

UNINTERRUPTIBLE POWER SUPPLY

UQ33-PRO

from 10 to 125 kVA three phase output

User Manual



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The WS 55/RTQ series consists of the following models:

UQ33-PRO 10kVA UPS

(UQ33-PRO 12kVA UPS

(UQ33-PRO 15kVA UPS

(UQ33-PRO 20kVA UPS

(UQ33-PRO 30kVA UPS

UQ33-PRO 40kVA UPS

(UQ33-PRO 60kVA UPS

UQ33-PRO 80kVA UPS

UQ33-PRO 100kVA UPS

UQ33-PRO 125kVA UPS



WS 55/RTQ UPS operates a Quality Management System certified to ISO 9001/2000 (Certification No. CERT-04116-99-AQ-MIL-SINCERT) covering all company functions from design and manufacture to after sales services.

In addition, the UPS meets the VFI-SS-111 classification (according to EN 62040-3) and complies with the following specific standards for UPS:

- **IEC EN62040-1:** Static uninterruptible power supplies (UPS): general and safety provisions;
- **IEC EN62040-1-1:** Static uninterruptible power supplies (UPS): general and safety provisions for operator-accessible areas;
- **IEC EN 62040-2:** Electromagnetic compatibility (EMC) requirements category C2
- **EN 62040-3:** Methods of specification of performances and test provisions;

The WS 55/RTQ series also satisfies the following general standards, where applicable:

- **IEC 60529:** Degree of protection provided by enclosures;
- **IEC 60664:** Insulation for low-voltage equipment;
- **IEC 60755:** General Requirements for Residual Current Operated Protective Devices;
- **IEC 60950:** General safety provisions for "Information Technology" equipment;
- **IEC 61000-2-2:** Electromagnetic compatibility immunity;
- **IEC 61000-4-2:** Electrostatic discharge immunity test;
- **IEC 61000-4-3:** Radio frequencies, electromagnetic immunity test;
- **IEC 61000-4-4 :** Transitory overvoltage immunity test;
- **IEC 61000-4-5 :** Overvoltage immunity test;
- **IEC 61000-4-11:** Voltage dips, short interruptions and voltage variations immunity test.
- **IEC 61000-3-12:** Harmonic current emissions (for equipment with rated current $> 16 \text{ A} \leq 75$)

European Directives:

LV 2006/95/EC

Low voltage Directive: contains provisions relating to equipment safety and imposes the EC marking obligation from 1/1/97.

EMC 2004/108/EC

Electromagnetic compatibility directive: contains provisions relating to UPS immunity and emissions in its installation environment and imposes the EC marking obligation from 1/1/96.

4 - APPLICATIONS

WS 55/RTQ"UPS are suitable for applications requiring critical load protection including:

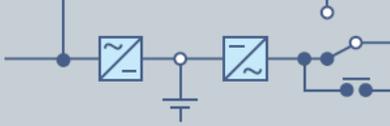
LAN, Server and Datacenters: the 0.9 output power factor ensures greater active power availability for efficient UPS loading.

e-business and Telecommunications: parallel operation means that the installed UPS size can be increased (up to 6 units) to keep pace with the growth of the organisation.

Industrial processes and electro-medical systems: the UPS is designed to protect a range of loads, from industrial processes to electro-medical applications. This has been achieved through careful load analysis at the design stage of the UQ33-PRO project, to ensure the following characteristics:

- optimum input technical characteristics to achieve "cleaned" power supply source
- high short circuit and overload capacity
- high battery recharge capacity with the option to use a variety of battery types (sealed valve regulated and open-vented) for long back-up times.

Emergency systems: the UPS can be configured to operate in any one of four operating modes to comply with EN 50171 (the Centralised Power Supply Systems) standard:

Operating modes (EN50171)	UQ33-PRO Configurations
<p>1. Always powered</p> 	<p>The UPS operates in the following mode: ON-LINE (See chapter 6 "Ups descriptions")</p>
<p>2. Powered from the mains</p> 	<p>The UPS operates in the following mode: ECO-MODE (See chapter 6 "Ups descriptions")</p>
<p>3. Emergency only</p> 	<p>The UPS operates in the following mode: STAND BY-OFF (See chapter 9.4 "Configuration Software")</p>
<p>4. Always powered/Emergency only</p> 	<p>The UPS operates in the "ON LINE" MODE by using the POWERSHARE socket (see the operating manual)</p>

5 - CONFIGURATIONS

The UPS can be installed as a single, stand-alone UPS and this format is most commonly used for relatively straight forward installations. This can be expanded up to 6 units (4 units in the 3/1 version) in order to meet load power demands or to introduce a level of redundancy.

Parallel configuration

Up to 6 UPSs (4 units in the 3/1 version) can be connected in parallel either to increase the power of the uninterruptible power system (power parallel) or to enhance its reliability (redundant parallel).

