# QUINT-HP-UPS/120AC/1.5KVA/PT

## Uninterruptible power supply



Data sheet
110729_en_01

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## 1 Description

The QUINT-HP-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.

- Online UPS (VFI-SS-111) with pure sine wave voltage at the output
- Parallel connection possible for increased performance, redundancy and for 3-phase operation
- Optimum use of the buffer time and preventive battery monitoring
- Maximum energy efficiency
- Extensive signaling and parameterization
- Flexible configuration
- PC mode for safely shutting down industrial PCs, for example

| Technical data (short form) | |
|---|---|
| Nominal input voltage | 100 V AC , 110 V AC , 120 V AC , 130 V AC |
| Frequency range | 47.5 Hz ... 52.5 Hz / 57 Hz ... 63 Hz |
| Current consumption ( 100% load , Charger active ) * | nom. 15.9 A ( 120 V AC ) / max. 21.5 A ( 120 V AC ) |
| Apparent power | 1500 VA |
| Real power | 1350 W |
| Nominal output voltage ($U_N$) | 100 V AC , 110 V AC , 120 V AC , 130 V AC |
| Nominal output current ( 100% load ) * | nom. 12.5 A ( 120 V AC ) |
| Efficiency ( 100% load, battery charged ) | > 94 % |
| Ambient temperature (operation) | -25 °C ... 60 °C |
| Derating ( Output power, charging current ) | > 50 °C: 2,5 % / K |
| Dimensions (W/H/D) | 150 mm / 240 mm / 143 mm |
| Weight | 4400 g |
| Nominal voltage ( Battery ) | 48 V DC |
| Nominal capacity range | 7 Ah ... 200 Ah |

* for further information, see the section on device connection

All technical specifications are nominal and refer to a room temperature of 25 °C and 70% relative humidity at 2000 m above sea level.

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# 3 Ordering data

| Description | Type | Item no. | Pcs./Pkt. |
|---|---|---|---|
| QUINT AC UPS, IQ Technology, Panel mounting, input: 120 V AC, output: 120 V AC / 1500 VA. | QUINT-HP-UPS/120AC/ 1.5KVA/PT | 1136804 | 1 |

| Necessary accessories | Type | Item no. | Pcs./Pkt. |
|---|---|---|---|
| Battery module (device with battery), VRLA-AGM, 48 V DC, 7 Ah | QUINT-HP-BAT/PB/48DC/ 7.0AH/PT | 1133819 | 1 |

| Accessories | Type | Item no. | Pcs./Pkt. |
|---|---|---|---|
| Type 2/3 surge protection, consisting of protective plug and base element, with integrated status indicator and remote signaling for single-phase power supply networks. Nominal voltage: 120 V AC/DC | PLT-SEC-T3-120-FM-UT | 2907918 | 5 |
| USB/RS-232/RS-485 interface card for QUINT-HP-AC UPS | QUINT-HP-COM/USB-SER | 1252055 | 1 |
| Replaceable fan module for QUINT-HP-AC UPS | QUINT-HP-FAN | 1252068 | 1 |
| Used for communication between an industrial PC and Phoenix Contact devices with USB-Mini-B connection. | MINI-SCREW-USB-DATACABLE | 2908217 | 1 |
| USB connecting cable: USB plug type A to USB plug type Mini-B; length: 3 m | CABLE-USB/MINI-USB-3,0M | 2986135 | 1 |
| Configuration and management software | POWER MANAGEMENT SUITE | 1252232 | 1 |

You will find the latest accessories for the item at phoenixcontact.com/products.

# 4 Technical data

| Input data | | |
|---|---|---|
| | **Voltage** | **Tolerance** |
| Nominal input voltage | 100 V AC<br>110 V AC<br>120 V AC<br>130 V AC | -10 % / +20 %<br>-10 % / +20 %<br>-10 % / +15 %<br>-15 % / +10 % |

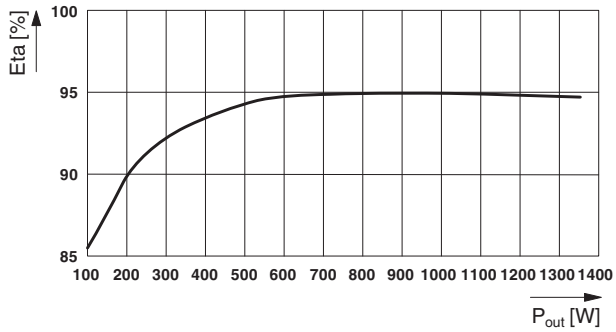
| | |
|---|---|
| Frequency range | 47.5 Hz ... 52.5 Hz / 57 Hz ... 63 Hz |
| Current consumption ( 100% load , Charger active ) * | nom. 15.9 A ( 120 V AC ) / max. 21.5 A ( 120 V AC ) |
| Max. permissible backup fuse | 32 A (Listed breaker) |
| Bypass fuse | 30 A T 250 V |
| Rated short-time current carrying capacity ( Icw ) | 6 kA |
| * for further information, see the section on device connection | |

| **Connection data: Input** | **Connection capacity Terminal block** |
|---|---|
| Position | 1.x |
| Position identifier | 1.1 (L), 1.2 (N), 1.3 (⏚) |
| Connection method | Push-in connection |
| Stripping length | 10 mm (Rigid/flexible/ferrule) |
| 1-conductor rigid | 2.5 mm² ... 6 mm² |
| 1-conductor flexible | 2.5 mm² ... 6 mm² |
| 1-conductor flexible with ferrule without plastic sleeve | 2.5 mm² ... 4 mm² |
| 1-conductor flexible with ferrule with plastic sleeve | 2.5 mm² ... 4 mm² |
| AWG (Cu) | 14 ... 10 |

| **General output data** | |
|---|---|
| Apparent power | 1500 VA |
| Real power | 1350 W |
| Power factor (cos phi) | 0.9 |
| Switch-over time | 0 ms |
| Rated short-time current carrying capacity ( Icw ) | 6 kA |

| **Overload capability** | |
|---|---|
| Mains operation | 120 % / 150 % ( 20 s / 5 s, then switch to bypass operation ) |
| Battery operation | 120 % / 150 % ( 20 s / 5 s, then shutdown ) |
| Bypass operation | 120 % / 150 % ( for a sustained period / 20 s, then shutdown ) |

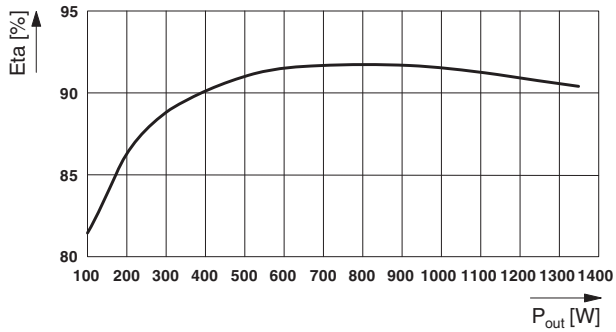
| Output data Normal operation | |
|---|---|
| Nominal output voltage ($U_N$) | 100 V AC , 110 V AC , 120 V AC , 130 V AC |
| Output voltage tolerance | ±2 % |
| Nominal output frequency | 50 Hz / 60 Hz |
| Nominal output current ( 100% load ) * | nom. 12.5 A ( 120 V AC ) |
| Electronic current limitation | > 2,5 x Output: Current nom. (> 200 ms) |
| Efficiency ( 100% load, battery charged ) | > 94 % |




* for further information, see the section on device connection

| Normal operation power dissipation | |
|---|---|
| No load | 28 W |
| Nominal load | 75 W ( 100% load, battery charged ) |

| Output data Battery operation | |
|---|---|
| Nominal output frequency | 50 Hz / 60 Hz |
| Output frequency tolerance | ±0.5 % |
| Crest factor | 2.8 |
| Total harmonic distortion factor (THD) | < 3 % (linear load) , < 8 % (non-linear load) |
| Electronic current limitation | > 2,5 x Output: Current nom. (> 200 ms) |
| Efficiency ( 100% load, battery charged ) | > 90 % |




* for further information, see the section on device connection

| Battery operation power dissipation | |
|---|---|
| No load | 25 W |
| Nominal load | 140 W ( 100% load, battery charged ) |

| Connection data: Output | Connection capacity Terminal block |
|---|---|
| Position | 2.x |
| Position identifier | 2.1 (L), 2.2 (L'), 2.3 (N), 2.4 (⏚) |
| Connection method | Push-in connection |
| Stripping length | 10 mm (Rigid/flexible/ferrule) |
| 1-conductor rigid | 2.5 mm² … 6 mm² |
| 1-conductor flexible | 2.5 mm² … 6 mm² |
| 1-conductor flexible with ferrule without plastic sleeve | 2.5 mm² … 4 mm² |
| 1-conductor flexible with ferrule with plastic sleeve | 2.5 mm² … 4 mm² |
| AWG (Cu) | 14 … 10 |

| Battery | |
|---|---|
| Nominal voltage | 48 V DC |
| Nominal capacity range | 7 Ah … 200 Ah |
| Input voltage | max. 60 V DC |
| Input current | max. 40 A |
| Short-circuit current | 650 A (< 1,5 ms) |
| Charging current | max. 7 A |
| Permissible backup fuse | 40 A |

| Connection data: Battery | Connection capacity Terminal block |
|---|---|
| Position | 4.x |
| Position identifier | 4.1 (+), 4.2 (-) |
| Connection method | Push-in connection |
| Stripping length | 18 mm (Rigid/flexible/ferrule) |
| 1-conductor rigid | 6 mm² … 16 mm² |
| 1-conductor flexible | 6 mm² … 16 mm² |
| 1-conductor flexible with ferrule without plastic sleeve | 6 mm² … 16 mm² |
| 1-conductor flexible with ferrule with plastic sleeve | 6 mm² … 16 mm² |
| AWG (Cu) | 8 … 6 |

