



Dale Power Solutions Ltd

User Manual

1 and 3 kVA E200 Series UPS

E201U, E201RU

E203U, E203RU, E203RSU

External Battery Packs

EE201U, EER201U

EE203U, EER203U

Dale Power Solutions Ltd

Salter Road, Eastfield Industrial Estate, Scarborough, North Yorkshire, YO11 3DU, UK
hello@dalepowersolutions.com | www.dalepowersolutions.com | +44 (0) 330 999 3000

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Safety

There are dangerous voltages and high temperatures inside the UPS. During installation, operation and maintenance please abide by local safety instructions, regulations and laws. Failure to do so may result in injury to personnel or damage to equipment. Safety instructions in this manual are supplementary to local safety instructions. Dale Power Solutions Ltd does not accept any liability caused as a result of failure to follow safety instructions. Please note the following:

- The UPS contains its own power source in the form of batteries, and these can supply an output even when the UPS isn't connected to the mains supply.
- Do not disconnect the UPS from the mains while it is turned on.
- After turning off a UPS leave it for 10 seconds before attempting to disconnect it from the mains to allow the EMC capacitors to discharge.
- Do not use the UPS for any other purpose than the one for which it was designed.
- Do not exceed the rated load of the UPS.
- Under no circumstances open the UPS. There are high capacity batteries inside and other electronics that can cause electric shock. If the UPS requires internal maintenance or battery replacement, contact Dale Power Solutions Ltd.
- Keep the UPS in a dry, well ventilated location away from any area or situation in which there is a risk of fire, such as direct sunlight or other sources of heat.
- If the UPS emits smoke, operate the emergency power off (EPO) switch and isolate from the mains. Contact Dale Power Solutions Ltd.



WARNING! THIS IS A PRODUCT FOR COMMERCIAL AND INDUSTRIAL APPLICATION IN THE SECOND ENVIRONMENT INSTALLATION RESTRICTIONS OR ADDITIONAL MEASURES MAY BE NEEDED TO PREVENT DISTURBANCES (AS STATED IN EN62040-2:2006).

Warning Symbols

The safety symbols used in this manual are shown in table below. They alert you to important safety information that you need to be aware of when installing, operating and maintaining the UPS.

Safety Symbol	Indication
	Attention
	Static discharge sensitive
	Electric shock



Caution: A caution describes a situation in which there is a risk of damage to equipment.



WARNING! A WARNING DESCRIBES A SITUATION IN WHICH THERE IS A RISK OF INJURY OR DEATH TO PERSONNEL.

Product Description

Applications

This UPS series provides reliable AC backup power to various types of equipment, for example personal computers, small scale servers, network switches and small office telephone exchanges.

Product Range

The following table lists the tower and rack mount models available in the E200 series. For increased backup power (see the battery backup times on page 38), external battery packs are also available in both mechanical formats.

Capacity	1 kVA	3 kVA
Tower units	E201U	E203U
Rack mount units	E201RU	E203RU, E203RSU
Battery voltage	36 V	72 V
No. of 12 V batteries	3	6
External battery packs:		
Tower units	EE201U	EE203U
Rack mount units	EER201U	EER203U

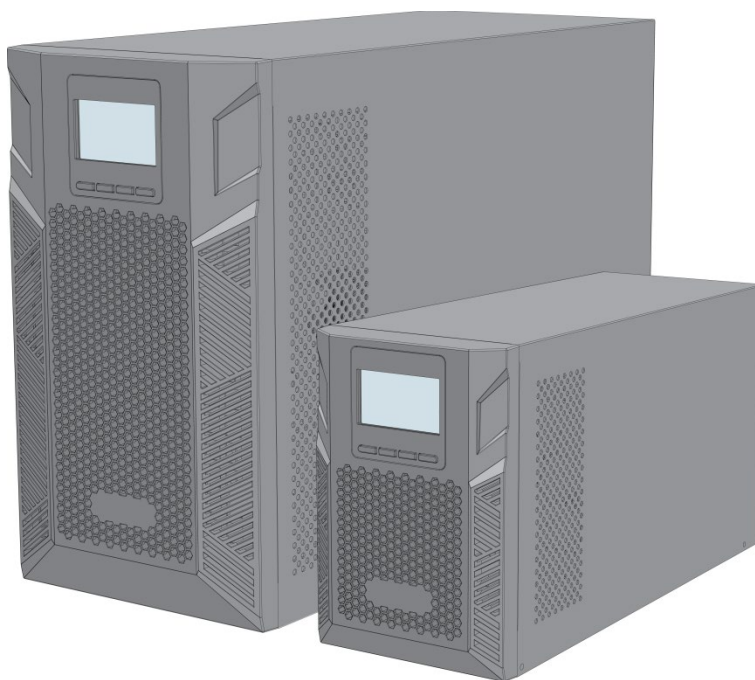


Figure 1 E203U and E201U tower units

Models with an R suffix are designed to be mounted horizontally (Figure 2) or vertically (not shown). The LCD control panel can be manually rotated by 90 degrees to suit the orientation of the unit. Mounting brackets are available to allow horizontal units to be rack mounted, and support bases are provided to hold vertically positioned units in place.

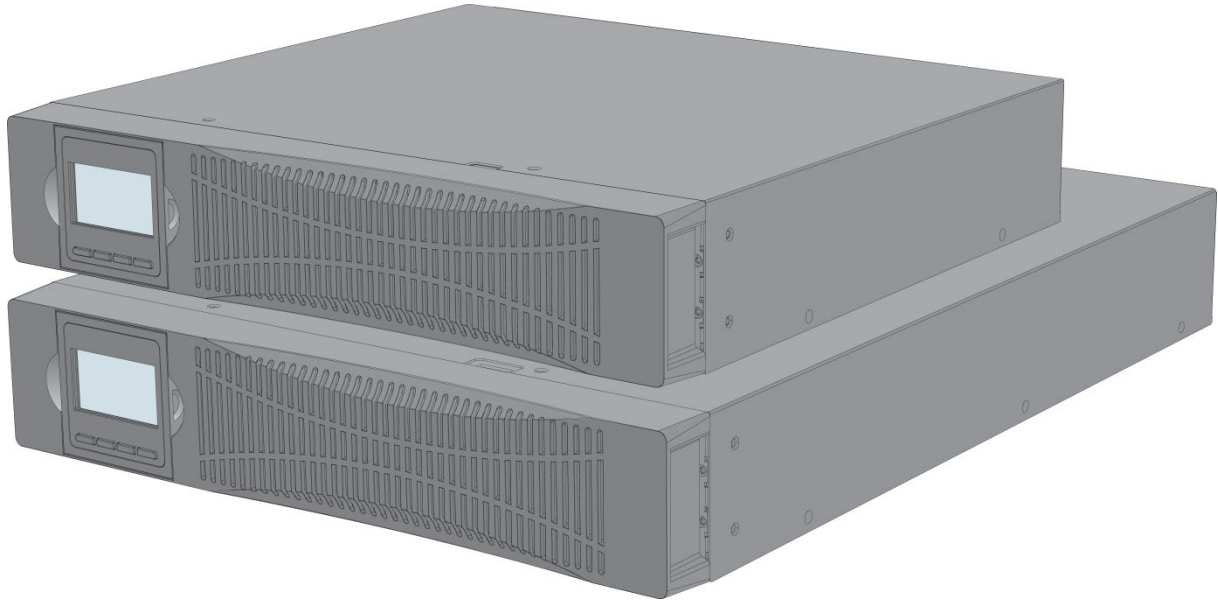


Figure 2 E201RU and E203RU shown in the horizontal position

System Block Diagram

A functional block diagram representing the UPS is shown in Figure 3. Power is delivered to the output via one of these three paths; a) via the bypass, b) directly through the rectifier and inverter, or c) from the battery via the DC/DC converter and inverter. In normal operation you can choose either path a) or b).

In cases where it is not possible to meet the required hold up time with an internal battery, up to 4 external battery packs (EBPs) can be added to the UPS.

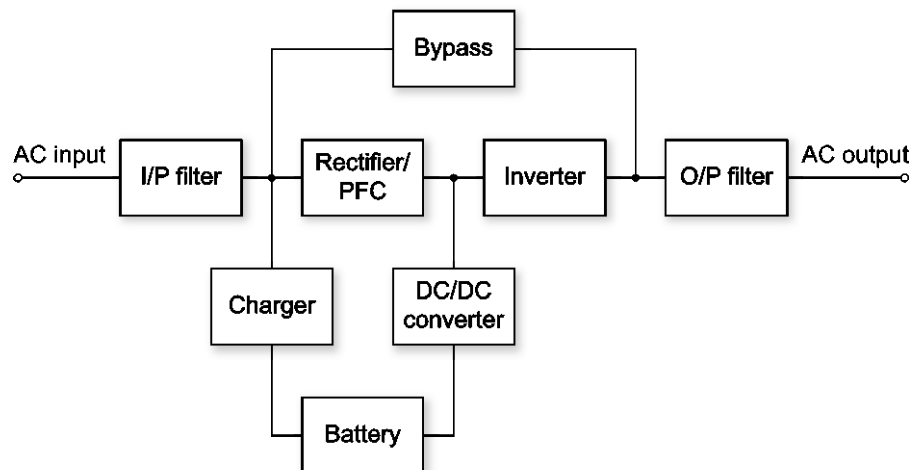


Figure 3 Single unit block diagram

Features

- E200 series units have an intelligent online sine-wave output with power factor correction. High frequency double-conversion and a wide input voltage range ensure continuous output for areas with poor power supply regulation.
- DSP technology for digital control ensures high reliability, circuit protection and self-diagnostics in the unlikely event of a fault. Intelligent digital battery management extends battery life and ensures optimum performance.
- An LCD panel and LED indicators clearly display the system status and system parameters such as input/output voltage, frequency, load, and unit temperature.
- Network power management can be achieved using UPS monitoring software via an RS232 serial connection or a USB connection.
- Segregated output connectors to allow less-essential loads to be shed before critical loads when operating on battery power.
- Remote EPO (emergency power off) operation.
- Optional SNMP or dry contact relay cards are available.
- If required, in-line network surge protection is available via RJ45 connectors on the rear panel.

