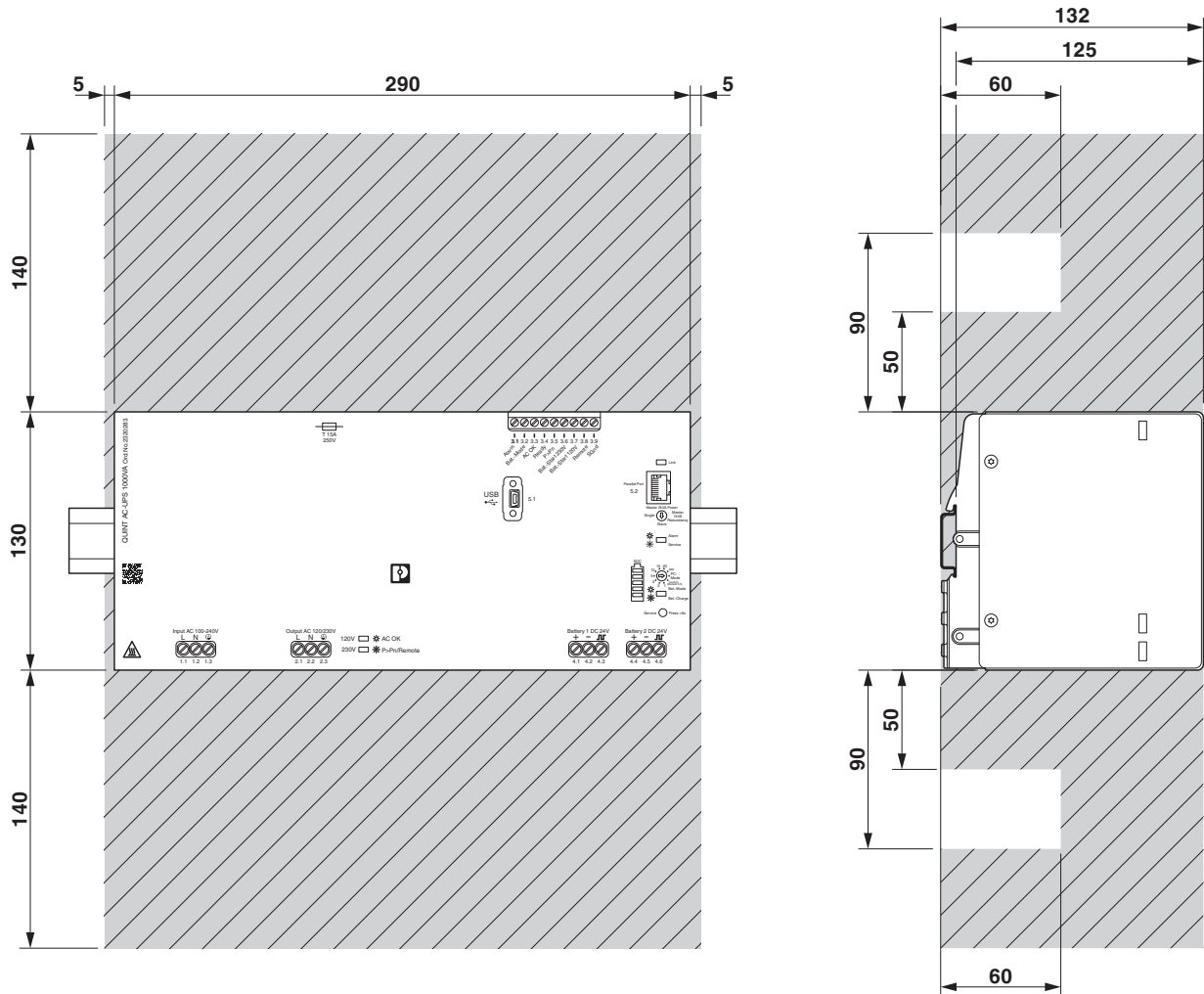


Figure 2 Device dimensions and keep-out areas

6.3 Block diagram

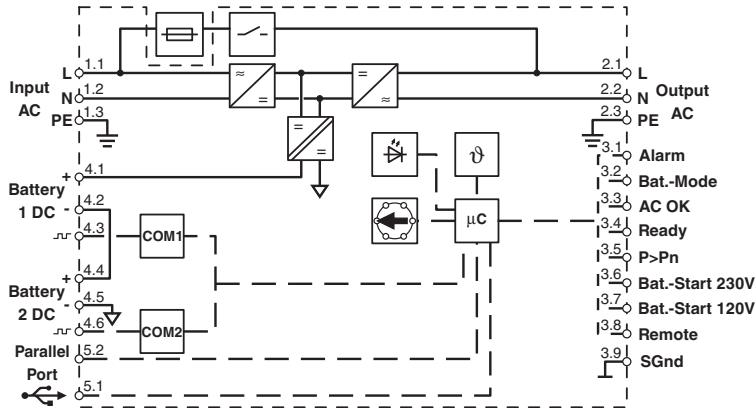













Figure 3 Block diagram

Key

Element	Meaning
	Bypass fuse
	Switch
	Rectifier
	DC/DC converter with electrical isolation
	Inverter
	Microcontroller
	LED
	Temperature sensor
	Selector switch
	Battery communication (COM1)
	Battery communication (COM2)

7 Mounting and removing



NOTE

The device must be installed in a control cabinet that can be locked and only opened by specialist staff.

7.1 Convection



NOTE: enable convection

Depending on the ambient temperature and load on the uninterruptible power supply, the housing can become hot.

In order to ensure sufficient convection, we recommend a minimum vertical distance of 50 mm to the other devices.

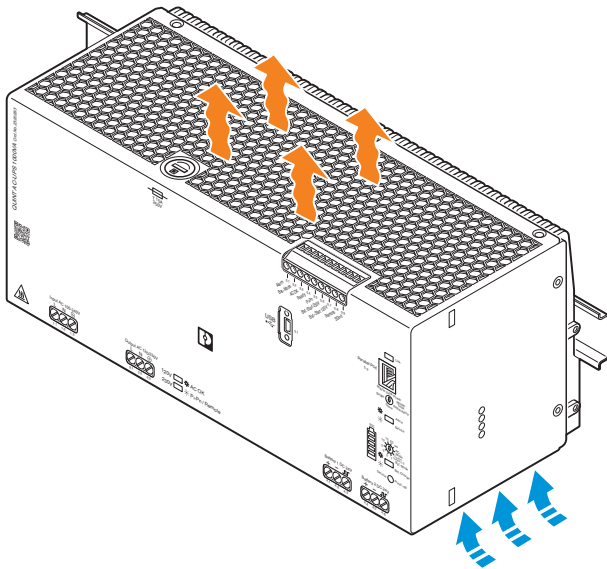


Figure 4 Convection

7.2 Normal mounting position



The device can be snapped onto all DIN rails according to EN 60715 and should only be mounted in the normal mounting position.