| Status and diagnostic indicator / signal output Alarm | |
|---|---|
| Position | 3.x |
| Position identifier | 3.1 (Alarm) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Status and diagnostic indicator / signal output Bat.-Mode | |
|---|---|
| Position | 3.x |
| Position identifier | 3.2 (Bat.-Mode) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Status and diagnostic indicator / signal output Power Good | |
|---|---|
| Position | 3.x |
| Position identifier | 3.3 (Power Good) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Status and diagnostic indicator / signal output Ready | |
|---|---|
| Position | 3.x |
| Position identifier | 3.4 (Ready) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Status and diagnostic indicator / signal output $P>P_n$ | |
|---|---|
| Position | 3.x |
| Position identifier | 3.5 (P>Pn) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Status and diagnostic indicator / signal output Service Required | |
|---|---|
| Position | 3.x |
| Position identifier | 3.6 (Service Required) |
| Switching output | Transistor output, active |
| Output voltage | 24 V |
| Continuous load current | ≤ 20 mA |

| Battery-operated start ( Bat.-Start ) | Digital control input (configurable) |
|---|---|
| Position | 3.x |
| Position identifier | 3.7 (Bat.-Start) |
| Low signal | Connection to SGnd with < 2.7 kΩ |
| High signal | Open (> 200 kΩ between Bat.-Start and SGnd) |

| Remote control Remote | Low active digital control inputs |
|---|---|
| Position | 3.x |
| Position identifier | 3.8 (Remote) |
| Low signal | Connection to SGnd with < 2.7 kΩ |
| High signal | Open (> 35 kΩ between Remote and SGnd) |

| Signal ground SGnd | |
|---|---|
| Position | 3.x |
| Position identifier | 3.9 (SGnd) |
| Function | Signal ground |
| Reference potential | For signal inputs and signal outputs |

| Connection data: Signal | Connection capacity Terminal block |
|---|---|
| Position | 3.x |
| Position identifier | 3.1 (Alarm), 3.2 (Bat.-Mode), 3.3 (Power Good), 3.4 (Ready), 3.5 (P>Pn), 3.6 (Service Required), 3.7 (Bat.-Start), 3.8 (Remote), 3.9 (SGnd) |
| Connection method | Push-in connection |
| Stripping length | 10 mm (Rigid/flexible/ferrule) |
| 1-conductor rigid | 0.2 mm² ... 4 mm² |
| 1-conductor flexible | 0.2 mm² ... 4 mm² |
| 1-conductor flexible with ferrule without plastic sleeve | 0.2 mm² ... 2.5 mm² |
| 1-conductor flexible with ferrule with plastic sleeve | 0.2 mm² ... 2.5 mm² |
| AWG (Cu) | 24 ... 12 |

| Data interface Battery module communication interface | |
|---|---|
| Interface designation | Battery module communication interface |
| Position | 5.x |
| Position identifier | 5.1 |
| Number of interfaces | 1 |
| Connection method | RJ45 |
| Locking | Locking clip |
| Transmission physics | Twisted-Pair 4x2 |

| Data interface Parallel operation communication interface | |
|---|---|
| Interface designation | Parallel operation communication interface |
| Position | 5.x |
| Position identifier | 5.2 , 5.3 |
| Number of interfaces | 2 |
| Connection method | RJ45 |
| Locking | Locking clip |
| Transmission physics | Twisted-Pair 4x2 |

| Device combinations | |
|---|---|
| UPS connection in parallel | yes max. 3 |
| UPS connection in series | no |
| Battery module connection in parallel | yes max. 5 |

| General data | |
|---|---|
| Overvoltage category | II |
| Degree of protection | IP20 |
| Class of protection | I |
| Dimensions (W/H/D) | 150 mm / 240 mm / 143 mm |
| Weight | 4400 g |

| Ambient conditions | |
|---|---|
| Ambient temperature (operation) | -25 °C ... 60 °C |
| Derating ( Output power, charging current ) | > 50 °C: 2,5 % / K |
| Ambient temperature (storage/transport) | -40 °C ... 85 °C |
| Humidity at 25 °C, non-condensing | ≤ 95 % |
| Installation height | ≤ 4000 m |
| Derating ( Output power ) | > 1000 m: 3 % / 1000 m |
| Degree of pollution | 3 |
| Vibration (operation) | 5 Hz ... 100 Hz, 0.7g (EN 60068-2-6) |
| Shock | 30g in each direction, according to IEC 60068-2-27 |

| Standards | |
|---|---|
| Uninterruptible power supply systems | EN 62040-1<br>EN 62040-2 |

| Approvals | |
|---|---|
| UL | UL/C-UL Recognized UL 1778 |

You will find the latest approvals for the item at phoenixcontact.com/products.

| Electromagnetic compatibility / Conformance with EMC Directive 2014/30/EU | | |
|---|---|---|
| **Noise emission** | | |
| Conducted noise emission | EN 62040-02 (Class C2) | |
| Noise emission | EN 62040-02 (Class C2) | |

| Immunity | | |
|---|---|---|
| **CE basic standard** | **EN 62040-2 requirement** | **Tested** |
| Electrostatic discharge EN 61000-4-2 | | |
| Housing contact discharge | ± 6 kV | ± 6 kV |
| Housing air discharge | ± 8 kV | ± 8 kV |
| Comments | Criterion B | 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 | ± 2 kV |
| DC input | ± 1 kV | ± 2 kV |
| Output | ± 1 kV | ± 2 kV |
| Signal | ± 2 kV | ± 2 kV |
| Communication for parallel operation, battery module | -- | ± 2 kV |
| Comments | Criterion B | Criterion A |
| Surge voltage load (surge) EN 61000-4-5 | | |
| Input/Output | ± 1 kV (symmetrical)<br>± 2 kV (asymmetrical) | ± 1 kV (symmetrical)<br>± 2 kV (asymmetrical) |
| Signal | 1 kV (asymmetrical) | 1 kV (asymmetrical) |
| Comments | Criterion B | Criterion A |
| Conducted interference EN 61000-4-6 | | |
| Frequency range | 0.15 MHz ... 80 MHz | 0.15 MHz ... 80 MHz |
| Signal | 10 V | 10 V |
| Comments | Criterion A | Criterion A |
| Power frequency magnetic field EN 61000-4-8 | | |
| Frequency | 60 Hz | 60 Hz |
| Signal | 30 A/m | 30 A/m |
| Comments | Criterion A | Criterion A |
| Harmonics and interharmonics EN 61000-4-13 | | |
| Frequency range | -- | 140 Hz ... 360 Hz |
| Signal | -- | 10 V |
| Comments | -- | 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. |

# 5 Safety regulations and installation notes

## 5.1 Symbols used

Instructions and dangers are labeled with the corresponding symbols in this installation note.



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.



This indicates that the device can be hot and should not be touched without taking care.



This symbol and the accompanying text provide additional information on the proper disposal of electronic components.



This symbol and the accompanying text provide additional information on recycling.

## 5.2 Important safety and warning instructions



**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.
- Operation of the device is only permitted in supply system configurations with grounded neutral conductor. This mainly complies with the TN-C-S supply system configuration. TT and IT supply system configurations are not permitted. National regulations must be observed.
- Disconnection of the grounded neutral conductor is not allowed.
- Make sure that the wiring on the primary side and the secondary side is adequately dimensioned and protected.
- The cross-section of the PE protective conductor must correspond to the cross-section of the supply lines, but must be at least 2.5 mm².
- The use of an RCD (at least type B) is only permitted at the output of this UPS.
- Cover termination area after installation in order to avoid accidental contact with live parts (e. g., installation in control cabinet).
- The UPS starts automatically when the supply voltage is applied at the input. After a device self-test and the synchronization time, the output is switched on.
- This device receives power from more than one source - disconnect the input power source and the battery module to de-energize the device before servicing.
- Provide a switch/circuit breaker close to the device at the AC input, AC output, and at the battery terminals. For these devices, they are labeled as the disconnecting device (at the output as the emergency disconnecting device).
- Keep flames, embers or sparks away from the module.
- When connecting the batteries, observe the polarity and do not short circuit the pole terminals.
- Do not disconnect the fuse and / or battery connection under hazardous location conditions.



**WARNING: Risk of burns**

The housing can become hot, depending on the ambient temperature and device load.

**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.
- Observe the mechanical and thermal limits of the device.
- Ensure sufficient convection. The minimum distance (above/below) is shown in the relevant figure.
- Use in a CONTROLLED ENVIRONMENT - the unit is intended for installation in a temperature-regulated, indoor area that is relatively free of conductive contaminants.
- Ensure that the location is sufficiently ventilated.
- Vertical mounting (normal mounting position)
- For the connection parameters, such as the required stripping length for wiring with and without ferrule, refer to the technical data.
- To reduce the risk of fire, connect only to a circuit provided with the following maximum branch circuit overcurrent protection in accordance with the National Electrical Code, ANSI/NFPA 70.
- To reduce the risk of fire, replace only with same type and rating of fuse.

**UL note**

- Use copper cables with an operating temperature of >75°C (ambient temperature<55°C) and > 90°C (ambient temperature< 75°C).

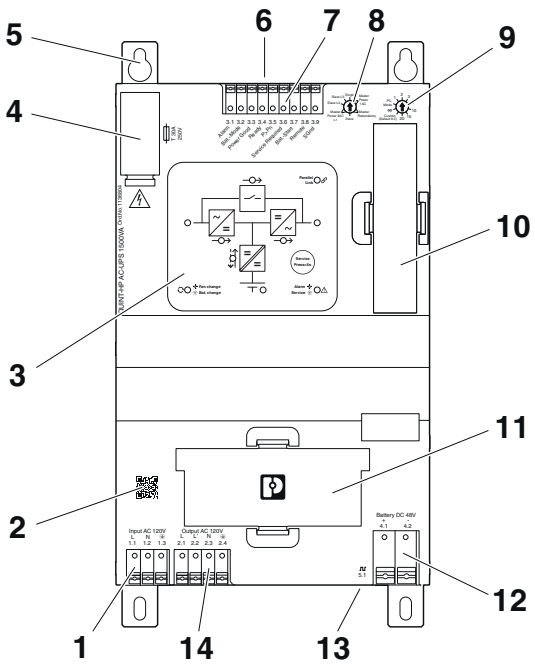
**More follows**

- This QUINT UPS is compatible with certain Phoenix Contact battery modules. For further information on this, refer to the corresponding data sheet. The use of VRLA battery modules from other manufacturers is possible in principle, but has not been tested.
- Use current-limited source or suitable fuse.
- The switching outputs are active outputs in accordance with safety extra-low voltage (SELV or DVC A). They may only be operated on approved SELV or DVC A circuits.
- Application of an external voltage is not permitted at any of the signal outputs.
- This QUINT UPS is designed to supply AC loads. Under certain circumstances, a DC load at the AC output can terminate online operation. The load is then supplied directly with the input voltage through the internal bypass. Battery operation is not possible in this state.