Installation

Siting Considerations

Before unpacking and installing the unit, consider the following:

- DO NOT expose the UPS to high temperatures, water ingress, environments in which water may condense, flammable or corrosive gas, dust, or direct sunlight.
- Locate the UPS indoors on a level surface as close as possible to the equipment it will be powering to minimise cable voltage drops. Allow enough spare cable to move the UPS and access the rear and side panels during servicing.
- Maintain a gap of at least 20 cm between the ventilation holes/slots at the front and rear of the unit, and walls or other equipment.
- For maximum battery life and improved product reliability ensure cool air is available at the front of the unit. As an approximation, battery life is halved for every 10°C rise in temperature (above 20°C).
- Ensure the ambient temperature is in the range 0 to 40°C. If you need to operate the UPS above 40°C, derate the output by 2.4% per °C increase in temperature. The maximum operating temperature is 50°C.

Wiring Considerations

To ensure a safe installation please follow these instructions and the local electrical code of the area or country in which you are installing the equipment:

- If the UPS is to be supplied from a local transformer, ensure the transformer kVA rating is at least 50% greater than the UPS output kVA rating.
- Use the cables provided to wire up the input and output. The cables are fitted with the appropriate female and male connectors for input and output respectively.
- Position cables to prevent trip hazards and do not allow people to step on cables.
- DO NOT connect inductive loads such as motors, fluorescent lamps and photocopiers to the UPS, as damage may occur.
- Ensure the mains supply has over-current protection and an adequate earth connection.
- When connecting a laser printer to the UPS ensure the capacity of the UPS is equal to or greater than the highest power rating of the laser printer plus any other loads.
- Ensure that the sum of the leakage current of the UPS and connected devices does not exceed 3.5 mA.

Operation from a Generator

As a guide, it is recommended that the load capacity should be less than 30% of the generator capacity, and the generator rating should be 1.5 to 2 times the rating of the UPS, depending on the type of generator used.



Caution: Ensure that the neutral line from the generator is permanently connected to the mains neutral line. Do not use an MCB or any other type of switch in this line.

Supply Cables

Units are supplied with appropriately sized cables with moulded plugs and sockets at each end. E203U and E203RU units are supplied with a higher current IEC male plug as an additional wiring option.

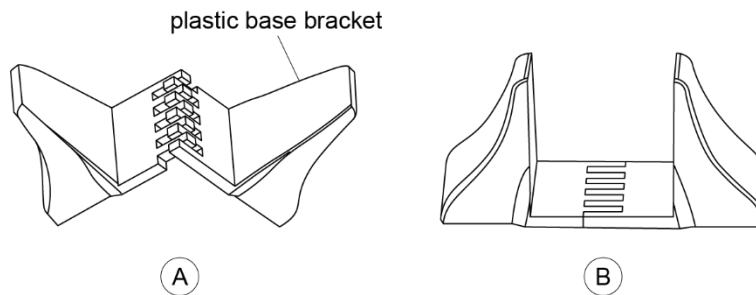
Rack mount units only

Vertical positioning

If you want to stand your rack mount UPS and EBP vertically, use the plastic support bases, which are supplied as two pairs of brackets and the appropriate number of spacers.

To assemble a stand for an E201RU or E203RU:

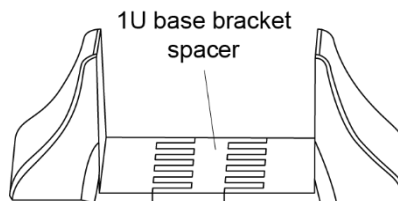
- Interlink the fingers of a pair of brackets at 90 degrees (A), and then press flat (B).



To assemble a stand for a combination of UPS and EBP(s):

Note: To allow interconnection, UPSs and EBPs must be positioned directly adjacent to each other.

- Use the method above, adding one or more 1U spacers between the brackets. The finished stand should look like this:



Rack mounting

If rack mounting your UPS, screw rack-mounting brackets to the sides of the unit in the positions shown in Figure 4 using the 4M screws supplied.

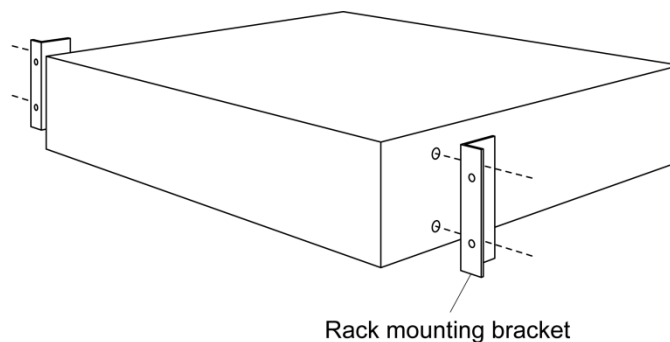


Figure 4 Fitting rack mounting brackets

Rear Panel Layouts

Tower units

Figure 5 and Figure 6 show the rear panel connections for the two sizes of tower UPS.

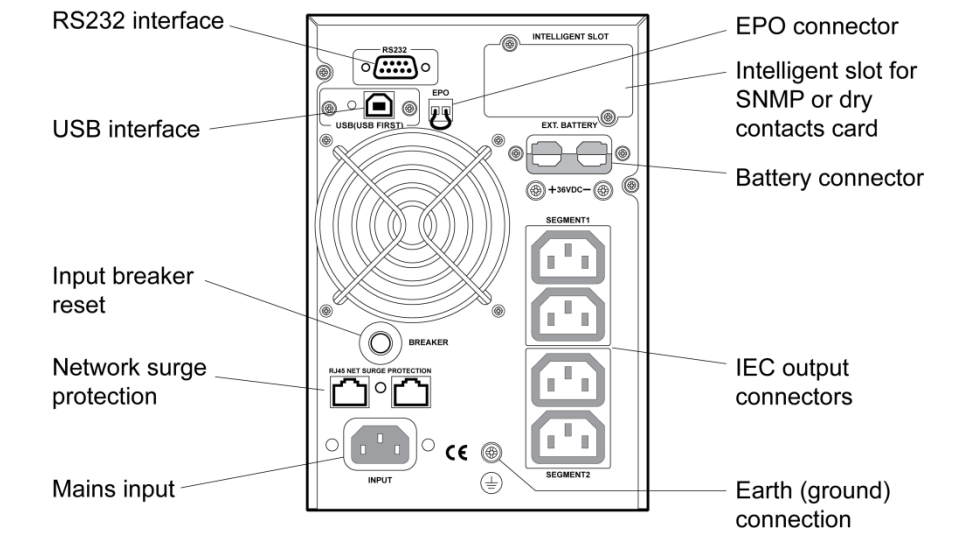


Figure 5 E201U rear panel layout (1 kVA unit)

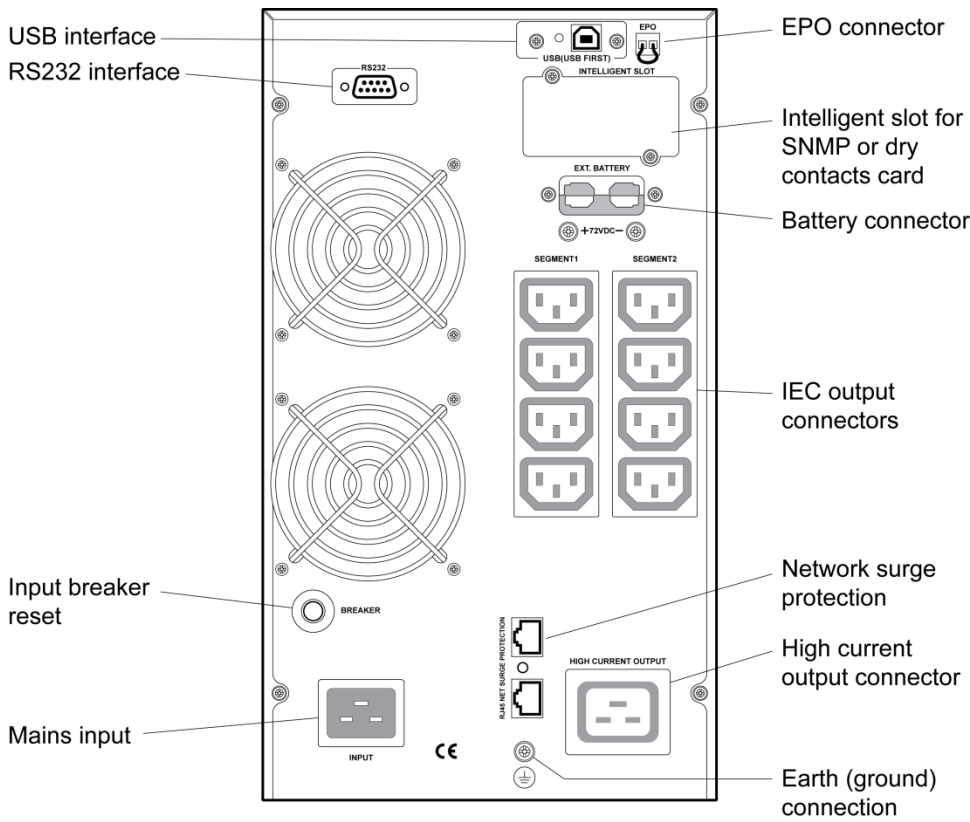


Figure 6 E203U rear panel layout (3 kVA units)

Figure 7 and Figure 8 show the rear panel connections of the two sizes of tower external battery pack.