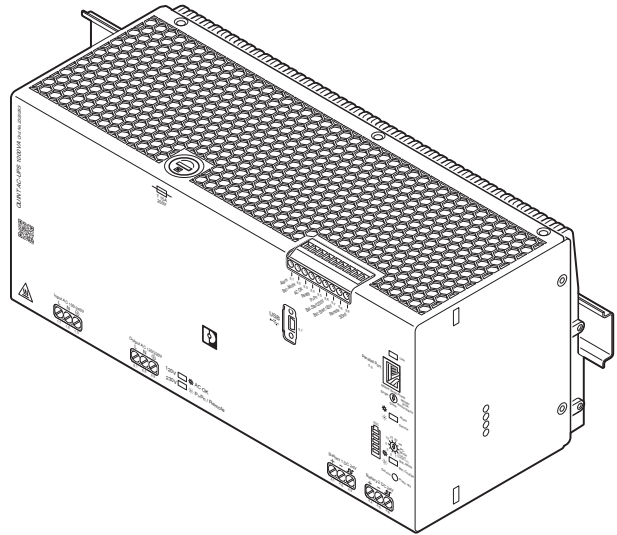


Figure 5 Normal mounting position

7.3 Mounting the uninterruptible power supply

Proceed as follows to mount the device:

1. In the normal mounting position the device is mounted on the DIN rail from above. When doing so, ensure that the base latch engages correctly behind the DIN rail (A).
2. Push the front of the device in the direction of the mounting surface until the base latch audibly snaps in (B).
3. Check that the UPS is securely attached to the DIN rail.

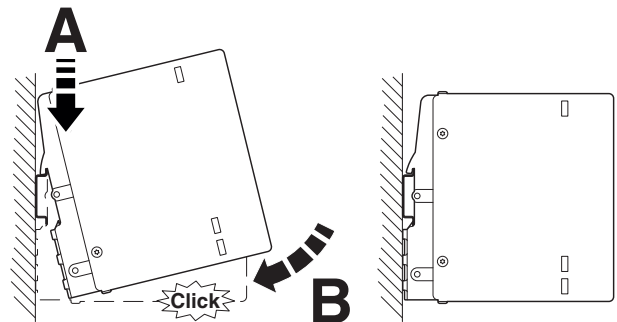


Figure 6 Snapping onto the DIN rail

7.4 Removing the uninterruptible power supply

Proceed as follows to remove the device:

1. Take a suitable screwdriver and insert this into the lock hole on the base latch (A).
2. Release the lock by lifting the screwdriver (B).
3. Perform these procedures (A) and (B) for the second base latch.
4. Carefully swivel the device forward (C) so that the lock slides back into the starting position.
5. Then separate the device from the DIN rail (D).

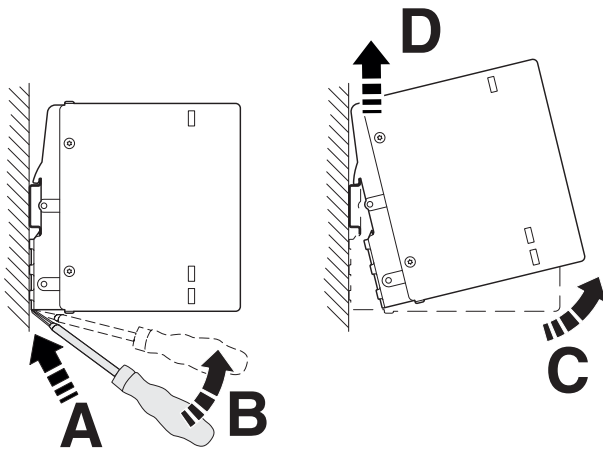


Figure 7 Removing from the DIN rail

7.5 Wall mounting

The UWA 130 universal wall adapter (Order No. 2901664) is used to attach the uninterruptible power supply directly to the mounting surface.

The use of the universal wall adapter is recommended under extreme ambient conditions, e.g., strong vibrations. Thanks to the tight screw connection between the uninterruptible power supply and the universal wall adapter or the actual mounting surface, an extremely high level of mechanical stability is ensured.



The maximum tightening torque of the Torx screw (Torx® T10) is 0.7 Nm.
Make sure you use suitable mounting material when attaching to the mounting surface.

7.5.1 Mounting the UWA 130 2-piece universal wall adapter



The UWA 130 universal wall adapter (Order No. 2901664) is attached to the device using the Torx screws provided.

Proceed as follows to install the universal wall adapter:

1. Position the two-piece universal wall adapter on the right and left side of the housing.
2. Insert the Torx screws into the appropriate hole pattern on the universal wall adapter so that the necessary mounting holes of the device can be accessed.
3. Screw the two-piece universal wall adapter onto the uninterruptible power supply.

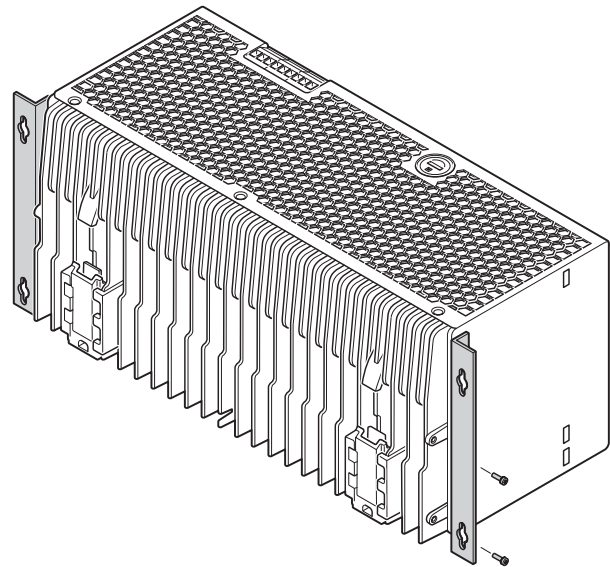


Figure 8 Mounting the UWA 130 universal wall adapter

8 Device connection

The working ranges of the uninterruptible power supply are specified in the following table.



Note the different performance and tolerance values for the various voltages.

Input				Output		
Voltage	Voltage neg. tol.	Voltage pos. tol.	Current	Voltage	Current	Power
100V 50Hz / 60Hz	10 %	20 %	10,4 A	100 V	7,8 A	778 VA / 700 W
110V 50Hz / 60Hz	10 %	20 %	10,5 A	110 V	8,1 A	889 VA / 800 W
120V 50Hz / 60Hz	10 %	20 %	10,5 A	120 V	8,3 A	1000 VA / 900 W
130V 50Hz / 60Hz	10 %	20 %	9,7 A	130 V	7,7 A	1000 VA / 900 W
200V 50Hz / 60Hz	20 %	20 %	6,4 A	200 V	5,0 A	1000 VA / 900 W
210V 50Hz / 60Hz	20 %	20 %	6,0 A	210 V	4,8 A	1000 VA / 900 W
220V 50Hz / 60Hz	20 %	20 %	5,7 A	220 V	4,5 A	1000 VA / 900 W
230V 50Hz / 60Hz	20 %	15 %	5,5 A	230 V	4,3 A	1000 VA / 900 W
240V 50Hz / 60Hz	20 %	10 %	5,3 A	240 V	4,2 A	1000 VA / 900 W

Figure 9 Working range of the uninterruptible power supply

The uninterruptible power supply automatically detects if there is an input voltage from the 100 V range or from the 200 V range.

- The following output voltages are preset by default:
- 120 V AC at an input voltage in the 100 V range
 - 230 V AC at an input voltage in the 200 V range

The uninterruptible power supply automatically detects if there is a frequency in the 50 Hz or 60 Hz range.

The following frequency is set at the output:

- 50 Hz +/- 5 % at an input frequency of 45 Hz to < 55 Hz
- 60 Hz +/- 5 % at an input frequency of 55 Hz to 65 Hz

If you require another output voltage or output frequency, you can configure this using the UPS-CONF configuration software.



Configure the uninterruptible power supply for a non-connected load or via a service USB interface without input voltage. This prevents the UPS from being supplied with an impermissible voltage or frequency.



The configured values for the output voltage and output frequency take effect when the device and battery start up.

8.1 AC input

The supply voltage is connected via "Input AC 100 - 240 V" connection terminal blocks.