# 6 Design

## 6.1 Function elements

Figure 1 Position of the function elements

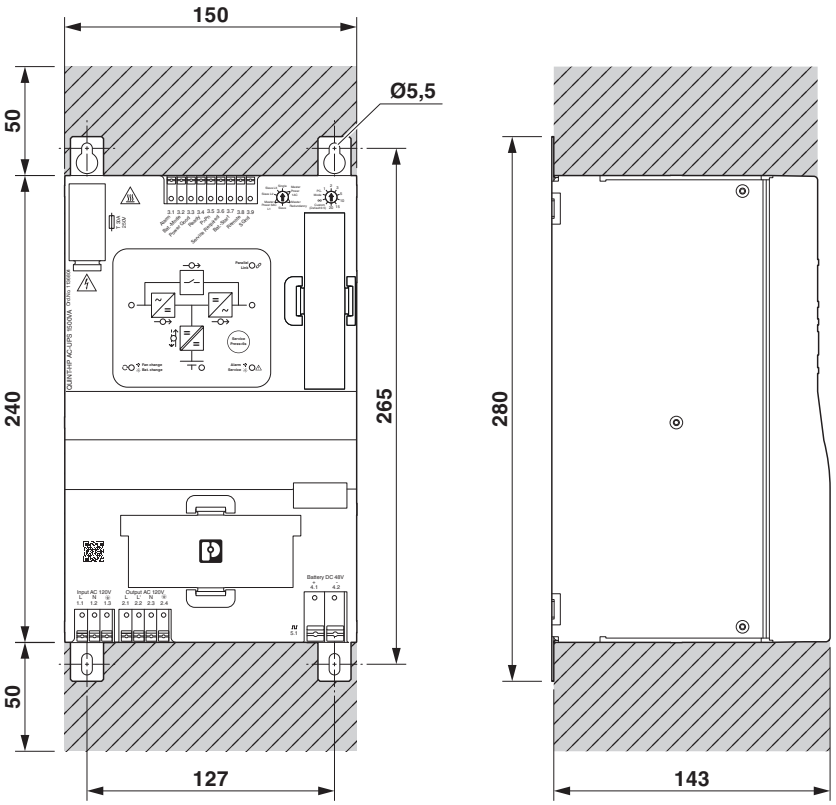



**Key**

| No. | Designation | Pole identifier |
|---|---|---|
| 1 | Input voltage connection terminal blocks: Input AC L/N/⏚ | 1.1 … 1.3 |
| 2 | QR code web link | |
| 3 | LED indicator with service mode button | |
| 4 | Cover: Bypass fuse | |
| 5 | Fixing clip (4x) | |
| 6 | Communication interface Parallel operation (top of device) | 5.2, 5.3 |
| 7 | Signaling connection terminal blocks | 3.1 … 3.9 |
| 8 | Rotary selector switch parallel run mode | |
| 9 | Rotary selector switch for setting the buffer time | |
| 10 | Cover: Slot for interface card | |
| 11 | Cover: Fan unit | |
| 12 | Battery terminal blocks | 4.1, 4.2 |
| 13 | Battery module communication interface (device underside) | 5.1 |
| 14 | Output voltage connection terminal blocks: Output AC L/L'/N/⏚ | 2.1 … 2.4 |

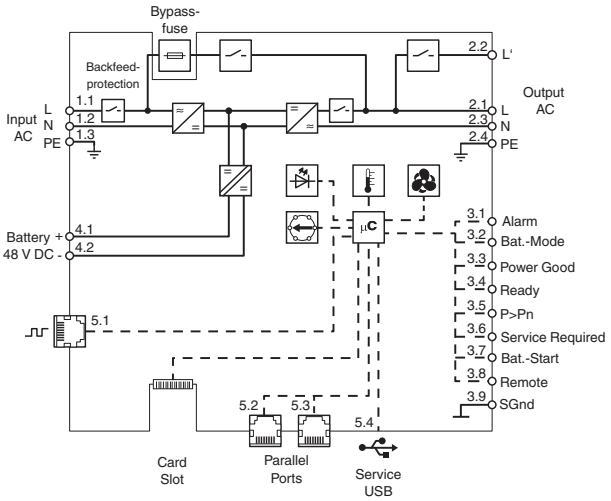
## 6.2 Device dimensions and keep-out areas

Figure 2 Device dimensions and keep-out areas



### 6.3 Block diagram

Figure 3 Block diagram




**Key**

| Element | Designation |
|---|---|
|  | Switch |
|  | Bypass fuse |
|  | Rectifier |
|  | DC/DC converter with electrical isolation |
|  | Inverter |
|  | LED |
|  | Temperature measuring unit |
|  | Fan |
|  | Rotary selector switch |
|  | Microcontroller |
|  | RJ45 interface |

## 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

**CAUTION: Hot surface**

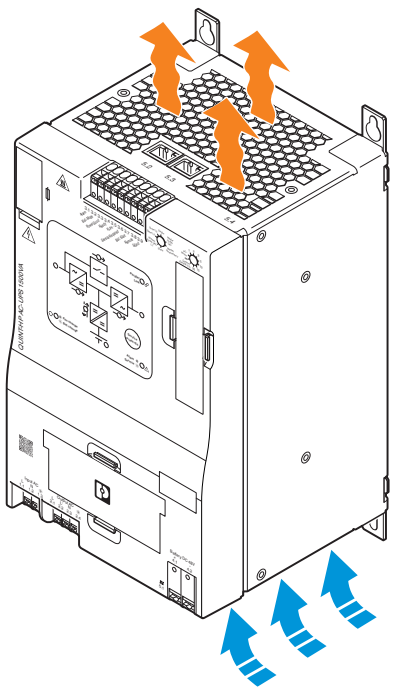
Depending on the ambient temperature and the load, the housing of the uninterruptible power supply can become very hot (T > 65 °C).

**NOTE: enable convection**

To ensure sufficient convection, maintain an adequate minimum clearance between the UPS and above/below the installed devices.

For information on the required minimum clearances, refer to the section: Device dimensions and keep-out areas.

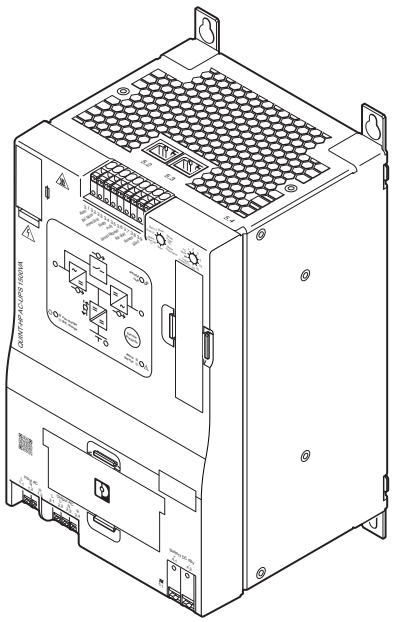
Figure 4 Convection



### 7.2 Normal mounting position

The normal mounting position is vertical.

Figure 5 Normal mounting position



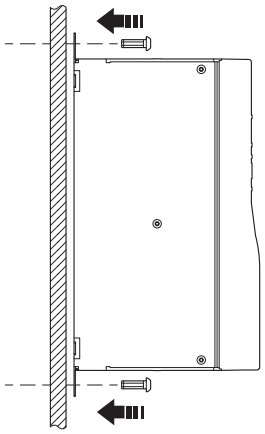
### 7.3 Mounting the UPS

Mount the device as follows:

1. Mount the device in the normal mounting position (vertical) on a mounting surface, e.g., on the rear panel of the control cabinet.
2. For fastening the device, drill four holes into the mounting surface. For the required dimensions of the drill holes, please refer to the figure for the keep-out areas (see Section: Device dimensions and keep-out areas).
3. Fasten the device to the mounting surface using suitable screws (ø 5 mm, maximum). Observe the maximum tightening torque for the mounting screws.
4. Check that the device is securely attached to the mounting surface.

In addition, use the press-formed profiles included in the delivery as washers for mounting - particularly if there are increased mechanical shock and vibration requirements.

Figure 6 Panel mounting



### 7.4 Removing the UPS

**WARNING:Never carry out work when voltage is present!**

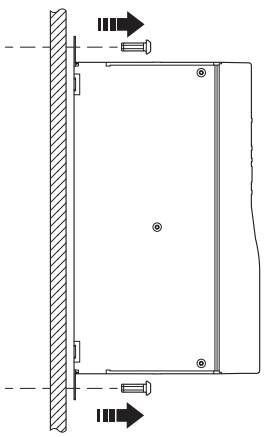
Switch off the supply voltage and ensure it cannot be switched on again.

Disconnect the connecting cables before you remove the device.

Remove the device as follows:

1. Use a suitable screwdriver and loosen the four mounting screws on the mounting surface.
2. Carefully lift the device off the mounting surface.

Figure 7 Wall removal



# 8 Device connection

## 8.1 Network types

**WARNING**

Operation of the device is only permitted in supply system configurations with grounded neutral conductor.
This mainly complies with the TN-C-S supply system configuration. National regulations must be observed.
TT and IT supply system configurations are not permitted.

**WARNING**

The incoming neutral conductor must be earthed at the source and must never be disconnected.

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.

Figure 8 Working range of the uninterruptible power supply

| Input | | | | | Output | | |
|---|---|---|---|---|---|---|---|
| Voltage | Voltage neg.tol. | Voltage pos.tol. | Current nom. | Current max. | Voltage | Current nom. | Power |
| 100 V 50 Hz / 60 Hz | 10% | 20% | 19,0 A | 25,8 A | 100 V | 15,0 A | 1500 VA / 1350 W |
| 110 V 50 Hz / 60 Hz | 10% | 20% | 17,3 A | 23,4 A | 110 V | 13,6 A | 1500 VA / 1350 W |
| 120 V 50 Hz / 60 Hz | 10% | 15% | 15,9 A | 21,5 A | 120 V | 12,5 A | 1500 VA / 1350 W |
| 130 V 50 Hz / 60 Hz | 15% | 10% | 14,6 A | 21,0 A | 130 V | 11,5 A | 1500 VA / 1350 W |

The 120 V operating range is set in delivery state.