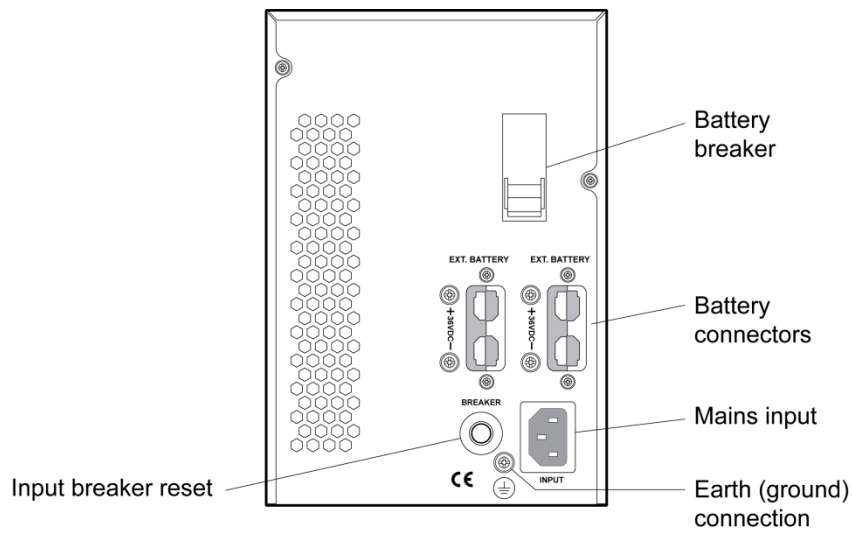


Figure 7 EE201U rear panel layout (EBP for 1 kVA tower UPSs)

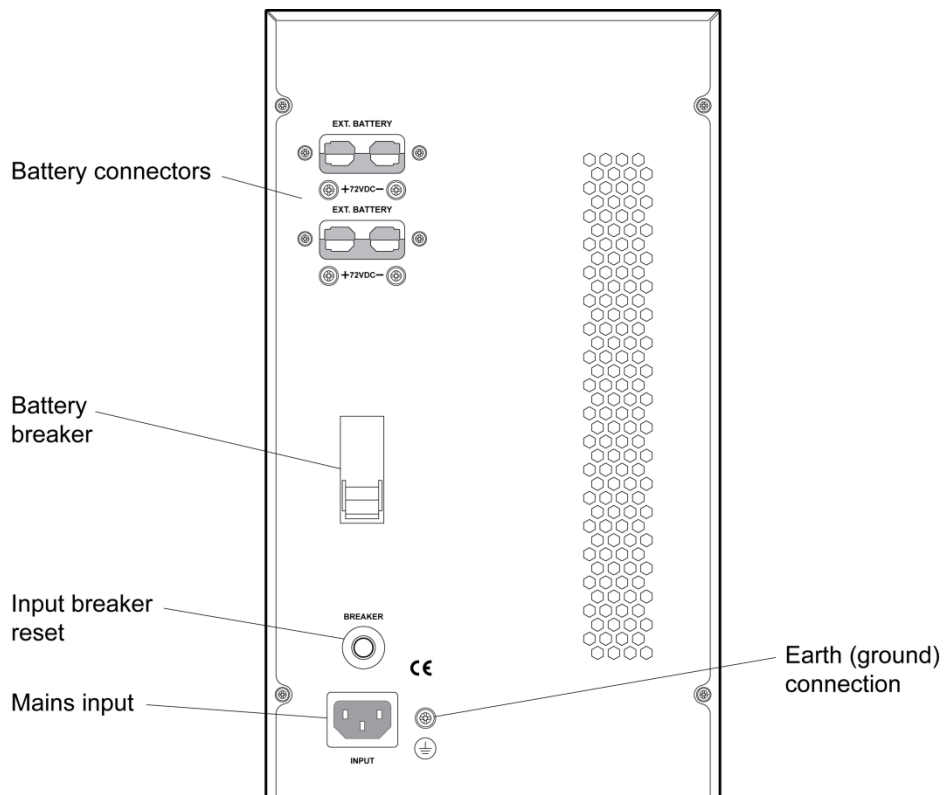


Figure 8 EE203U rear panel layout (EBPs for 3 kVA tower UPSs)

Rack mount units

Figure 9 and Figure 10 show the rear panel connections of the rack mount UPSs.

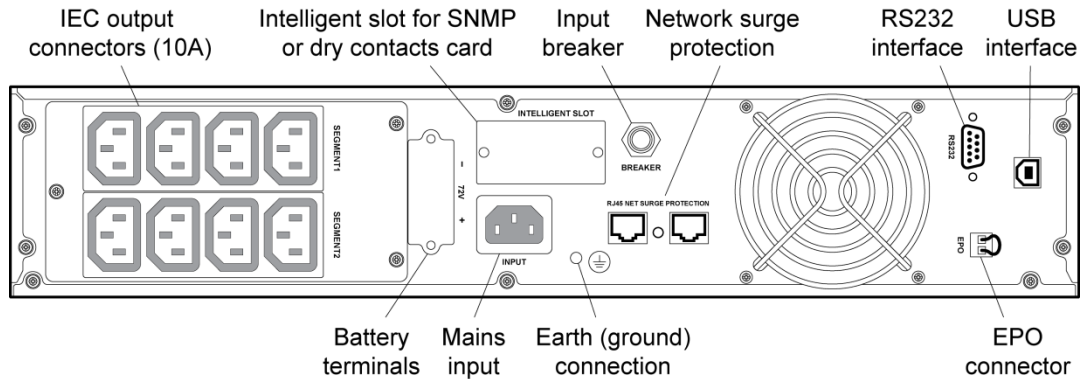


Figure 9 E201RU rear panel layout (1 kVA unit)

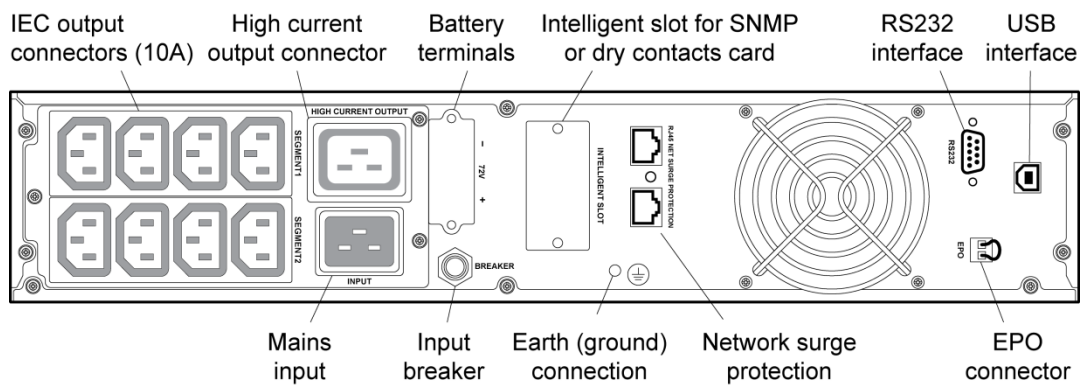


Figure 10 E203RU, E203RSU rear panel layout (3 kVA unit)

Figure 11 shows the rear panel connections of the rack mount external battery packs.

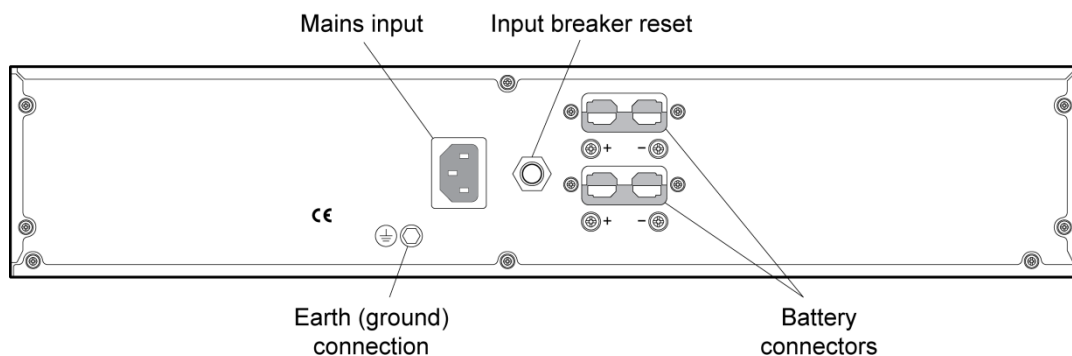


Figure 11 EER201U and EER203U rear panel layout (EBPs for 1 kVA and 3 kVA UPSs)

Unpacking the UPS

1. Unpack the UPS and check that it has not been damaged during transportation. If damage has occurred or parts are missing, inform Dale Power Solutions Ltd immediately.
2. If the UPS has been moved from a cold to a warm environment, allow at least 2 hours for any condensation to disperse before installation.
3. Remove and retain the documentation, CD and leads from inside the box.
4. Dispose of packets of desiccant correctly.

Load Segments

The output sockets are split into two groups or segments (see Rear panel layouts on page 11) that can be independently turned on and off by the UPS software to provide an orderly start-up and shutdown of the connected equipment. For example, during a power outage, less-essential equipment can be turned off at a higher battery discharge voltage, providing more battery power for critical equipment, which is then powered until the EOD (end of discharge) voltage is reached. At start up critical loads are turned on first. The table below shows which load segments to use and the battery cell voltages at which they are removed.

Load segment	Load types	Shed voltage available settings
1	less-essential	1.75 V (default), 1.84 V, 1.92 V (to change, see page 26)
2	critical	1.60 V, 1.70 V (default), 1.75 V, 1.80 V (to change, see page 26)

To make use of load segments:

1. Connect your loads to the load segments as shown in the table above.
2. If required, change the load segment shed voltages once your UPS is operating.

Wiring the UPS

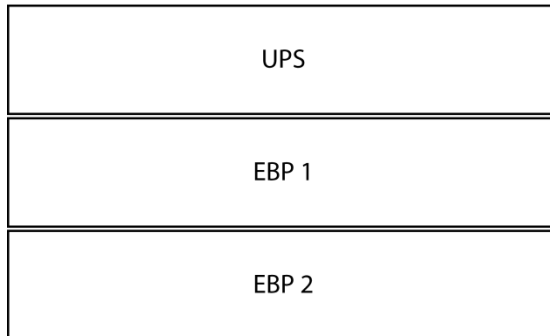
Before connecting the UPS, read the siting considerations on page 8.

Note: If you intend to use the dry contact signals card (if fitted) you will need a PH1 Phillips screwdriver to remove and replace the card. Do not use a pozidrive (PZ) screwdriver.

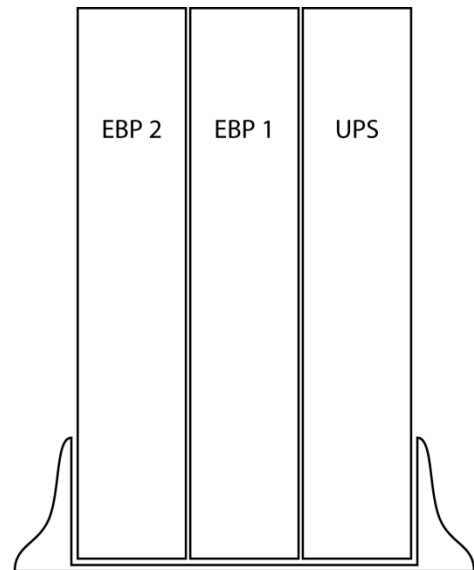
To connect the UPS to your system:

1. Before making any connections, ensure that all units (UPS and optional EBPs) are unplugged from the mains.
2. If your system uses one or more external battery packs (EBPs), ensure that the UPS and EBP are matching types, for example E201U and EE201U or E201RU and EER201U where the numbers after E and EE match, and there is an R if the units are rack mountable. Connect units together as follows:

- a. **E201RU and E203RU and their corresponding EBP(s) only:** position the UPS and EBP(s) directly adjacent to each other as shown below.