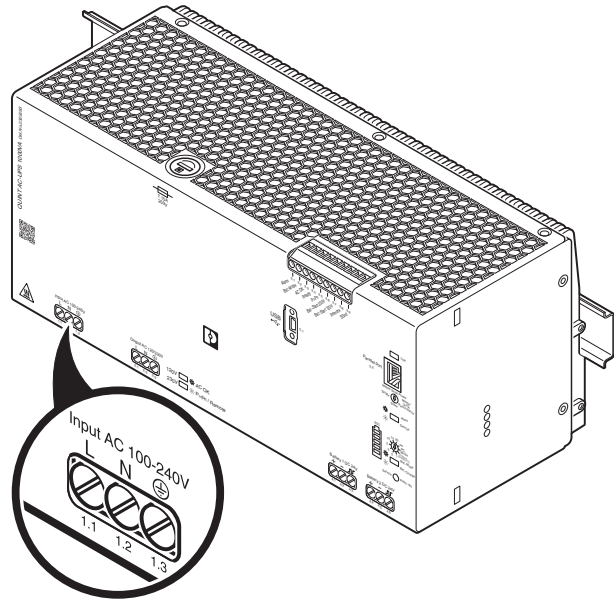


Figure 10 Connection terminal blocks for input

8.1.1 Protection of the primary side

It must be possible to switch the device off using a suitable disconnection device outside the power supply. For example, the primary-side line protection is suitable for this (see technical data).

The bypass fuse protects the device, especially when it starts. This fuse is accessible from the outside and, if necessary, can be replaced.

There are fuses inside the device that protect it. Additional device protection is not required.



If an internal fuse trips, this is due to a device fault. In this case, the device must be inspected in the factory. Opening the device or repairing it yourself is prohibited.

8.2 AC output

Buffered output voltage is connected via "Output AC 120/230V" connection terminal blocks.

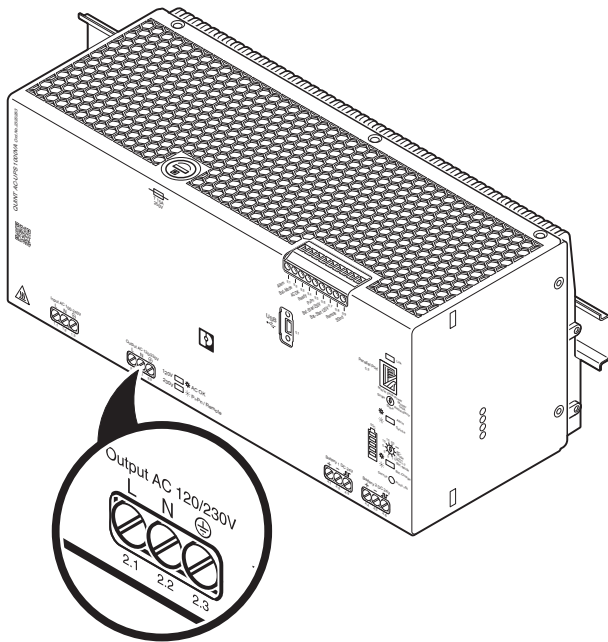


Figure 11 Connection terminal blocks for output

8.3 DC battery

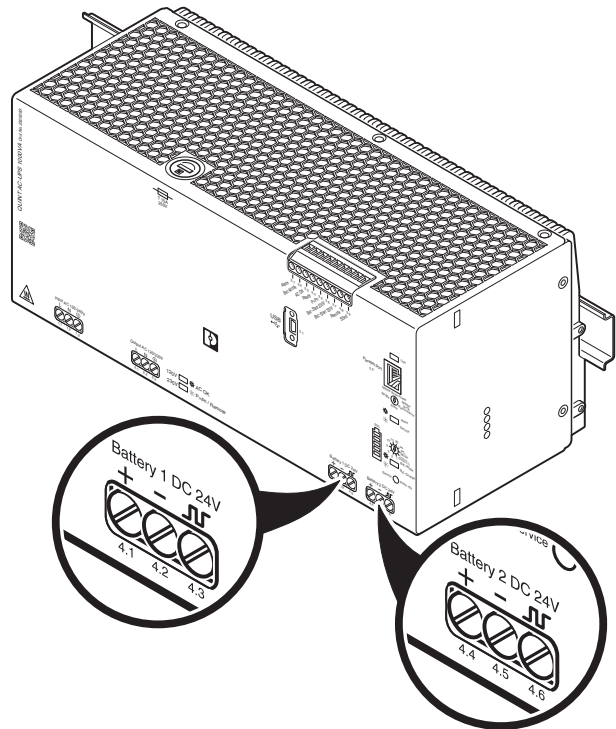


Figure 12 Battery connection

8.2.1 Protection of the secondary side

The uninterruptible power supply is electronically short-circuit-proof and idling-proof. It must be ensured that all output cables are dimensioned appropriately for the maximum output current or have separate protection.

8.4 Connection terminal block signaling

The uninterruptible power supply has the signal outputs:

- Alarm (can be inverted via software)
- Bat. Mode (can be inverted and parameterized via software)
- AC OK (can be inverted and parameterized via software)
- Ready (can be inverted and parameterized via software)
- $P > P_n$ (can be inverted and parameterized via software)

The uninterruptible power supply also features the signal inputs:

- Remote
- Bat.-Start 120 V
- Bat.-Start 230 V

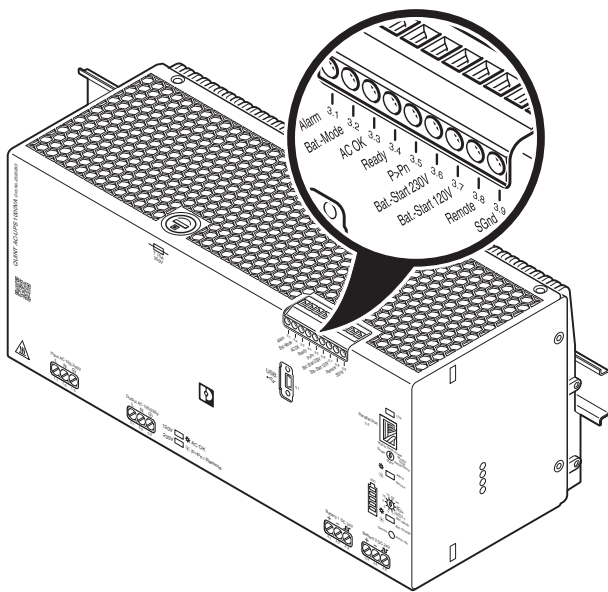


Figure 13 Signal inputs and outputs

8.5 Conductor cross sections

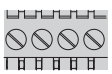

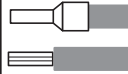

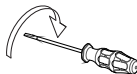
							
		[mm ²]	[mm ²]	AWG	[mm]	[Nm]	[lb in]
Input AC 1.1...1.3	Screw	0.2-6	0.2-4	30-10	8	0.5-0.6	5-7
Output AC 2.1...2.3		0.2-6	0.2-4	30-10	8	0.5-0.6	5-7
Battery 1 DC 4.1...4.3		0.2-6	0.2-4	30-10	8	0.5-0.6	5-7
Battery 2 DC 4.4...4.6		0.2-6	0.2-4	30-10	8	0.5-0.6	5-7
Signals 3.1...3.9		0.2-1.5	0.2-1.5	30-12	8	0.5-0.6	5-7