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 POWER MANAGEMENT SUITE 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.

## 8.2 Connection parameters

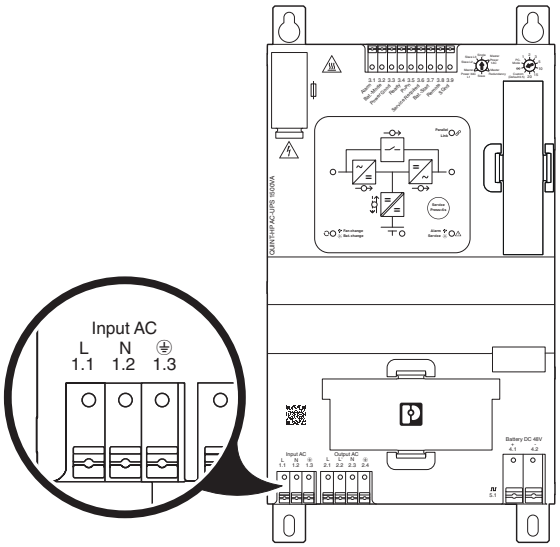
For the connection parameters, including the required stripping length for wiring with and without ferrule, refer to the Section: Technical data.

# 9 Device connection terminal blocks

## 9.1 AC input

The supply voltage is connected via the following connection terminal blocks: Input AC 120 V.

Figure 9 Input voltage connection terminal blocks: Input AC L/N/⏚ (1.1...1.3)




### 9.1.1 Protection of the primary side

It must be possible to switch the device off using a suitable disconnection device outside the power supply. The protection on the primary side, for example, is suitable for this (see section: Technical data).

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

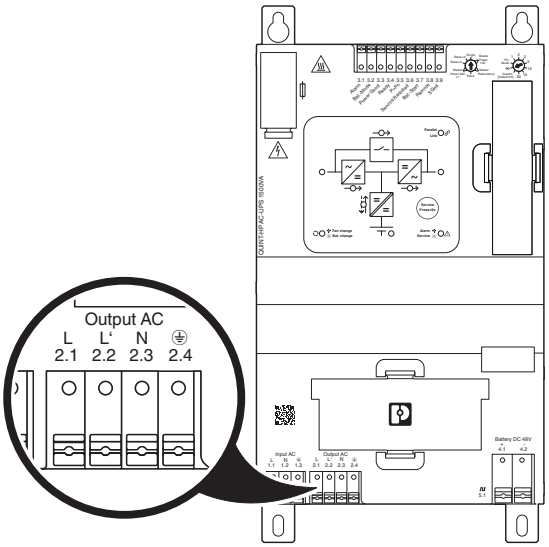
Additional fuses inside the device protect it. Additional device protection is not required.

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.

## 9.2 AC output

Buffered output voltage is connected via the connection terminal blocks: Output AC 120 V.

Figure 10 Output voltage connection terminal blocks: Output AC L/L'/N/⏚ (2.1...2.4)




Connect the loads that are to be buffered in the event of a mains failure to output L.
You can connect additional non-critical loads to output L'. The default setting switches the output L' off immediately in the event of a mains failure. You can use the POWER MANAGEMENT SUITE software to set the time when output L' should be switched off in the event of a mains failure. The sum of the powers on outputs L and L' may not exceed the output capacity of the UPS.

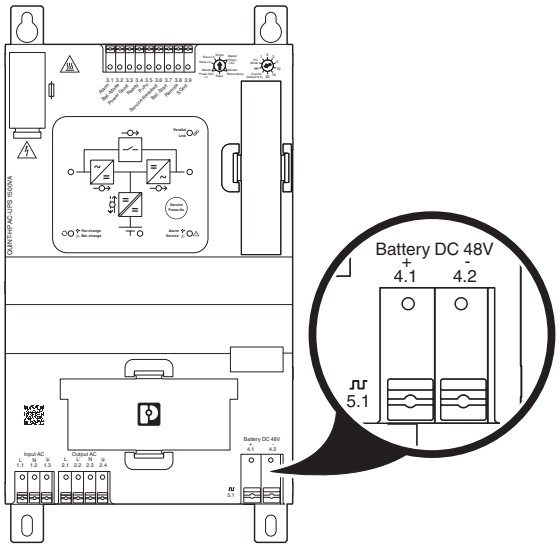
### 9.2.1 Protection of the secondary side

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.

### 9.3 Battery DC

The battery is connected via the following connection terminal blocks: Battery DC 48 V.

Figure 11 Battery connection terminal blocks: Battery DC 48V +/- (4.1, 4.2)




### 9.4 Connection terminal blocks for signaling

The signal contacts are digital inputs, active outputs and a reference potential in accordance with safety extra-low voltage (SELV or DVC A). They may only be operated on approved SELV or DVC A circuits.

The uninterruptible power supply has the signal outputs:

– Alarm (can be inverted via software)
– Bat. Mode (can be inverted and parameterized via software)
– Power Good (can be inverted and configured via software)
– Ready (can be inverted and parameterized via software)
– $P > P_n$ (can be inverted and parameterized via software)
– Service Required (can be inverted and configured via software)

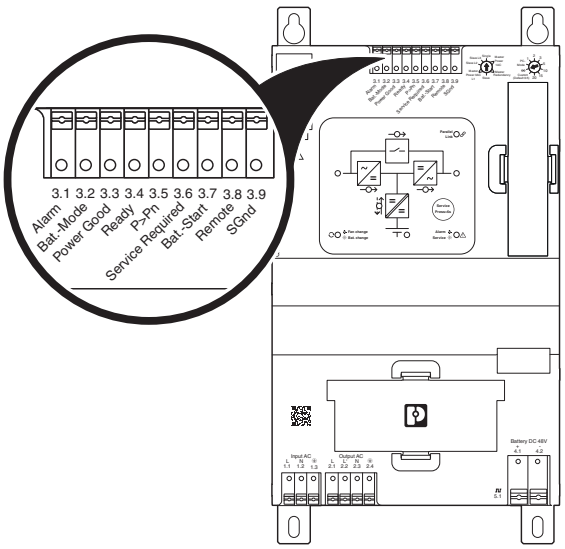
The uninterruptible power supply also features the signal inputs:

– Bat.-Start
– Remote

The reference potential for the inputs and outputs is provided by:

– SGnd (Signal Ground)

Figure 12 Connection terminal block signaling (3.1...3.9)

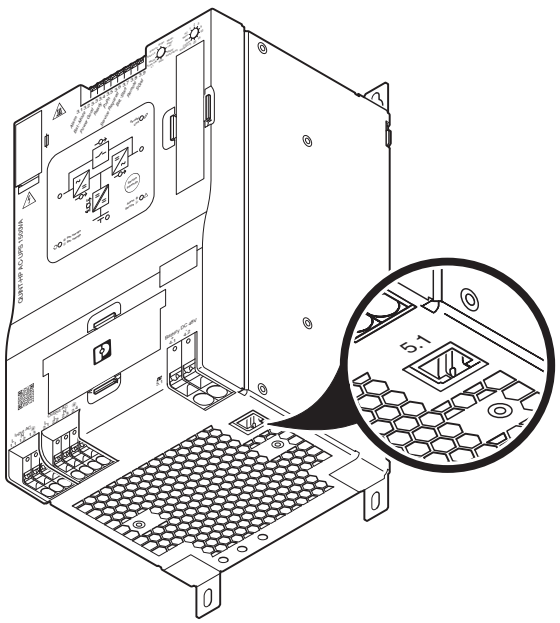



## 10 Device interfaces

### 10.1 Battery module communication interface

There is an RJ45 connection socket on the bottom of the uninterruptible power supply housing. The communication between the uninterruptible power supply and the battery module and the power supply for the battery module electronics take place via an RJ45 twisted-pair patch cable.

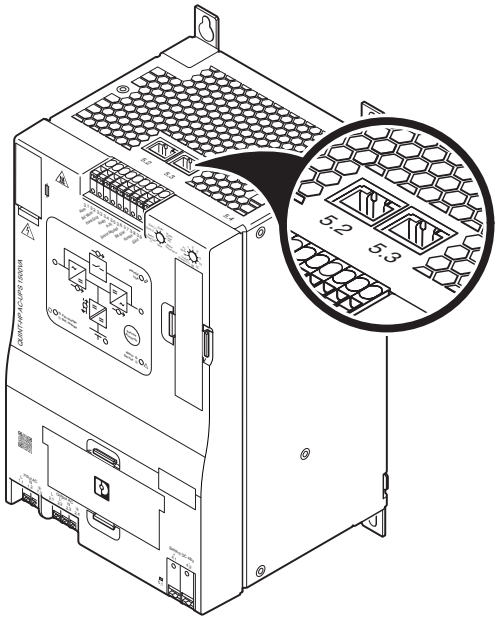
Figure 13 Battery module communication interface (5.1)



### 10.2 Parallel operation communication interfaces

Two RJ45 connection sockets are located on the top of the uninterruptible power supply housing. They are used for communication of devices connected in parallel. The uninterruptible power supplies are connected together via one RJ45 twisted pair patch cable. You can connect a maximum of up to three devices in parallel.

Figure 14 Parallel operation communication interfaces (5.2., 5.3)




### 10.3 Inserting the interface card

**NOTE**

Observe the necessary safety precautions when handling components that are vulnerable to electrostatic discharge.

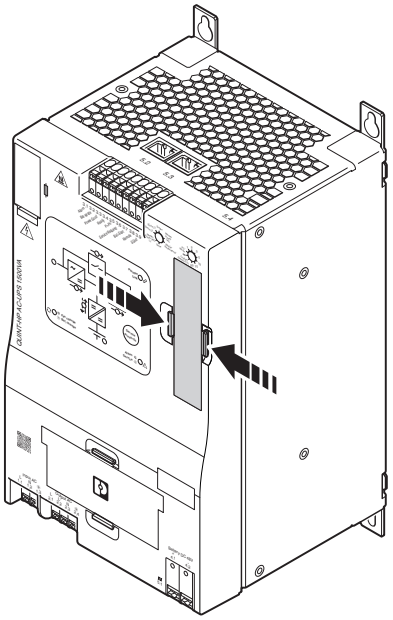
Information on the interface card can be found in the Ordering data section.