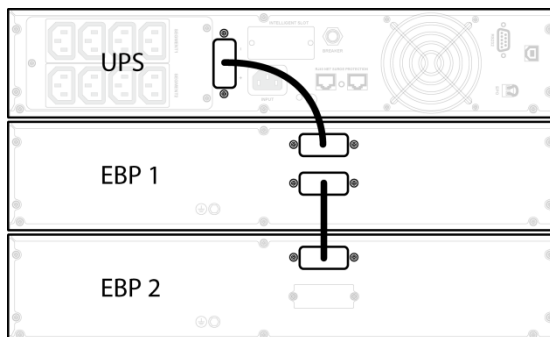
Horizontally mounted with UPS at the top



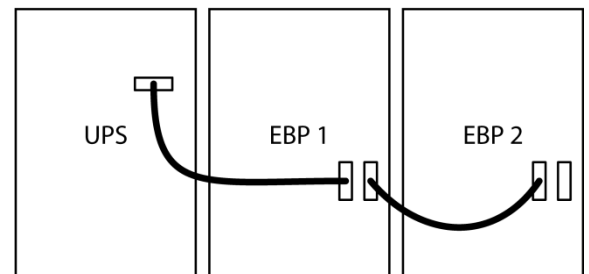
Vertically mounted with the UPS on the right when viewed from the front

- b. On the rear panel, plug the battery cable of EBP 1 into the UPS as shown below.

If you have more EBPs, connect the battery cables from each unit to the next as shown in the diagrams below.



Rack mount UPS and EBPs



Tower UPS and EBPs

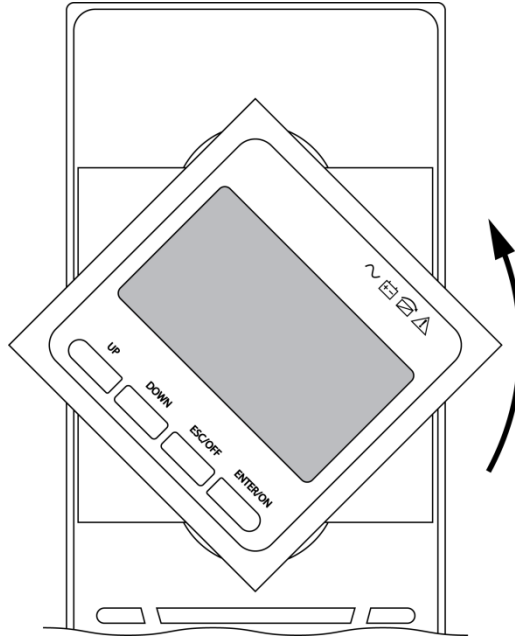
- c. **All tower units and their corresponding EBPs only:** on the unit rear panels, connect an earth cable between the UPS and each EBP.



WARNING!

YOU CANNOT RELY ON THE MAINS EARTH TO PROVIDE AN ADEQUATE EARTH INTERCONNECTION BETWEEN THE UPS AND EACH EBP.

3. **E201RU and E203RU only:** if vertically mounting the UPS, ensure that the control panel is rotated so that buttons and screen are in the correct orientation. To rotate the panel, grip its sides, pull forwards and rotate through 90° as shown below.



4. Using the supplied cables, connect the UPS output(s) to your load(s), and if required, take into account the load segments as described above. The E201U has four IEC output sockets, the E201RU has six and the remaining higher power units each have eight IEC outputs plus a high current IEC output.

Note: A plug only is supplied for use with the high current output. If you want to use this output you will need to wire the plug to your load cable. Dale Power Solutions Ltd can supply load cables if required.

5. Ensure the loads are turned off.
6. If your unit has an SNMP or relay contact card fitted or you plan to use the RS232 port or other standard signals including remote EPO (emergency power off) switch, see Appendix 1 Signals options on page 34.
7. If fitted, connect the EBP(s) to the mains using the supplied IEC input power cable(s).
8. Connect the UPS to the mains using the supplied IEC input power cable.

Operation

Working modes

The UPS has four distinct modes of operation:

- On-line mode
- Bypass mode
- Battery mode
- ECO mode

Each operating mode is described below.

On-Line mode

This is the default mode of operation in which the load is supplied via the rectifier and inverter when the a.c. input and load are within their normal ranges. In this mode the green inverter icon is on () and the battery is trickle charged.

During fault conditions the UPS automatically switches to either bypass mode or battery mode without interruption to the load.

Bypass mode

In bypass mode the load is supplied directly from the a.c. input and the battery is charged. The UPS switches to bypass mode () when any of the following conditions occur:

- An output overload – the unit beeps twice every second, indicating that the load must be reduced to within its normal range as soon as possible. Once the overload is removed the inverter re-starts after a 5 minute delay. If the UPS is overloaded too many times in any one hour it will eventually remain in bypass mode.
- The UPS is too hot – the UPS reverts to on-line mode as soon as the unit temperature returns to normal.
- The UPS fails – a serious fault has occurred within the UPS that must be repaired.
- The UPS is manually turned off (when this option is enabled).

In bypass mode the inverter icon is off, the amber bypass icon () is on, the red fault icon () flashes and the UPS beeps every 4 seconds.

Battery mode

In battery mode the load is supplied from the battery via the DC/DC converter and inverter, the UPS beeps every 4 seconds, and the rectifier and charger are turned off. The UPS switches to battery mode when there is no a.c. input or the a.c. input is outside its normal range. On the front panel the inverter (), battery () and fault () icons are on.

When the battery reaches a pre-set low limit, the battery () and fault () icons, and **LOW BATT** on the LCD flash once a second. Error 35 is displayed on the LCD. Eventually the UPS shuts down to prevent damage to the batteries. When this happens the fault () icon flashes once a second and the unit beep once a second. Error 34 and **LOW BATT** are displayed on the LCD.

When the a.c. mains is restored the inverter starts automatically and the UPS reverts to the mode in which it was previously operating.

ECO mode

If specified, your UPS may be set to operate in ECO mode instead of on-line mode. In ECO mode the load is supplied via the bypass circuit and not the rectifier and inverter, allowing the UPS to work at higher efficiency and the inverter (~) and bypass (⚡) icons are on. The battery is trickle charged in this mode. If the a.c. input is lost or goes beyond its normal range the UPS automatically switches to battery mode, however, the transfer speed is slower than on-line mode and may not be suitable for all applications.

Note: Do not use ECO mode when the mains supply is of poor quality or the load comprises sensitive equipment.

Front Panel Controls and INDICATORS

THE FRONT PANEL CONTROLS AND INDICATORS ARE SHOWN IN FIGURE 12. ON RACK MOUNTED UNITS YOU ROTATE THE DISPLAY PANEL TO SUIT VERTICAL OR RACK MOUNT ORIENTATION. USING THE BUTTONS, INDICATOR ICONS AND THE MENU STRUCTURE DISPLAYED ON THE LCD PANEL YOU CAN:

- CHECK THE STATUS OF THE UPS
- CHECK AND MAKE CHANGES TO THE SETTINGS

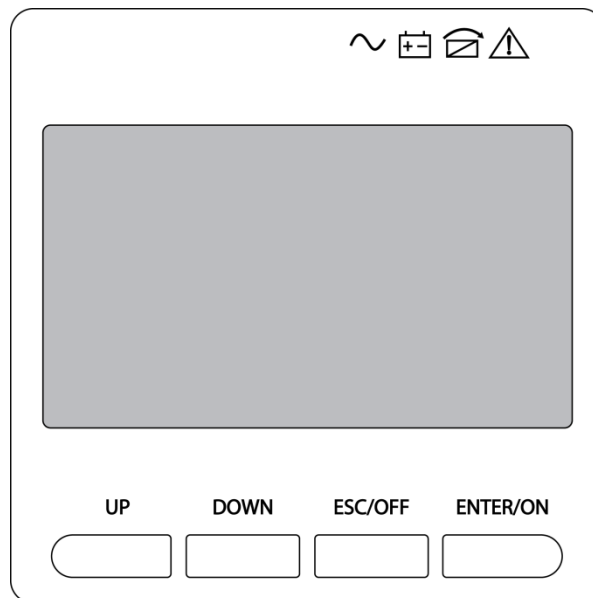


FIGURE 12 FRONT PANEL CONTROLS AND DISPLAY

BY DEFAULT THE LCD SCREEN IS BLANK AND REMAINS IN THAT STATE UNTIL ANY BUTTON IS PRESSED. ABOUT 1 MINUTE AFTER THE LAST BUTTON PRESS THE SCREEN GOES BLANK AGAIN.

THE FOLLOWING TABLE DESCRIBES THE OPERATION OF THE LEDS (FOR A FULL DESCRIPTION OF LED STATUS UNDER NORMAL AND FAULT CONDITIONS, SEE APPENDIX 4 ON PAGE 43):

LED	DESCRIPTION
	INDICATES A FAULT. MAYBE LIT OR FLASHING DEPENDING ON THE FAULT.
	WHEN ON ALONE, INDICATES THAT THE UPS IS WORKING IN BYPASS MODE. WHEN ON WITH THE GREEN INVERTER LED, INDICATES THAT THE UPS IS WORKING IN ECO MODE.
	INDICATES THAT THE UPS IS IN BATTERY MODE. FLASHES UNDER FAULT CONDITIONS OR LOW BATTERY STATUS.
	INDICATES THAT THE UPS INVERTER IS RUNNING. IF FLASHING IT INDICATES THAT THE OUTPUT IS OVERLOADED.