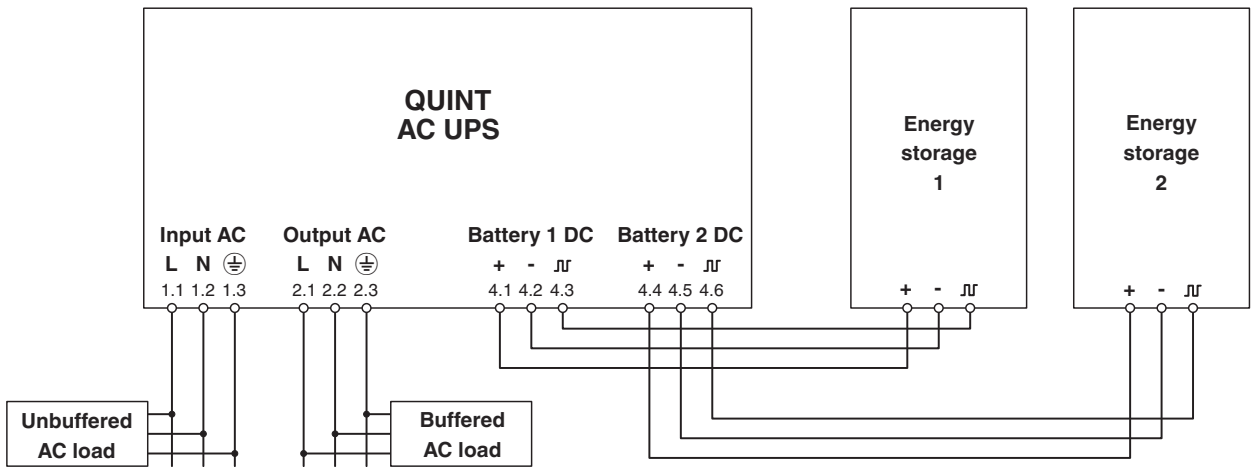
Figure 14 Conductor cross sections

8.6 Installation of individual components

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



Provide a switch/circuit breaker close to the device at the AC input, AC output and at the battery terminals, which are labeled as the disconnecting device for this device.



Protective conductor

Figure 15 Schematic design



The image is a schematic representation of the design and does not contain all parts. Observe the installation instructions.

9 Device operation

Basic settings for commissioning can be made directly via the rotary selection switch on the device. Advanced settings can be made via the UPS-CONF PC software.



The latest software version is to be found in the product download area.

9.1 Setting the operating mode

You can set the following functions via the rotary selector switch on the front of the device:

- Buffer period
- PC mode

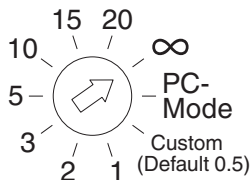


Figure 16 Rotary selector switch



Use a suitable screwdriver to set the rotary selector switch.

9.1.1 Buffer time

Rotary selector switch 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 energy. An alarm is generated as soon as the voltage of the energy storage falls below 20.4 V (default).

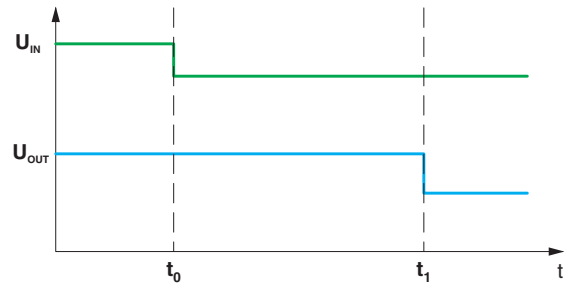


Figure 17

t_0 : mains power failure

t_1 : after the preset buffer time has expired, the output is switched off

9.1.2 PC mode

In PC mode, you can individually parameterize the chronological sequence of the UPS functions via the UPS-CONF configuration software.

To access the PC mode of the UPS, set the rotary selector switch to PC mode.



The following components are required for the PC mode function:

Data cable MINI-SCREW-USB-DATACABLE (Order No. 2908217)

Configuration software UPS-CONF (Order No. 2320403)

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

1. Delay time

If the mains supply is not restored during the delay time, the PC is shut down.

2. Program start

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

3. PC shutdown

The time required for PC shutdown is set here.

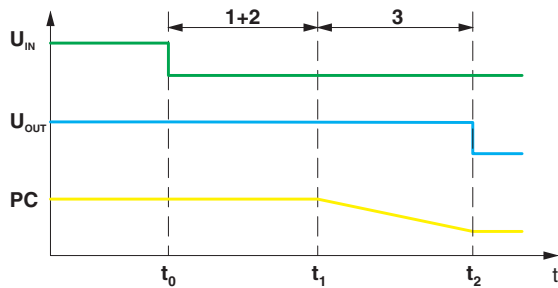


Figure 18

t_0 : mains power failure

t_1 : delay time and program runtime have expired, PC will be shut down

t_2 : the PC has shut down, the output will be switched off

4. PC idle time

Only if the PC is shut down and the mains supply is restored in the meantime is the output voltage interrupted for the reset time and the PC then started automatically.

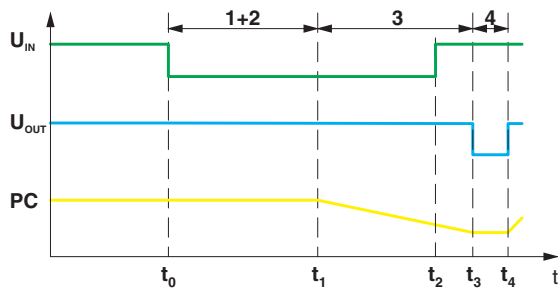


Figure 19

t_0 : mains power failure

t_1 : delay time and program runtime have expired, PC will be shut down

t_2 : mains restored while PC is shutting down

t_3 : the PC has shut down and the output will be switched off, PC idle time starts

t_4 : the PC idle time has expired, PC is starting back up

9.1.3 Service mode

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

Service  Press >6s

Figure 20 Service mode buttons



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.

Energy storage device replacement



WARNING

When connecting the batteries take note of the polarity.

Do not short circuit the pole terminals.

The batteries are maintenance free and may not be opened.



NOTE

When replacing batteries, always use new batteries from the same production batch.

When replacing batteries, you should always replace all of the batteries in use.



When storing the battery modules, observe the latest startup date and recharge the batteries if necessary. The batteries may only be recharged using the uninterruptible power supply.

To replace the energy storage device, proceed as follows:

1. Press and hold down the Service Mode button more than 6 s.
2. Remove the fuses.
3. Remove the cabling of the battery blocks.
4. Remove the batteries.
5. Install the new batteries.
6. Connect the cabling of the battery blocks.
7. Insert the fuses.
8. Exit Service mode.
 - a) With acknowledgment of the battery replacement: Press and hold down the Service Mode button for more than 6 s (the LED bar graph flashes 6 times and the red LED goes out).

Acknowledge the battery replacement to confirm it. Assuming that there are new batteries, the SOH (State of Health) and SOC (State of Charge) are recalculated.

- b) Without acknowledgment of the battery replacement:
Press and hold down the Service Mode button for more than 1 s and less than 6 s (the red LED goes out).

9. Set the buffer time or PC mode.

Notes on disposal



Do not dispose of the UPS and battery modules in household waste! They should be disposed of according to the currently applicable national regulations.



You can return used batteries and accumulators to Phoenix Contact or the manufacturer.

9.2 Remote

You can use the Remote signal terminal to:

1. Deactivate and exit battery operation.
2. Perform controlled shutdown of the PC in mains operation and battery operation.
3. Perform controlled shutdown of the PC in battery operation.

To perform these steps, you must connect the Remote signal terminal to the SGnd signal terminal.

1. Remote deactivates battery operation

You can deactivate battery operation using this function. This function is always active when a buffer time has been preset.

This function is the default setting in PC mode.

In mains operation, the Remote signal is indicated by the flashing green LED (see Signaling section).

In the event of mains failure, battery operation is not started.