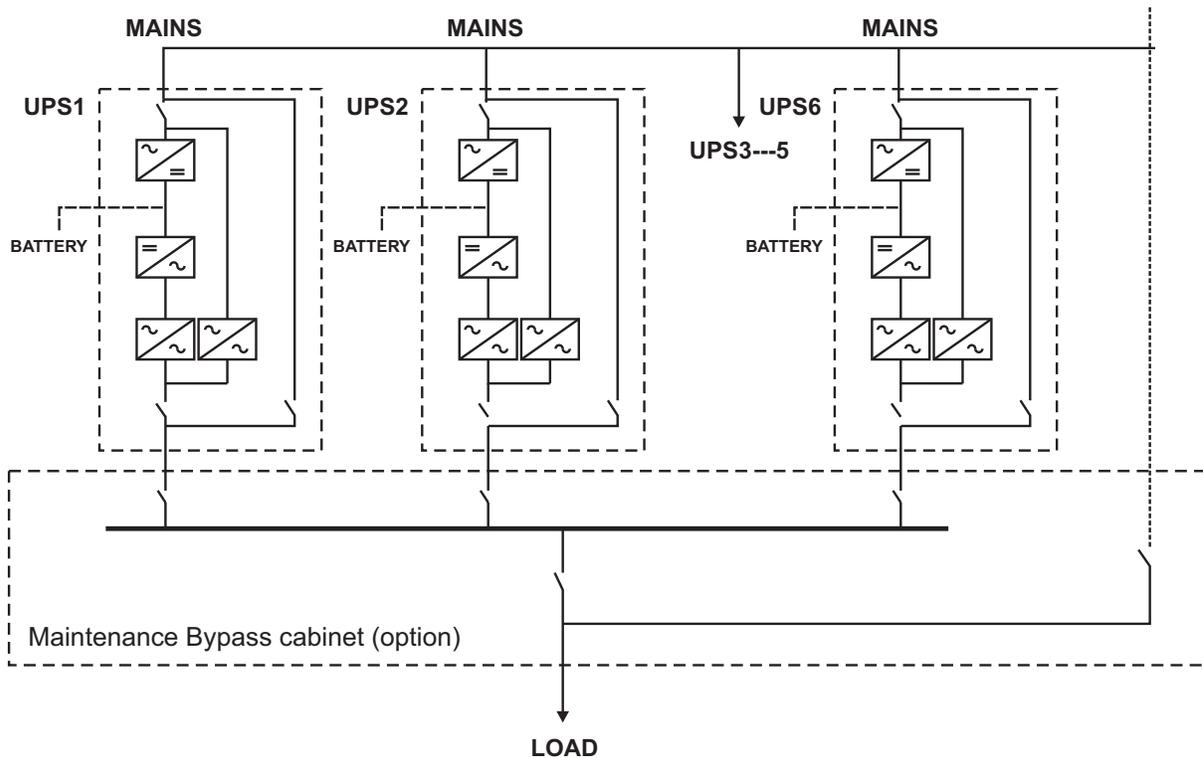
The system is defined as “redundant parallel” when the stoppage of one or several UPSs does not determine the loss of the power supply.

All the UPSs power the load simultaneously with automatic sharing of the current.

The units exchange information on the operating status and the sync signals by means of the RS485 connections in loop with dual redundancy. This means that even in the event of the accidental interruption of both connections, only the UPS affected by this interruption cuts itself off, while the other one continues to operate without any interference.

The “Hot Plug-in” feature means that a new UPS can be added to the system while the other units are on-line and powering the load from the inverter.

The integrated UPS will configure itself automatically with the system data without any disturbance to the load.



6 - UPS DESCRIPTION

The UPS can be operated in four main operating modes: ON-LINE, FREQUENCY CONVERTER, ECO and SMART ACTIVE and in their mode of operations are described below:

Mode: ON-LINE

Normal Operation: the rectifier, drawing power from the mains power supply, supports the Inverter and charges the batteries; the load is powered by the Inverter which provides a clean and secure supply, synchronised to the bypass supply.

Emergency Operation: if the mains power supply is outside the permitted input range (voltage and frequency), the rectifier is shut down and the Inverter is automatically powered by the battery set for the preset back-up time and without disruption to the load. When the mains power supply returns, the rectifier gradually starts up, charging the batteries and eventually powers the Inverter.

Operation from By-pass: if an Inverter overload exceeds permitted limits (or is manually shutdown), the load automatically transfers to the emergency bypass via the static switch and without disruption to the load.

Mode: FREQUENCY CONVERTER

The UPS can be configured as a frequency converter (with "UPS tools"), therefore when the input frequency is 50Hz the output frequency can be 60Hz and vice versa. During this mode of operation the automatic by-pass is disable. In frequency converter mode the battery installation is anyway necessary.

Mode: ECO

The load is normally powered from the emergency bypass supply and the rectifier maintains battery charge. When the mains power supply wanders outside the permitted input range, the load is automatically transferred to the output of the Inverter until the mains power supply returns within range. This mode is useful when powering loads that do not require the regulated no-break supply from the Inverter and allows the system to achieve an efficiency up to 98%.

Mode: SMART

When the UPS is configured to operate in SMART ACTIVE mode, it automatically selects whether to operate in ON-LINE or ECO mode.

The decision is made based on statistical calculations performed by the UPS and based on the quality of the mains and bypass supplies: if the latter remains suitable for a certain period, the unit selects ECO mode, otherwise it remains in ON-LINE mode.

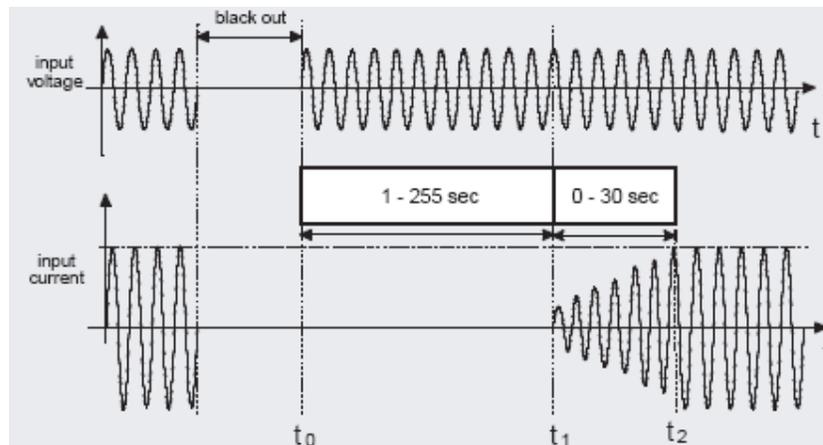
> 6.1 PFC CONVERTER (“Cleaned” SOURCE)

The PFC Converter converts the AC voltage into a DC supply to power the Inverter; if the mains or alternative power supply fails, the Converter will raise the battery voltage to a value suitable with which to power the Inverter. The PFC control technology using Digital Signal Processing (DSP) microprocessors and IGBT power semiconductors to achieve a low impact on the power supply source, low harmonic distortion and high input power factor. A zero impact on the supply source is achieved due to the following characteristics:

Negligible Input Harmonics: upstream generators and transformers (including distribution) can be reduced due to the negligible input harmonic distortion of < 3% and high input power factor > 0.99.