THE FOLLOWING TABLE DESCRIBES THE BUTTON FUNCTIONS:

FUNCTION	BUTTONS	DEFINITION
SWITCH INVERTER ON	ENTER/ON	PRESS AND HOLD FOR MORE THAN 2 S TO TURN ON THE UPS.
SWITCH INVERTER OFF	ESC/OFF	PRESS AND HOLD FOR MORE THAN 2 S TO TURN OFF THE UPS INVERTER. WHEN BYPASS MODE IS ENABLED THE UPS IS SWITCHED TO BYPASS, OTHERWISE ITS OUTPUT IS SHUT DOWN.
MENU ACCESS	UP + DOWN	PRESS AND HOLD FOR MORE THAN 2 S TO ENTER SETTINGS MODE.
EXIT MENU	DOWN ESC/OFF	PRESS A FINAL TIME ON THE LAST MENU SELECTION TO SAVE AND EXIT. PRESS TO EXIT SETTINGS MODE WITHOUT SAVING ANY CHANGES.
CHANGE SETTINGS	ENTER/ON	PRESS TO CONFIRM CHANGES WHEN IN SETTINGS MODE.
TEST/MUTE	ENTER/ON	OPERATING IN ON-LINE OR ECO MODE: PRESS AND HOLD FOR MORE THAN 2 S TO RUN THE SELF-TEST FUNCTION. OPERATING IN BATTERY MODE: PRESS AND HOLD FOR MORE THAN 2 S TO MUTE WARNING SOUNDS.
PARAMETER CHECK	DOWN OR UP	PRESS REPEATEDLY TO SEE OUTPUT VOLTAGE, LOAD, TEMPERATURE, INPUT VOLTAGE, BATTERY VOLTAGE, BATTERY REMAINING TIME (BATTERY MODE ONLY) AND SYSTEM SOFTWARE VERSION.

LCD Display

The LCD display comprises a numerical values section at the top and various graphics showing the operating mode and status as shown below.

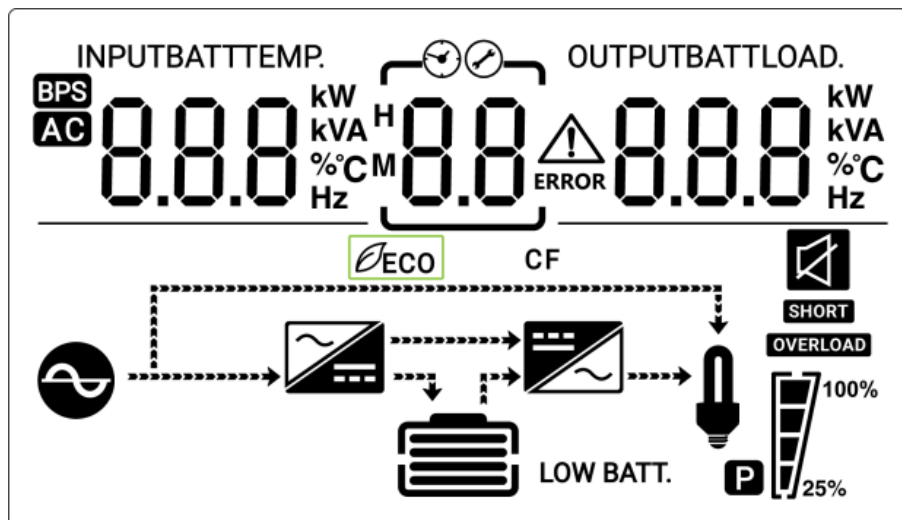


Figure 13 LCD display

The table below describes what each icon displays when lit.

Icon	Description
AC	Indicates that mains is present
INPUTBATTTEMP. 8.8.8 kW kVA %C Hz	Displays input voltage, frequency, power, battery voltage and temperature
[88]	Indicates the settings program that is being accessed
[88] ⚠	The warning triangle flashes and a warning code number is displayed when there is a problem. See Troubleshooting on page 32 and Appendix 4 Alarm and fault reference codes on page 43
[88] ERROR	Error flashes and an error code is displayed when there is a fault. See Troubleshooting on page 32 and Appendix 4 Alarm and fault reference codes on page 43
OUTPUTBATTLOAD. 8.8.8 kW kVA %C Hz	Displays output voltage, frequency, power, load percentage, and discharge current
[Battery Icon]	Indicates the battery level in 25% steps (one bar per step)
[Load Icon]	Indicates the load level in 25% steps (one bar per step)
OVERLOAD	Indicates that the UPS is overloaded
SHORT	Indicates that there is a short circuit on the output

Icon	Description
	Indicates that the UPS is connected to the mains
	Indicates that the UPS is operating in bypass mode
	Indicates that the charger is operating
	Indicates that the inverter is operating
	Indicates that the audible alarm is muted

Before switch on

Before turning on the unit for the first time or after any wiring or battery changes:

1. Read the section above on working modes.
2. Check all the wiring.
3. Check that the rated load does not exceed the rated output of the UPS.
4. If the UPS is supplied by a generator, check that the generator is correctly rated and wired (see Operation from a generator on page 9).

Switching on the UPS

Note: It is important to switch on your UPS as described below as damage may occur when supplying certain load types.



Caution: When using the UPS for the first time, charge the batteries for at least 8 hours as they may have lost charge during the time between production and installation.

To switch on the UPS:

Note: If there is no mains and you want to start the UPS and run it from the battery, follow the procedure from step 3.

1. Ensure your system is installed and connected as described in the Installation section starting on page 8.
2. Turn on the mains supply to the UPS and EBP(s), if these are also installed.
You should immediately hear the fan start up. The output screen will display 0 V a.c. if bypass is not set, or approximately 240 V a.c. if bypass is set; the bypass LED would also be lit.

3. On the front panel, press and hold **ENTER/ON** (see Figure 12 on page 18) until a beep is heard (after approximately 2 seconds).

The LED are lit according to the working mode of the UPS:

- **On-line:** 
- **ECO:**  and 

The output voltage and frequency are displayed. In one of these states your unit is working correctly and able to deliver power to the load, and provide backup in the case of a power cut. There is no need to alter any settings.

4. Switch on the loads, preferably one-by-one.



Caution: If the UPS input power is provided by a generator it is important to apply the load gradually.

Switching off the UPS



Caution: All power to the loads will be removed when you follow this procedure.

To switch off the UPS:

1. On the front panel, press and hold **ESC/OFF** until a beep is heard. Ignore step 2 if mains is not connected.
2. Switch off the mains to the UPS.



Caution: If disconnecting the UPS from the mains, allow 10 seconds for internal charge to dissipate before doing so.

Self-test

To perform a self-test:

1. Ensure the inverter is running ().
2. On the front panel, press and hold **ENTER/ON** until a beep is heard. A self-test is performed before normal operation is resumed. During the self-test the LEDs will flash in sequence.

Mute sounds in battery mode

To mute warning sounds when operating in battery mode:

- On the front panel, press and hold **ENTER/ON** until a beep is heard.

Note: It is not possible to mute sounds for any other warnings.

Settings

You can change these settings in any mode:

- **nod** (operating mode): ECO, NOR, CF
- **OPU** (output voltage): set to 200, 208, 220, 230 or 240 VAC
- **OPF** (frequency converter mode): 50 or 60 Hz output
- **bAH** (battery capacity): 1 to 200 Ah
- **EOD** (battery end of discharge for load segment 1): 1.75, 1.84, 1.92
- **EOD** (battery end of discharge for load segment 2): 1.60, 1.70, 1.75, 1.80
- **HLS** (bypass voltage upper limit): 230 to 264 V
- **HLS** (bypass voltage lower limit): 170 to 220 V
- **b2** (mute): ON/OFF
- **ENA** (bypass mode): ON/OFF

To enter settings mode:

- Press **UP** + **DOWN** for more than 2 s.

To exit settings mode without saving any changes:

- press **ESC/OFF**.

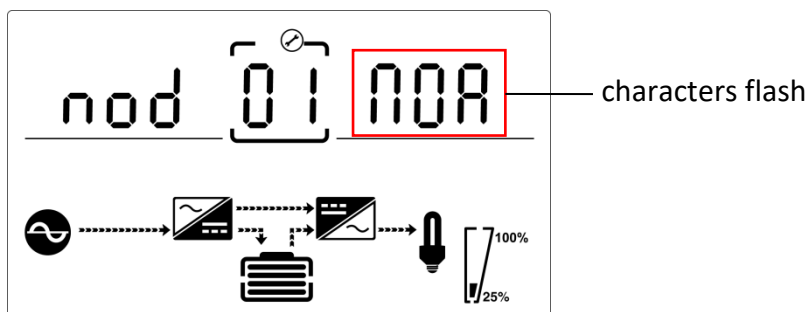
To save changes and exit settings mode:

1. Press **DOWN** repeatedly until setting 10 is displayed.
2. Press **DOWN** one more time.

Mode setting

To set the operating mode:

1. On the front panel, press **UP** + **DOWN** for more than 2 s. The following is displayed.



2. Press **ENTER/ON** until the setting flashes.

- Press **UP** or **DOWN** to display **ECO**, **NOR** or **CF**.

Note: If you want to use **CF** (convert frequency) mode, first go to Frequency converter mode on page 24 and change the output frequency. If you change to **CF** mode first you will get unwanted error codes.

- Press **ENTER/ON** until the setting stops flashing.
- Save and exit settings or press **DOWN** to enter the next setting.

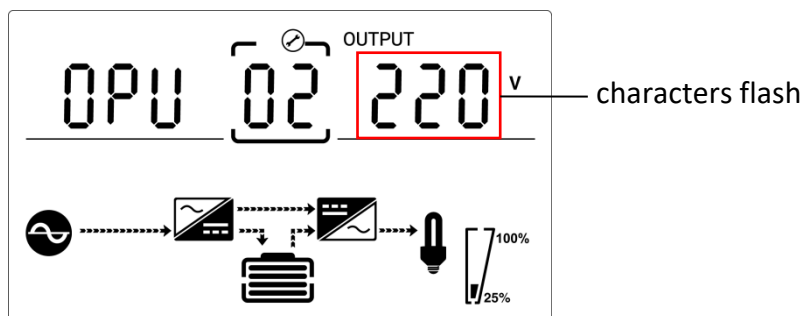
Output voltage level

To change the output voltage:



Caution: Before changing the output voltage, turn off all loads and ensure they are rated for the new output voltage.

- On the front panel, press **UP** + **DOWN** for more than 2 s if not in settings mode.
- Press **DOWN** until the following is displayed.

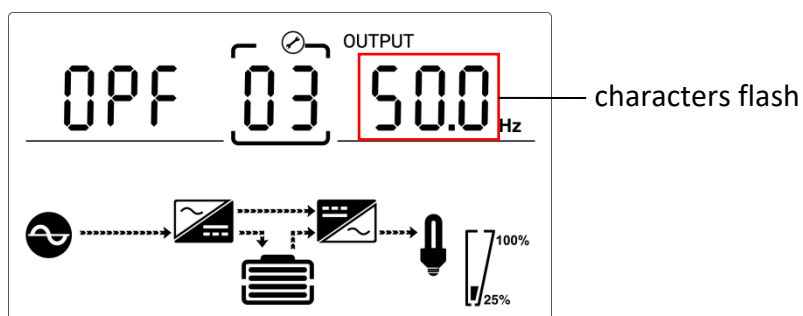


- Press **ENTER/ON** until the setting flashes.
- Press **UP** or **DOWN** to display the output voltage you require. The voltages provided are 200 V, 208 V, 220 V, 230 V (the default value) and 240 V.
- Press **ENTER/ON** until the setting stops flashing.
- Save and exit settings or press **DOWN** to enter the next setting.