On the device front is a compartment for the interface card.

Insert the interface card as follows:

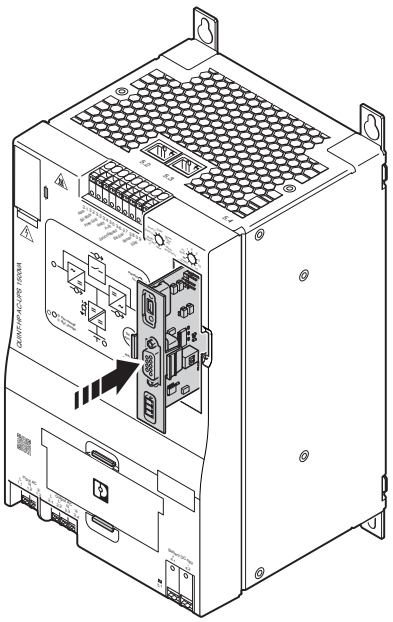
– Press the two push buttons on the interface card compartment cover and remove the cover.

Figure 15 Open the cover



– Insert the interface card into the compartment. Make sure the direction of insertion is correct.

Figure 16 Insert interface card



### 10.4 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 via the service Mini Type B USB interface.

You will find the interface (5.4) on the right top side of the device.

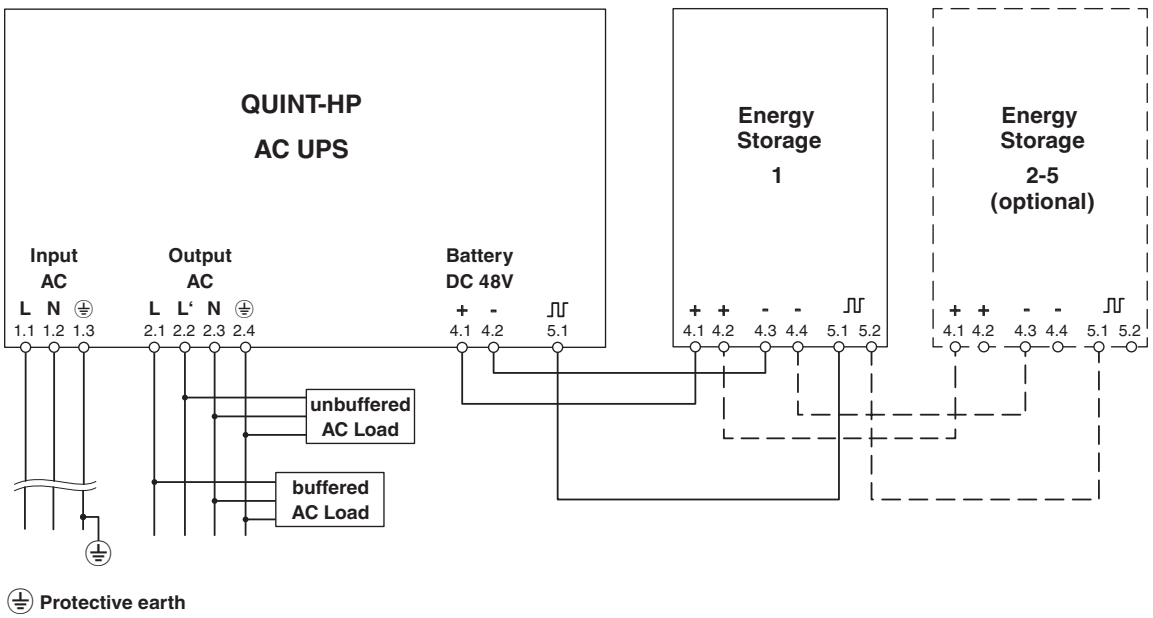
Information on the data cable can be found in the Ordering data section.

## 11 Installation of individual components

**WARNING**

Provide a switch/circuit breaker close to the device at the AC input, AC output, and at the battery terminals. For these devices, they are labeled as the disconnecting device (at the output as the emergency disconnecting device).

Figure 17 Schematic design




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

# 12 Device operation

Basic settings for startup can be made directly on the device using the rotary selector switches. Advanced settings can be made via the POWER MANAGEMENT SUITE software.

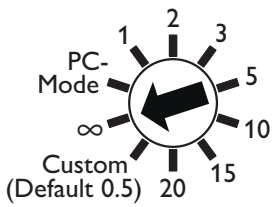
Information on the software can be found in the Ordering data section.

## 12.1 Setting the battery operating mode

You can use the right rotary selector switch on the device front to set the operating mode in the event of mains failure.

– Buffer period
– PC mode

Figure 18 Rotary selector switch

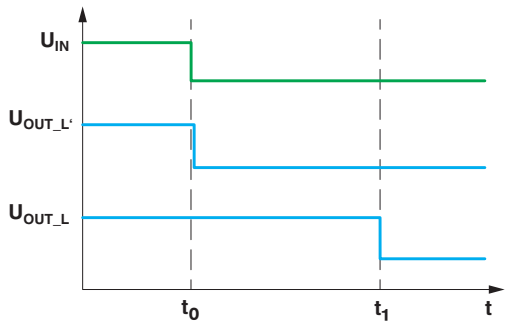



Use a suitable screwdriver to set the rotary selector switch.

### 12.1.1 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 the POWER MANAGEMENT SUITE software. If a buffer time is not set, the UPS shuts down after 30 seconds. |
| ∞ (unlimited, delivery state) | Buffering with the total stored power. An alarm is generated as soon as the voltage of the battery module falls below 40.8 V (default). |

Figure 19




$t_0$: mains failure, output L' is immediately switched off

$t_1$: output L is switched off after the set buffer time has elapsed

### 12.1.2 PC mode

In PC mode, output L' is switched off with L at the latest.

In PC mode, you can individually parameterize the chronological sequence of the UPS functions using the POWER MANAGEMENT SUITE 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:

- MINI-SCREW-USB-DATACABLE data cable
- POWER MANAGEMENT SUITE software
- QUINT-HP-COM/USB-SER interface card

Information on the individual components can be found in the Ordering data section.

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.

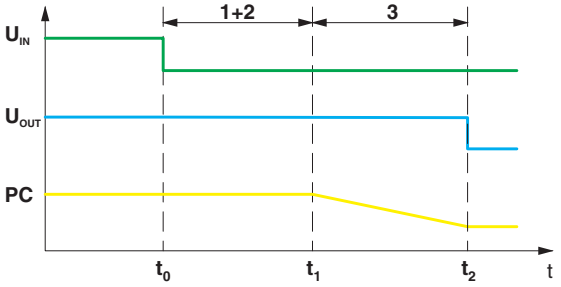
**2. Program start**

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 20




$t_0$: mains power failure

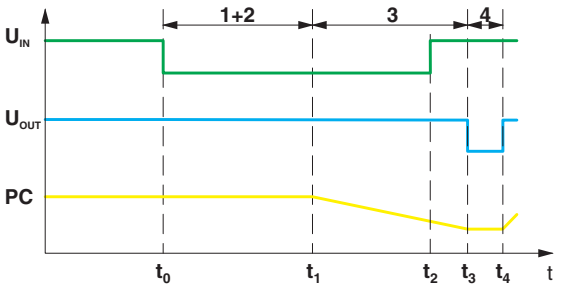
$t_1$: delay time and program runtime have expired, PC will be shut down

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

**4. PC no-load 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 21




$t_0$: 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 no-load time starts

$t_4$: the PC no-load time has expired, PC is starting back up

### 12.1.3 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.

Battery operation is not possible if service mode is activated during a mains failure.

**Battery 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 change the battery module, 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 (several LEDs flash six 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.

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

**Fan change**

**WARNING: Danger to life by electric shock!**
Do not reach into the open device.

**CAUTION**
The fan can still rotate during removal. Do not reach into the rotor.

**NOTE**
Observe the necessary safety precautions when handling components that are vulnerable to electrostatic discharge.

Information on the fan can be found in the Ordering data section.

On the device front is a compartment for the fan.

Replace the fan as follows:

1. Press and hold down the Service Mode button more than 6 s.
2. Press the two push buttons on the fan compartment cover and remove the cover.
3. Reach into the round recess in the fan PCB and remove the fan from the fan compartment.
4. Slide the new fan into the compartment within 10 seconds. Make sure the direction of insertion is correct. Service mode is automatically exited (some LEDs flash 6 times and the red LED goes out).
5. Close the cover.

The time of 10 seconds mentioned in point 4 is the time the UPS can work in normal operation under the worst conditions. At maximum ambient temperature, maximum power, minimum input voltage, etc., for example.

Figure 22 Open the cover

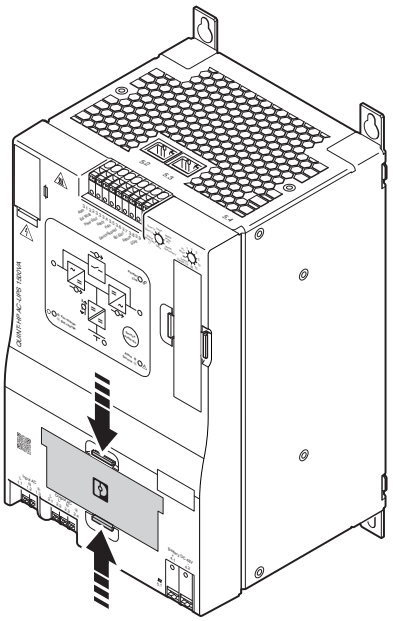
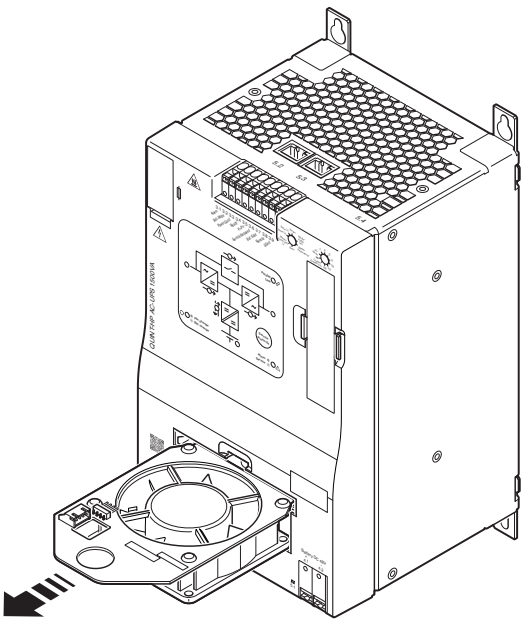


Figure 23 Remove the fan



## 12.2 Remote

You can use the Remote signal terminal to:

1. Deactivate and exit battery operation.
2. Perform controlled shutdown of the PC in normal operation and battery operation.
3. Perform controlled shutdown of the PC in battery operation.
4. Switch the UPS output off or on.