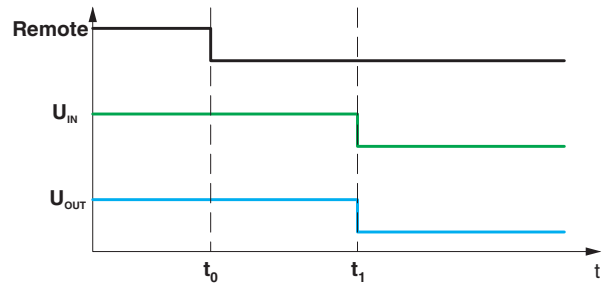


Figure 21

t_0 : remote signal is set in mains operation
 t_1 : no input voltage, output will be switched off

If the Remote signal is set in battery operation, battery operation is exited immediately. The UPS output is switched off. This procedure cannot be reversed. The UPS is only activated once the input voltage is applied.

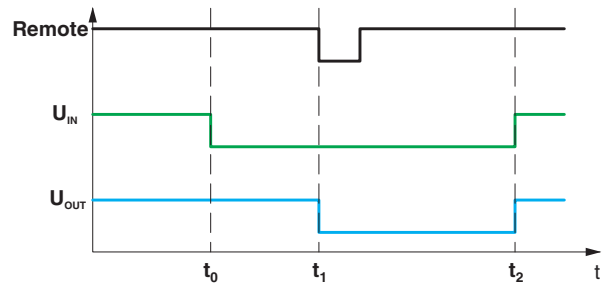


Figure 22

t_0 : no input voltage
 t_1 : remote signal is set in battery operation, output will be switched off
 t_2 : input voltage restored, output will be switched on

2. Remote starts undelayed PC-Shutdown

You can shut down the PC immediately via the UPS-CONF configuration software.

This setting only applies in PC mode.

The Remote signal is indicated by the flashing green LED (see Signaling section).

The PC shuts down, and the delay time under Item 1 is skipped (see PC mode section).

Once the PC has shut down, the UPS output is switched off. When input voltage is present, the connected energy storage devices remain charged and the system is ready to use. When you reset the Remote signal, the UPS output is switched on again.

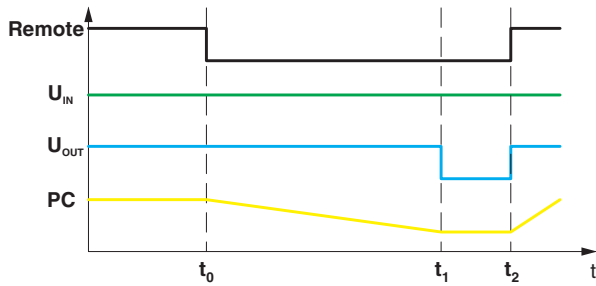


Figure 23

t_0 : remote signal is set during mains operation, PC will be shut down
 t_1 : PC has shut down, output will be switched off
 t_2 : remote signal will be reset, output will be switched back on



Once the PC has shut down in battery operation, the uninterruptible power supply output is switched off. This procedure cannot be reversed. The uninterruptible power supply is not activated until the input voltage is applied.

3. Remote starts immediate PC shutdown only in battery operation

You can perform immediate shutdown of the PC when battery operation is entered via the UPS-CONF configuration software.

This setting only applies in PC mode.

The Remote signal is indicated by the flashing green LED (see Signaling section).

If the Remote signal is set in mains operation, the PC is shut down when battery operation is entered. The delay time under Item 1 is skipped (see section PC mode).



Once the PC has shut down in battery operation, the uninterruptible power supply output is switched off. This procedure cannot be reversed. The uninterruptible power supply is not activated until the input voltage is applied.

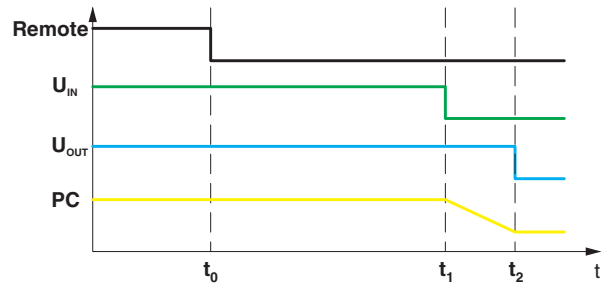


Figure 24

t_0 : remote signal is set in mains operation
 t_1 : no input voltage, PC shutdown begins immediately
 t_2 : the PC has shut down, the output will be switched off

9.3 Battery start (Bat.-Start 120 V / Bat.-Start 230 V)

You can use the signal terminal Bat.-Start 120 V or Bat.-Start 230 V to start the UPS without supply voltage on the input side and create an autonomous supply for the load. To do this, you must connect the signal terminal Bat.-Start 120 V or Bat.-Start 230 V to the SGnd signal terminal.

- Bat.-Start 120 V: The output voltage is 120 V / 60 Hz
- Bat.-Start 230 V: The output voltage is 230 V / 50 Hz

The maximum duration of the autonomous supply for the load depends on the charging state of the battery.

The signaling corresponds to the signaling for battery operation (see Signaling section).

To exit autonomous operation, you must disconnect the signal terminal Bat.-Start 120 V or Bat.-Start 230 V and the SGnd signal terminal.

If PC Mode operating mode is set, then in this case the PC shuts down immediately (see section Remote starts immediate PC shutdown).



Do not connect the communication line during a battery start, even for Phoenix Contact battery types. An alarm is always generated when connecting a communication line to a non-initialized battery. This does not negatively impact the supply to the connected load.

10 Method of operation

10.1 IQ technology

IQ Technology is an intelligent battery management system. In order to use IQ Technology, one of the following Phoenix Contact IQ battery types must be implemented:

- UPS-BAT/VRLA/24DC/...
- UPS-BAT/VRLA-WTR/24DC/...
- UPS-BAT/LI-ION/24DC/...

The respective battery type is connected to the uninterruptible power supply via three connecting cables. One cable each is connected to the plus (+) and minus (-) contacts for power transmission. A data cable is provided for communication.

The communication between the UPS and battery reveals the UPS of the battery type and the number of connected batteries. This uninterruptible power supply can use this information to calculate and configure the following parameters:

- SOC (State of Charge): current charging state and remaining runtime of the battery is always available.
- SOH (State of Health): displays the remaining battery life and warns of failures at an early stage.
- Optimal charging: the optimally set charging characteristics maximize the remaining service life of the battery and ensure the fastest possible recharge time and a high availability.

The batteries of the aforementioned type must first be fully charged (initialized) in order to determine the SOC and SOH. After this initial charging process, all IQ Technology functions are available.

10.2 Battery management

The uninterruptible power supply works with a 48 V battery system. Connect at least two 24 V batteries.

You can connect up to 5 batteries of the same type per battery string (battery connection terminals "Battery 1" and "Battery 2").

The following table shows the charging times for different battery capacitance levels:

Battery type	Battery capacity	Number/ Battery string	Charging time (approx.) [h]
UPS-BAT/ VRLA/24DC/...	3.4AH	1	4
	7.2AH	1	4
	12AH	1	4
	12AH	2	8
	38AH	1	12
	38AH	2	24
UPS-BAT/ VRLA-WTR/24DC/...	13AH	1	4
	26AH	1	8
	26AH	2	16
UPS-BAT/ LI-ION/24DC/...	120WH	1	2
	120WH	2	3
	924WH	1	11
	924WH	2	22

Figure 25 Battery charging times for various battery capacities

The battery charger for the uninterruptible power supply operates according to the IUoU charge curve.