Delayed switching of UPS – t_0 - T_1 (Power on Delay): when the mains power supply returns, the UPS delays switching of the input stage for a period of time that can be set between 0 and 255 seconds (5 seconds standard). This function is particularly useful when the mains power supply returns after an interruption (or when the generator set is started) and the source must supply various UPS or, more typically, multiple users.

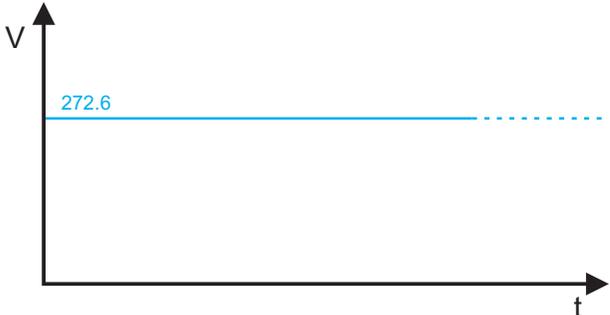
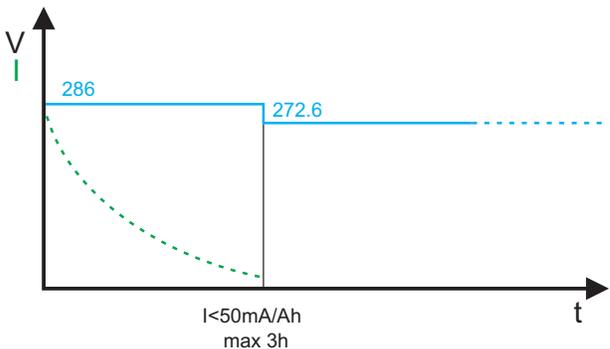
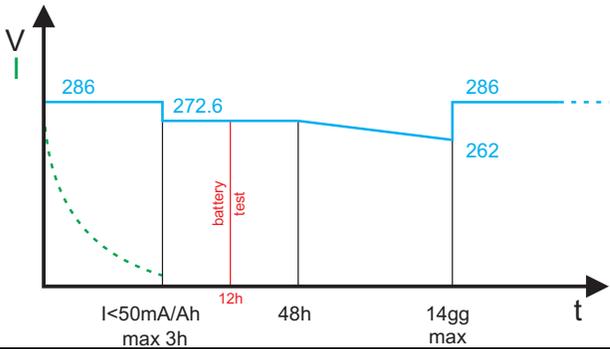
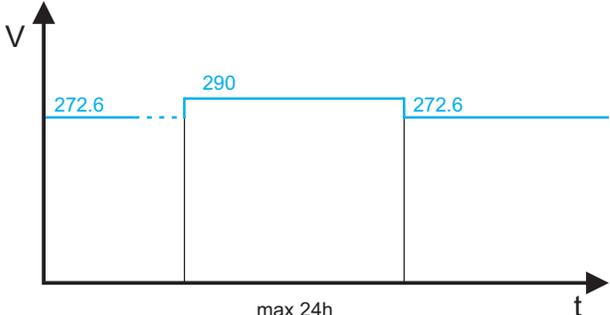
Progressive rectifier start-up – T_1 - t_2 (Power Walk-in): when the mains power supply returns, absorption of the mains power supply progressively reaches the nominal value within a time period that can be set from 5 to 30 seconds. This function is normally disabled.



> 6.2 BATTERY CHARGER (Battery Care System)

The "Battery Care System" is a set of functions arranged to help extend the working life the battery set and optimise its performance.

- a) **Battery recharging:** the UPS can be used with sealed lead batteries (VRLA), AGM, open-vented and NiCd batteries. According to the type of battery used two recharge methods are available:

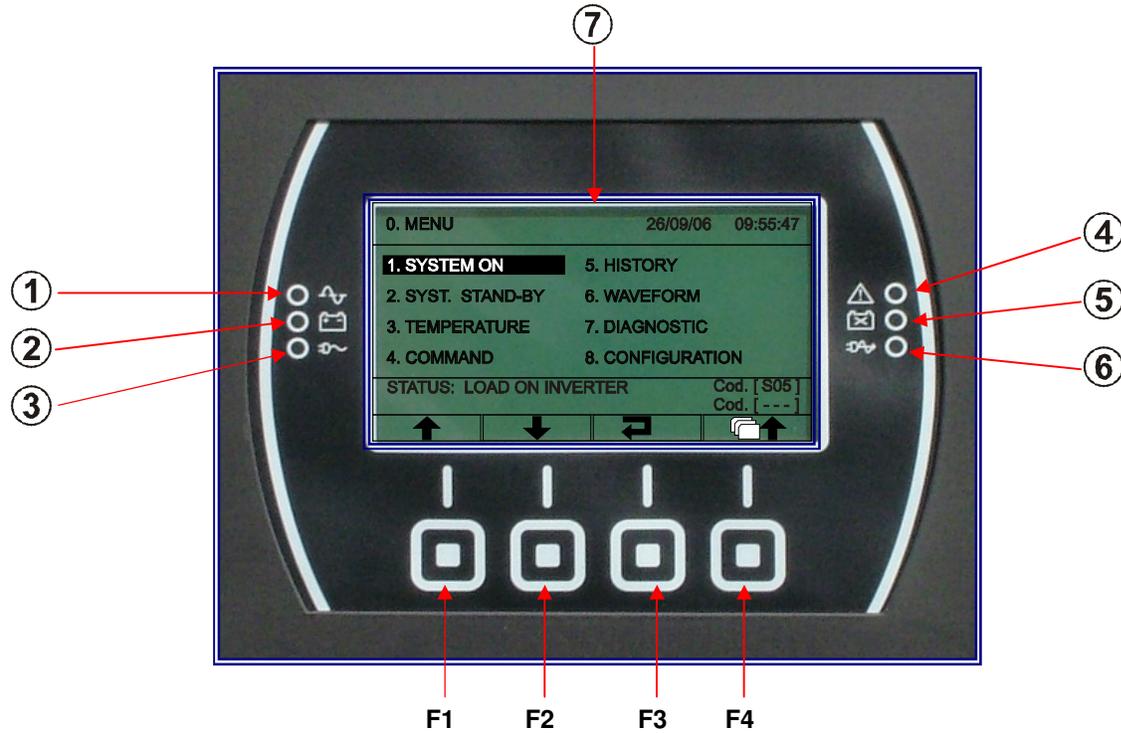
Modalità di ricarica (Selezionabili via "UPS tools")	Configuration WS 55/RTQ
 <p>The graph shows a constant voltage of 272.6V on the y-axis against time (t) on the x-axis. A horizontal line is drawn at 272.6V, extending across the time axis.</p>	<p>Floating (standard configuration): the charge state of the battery is continuously monitored; when the mains power supply is present, the batteries are charged at a preset voltage level and limited current relative to the recharge time required and the capacity of the battery itself.</p>
 <p>The graph shows a two-stage voltage profile. The voltage starts at 286V, then drops to 272.6V. A dashed green curve shows the battery voltage decreasing over time. Below the x-axis, it is noted: $I < 50\text{mA/Ah}$ max 3h.</p>	<p>Two-level recharge (configurable): this recharge is at limited current with two levels of voltage. In the first instance, the process uses a quick charge voltage, whilst in the second stage a float charge. This type of charging is mainly used with open-vented batteries or other types when an accelerated recharge time is required.</p>
 <p>The graph shows a cyclical charge and discharge process. The voltage starts at 286V, drops to 272.6V, then to 262V, and finally back to 286V. A dashed green curve shows the battery voltage decreasing over time. Below the x-axis, it is noted: $I < 50\text{mA/Ah}$ max 3h, 12h battery test, 48h, 14gg max.</p>	<p>Cyclical recharge: this recharge is sometimes recommended by battery manufacturers to prolong the battery life. It consists of battery charge and discharge cycles as indicated in the diagram.</p>
 <p>The graph shows a commissioning charge profile. The voltage starts at 272.6V, rises to 290V, and then returns to 272.6V. Below the x-axis, it is noted: max 24h.</p>	<p>"Commissioning charge": this charge method is useful every time new batteries are installed in the UPS. By increasing the voltage to 290 volts for a maximum of 24 hours, perfect equalisation of the battery charge is assured, thus guaranteeing a uniform discharge and wear of the battery monoblocks.</p>