Frequency converter mode

To set the output frequency:

- On the front panel, press **UP** + **DOWN** for more than 2 s if not in settings mode.
- Press **DOWN** until the following is displayed.



3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to select either 50.0 Hz or 60.0 Hz.

Note: If you want to stop frequency conversion, first go to Mode setting on page 23 and change the mode to **ECO** or **NOR** before changing the output frequency.

5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

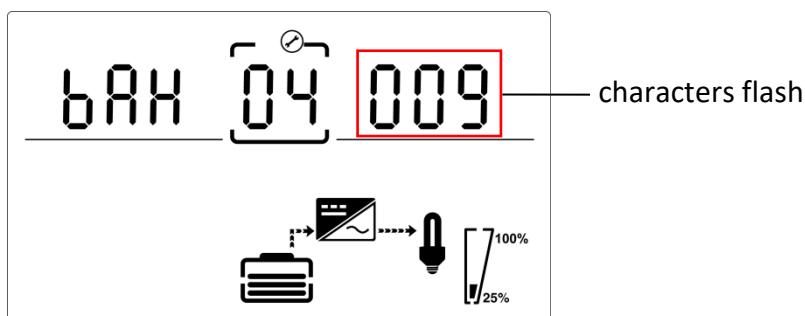
Battery capacity

The UPS contains one battery string and each EBP you add contains two battery strings. Use the following table to determine the battery capacity in your system and enter that value as described below.

Number of EBP units	Number of battery strings	Capacity (Ah)
UPS only (internal batteries)	1 (default)	9
UPS + 1 EBP	3	27
UPS + 2 EBPs	5	54
UPS + 3 EBPs	7	63
UPS + 4 EBPs	9	81

To set the battery capacity:

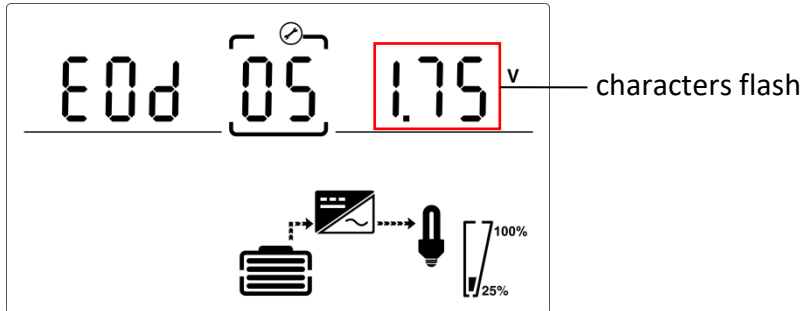
1. On the front panel, press **UP** + **DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.



3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to change the value between 1 and 200 Ah.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Battery end of discharge voltage (load segment 1 – less-essential loads)**To change the EOD voltage:**

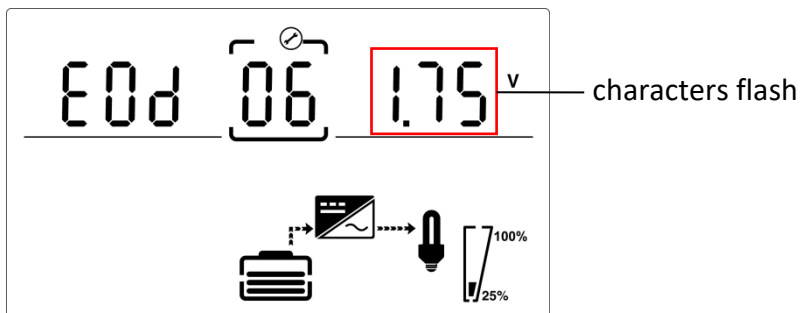
1. On the front panel, press **UP + DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.



3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to select 1.75, 1.84 or 1.92.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Battery end of discharge voltage (load segment 2 – critical loads)**To change the EOD voltage:**

1. On the front panel, press **UP + DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.

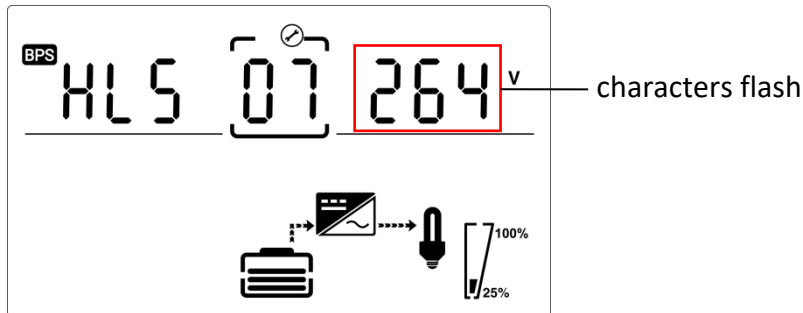


3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to select 1.60, 1.70, 1.75 or 1.80.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Bypass voltage upper limit

To set the bypass voltage upper limit:

1. On the front panel, press **UP** + **DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.

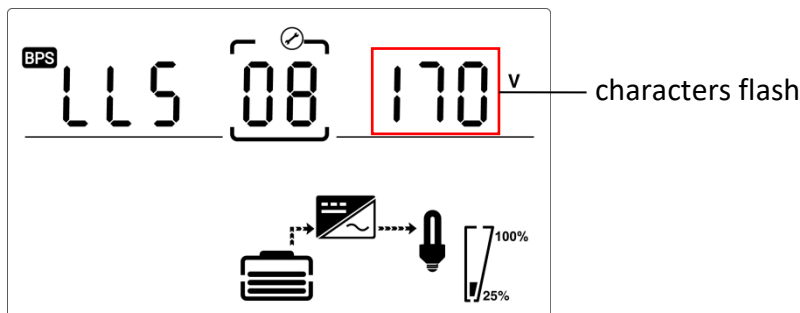


3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to set a value between 230 and 264.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Bypass voltage lower limit

To set the bypass voltage lower limit:

1. On the front panel, press **UP** + **DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.

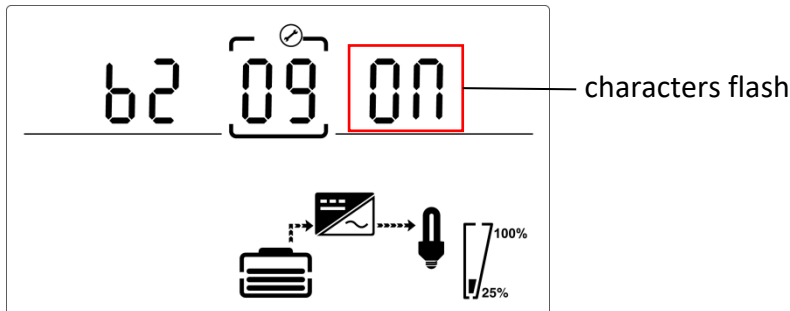


3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to set a value between 170 and 220.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Mute

To mute audible warnings:

1. On the front panel, press **UP + DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.



3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to select ON or OFF.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

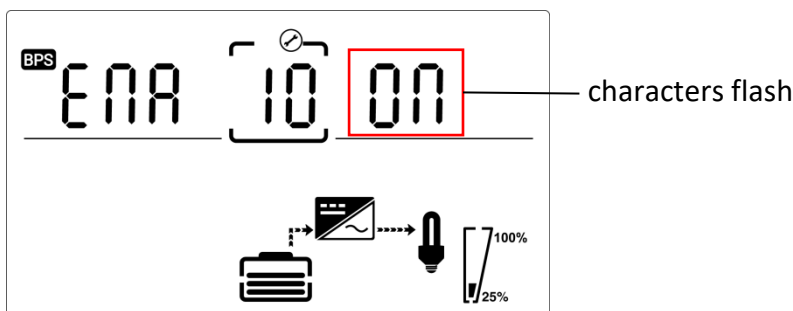
Bypass mode enable or disable



Caution: If bypass is enabled and the UPS is operating in bypass mode, do not use this setting to disable bypass as the load will be dropped. Instead switch to online, ECO or battery mode, or remove the load before disabling bypass mode.

To enable or disable bypass mode:

1. On the front panel, press **UP + DOWN** for more than 2 s if not in settings mode.
2. Press **DOWN** until the following is displayed.



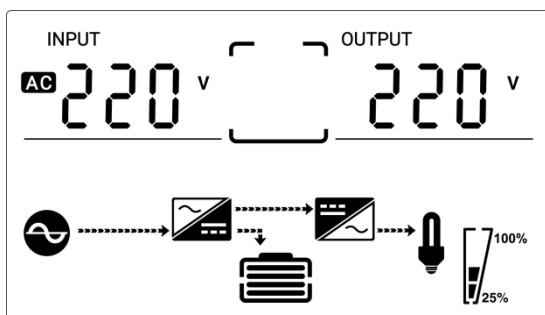
3. Press **ENTER/ON** until the setting flashes.
4. Press **UP** or **DOWN** to select ON or OFF.
5. Press **ENTER/ON** until the setting stops flashing.
6. Save and exit settings or press **DOWN** to enter the next setting.

Checking Parameters

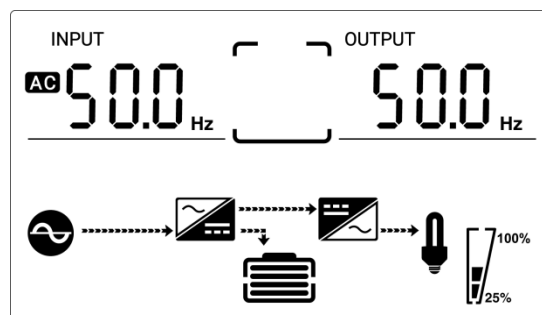
To check the UPS parameters:

- Press **DOWN** or **UP** to display the parameter you wish to check. Examples are shown below.