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

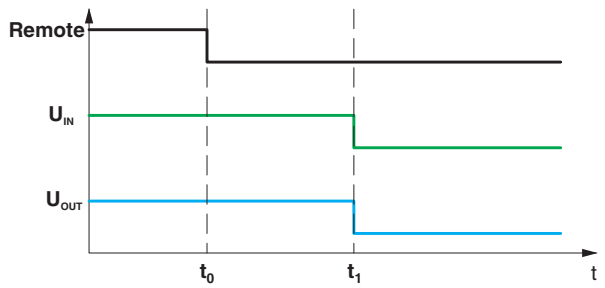
### 1. Remote deactivates battery operation

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 normal operation, the remote signal is indicated by the flashing green LED (see section: Signaling).

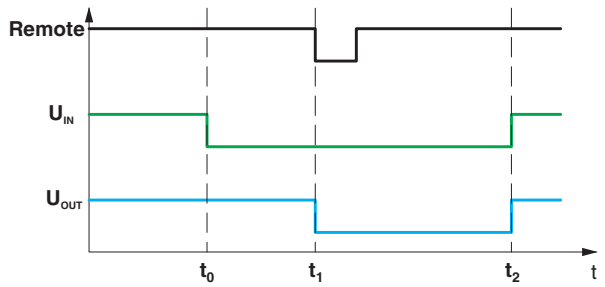
In the event of mains failure, battery operation is not started.




$t_0$: Remote signal is set in normal operation

$t_1$: no input voltage, output will be switched off

If the Remote signal is generated in battery operation, then 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.




$t_0$: 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

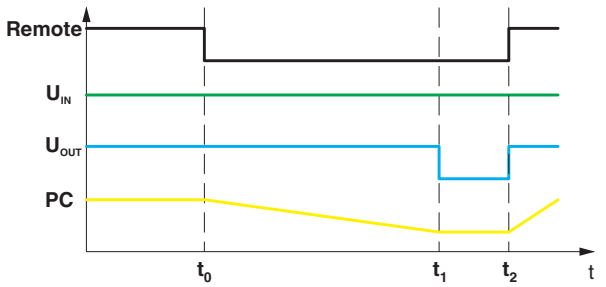
You can shut down the PC immediately via the POWER MANAGEMENT SUITE software.

This setting only applies in PC mode.

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

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 battery modules remain charged and the system is ready to use. When you reset the remote signal, the UPS output is switched on again.




$t_0$: Remote signal is set during normal operation; PC is 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**

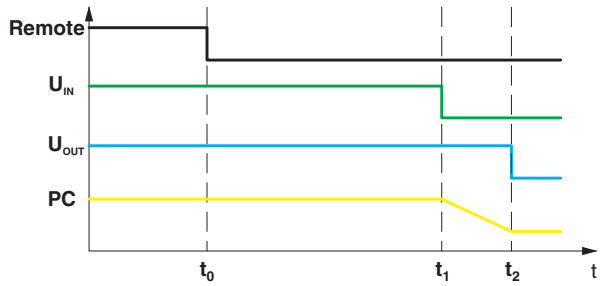
You can shut down the PC immediately upon going into battery operation using the POWER MANAGEMENT SUITE software.

This setting only applies in PC mode.

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

If the remote signal is set in normal 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.




$t_0$: Remote signal is set in normal operation

$t_1$: no input voltage, PC shutdown begins immediately

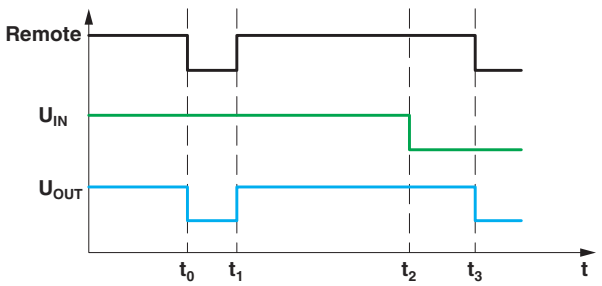
$t_2$: the PC has shut down, the output will be switched off

**4. Remote switches the output off/on**

With this function, you can switch the UPS output off or on in normal operation.

This function is only possible when a buffer time has been set.

In PC operation, you cannot use this function.




$t_0$: Remote signal is set in normal operation; output is switched off

$t_1$: Remote signal is reset in normal operation, output is switched back on

$t_2$:Mains failure

$t_3$: The remote signal is set in battery operation, output is switched off

If the Remote signal is generated in battery operation, then 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.

### 12.3 Battery start (Bat.-Start)

You can use the Bat.-Start signal terminal 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 Bat.-Start signal terminal to the SGnd signal terminal.

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 Bat.-Start signal terminal 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).

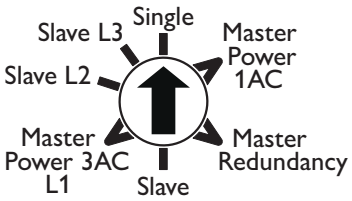
Do not connect the communication line during a battery start, even for Phoenix Contact battery types.
An alarm is always generated when connecting a communication line to a non-initialized battery. This does not negatively impact the supply to the connected load.

# 13 Parallel operation

## 13.1 Parallel operation operating mode

You can use the left rotary selector switch on the device front to set the operating mode in parallel operation and to set the device hierarchy.

Figure 24 Rotary selector switch parallel run mode




The following operating modes can be set:

– Single operation (switch position: Single)
– Parallel operation for power increase (switch position: Master Power 1AC)
– Parallel operation for redundancy (switch position: Master Redundancy)
– Parallel operation for creating a 3AC grid (switch position: Master Power 3AC L1)

The operating mode setting defines the device simultaneously as a master device in the parallel network.

Set the associated slave devices as follows:

– Slave in parallel operation for increased performance or redundancy (switch position: slave)
– Slaves in parallel operation for creating a 3AC network (switch position: slave L2 or slave L3)

The line conductors L1, L2, and L3 in parallel operation for creating a 3AC network must have a clockwise field of rotation.

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 via the parallel operation communication interfaces with a RJ45 twisted pair patch cable.
The output power is distributed symmetrically to each UPS in the increased performance and redundancy parallel operating modes.

Observe the following points when carrying out parallel connection:

1. Always connect the same number and the same type of battery modules to the UPS devices.
2. Use the parallel running rotary selector switch to configure the individual UPS devices (see section: Parallel operation).
3. Use the same cable cross sections for wiring.
4. Use the same cable lengths up to the convergence point of the AC outputs.
5. Operate the UPS devices in the same temperature conditions.
6. Connect the complete system (AC inputs, AC outputs, batteries, parallel operation communication interfaces, and signaling, where applicable).
   Switch the AC UPS devices on at the same time (within five seconds).

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
– Settings via the POWER MANAGEMENT SUITE configuration software. Changes to the settings can only be made using the master device and are permanently transferred to the slave devices. Parameters can be read off from all devices.

The following alarm messages are available in parallel operation:

– Parallel mode is not possible:
  This combination of master or slave devices is impermissible.
– 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.

## 13.2 Increasing power

**NOTE**

Power the UPS devices at the AC input from the same power supply (phase relation, frequency, and amplitude).

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 Power 1AC”
– UPS 2: "Slave"

### 13.3 Redundant operation

**NOTE**

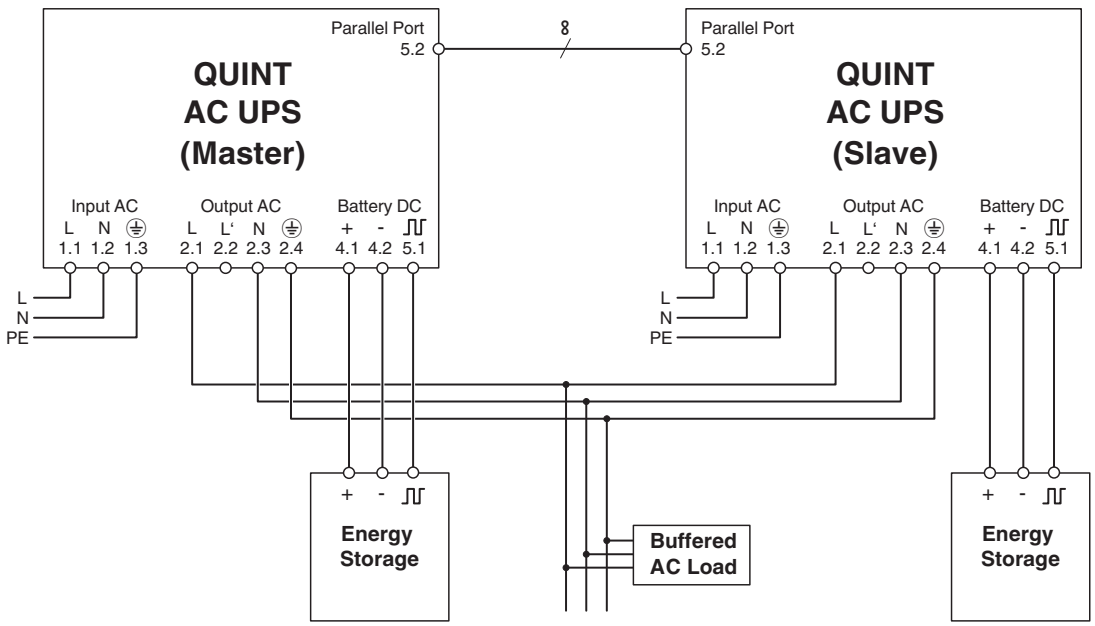
Power each UPS device at the AC input from the appropriate power supply of a symmetrical 3AC network (120° shifted phase relation, clockwise rotating field, same frequency, and same amplitude).