The various recharge methods and the preset voltage values are defined using UPS tools. The presence of the external temperature sensor option will activate compensation of the voltage depending on the temperature with the battery backup voltage (272V for 20 battery blocks)

- b) **Battery test:** during normal operation the battery is automatically tested at regular intervals. The battery test can also be manually activated. The test is performed to ensure a limited battery discharge and impact on overall life expectancy. If the test returns a negative result a warning is displayed on the UPS panel (or remote panel, if installed).
- c) **Protection against deep discharge:** for long runtimes and low load discharges, the end of discharge voltage is raised to approximately 1.8V/eh as recommended by the battery manufacturers to avoid a deep discharge state.
- d) **Ripple current:** recharge ripple current (residual AC component) is one of the most important causes of poor battery reliability and reduced operating life. The UPS battery charger is a high-frequency design with a negligible level of ripple current,
 - e) **Battery recharge limit current:** The battery recharge current is limited to a prefixed value of $C_{nom}/8$ (i.e. 12.5% C_{nom})
 - f) **Cold-Start:** This feature allows the Inverter to be switched on and the load to be powered by the battery, when the mains power supply is not present.
 - g) **UPS without batteries:** the UPS must always be operated with the batteries connected; if they are not connected alarms will be generated and the UPS will not be able to perform to specification.

7 - CONTROL PANEL

The control panel consists of a graphical display, 6 visual warning LEDs and 4 function keys.



- | | |
|-----------------------------|-----------------------------|
| ① LED for mains operation | ⑤ LED for replace batteries |
| ② LED for battery operation | ⑥ LED for ECO mode |
| ③ LED for load on bypass | ⑦ Graphical Display |
| ④ LED for stand-by/alarm | |

F1, F2, F3, F4=FUNCTION KEYS. The function of each key is illustrated in the lower part of the display and varies according to the menu.

Messages are available in the following languages: Italian, English, French, German, Spanish, Polish, Turkish, Chinese and Russian.

At the centre of the control panel there is a wide-area graphical display providing a detailed real-time overview of the UPS operational state. From the control panel the user can switch the UPS on/off, read electrical measurements - mains, output, battery, etc, and set the main operational parameters.

The display is divided into four main areas, each with a specific function:

1 GENERAL INFORMATION

An area permanently showing the date and time and according to the level of display, either the UPS model or the title of the menu active at that time.

2 DATA DISPLAY/NAVIGATION MENU

The main area of the display showing key UPS measurements (constantly updated in real-time). The user can also select and view various menus using the appropriate function keys. After selecting the required menu, this part of the display shows one or more pages containing all the data relevant to that menu.

3 UPS STATE / ERRORS - FAILURES

An area in which the UPS operating state is shown. The first line is always active and constantly displays the state of the UPS at any given time; the second line is active only if an error and/or failure of the UPS occurs and shows the type of error/failure found. Each line on the right shows the code corresponding to the current event.

4 EVENT LOG

An area showing chronological events recorded (supply voltage out of range, high temperature, overload, etc.) and alarms. The log records 960 events in FIFO (First In First Out) mode and the string contains the following information: Event Code, Event Description, Date and Time.

Data is displayed through the graphical display using the scroll keys; the log can be downloaded in TXT format using the UPSTools configuration software.