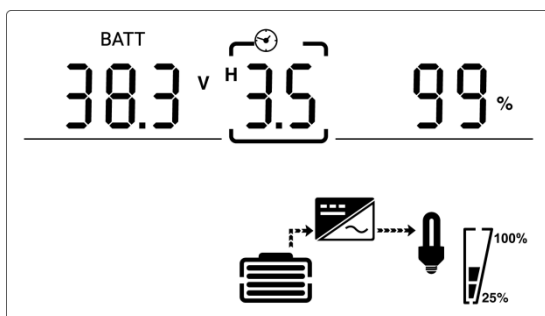
Voltages (input and output)



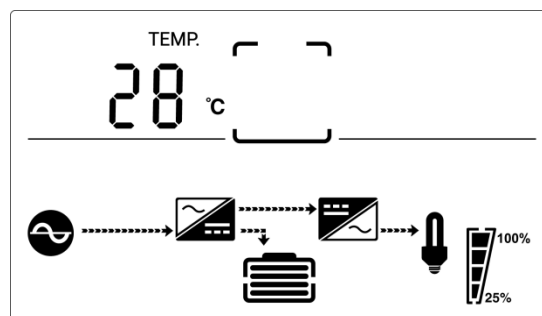
Frequency (input and output)



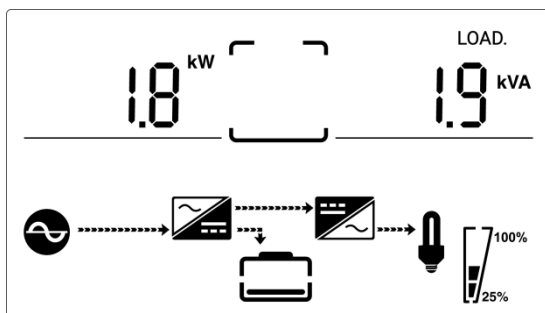
Battery (voltage, backup time, capacity)



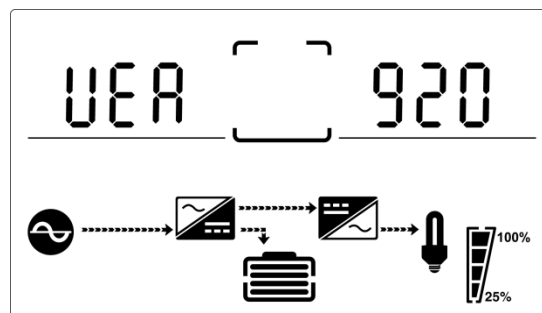
Temperature



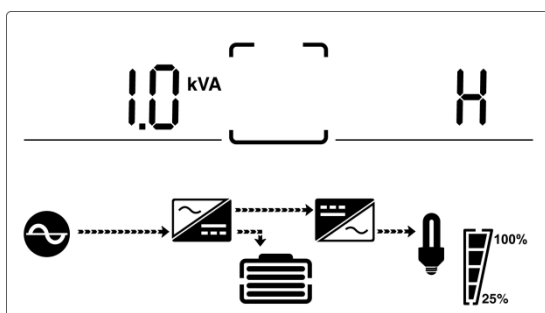
Load



Version



UPS model



Fault Mode

In fault mode the UPS cuts off the output or switches to bypass mode, and sounds the buzzer. The warning LED is lit, and the display shows a fault code. A list of fault codes is shown on page 43.

Maintenance

E200 series units use sealed lead acid batteries and require minimum maintenance in general. To keep the batteries fully charged and in good condition, ensure the UPS is plugged into the mains at all times. The UPS battery charger guards against over-charging and deep discharge.

Fan

At normal room ambient temperature the fans will operate continuously for 20,000 to 40,000 hours. Increased ambient temperatures will shorten this lifetime.

Periodically, ensure that air is blowing out of the rear of the unit.

Ensure that the fans are clear of dust and other debris.

Battery

Battery life depends on the ambient temperature and the number of discharge/charge cycles. Battery life is shortened with high ambient temperature and deep discharges.

To maximise the life of your batteries, maintain them as follows:

- Maintain the ambient temperature in the range 15 to 25°C
- Avoid discharge currents of less than 10% of full load current.
- Charge the battery for at least 12 hours every 3 months if it has not been used. If the ambient temperature is higher than 25°C, charge the battery every 2 months.

If the backup time has significantly reduced, or a battery fault is displayed on the LCD screen contact your distributor to find out if the batteries need replacing.

WARNING!



DON'T SHORT CIRCUIT THE BATTERY AS IT COULD CAUSE A FIRE.

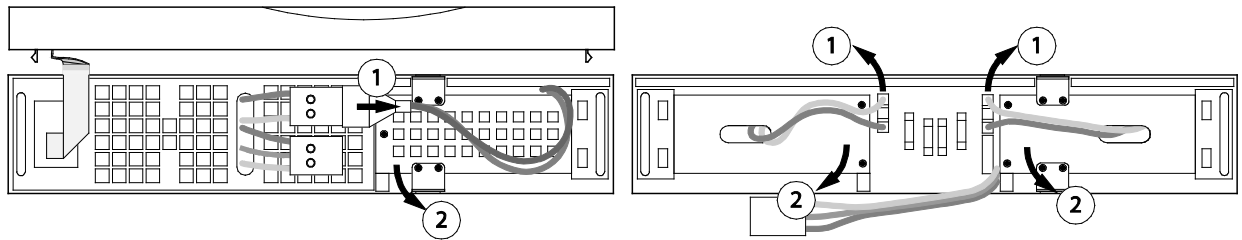
DON'T OPEN THE BATTERY AS THE ELECTROLYTE INSIDE IS HARMFUL TO SKIN AND EYES.

Battery Replacement – 2U Rack Mount Units

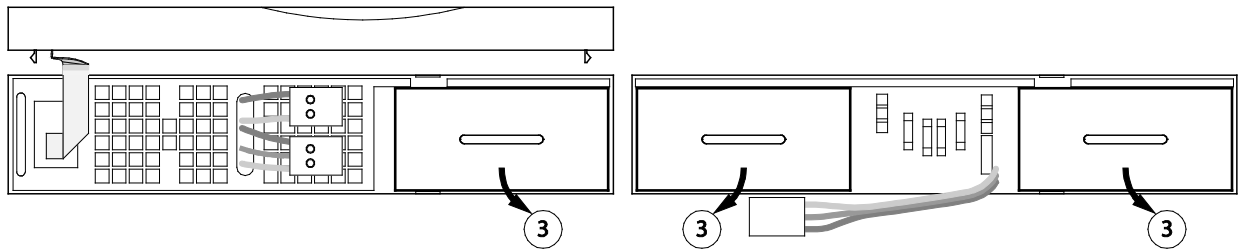
2U rack mount UPSs and EBP units are fitted with replaceable battery cartridges. The following procedure explains how to replace the batteries cartridges; one in a UPS and two in each EBP.

To replace a UPS or EBP battery cartridge:

1. Isolate all devices from the mains.
2. Remove the front panel(s). If removing the UPS front panel, position it so that no damage is caused to the LCD panel ribbon cable
3. Disconnect any EBPs from each other and the UPS.
4. Disconnect the battery cable (1) of the cartridge you want to replace.



5. Unscrew and remove the baffle plate (2) that holds in place the battery cartridge to be replaced. UPSs have only one plate on the right and EBPs have left and right baffle plates.
6. Using the handle on the cartridge, remove the faulty battery cartridge (3).



7. Insert a new cartridge. Ensure it is fully inserted into its bay.
8. Reassemble the units in the reverse order.

External Battery Pack Change



Caution: We strongly recommend you switch off and isolate the whole UPS when you need to change an external battery pack.

Visual Check

Ensure there is adequate ventilation to maintain the UPS at the correct temperature (see Siting considerations on page 8).

UPS Status Check

Check the following:

- Ensure there are no faults or alarms indicated.
- If the UPS is working in bypass mode, investigate the cause.
- If the UPS is working in battery mode, make sure it is normal, if not, investigate.

Function Check

Perform a self-test every 6 months as described on page 22.

Storage

Before storing the UPS, charge it for 5 hours. Cover the UPS and store upright in a cool and dry location. During storage, recharge the UPS according to the following table.

Storage temperature	Recharge frequency	Charging duration
-25°C to 40°C	Every 3 months	1 to 2 hours
40°C to 45°C	Every 2 months	1 to 2 hours

Troubleshooting

Before contacting your distributor, try to solve your problem using the information in the following table. If you need to contact your distributor make sure you have the model number and serial number of your UPS.

Problem description	Probable causes	Solution
No indication or alarm even though the mains is normal	The AC input power is not correctly connected	Check that input power cord is firmly connected to the mains
	The AC input is connected to the UPS output	Plug the AC input power cord to the AC input correctly
Alarm code 33 Battery LED flashing	The external or internal battery is incorrectly connected	Check if all batteries are correctly connected
Alarm code 26 Battery LED flashing	Battery voltage is too high or the charger is faulty	Contact distributor

Problem description	Probable causes	Solution
Alarm code 34 Battery LED flashing	Battery voltage is too low or the charger is faulty	Contact distributor
Alarm code 32 Inv or bypass LED flashing	UPS is overloaded	Remove excess load from UPS
Alarm code 29 Fault LED light	Short circuit on the UPS output and the UPS has shutdown automatically	Check load and remove any short circuit
Alarm code 9 Fault LED light	Fan faulty	Contact distributor
Alarm codes 01, 02, 15, 16, 17 or 18	An internal fault has occurred	Contact distributor
Battery backup time is shorter than nominal value	Batteries are not fully charged	Charge the batteries for at least 5 hours and then check the capacity. If the problem still persists, contact your distributor
	Batteries defective	Contact distributor

Appendix 1 Signals options

USB Port

Units are fitted with a USB port, which can be used to:

- Monitor the UPS power status
- Monitor the UPS alarm information
- Monitor the UPS running parameters
- Perform a battery test

To enable USB monitoring:

1. Connect the UPS to your computer using the supplied USB cable.

Note: The USB port is internally wired to the RS232 port through a converter and overrides the RS232 connection.

2. Load the supplied software onto your computer.

RS232 Serial Port

This provides the same monitoring capabilities as above.

To enable RS232 monitoring:

1. Connect the UPS to your computer using the supplied RS232 cable.
2. If present, disconnect the USB cable between UPS and your computer.

Note: A USB connection overrides the RS232 connection.