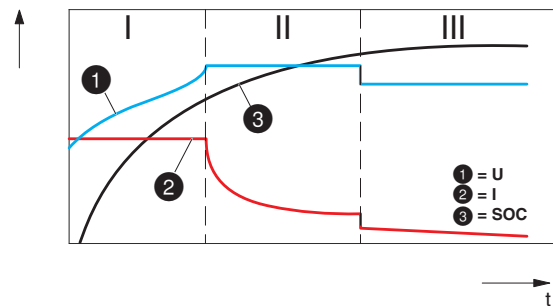


Figure 26 Charging characteristic

- Segment I: Base charge with a constant charging current until the end-of-charge equalization voltage is reached at the battery.
- Segment II: Charging with an end-of-charge equalization voltage until the charging current is reduced to a specific value.
- Segment III: Trickle charging with a constant trickle end-of-charge voltage to prevent self-discharge.

When using the Phoenix Contact IQ energy storage devices, all the necessary charging parameters are set automatically.

When using standard energy storage devices (not IQ Technology), you can set the following charging parameters using the UPS-CONF configuration software:

Parameter	Area	Default
Nominal capacity	3 ... 200 Ah	-
Initial charging current	0.2 ... 5 A	2.8 A
Absorption charging end voltage	50 V to 60 V	56 V
Float charging end voltage	50 V to 60 V	55.2 V
Temperature compensation (of the charging voltages)	0 mV / K ... -200 mV / K	-42 mV / K
End-of-discharge voltage	36 ... 48 V	38.4 V



When using Phoenix Contact IQ battery types, the configurable parameters are ignored. The values from the IQ battery types are used to configure the charger.

If segment III (see the charging characteristic figure) is not achieved within a specific period, an alarm is generated (alarm: maximum charging time exceeded). The uninterruptible power supply uses the charging parameters to calculate the permitted time.

11 Signaling

Various LED indicators are available for visual function monitoring of the uninterruptible power supply. Active signal outputs can be used to forward this data to a higher-level control system.

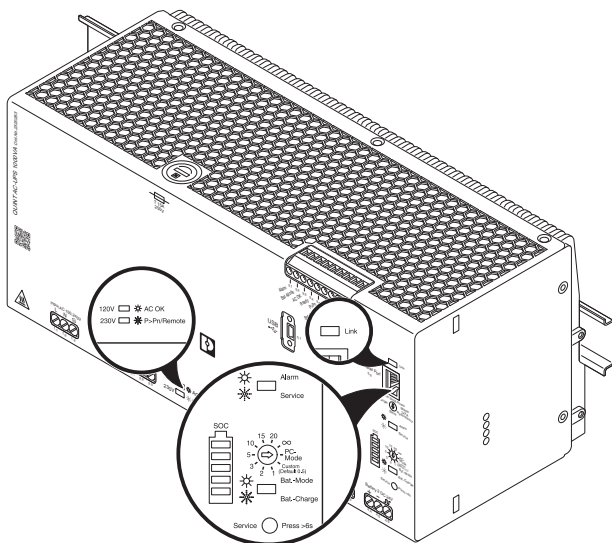


Figure 27 LED indicators

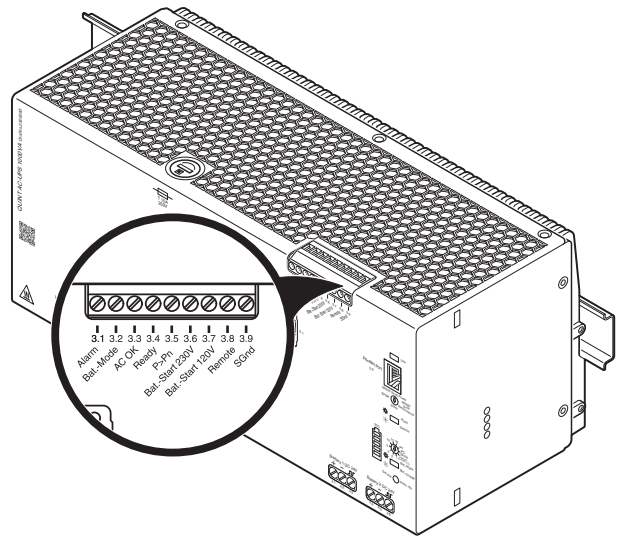


Figure 28 Signal inputs and outputs

11.1 LED indicators and signal outputs

For UPS signaling and the corresponding states, please refer to the table below.

Status LED			Switching output					Note
120V / 230V	Bat.	Alarm	Bat.-Mode	Ready	Alarm (active low)	AC OK	P>Pn	
○	○	○	low	low	low	low	low	Device off
●	●	●	low	low	high	low	low	Initialization, LED test (~3 sec.)
●	○	○	low	high	high	high	low	Mains operation, battery is fully charged
	☀ D = 50%	○	low	low or high	high	high	low	Mains operation, battery charging in process
	●	○	high	high or low	high	high	low	Battery mode
	○	●	low	low	low	high	low	Mains operation, battery failure
	○	☀ D = 50%	low	low	low	high	low	Mains operation, service mode for battery change
	●	●	high	low	low	high	low	Battery mode, battery voltage low
☀ D = 50%	○	○	low	high	high	high	high	Mains operation, overload, battery is fully charged
	●	○	high	high or low	high	high	high	Battery mode, overload
	☀ D = 50%	○	low	low or high	high	high	high	Mains operation, overload, battery charging in process
	○	●	low	low	low	high	high	Mains operation, overload, battery failure
	○	☀ D = 50%	low	low	low	high	high	Mains operation, overload, service mode for battery change
☀ D = 85%	○	○	low	high	high	high	low	Mains operation, remote contact shorted to SGnd, battery is fully charged
	☀ D = 50%	○	low	low or high	high	high	low	Mains operation, remote contact shorted to SGnd, battery charging in process
	●	○	high	high or low	high	high	low	Battery mode, remote contact shorted to SGnd, (only PC-Mode)
	○	●	low	low	low	high	low	Mains operation, remote contact shorted to SGnd, battery failure
	○	☀ D = 50%	low	low	low	high	low	Mains operation, remote contact shorted to SGnd, service mode for battery change
Link								
○	—	—	—	—	—	—	—	Single mode
●	—	—	—	—	—	—	—	Parallel system in operation
☀ D = 50%	—	—	—	—	—	—	—	Malfunction in parallel system



Figure 29 LED indicators and signal outputs

11.2 Signal outputs

Alarm

In the event of an alarm, the signal output is active (low level). The signal status can be inverted via the UPS-CONF configuration software.

A digital transistor output is available as a signal contact.

This signal is indicated visually by a red LED.

Possible general alarms include:

- Shutdown when overloaded
- Service mode active
- Bypass fuse defective

Possible battery alarms include:

- No battery connected
- Batteries of different types connected
- Low battery voltage in the network operation
- Block voltage difference too large
- Permitted charging time exceeded
- End of the battery life reached SOH (State of Health), can be adjusted using UPS-CONF
- Low battery voltage in battery operation, can be adjusted using UPS-CONF
- Low SOC (State of Charge) in battery operation, can be adjusted using UPS-CONF
- Low remaining buffer time in battery operation, can be adjusted using UPS-CONF

Possible alarms in the parallel system include:

- Impermissible settings in the devices
- No redundancy present (in general, the total load is too large)
- System error

Bat.-Mode

If there is a mains failure and the load is being supplied from the energy storage device, the signal output is active (high level). The signal status can be inverted via the UPS-CONF configuration software.

A digital transistor output is available as a signal contact.

This signal is indicated visually by a yellow LED.

You can assign other additional information to this signal output using the UPS-CONF configuration software.