5 KEY FUNCTIONS

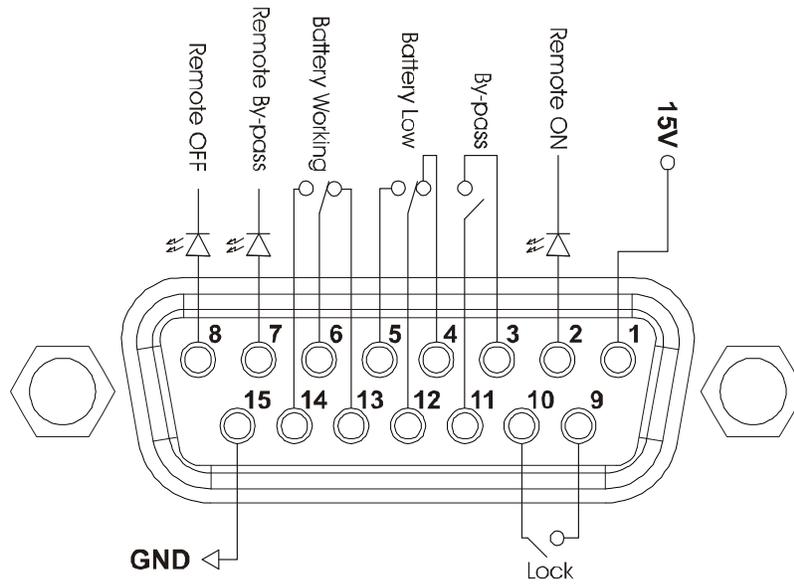
An area divided into four sections, one for each of the function keys. According to the menu active at any time, the display will show the corresponding function key in the appropriate box.

When an alarm appears an audible warning will sound.

Measurements

- Input voltage and frequency
- By-pass voltage and frequency
- Output voltage, current and frequency
- Output power (VA, W and %)
- Output peak current
- Battery voltage
- Battery charge current
- Internal temperature (control logic, power modules, battery charger, internal batteries)
- External battery temperature
- Back-up time

AS400 PORT



PIN #	DESCRIPTION	TYPE	FUNCTION
1	15V	POWER	Isolated auxiliary power supply +15V± 5% 80mA max
15	GND	POWER	Ground for the isolated auxiliary power supply (15V) and remote controls (Remote ON, Remote BYPASS, Remote OFF)
2	REMOTE ON	INPUT #1	By connecting pin 2 with pin 15 for at least 3 seconds the UPS switches on
8	REMOTE OFF	INPUT #2	By connecting pin 8 to pin 15 the UPS is shut down immediately
7	REMOTE BYPASS	INPUT #3	By connecting pin 7 to pin 15 the load power supply switches from inverter to bypass. For as long as the connection is made, the UPS continues to operate on bypass even if the input mains supply fails. If the jumper is removed with the mains power supply present, the UPS will resume operation and the load will be powered by the inverter. If the jumper is removed with the mains power supply fails, the UPS will resume operation on battery power.
4,5,12	BATTERY LOW	OUTPUT #1	Reports that the batteries are at the end of discharge when contact 5/12 is closed ⁽¹⁾
6,13,14	BATTERY WORKING	OUTPUT #2	Reports that the UPS is operating on battery power when contact 6/14 is closed
9,10	LOCK	OUTPUT #3	When the contact is closed, reports that the UPS is blocked ⁽¹⁾
3,11	BYPASS	OUTPUT #4	When the contact is closed, reports that the bypass supply is powering the load

NOTE: The diagram shows the contacts present inside the UPS that can provide a maximum current of 0.5A at 42Vdc. The position of the contacts in the diagram is shown without alarms or warnings.

⁽¹⁾ The output can be programmed through the appropriate configuration software. The function shown is the default (configured by the manufacturer).

FUNCTION	DESCRIPTION	PRESET	POSSIBLE CONFIGURATIONS	MOD.
Output frequency	Selection of the output nominal frequency	Auto	50 Hz • 60 Hz • Auto: automatically selected from the input frequency	CP
Output voltage “Phase – Neutral”	Selection of the output nominal voltage	230V	• 200V * • 208V * • 220V • 230V • 240V • 220 to 240 in steps of 1V (only through software)	CP
Modes of operation	Selection of one of the 4 different operating modes	ON LINE	• ON LINE • ECO • SMART ACTIVE • STAND-BY OFF • FREQUENCY CONVERTER (only through software)	CP
Switch-on delay	Delay time for automatic switching-on after the mains is restored	5 seconds	Disabled • 1 to 255 in steps of 1 second	CP
Power Walk In	Starts the ramp return mode from the mains	Disabled	Enabled Disabled	SW
Duration Power Walk In	Setting of the ramp duration when the mains is restored (only if Power Walk-In is enabled)	10 seconds	Min.: 1 second - Max.: 30 seconds	SW
Shutdown due to minimum load	Automatic shutdown of the UPS when battery-operated, if the load is lower than 5%	Disabled	• Enabled • Disabled	CP
Back-up time limit	Maximum time on battery-operation	Disabled	Disabled (batteries totally discharged) • 1 to 65000 in steps of 1s	SW
End of discharge pre-alarm	Estimated remaining back-up time before end of discharge pre-alarm	3 minutes	1 to 255 in steps of 1 minute	SW
Battery Test	Time range for the automatic testing of the batteries	40 hours	Disabled • 1 to 1000 in steps of 1 hours	SW
Alarm threshold for maximum load	Selects the user limit for overload	Disabled	Disabled • 0 to 103 in steps of 1%	SW
Buzzer	Selects the buzzer mode operation	Limited	Normal • Limited: does not sound for temporary bypass operation	CP
Auxiliary Socket (power share)	Selects the operating mode for the auxiliary socket	Always connected	Always connected • Disconnected after n seconds of battery operation • Disconnected after n seconds from the end of discharge pre-alarm • ... (see UPSTools manual)	SW