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:

– UPS 1: “Master Redundancy”
– UPS 2: "Slave"

Figure 25 Parallel operation



### 13.4 3AC parallel operation

**NOTE**

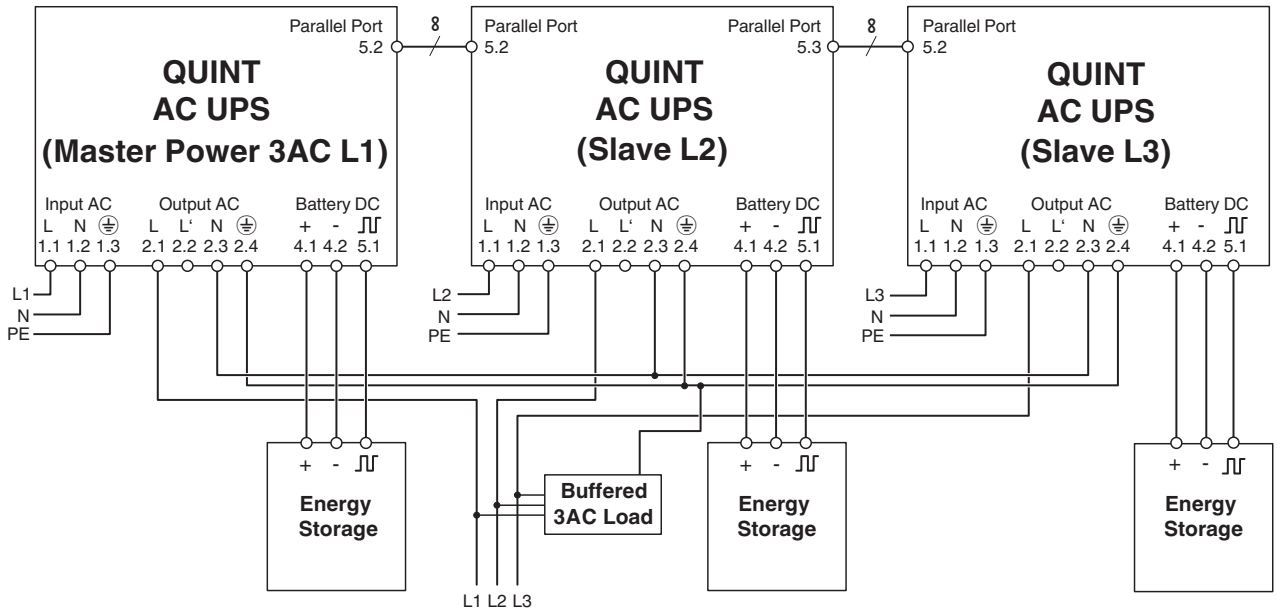
Power each UPS device at the AC input from the appropriate power supply of a symmetrical 3AC network (120° shifted phase relation, clockwise rotating field, same frequency, and same amplitude).

For supplying 3-phase loads, you can interconnect three UPS devices to form a 3AC system.
The device set to “Master Power 3AC L1” assumes the coordination of the phase relations of the three string voltages, each of which are offset by 120°.

Settings in the parallel running mode rotary selector switch:

– UPS 1: “Master Power 3AC L1“
– UPS 2: “Slave L2”
– UPS 3: “Slave L3”

Figure 26 3AC parallel operation



# 14 Method of operation

## 14.1 Operating modes

The uninterruptible power supply always functions in one of the two following operating modes:

**Normal operation**

The input voltage or the frequency is in the valid range. The connected load is supplied via the internal double converter due to the online topology of the UPS (see Section: Block diagram).

**Battery operation**

The input voltage or the frequency is not in the valid range. The connected load is supplied from the battery via the internal UPS inverter (see section: Block diagram).

If the input voltage or frequency exits the valid range (as a rule, mains failure but also grid interruption or fluctuations), the UPS switches from normal to battery operation without interruption.

If the input voltage or frequency returns to the valid range, the UPS switches from battery to normal operation without interruption.

## 14.2 Device start

When a valid input voltage is applied, the device starts. During the subsequent LED test, all LEDs on the device front are switched on for a short time.
The output is connected to the input voltage via the bypass for a short time and the load is analyzed.
If the load is in the valid range, the UPS switches to normal operation in synchronization with the input voltage. The load is now being supplied via the internal double converter.

You can use the POWER MANAGEMENT SUITE software to set one of the following nominal voltages or nominal frequencies:

– 100 V, 110 V, 120 V (= default), or 130 V
– 50 Hz or 60 Hz (= default)

## 14.3 Switching behavior

### 14.3.1 Switchover due to voltage changes

The percentages in the following table apply for switching from normal operation to battery operation.
To switch from battery operation to normal operation and when switching on the UPS output when the device starts for the first time, you must subtract 5% hysteresis from the percentage values.

**Valid input voltages**

| Nominal voltage [V] | Lower limit [%] | Upper limit [%] | Lower switching threshold [V] | Upper switching threshold [V] |
|---|---|---|---|---|
| 100 | 10 | 20 | 90 | 120 |
| 110 | 10 | 20 | 99 | 132 |
| 120 | 10 | 15 | 108 | 138 |
| 130 | 15 | 10 | 111 | 143 |

**Example:**

Upon device start in 120 V nominal voltage operation, the UPS switches on the output in the range between 114 V … 132 V or switches from battery operation to normal operation.
Outside the 108 V … 138 V range, the UPS switches from normal operation to battery operation.

### 14.3.2 Switchover due to changes in frequency

The frequency values in the following table are valid for switching from normal operation to battery operation.
To switch from battery operation to normal operation and to switch on the UPS output for the first time when starting the device, you must add 2.5 Hz to the lower switching threshold or subtract 2.5 Hz from the upper switching threshold.

**Valid input frequencies**

| Nominal frequency [Hz] | Lower switching threshold [Hz] | Upper switching threshold [Hz] |
|---|---|---|
| 50 | 45 | 55 |
| 60 | 55 | 65 |

Upon device start in 60 Hz nominal frequency operation, the UPS switches on the output in the range between 57.5 Hz … 62.5 Hz or switches from battery operation to normal operation.
Outside the 55 Hz … 65 Hz range, the UPS switches from normal operation to battery operation.

In normal operation (= grid-managed), the internal UPS inverter follows the input frequency up to +/- 5% with reference to the nominal frequency. If the input frequency is outside these limits when switching from normal operation to battery operation, the output voltage frequency is either +/- 5% of the nominal frequency at the time battery operation begins. This depends on the direction in which the frequency varies.
As battery operation continues, the frequency of the output voltage will adjust to the nominal frequency within a few seconds (= automatic).

## 14.4 IQ technology

IQ Technology is an intelligent battery management system.

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.

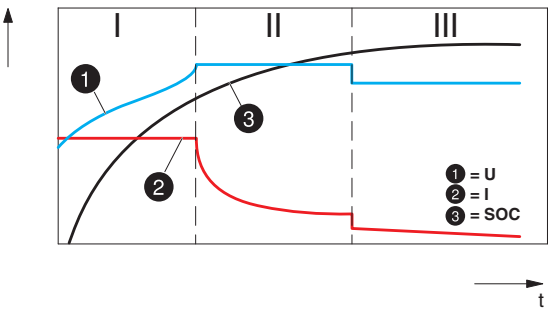
The batteries must first be fully charged (initialized) in order to determine the SOC and SOH. After this initial charging process, all IQ Technology functions are available.

## 14.5 Battery management

The uninterruptible power supply works with a 48 V battery system. You can connect a maximum of five 48 V batteries of the same type to the UPS.

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

Figure 27 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 Phoenix Contact IQ battery types, all required charging parameters are set automatically.

When using standard battery types (not IQ Technology), you can set the following charging parameters using the POWER MANAGEMENT SUITE software:

| Parameter | Area | Default |
|---|---|---|
| Nominal capacity | 3 ... 200 Ah | - |
| Initial charging current | 0.2 A ... 7 A | 2,1 A |
| Absorption charging end voltage | 50 V ... 59.2 V | 56 V |
| Conservation end-of-charge voltage | 50 V ... 59.2 V | 55.2 V |
| Temperature compensation (of the charging voltages) | 0 mV/K ... -200 mV/K | 72 mV / K |
| End-of-discharge voltage | 36 ... 48 V | 40 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 figure: Charging characteristic) 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.

## 14.6 Internal bypass

The uninterruptible power supply has an internal bypass. It can bridge the rectifier and inverter. The bypass is protected by a replaceable fuse (see block diagram).

The bypass is active in the following situations:

- Device start
- Overload
- Device error

### Device start

When starting the machine by connecting a supply voltage, the connected load is initially supplied via the internal bypass. In the meantime, the device checks whether the connected load is in the valid range. The internally generated AC voltage is synchronized with the input voltage in accordance with the phase relation and frequency. Operation is switched to the inverter when the connected load is in the valid range and the synchronization has been completed.

During device startup, bypass operation can also be used to start loads with an increased switch-on current.

**Overload**

In the event of an overload at the output or an impermissibly high temperature inside the device, operation is switched to the internal bypass at least temporarily. The load is then supplied directly with an input voltage.

**Device error**

If the connected load can no longer be supplied from the inverter due to a device error, the supply is switched to the internal bypass. The load is then supplied directly with an input voltage.

## 14.7 Replacing the fuse



**WARNING: Danger to life by electric shock!**
Never carry out work when voltage is present.
Use insulated pliers to change the fuse.

On the device front is a compartment for the bypass fuse.

Change the fuse as follows:

1. Open the cover of the fuse compartment using a suitable bladed screwdriver.
2. Remove the fuse holder from the fuse compartment using insulated pliers.
   There are two fuses preinstalled in the fuse holder.
3. To use the replacement fuse, turn the fuse holder by 180°. Remove the defective fuse and replace it with a new replacement fuse, if necessary.
4. Insert the fuse holder into the fuse compartment in the turned position.
5. Close the cover.