AC OK

If the load is being supplied, the signal output is active (high level). The signal status can be inverted via the UPS-CONF configuration software.

A digital transistor output is available as a signal contact.

This signal is indicated visually by a green LED.

Either the 120 V or 230 V LED lights up permanently (depending on the detected voltage range).

You can assign other additional information to this signal output using the UPS-CONF configuration software.

Ready

If the energy storage devices are fully charged (SOC = 100 %), the signal output is active (high level).

The signal status can be inverted via the UPS-CONF configuration software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the UPS-CONF configuration software.

P>Pn

If the output power exceeds the maximum permitted output power, the signal output is active (high level).

The signal status can be inverted via the UPS-CONF configuration software.

A digital transistor output is available as a signal contact.

This signal is indicated visually by a green LED.

Either the 120 V or 230 V LED flashes (depending on the detected voltage range).

You can assign other additional information to this signal output using the UPS-CONF configuration software.

11.3 Signal inputs

Remote

You can activate and trigger various functions using the remote signal input. For additional information, please refer to the "Remote device operation" section.

This signal is indicated visually by a green LED.

Either the 120 V or 230 V LED flashes (depending on the detected voltage range).



A change made to the remote function using the UPS-CONF configuration software is not applied until a corresponding status change of the remote signal input or device restart has been carried out.

Bat.-Start (Bat.-Start 120 V / Bat.-Start 230 V)

You can use the Bat.-Start 230 V or Bat.-Start 120 V signal terminals to start the UPS without supply voltage on the input side. For additional information, please refer to the section "Device operation, battery start".

11.4 LED bar graph display / Bat. LED

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

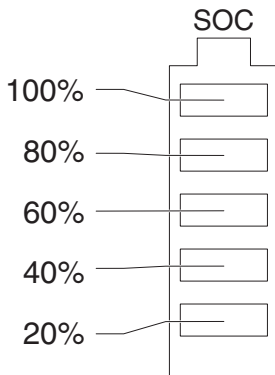


Figure 30 Bar graph display (SOC)

Depending on the type of energy storage device used (whether it is equipped with IQ technology or not), the bar graph display varies from the battery charging display to the battery discharging display.

The battery LED (bat. mode / bat. charge) indicates whether the battery is being charged or discharged.

11.4.1 Charging



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

IQ energy storage device - not initialized

As the state of charge (SOC) of the energy storage device is still unknown when installing it for the first time, the device must be fully charged once. Until the device has been fully charged for the first time, the LED bar graph display fills up repeatedly from bottom to top.

The bat. LED flashes during the charging process. If the energy storage device is fully charged, all five segments of the LED bar graph display light up and the bat. LED is off.

IQ energy storage device - initialized

The energy storage device has already been fully charged once. The energy storage characteristics are determined.

The individual segments of the LED bar graph display are illuminated based on the current state of charge (SOC) of the energy storage device. The current charging state is indicated by permanently illuminated segments. In this case, each segment corresponds to 20 % of the total capacity.

The flashing segment displays the charging process for the next 20 % segment.

Standard energy storage devices (without IQ technology)

The bottom LED bar graph display segment and bat. LED flash during the charging process.

If the energy storage device is fully charged, the bottom segment of the LED bar graph display continues to flash and the bat. LED is off.

11.4.2 Discharging

IQ energy storage device - not initialized

The energy content is not displayed because the state of charge of the energy storage device is unknown.

During the discharging process, the LED bar graph display empties from top to bottom. The bat. LED lights up permanently.

IQ energy storage device - initialized

The energy storage device has already been fully charged once. The energy storage characteristics are determined.

The individual segments of the LED bar graph display are illuminated based on the current state of charge (SOC) of the energy storage device. The current charging state is indicated by permanently illuminated segments. In this case, each segment corresponds to 20 % of the total capacity.

If the SOC (State of Charge) < 20 %, the bottom segment of the LED bar graph display lights up in red.

During the discharging process, the bat. LED lights up permanently.

Standard energy storage devices (without IQ technology)

During the discharging process, the LED bar graph display is off. The bat. LED lights up permanently.

12 Interfaces

The uninterruptible power supply unit is equipped with 3 interfaces for data transmission.

1. USB interface MINI type B
2. Communication interface parallel run
3. Service USB interface Mini type B (bottom of the device)

12.1 USB interface MINI type B

The uninterruptible power supply is equipped with a USB Mini type B interface for data transmission.

A data cable is required for communicating with a PC or a higher-level controller.

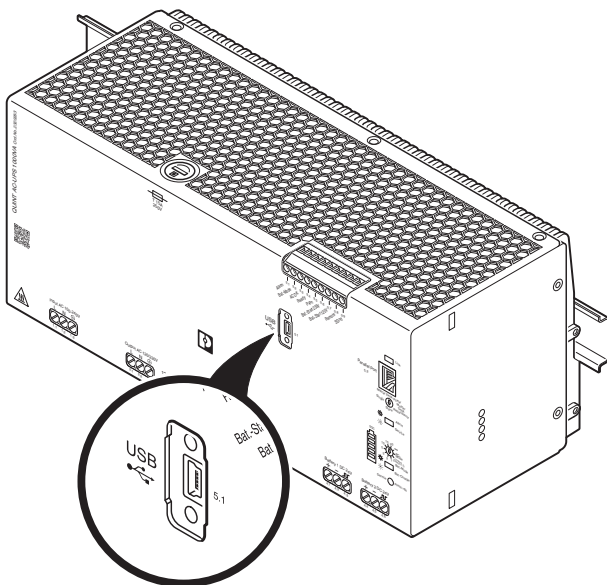


Figure 31 USB interface MINI type B

12.1.1 MINI-SCREW-USB-DATACABLE

The uninterruptible power supply unit is connected to the USB PC connection with data cable MINI-SCREW-USB-DATACABLE (Order No. 2908217) via USB interface mini type B.

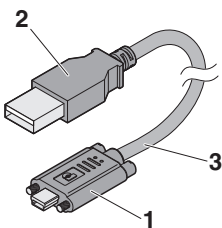


Figure 32 MINI-SCREW-USB-DATACABLE

No.	Designation
1	Mini type B USB connector with screw connection
2	USB plug type A
3	Cable length: 3 m

12.2 Communication interface parallel run

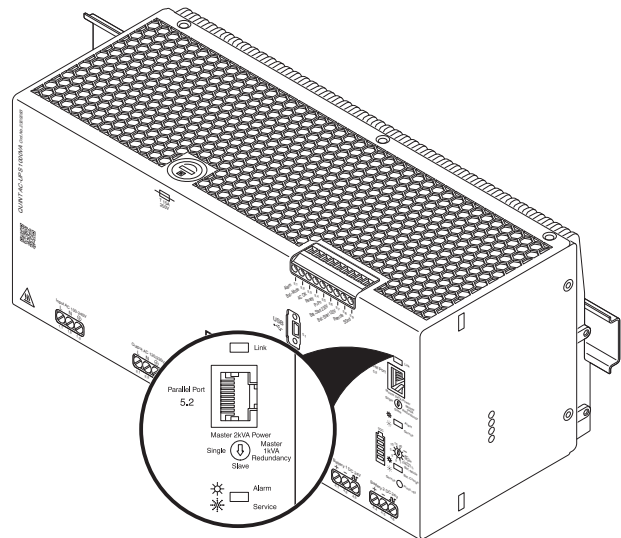


Figure 33 Communication interface parallel run

You can find additional information on the communication interface in the Parallel Operation section.

12.3 Service USB interface Mini type B



Connection via the service Mini type B USB interface is not electrically isolated.

The uninterruptible power supply unit is connected to the USB PC connection with data cable CABLE-USB/MINI-USB-3.0M (Order No. 2986135) via the service Mini Type B USB interface.