FUNCTION	DESCRIPTION	PRESET	POSSIBLE CONFIGURATIONS	MOD.
Battery expansion	Setting of the Ah installed (expansion of the external battery)	0 Ah	Min.: 0 - Max.: 999 (in steps of 1 unit)	CP
Language	It selects the display language	English	<ul style="list-style-type: none"> • English • Italian • German • French <ul style="list-style-type: none"> • Spanish • Polish • Turkish • Chinese 	CP Others languages available with different firmware version
Advanced Functions				
Input frequency tolerance	Selects the admitted input frequency range for the bypass transfer and output synchronization	± 5%	<ul style="list-style-type: none"> • ± 0.25% • ± 0.5% • ± 0.75% • 1 to 10 in steps of 1% 	SW
Bypass voltage thresholds	Selects the permissible voltage range for bypass transfer	Low:180V High:264V	Low: 180 to 200 in steps of 1V High: 250 to 264 in steps of 1V	SW
Bypass voltage thresholds for ECO	Selects the permissible voltage range for ECO operating mode	Low:200V High:253V	Low: 180 to 220 in steps of 1V High: 240 to 264 in steps of 1V	SW
Action sensitivity for ECO	Selects the operation sensitivity during ECO mode operation	Normal	<ul style="list-style-type: none"> • Low • Normal • High 	CP
Load power supply in stand-by	Load power supply on bypass with UPS off (stand-by state)	Disabled (load NOT powered)	<ul style="list-style-type: none"> • Disabled (not powered) • Enabled (powered) 	SW
Bypass operation	Selects the operating mode of the bypass line	Enabled / High sensitivity	<ul style="list-style-type: none"> • Enabled / High sensitivity • Enabled / Low sensitivity • Disabled with input / output synchronisation • Disabled without input / output synchronisation 	SW
Inverter synchronisation (External Sync)	Selects the synchronisation source for the inverter output	From bypass line	<ul style="list-style-type: none"> • From bypass line • From external input 	SW
Inverter synchronisation speed at the bypass line	Selects the inverter synchronisation speed at the bypass line	1 Hz/second	<ul style="list-style-type: none"> • 0.5 Hz/second • 1 Hz/second • 1.5 Hz/second • 2 Hz/second 	SW
External temperature probe (optional)	Enables reading of the external temperature probe	Not enabled	<ul style="list-style-type: none"> • Not enabled • Enabled 	SW

* Setting these output voltage values will lead to the reduction of the output power of the UPS (see "Reducing the load (at 200V and 208V) paragraph")

** Pressing the F1 and F4 keys at the same time for $t > 2$ sec will automatically reset English as the language.

10 - UPS CABINET

The cabinet is made of galvanised steel with an IP20 rating (degree of Ingress Protection), even with the front door open.

Ventilation via the rear panel; air intake is front to rear.

The main assemblies (including the power module and magnetics) are temperature monitored.

11 - OPTIONS

> 11.1 COMMUNICATION

PowerNETGuard is a centralised UPS management and control software package using the SNMP communications protocol. It is the ideal UPS management tool for IT/EDP managers running datacenters and medium-to-large-sized networks.

The main features of the software include:

- Various display levels by geographical areas, building plans, maps.
- Multi-user accesses with various security levels.
- Compatible with RFC 1628 standard SNMP agents.
- Graphical representation and file backup of operating measurements
- Notification of alarms via email and SMS.
- Integrated Wap Server for display of alarms.
- Suitable for operation with Windows operating systems: (98, ME, NT, 2000, 2003, and Xp) Linux, Mac OS X, Solaris 8 and 9.

Hardware

Two slots are available in which to house one or two of the following options:

- a) **NetMan 102 Plus:** the NetMan Plus network agent allows UPS management across a LAN using any of the main network communication protocols - TCP/IP, HTTP and network interface (SNMP). NetMan Plus enabled UPS integrate easily into medium and large sized networks and provide reliable communications between the UPS and management systems employed.
- b) **MultiCom 302:** a Modbus/Jbus protocol converter through an RS232 or RS485 output for monitoring the UPS, for example, from a BMS (Building Management System). It also provides a second independent RS232 serial line that can be used by other devices such as a NetMan Plus or PC.
- c) **MultiCom 352:** it is a serial duplexer that allows two devices to be connected to a single serial port on a UPS. It can be used where numerous serial connections and multiple UPS polling are required, and is ideal for LAN networks with a firewall..
- d) **Multicom 382:** it provides a set of relay contacts to provide UPS alarm and status indication. The contacts are connected through terminal connections. Signal contacts include Emergency Power Off (EPO), Remote Shut Down (RSD), On Battery, On Bypass, Alarm and Low battery. The contacts are change over or normally open.

> 11.2 EXTERNAL BATTERY TEMPERATURE SENSOR

The UPS has a special entry point for measuring the temperature inside a remote Battery Box and indicating the temperature on the UPS display.

The specific kit supplied by the manufacturer includes a bipolar double isolated cable measuring 6 meters. The use of a bipolar cable without isolation exposes the UPS and the user to risks resulting from a lack of isolation as the reading refers directly to the UPS neutral earthing.

Once installed, the device is configured using the UPSTools software package supplied on the CD-ROM with the UPS.

> 11.3 EXTERNAL MAINTENANCE BYPASS

An external remote maintenance bypass can be installed with the UPS, to allow, for example, UPS replacement without disruption to the load.

If this option is chosen, it is essential to connect the "SERVICE BYPASS" terminal located inside the UPS to the auxiliary "Normally Open "(NO) contact of the SERVICE BYPASS switch. Operation of the SERVICE BYPASS switch closes this auxiliary contact and informs the UPS. If such a connection is not made, operation of the remote maintenance bypass may disrupt the supply of power to the load and damage the UPS.

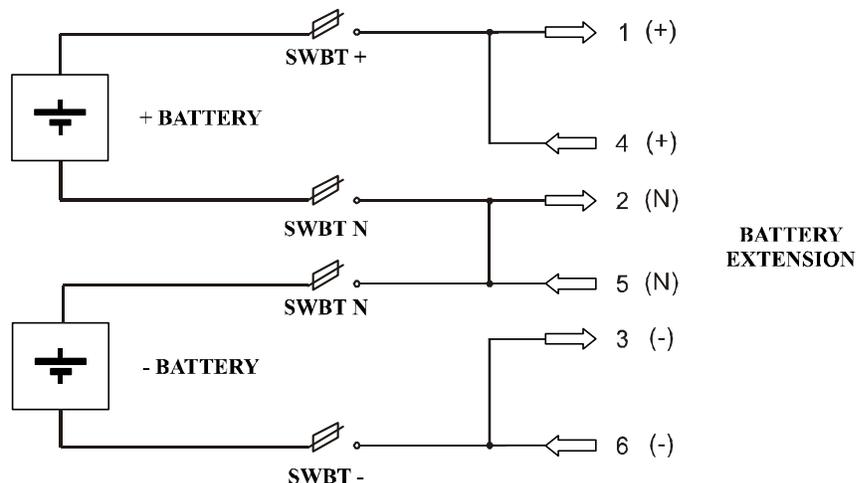
Note: Always check that the remote maintenance bypass installation (if selected) is compatible with any transformer options selected for the UPS - see paragraph 11.6 Optional Transformer.