Figure 28 Open the cover

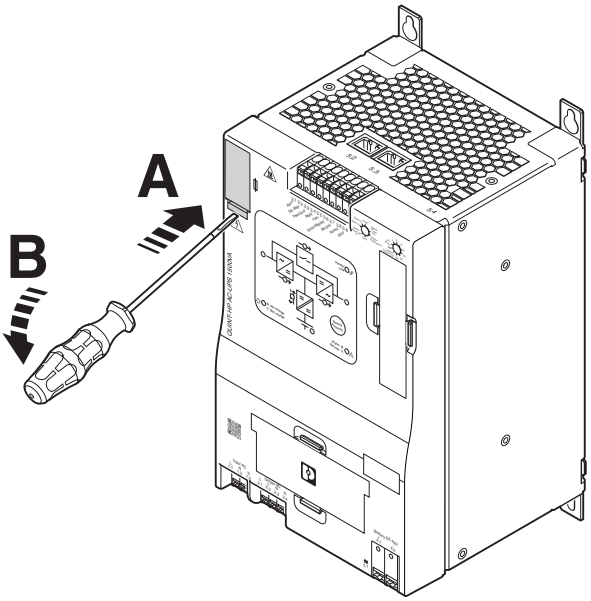
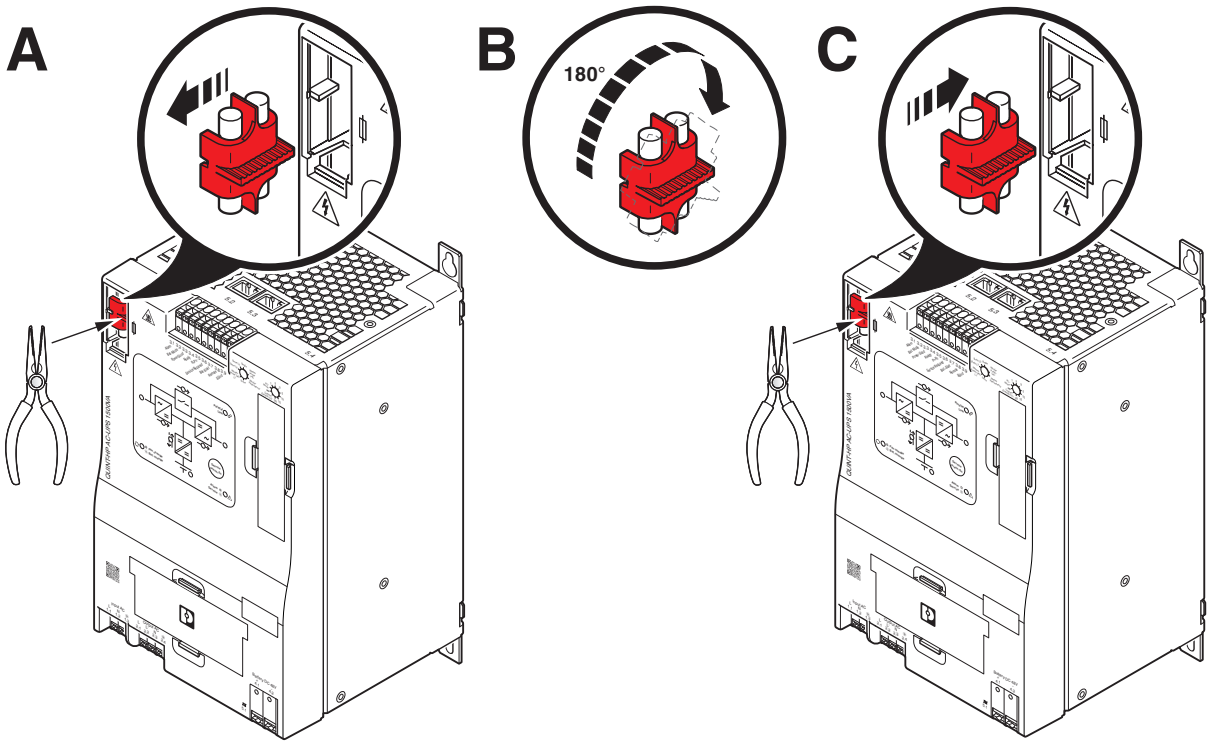



Figure 29 Replacing the fuse

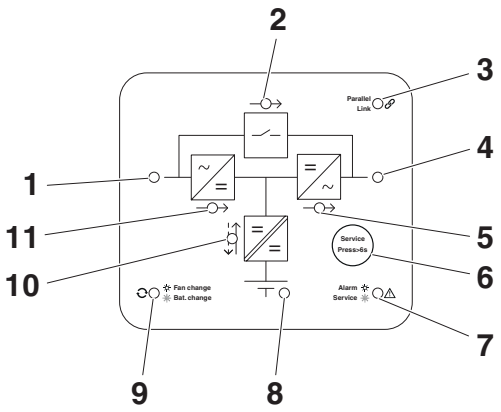


# 15 Signaling

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.

## 15.1 LED indicators

Figure 30 LED indicators




## 15.2 LED status and flash behavior

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

| No. | LED | LED status | Description |
|---|---|---|---|
| **1** | ● | ON | Input voltage in the valid range |
| | ○ | off | Input voltage not in the valid range |
| **2** | ● | ON | Output connected to input via bypass |
| | ✷ | flashing | Bypass fuse defective |
| | ○ | off | Bypass without function |
| **3** | ● | ON | Parallel operation active |
| | ✷ | flashing | Parallel operation disrupted |
| | ○ | off | No parallel operation |
| **4** | ● | ON | Output voltage in the valid range, load is supplied. |
| | ✷ | flashing | Remote active |
| | ○ | off | No output voltage present |
| **5** | ● | ON | Inverter working, output is supplied. |
| | ✷ | flashing | Overload |
| | ✹ | flashing, quickly | Bypass operation as protective function in combination with LED 11 |
| | ○ | off | Inverter without function |
| **6** | | | Button: Start and end service mode |
| **7** | ● | ON | Alarm |
| | ✷ | flashing | UPS in service mode, f = 2 Hz, D = 0.5 |
| | ○ | off | No alarm/no service mode |
| **8** | ● | ON | Battery present, fully charged |
| | ✷ | flashing | Charging state indicator/battery error in combination with LED 6 |
| | ○ | off | No battery present |
| **9** | ● | ON | Replacing the fan |
| | ✷ | flashing | Replacing the battery |
| | ○ | off | No service required |
| **10** | ● | ON | Battery supplies the intermediate circuit/the output |
| | ✷ | flashing | Normal operation, battery charging |
| | ○ | off | Normal operation, battery fully charged |
| **11** | ● | ON | Rectifier working, intermediate circuit is fed |
| | ✷ | flashing | Overload |
| | ○ | off | Rectifier without function |

**LED charge-state indicator**

When using Phoenix Contact IQ battery types, the SOC (State of Charge) charge state is indicated via a flash pattern. Here, each flash pulse represents an SOC range of 20%.

| Number of flash pulses | SOC range |
|---|---|
| 1 | 1 ... 20 % |
| 2 | 21 % ... 40 % |
| 3 | 41 ... 60 % |
| 4 | 61 ... 80 % |
| 5 | 81 ... 99 % |
| LED permanently on | 100 % |

### 15.3 Signal outputs

The signal states of all signal outputs can be inverted via the POWER MANAGEMENT SUITE software.

**Alarm**

When an alarm is present, the signal output is active (low level). The signal status can be inverted via the POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

Possible general alarms include:

- Shutdown when overloaded
- Service mode active
- Internal device error
- Bypass fuse defective
- Faulty fan
- End of the fan service life reached: can be adjusted using POWER MANAGEMENT SUITE
- Unintended bypass operation (protective function, due to an excessive DC component at the output)

Possible battery alarms include:

- No battery connected
- Battery voltage low in normal operation
- Block voltage difference too large
- Permitted charging time exceeded
- End of the battery life reached: SOH (State of Health); can be adjusted using POWER MANAGEMENT SUITE
- Low SOC (State of Charge) in battery operation; can be adjusted using POWER MANAGEMENT SUITE
- Low remaining buffer time in battery operation; can be adjusted using POWER MANAGEMENT SUITE
- Different batteries hooked up in parallel
- Defective battery connected

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 by the battery module, the signal output is active (high level). The signal state can be inverted via the POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the POWER MANAGEMENT SUITE software.

**Power Good**

If the load is being supplied, the signal output is active (high level). The signal status can be inverted via the POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the POWER MANAGEMENT SUITE software.

**Ready**

When the battery is fully charged (SOC = 100%), the signal output is active (high level). The signal state can be inverted via the POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the POWER MANAGEMENT SUITE 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 POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the POWER MANAGEMENT SUITE software.

**Service Required**

The signal output is enabled (high level) while replacing the battery or the fan.

The signal status can be inverted via the POWER MANAGEMENT SUITE software.

A digital transistor output is available as a signal contact.

You can assign other additional information to this signal output using the POWER MANAGEMENT SUITE software.

### 15.4 Signal inputs

**Remote**

You can activate and trigger various functions using the remote signal input. For further information, refer to section “Device operation, Remote”.

A change made to the remote function using the POWER MANAGEMENT SUITE software is not applied until a corresponding status change of the remote signal input or device restart has been carried out.

**Bat.-Start**

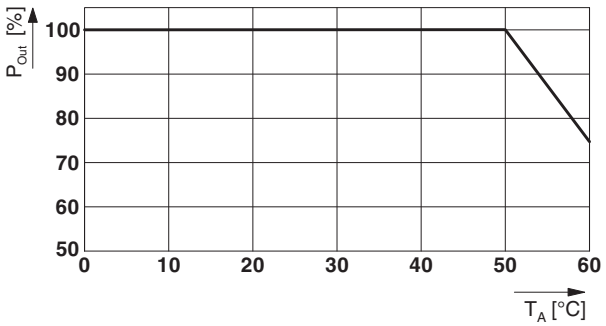
You can use the Bat.-Start signal terminal to start the UPS without supply voltage on the input side. For further information, refer to the “Device operation, battery start” section.

## 16 Derating

### 16.1 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 31 Temperature-dependent derating




### 16.2 Installation height

The uninterruptible power supply can be operated at an installation altitude of up to 1000 m without any limitations. For installation sites above 1000 m, other specifications apply due to the deviating air pressure.

A power derating of 3%/1000 m must be observed for installation heights between 1000 m and 4000 m.

Figure 32 Altitude-dependent derating