You can find the interface on the right bottom side of the device.

The data cable can be used to parameterize the uninterruptible power supply, even if there is no input voltage.

13 Parallel operation

You can connect two UPS devices in parallel in order to increase the power or to supply the loads redundantly. Configuration is carried out using the parallel running mode rotary selector switch on the front of the device.

Set the rotary selector switch of a UPS to "Master 2 kVA Power" to increase its power. Set the rotary selector switch of the second UPS to "Slave".

Set the rotary selector switch of a UPS to "Master 1 kVA Redundancy" to ensure a redundant load supply. Set the rotary selector switch of the second UPS to "Slave".

The rotary selector switch configuration is applied during device startup. Changes to the rotary selector switch configuration during operation have no effect on the proper functioning of the UPS.

During parallel operation, connect the uninterruptible power supplies with an RJ45 twisted pair patch cable via the parallel running communication interfaces.

The outputs of the two UPS devices are connected to each other directly. The output power is distributed symmetrically to each UPS in all parallel running modes.

Observe the following points when carrying out parallel connection:

1. Always connect the same number and same type of energy storage devices to the UPS devices.
2. Use the parallel running rotary selector switch to configure the individual UPS devices (see the section "Parallel operation").
3. Use the same cable cross sections for wiring.
4. Use the same cable lengths up to the AC convergence point.
5. Operate the UPS devices in the same temperature conditions.

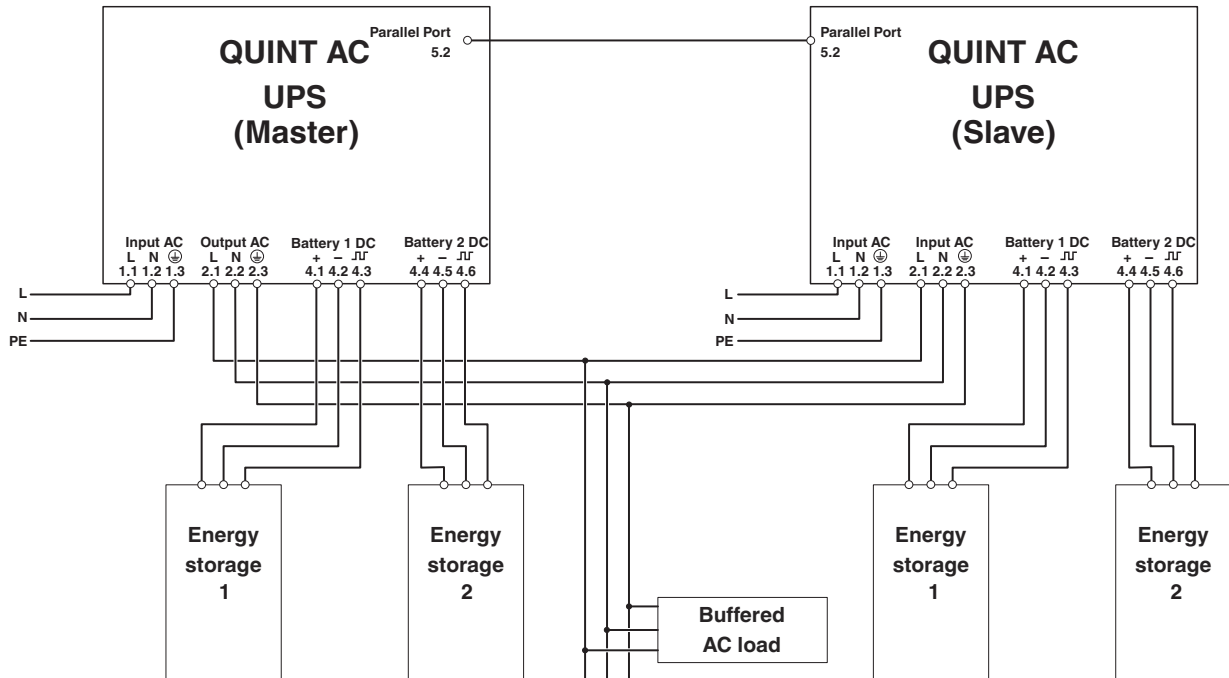


Figure 34 Schematic layout - parallel operation

During parallel operation, the following settings are transferred from the master device to the slave device. The settings of the slave device are ignored here:

- Selecting the operating mode (buffer time / PC mode) using the rotary selector switch
- Remote signal terminal operation
- Configuration using UPS-CONF configuration software. Changes to the settings can only be made using the master device and are permanently transferred to the slave device. Both of these devices can read parameters.

The following alarm messages are available in parallel operation:

- Parallel mode is not possible:
This combination of two master or slave devices is not permitted.
- No redundancy:
The device fails in redundant operation or the total power is too high in redundant operation. This means that in the case of a device fault, the load cannot be supplied using a device.
- System error:
Each alarm in parallel operation is displayed as a sum message. All alarm signal outputs can be used.

13.1 Increasing power

Parallel connection for increased power is used when extending existing systems. If the individual UPS does not cover the current consumption of the most powerful consumer, parallel connection of UPS devices is recommended. The output power can be doubled for two UPS devices connected in parallel.

Settings in the parallel running mode rotary selector switch:

- UPS 1: "Master 2 kVA Power"
- UPS 2: "Slave"

13.2 Redundant operation

Redundant operation of UPS devices is suitable for supplying systems and system parts which place particularly high demands on operational safety. In the event of a fault, it must be ensured that one of the uninterruptible power supplies is able to provide the total required power for the load.

Settings in the parallel running mode rotary selector switch:

- USV 1: „Master 1 kVA Redundancy“
- UPS 2: "Slave"

14 Derating

14.1 Ambient temperature

At an ambient temperature of up to 50 °C, the uninterruptible power supply supplies the continuous nominal power. At an ambient temperature of > 50 °C, a power derating of 2.5%/K should be observed for the uninterruptible power supply.

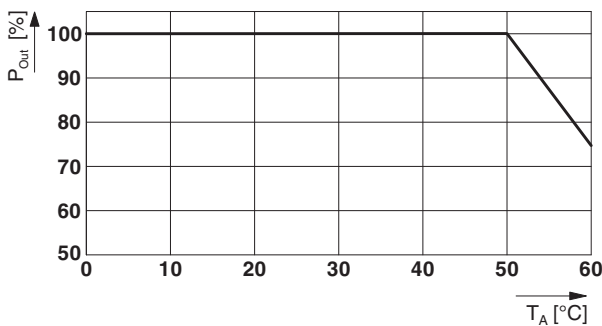


Figure 35 Temperature-dependent derating

14.2 Installation height

The uninterruptible power supply can be operated at an installation height of up to 2000 m without any limitations. Different data applies for installation locations above 2000 m due to the differing air pressure and the reduced convection cooling associated with this.

A power derating of 0.6%/100 m should be observed for installation heights between 2000 and 3000 m.

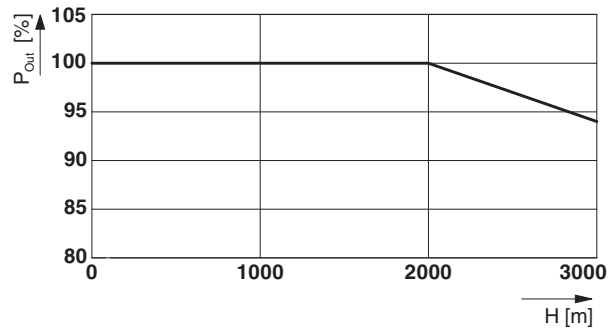


Figure 36 Altitude-dependent derating