> 11.4 BATTERY CABINETS

This is an optional item. The battery cabinet can be used to extend an internal battery set runtime or provide an external battery set when the space within the UPS for an internal battery is populated with extended runtime chargers or transformer options.

The number of batteries housed within the cabinet varies according to UPS rating. It is therefore necessary to carefully match that Battery Cabinet DC rating to that of the UPS.

The Battery Cabinet configuration is shown below.



Some solutions that have been studied and are available in the catalogue for the 10-40kVA range are described below.

Other solutions may be developed on site, bearing in mind that:

- the structure of the battery enclosure must respect that described above.
- the number of batteries must remain constant (20+20 12 volt monoblocks)
- the battery capacity (expressed in AH) must fall within the range of 4 and 20 times the available recharging current (see the "technical specifications table")

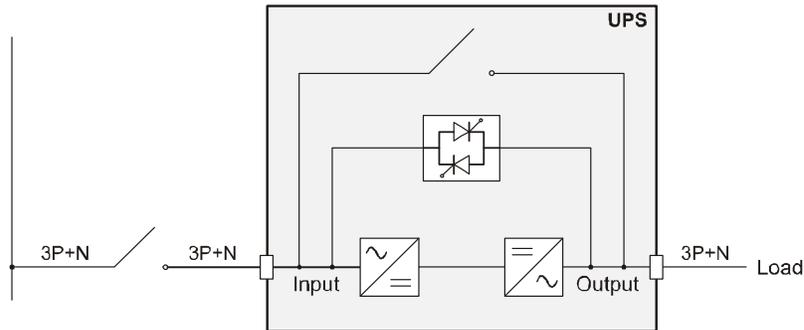
> 11.6 OPTIONAL TRANSFORMERS

A transformer can be installed within the UPS battery compartment (removing the potential for an internal battery set). Transformer options include: supply neutral reference, Galvanic isolation and output voltage (step-up or down).

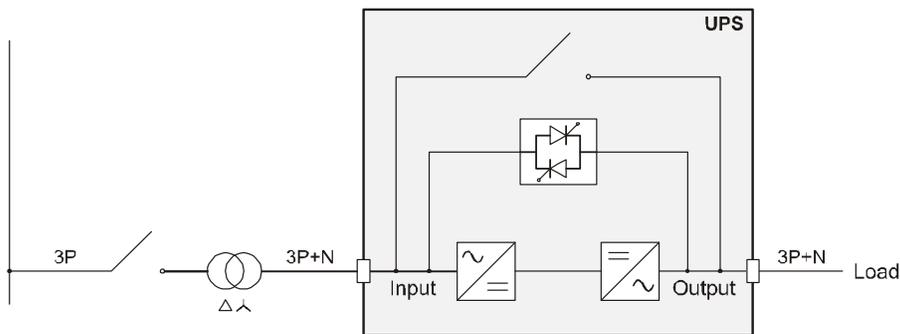
ELECTRIC CONNECTIONS DIAGRAMS

Note: An external transformer will modify the neutral arrangements of the installation. Therefore, if a "remote maintenance bypass" is installed it must be sited downstream of the transformer (for an input-side transformer) or upstream (for an output-side transformer).

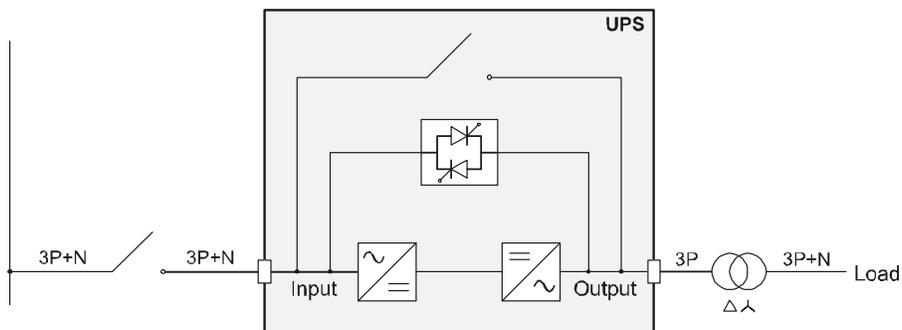
UPS without variation of the neutral arrangements



UPS with Galvanic isolation on the input

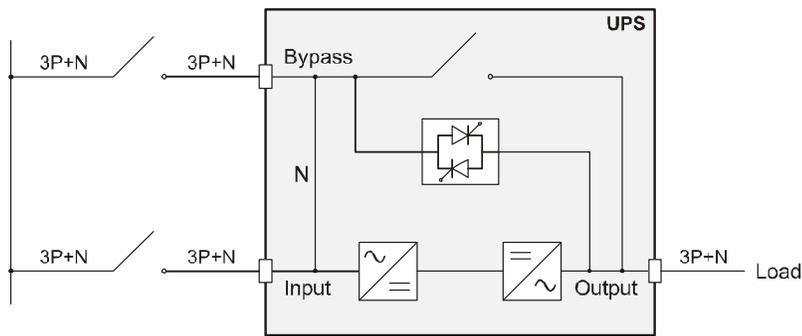


UPS with Galvanic isolation on the output



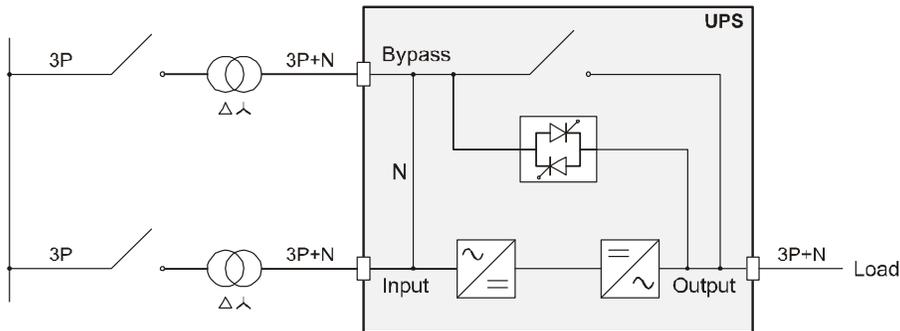
Separate bypass supply input from a common mains or alternative power supply:

UPS without variation of the neutral arrangements and with a separate bypass supply input



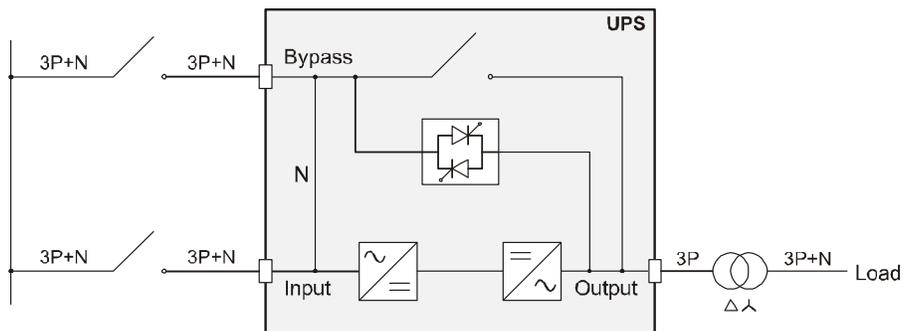
Remove the jumpers present between the SWIN and SWBY isolating switches

UPS with Galvanic isolation on the input-side and separate bypass supply input



Remove the jumpers present between the SWIN and SWBY isolating switches

UPS with Galvanic isolation on the output-side and separate bypass supply input



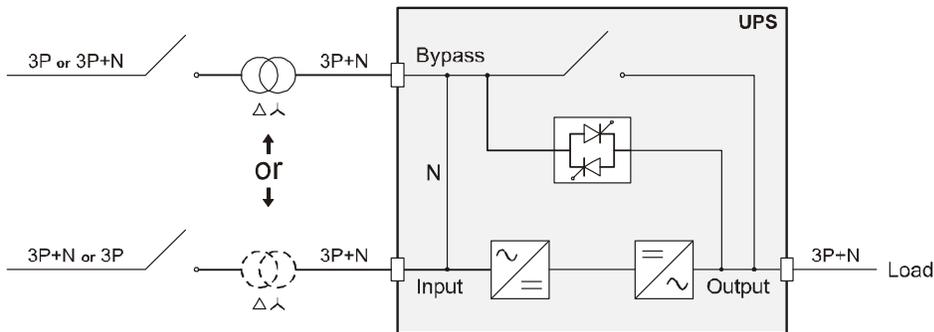
Remove the jumpers present between the SWIN and SWBY isolating switches

Separate bypass on separated lines upstream:

If the separate bypass option is present, the protection devices will be installed both on the mains supply line and on the separate bypass line.

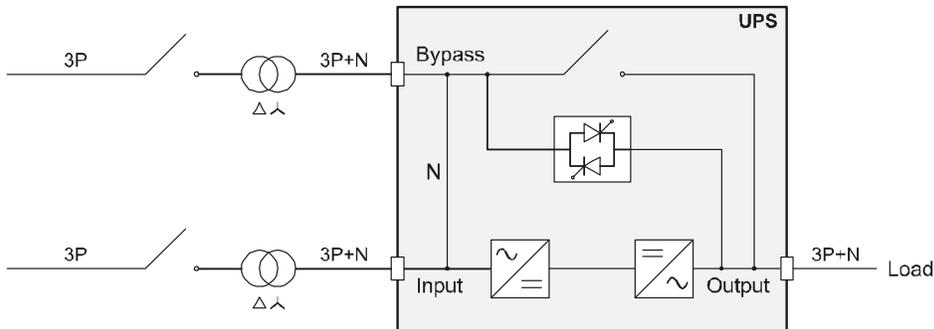
Note: the neutral of the input line and that of the bypass are joined inside the equipment, therefore they will refer to the same potential. If the two mains supplies are different, it is necessary to use an isolation transformer on one of the inputs.

UPS without variation of the neutral arrangement and with a separate bypass supply connected on the independent mains line



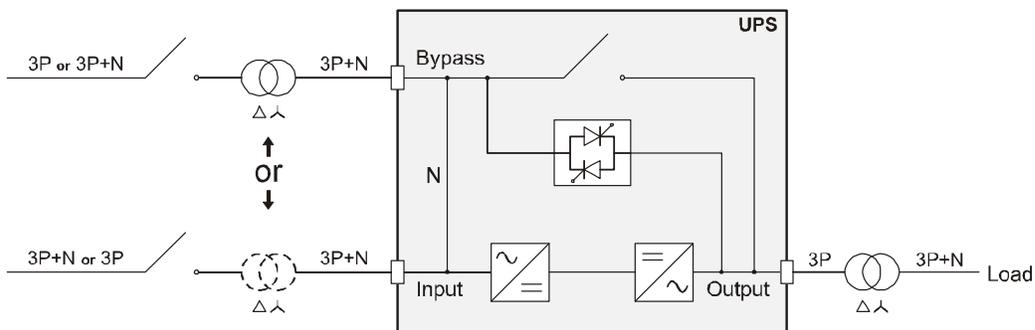
Remove the jumpers present between the SWIN and SWBY isolating switches

UPS with a separate bypass supply connected to an independent supply and with galvanic isolation on the input



Remove the jumpers present between the SWIN and SWBY isolating switches

UPS with a separate bypass supply connected to an independent mains supply and with galvanic isolation on the output



Remove the jumpers present between the SWIN and SWBY isolating switches