3. Load the supplied software onto your computer.

Connections between computer and UPS RS232 ports

Computer		UPS
RDX 2	←	TX 3
TDX 3	→	RX 2
GND 5		GND 5

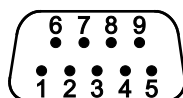


Figure 14 RS232 serial port pin-outs looking at the socket on the

RS232 communication data format

Parameter	Value
Baud rate	2400 bps
Byte length	8bit
End bit	1bit
Parity check	Null

SNMP Card (advanced monitoring and control)

If your unit is fitted with the optional SNMP card (located in the Intelligent Slot on the rear panel), connect it to your computer with a network cable.

For instruction on how to operate the SNMP card, refer to the supplied documentation.

Relay Card (advanced monitoring and control)

If your unit has been specified and fitted with the optional relay card (located in the Intelligent Slot on the rear panel) you have access to more advanced monitoring and control functionality via a set of dry contacts and a single opto-coupled input.

Connections:

Description	Terminal block connection no.	Additional information
Relay common	1	
UPS on (N/O)	2	
AC failure (N/O)	3	Utility or mains failure
AC failure (N/C)	4	
Battery low (N/O)	5	
Battery low (N/C)	6	
UPS alarm (N/O)	7	UPS in battery mode, Battery low UPS internal failure
UPS alarm (N/C)	8	
Bypass active (N/O)	9	
Bypass active (N/C)	10	
UPS failure (N/O)	11	UPS in battery mode, Battery low UPS internal failure
UPS failure (N/C)	12	
Remote shutdown	CN4-1	Shutdown signal: 5 V to 12 V
Remote shutdown GND	CN4-2	0 V for shutdown signal

Relay contact specifications:

Parameter	Value
Maximum switched voltage	220 V a.c. or 30 V d.c.
Minimum switching load	5 V d.c. 10 mA
Maximum current	3 A d.c. 3 A a.c. @ 120 V a.c.
Maximum switching power	360 VA or 90 W
Life (electrical)	100,000 operations (1 A 120 V a.c. /24 V d.c.) 50,000 operations (3 A 120 V a.c. / 24 V d.c.)

Opto-coupler input specifications (used for remote shutdown):

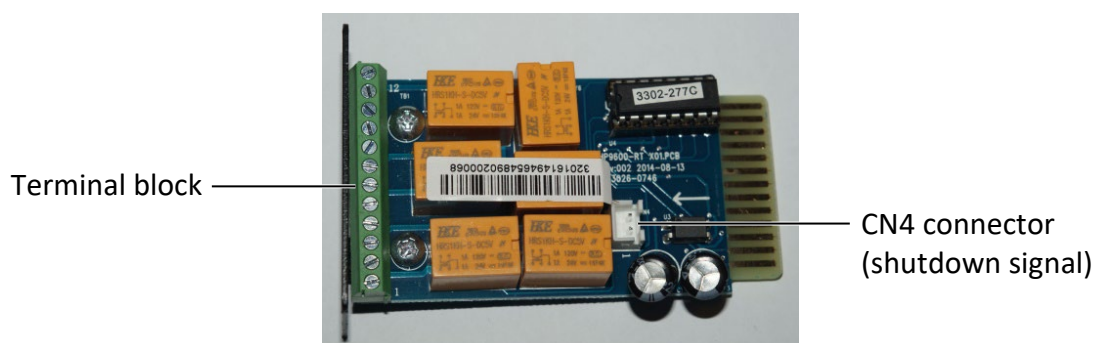
Parameter	Value
Reverse voltage (V_R)	6 V d.c.
Forward input voltage	1.4 V d.c. max., 1.2V d.c. typical
Forward current	50 mA max.
Peak forward current (I_{Fm})	1 A

To connect to the 12-way terminal block and CN4 connector:

- Using a PH2 Phillips screwdriver, remove the two screws holding the relay card in place, and remove the card.



- Connect your signal wires to the appropriate terminals and/or CN4 connector via the slots in the cover plate (see the connection table on the previous page).



- Refit the card and secure it in place with the two screws.

Remote Emergency Power Off (EPO)

The EPO input can be used to shut down the UPS remotely using a switch. The switch type is normally closed. When the EPO is activated (switched opened), the UPS shuts down the output and all its power converters immediately. The UPS remains on to alarm the fault.

WARNING!



THE EPO CIRCUIT IS AN IEC 60950 SAFETY EXTRA LOW VOLTAGE (SELV) CIRCUIT. SEPARATE THIS CIRCUIT FROM ANY HAZARDOUS VOLTAGE CIRCUITS WITH REINFORCED INSULATION.

Caution:



- DO NOT connect the EPO to any utility connected circuits.
- When the emergency power-off function is activated, the UPS stops supplying power to the load during any mode of operation.
- To switch the UPS back on remove the input power, clear the EPO and repower the UPS.

Note: For Europe, the emergency switch requirements are detailed in Harmonized document HD-384-48 S1, *Electrical Installation of the Buildings, Part 4: Protection for Safety Chapter 46: Isolation and Switching*.

Use a switch and wire with the following ratings:

- 24 Vd.c. and 20 mA, latching-type (the EPO signal must remain active for at least 250 ms)
- 1.0 mm² (17 AWG)

To connect an EPO switch:

1. On the rear of the unit, remove the shorting link plug (see Rear panel layouts on page 11).
2. Disconnect the shorting link from the plug and re-wire it to the remote switch wiring.

Appendix 2 Specifications

Electrical

Models	E201U, E201RU	E203U, E203RU, E203RSU
Capacity	1000 W / 1000 VA	3000 W / 3000 VA

Input		
Input type	Single phase (L, N and E)	
Power factor	≥0.98	
Voltage range	160 V a.c. to 300 V a.c. at full load 110 V a.c. to 300 V a.c. at 60% load	
Current (at 230 V a.c.)	4.4 A max	13.0 A max
Rated frequency	40 to 70 Hz ±0.1 Hz or auto sensing for 50/60 Hz systems 45-55 Hz ±0.02 Hz @ 50 Hz, 55-65 Hz ±0.02 Hz @ 60 Hz	
ECO range	Setting output voltage ±20 V a.c.	
Bypass voltage range	upper limit: 230 V a.c. to 264 V a.c. lower limit: 170 V a.c. to 220 V a.c.	
Current harmonics	≤7% (100% linear load)	

Battery		
Voltage	36 V	72 V
Batteries per string	3	6
Type	12 V, 9 Ah VRLA maintenance free	
Backup times (minutes)	At full load. Reduced load will extend the time	
Backup time UPS only	5	3
Backup time + 1EBP	22	14
Backup time + 2EBPs	46	28
Backup time + 3EBPs	74	45
Backup time + 4EBPs	105	65
Charge current	1 A (2 A extra per EBP)	4 A (2 A extra per EBP)

Output		
Output type	Single phase (L, N and E)	
Rated voltage	200 / 208 / 220 / 230 (default) / 240 V a.c.	
Power factor	1.0	

Output		
Voltage regulation	$\pm 1\%$	
Voltage distortion (THD)	$\leq 2\%$ with 100% linear load $\leq 4\%$ with 100% non-linear load	
Waveform	Pure sinewave	
Frequency: Battery mode Synchronized range	50 Hz / 60 Hz ± 0.1 Hz 47 – 53 Hz or 57 – 63 Hz	
Transfer time	On-line $\leftrightarrow$ battery: 0 ms On-line $\leftrightarrow$ bypass: 4 ms (typical)	
Overload (on-line and battery mode mode) (Ambient temp. < 35°C)	105 - 110%, after 10 mins switch to bypass mode 110 - 130%, after 1 min switch to bypass mode 130 - 150%, after 5 s switch to bypass mode > 150%, switch to bypass mode immediately	
Overload (on-line and battery mode mode) (< 35°C Ambient temp. < 40°C)	105 - 110%, after 1 min switch to bypass mode 110 - 130%, after 5 s switch to bypass mode > 130%, switch to bypass mode immediately	
Peak value factor	3:1	
Efficiency in on-line mode	$\geq 88\%$ at full load	$\geq 92\%$ at full load
Efficiency in battery mode	$\geq 85\%$ at full load	$\geq 90\%$ at full load

Safety and EMC		
Safety	IEC/EN62040-1, IEC/EN60950-1	
Isolation resistance	>2 M Ω (500 V d.c.)	
Isolation voltage	2,820 V d.c., <3.5 mA 1 min	
EMC	IEC/EN62040-2, IEC61000-4-2, IEC61000-4-3, IEC61000-4-4, IEC61000-4-5, IEC61000-4-6, IEC61000-4-8	
Leakage current	< 1.5 mA	

Environment

Operating temperature	0 to 40°C
Storage temperature	-25°C to 55°C without batteries -20°C to 40°C with batteries
Relative humidity	0 to 95% non-condensing
Altitude	< 1500 m (full power). Over 1500m, reduce the rated power output by 1% for every 100m increase in height.

Mechanical

Dimensions (mm)	W x D x H	
Tower units (inc. feet and connectors)	E201U 144 x 399 x 215	E203U 191 x 469 x 335
Rack mount units (case and front panel only)	E201RU 440 x 432 x 86.5	E203RU 440 x 599 x 86.5
Short Rack mount units (case and front panel only)	N/A	E203RSU 440 x 460 x 86.5
Net weight (kg)		
Tower units	E201U 12	E203U 23
Rack mount units	E201RU 12	E203RU 24
Short Rack mount units	N/A	E203RU 9
Audible noise	< 50dB (1m)	
Colour	Black	
Display	LCD and LED	
Ingress protection	IP20	

External Battery Packs

Battery packs	Tower units Rack mount units	EE201U EER201U	EE203U EER203U
Input	Voltage	208/220/230/240 VAC	
	Current	0.5 A	1.5 A
	Frequency	50/60 Hz	
	Input protection	Resettable circuit breaker	
Charger output	Voltage	41.1 ± 0.4 Vd.c.	82.2 ± 0.8 Vd.c.
	Current	2.0 A	
	Output protection	Resettable circuit breaker	
Battery	Battery Type	Sealed, maintenance free, valve regulated, lead acid	
	Battery type (EBP)	2 strings of (3) 12 V 9 Ah / 36 V	2 strings of (6) 12 V 9 Ah / 72 V
	Recharge time	4 to 8 hours to 90%	
Physical	Dimensions (mm)	W x D x H	
	Tower units (including feet and connectors)	144 x 413 x 215	191 x 474 x 336
	Rack mount units (case and front panel only)	440 x 432 x 86.5	440 x 704 x 86.5
	Weight (kg)		
	Tower units	23	22.4
	Rack mount units	45.2	48.3

Appendix 3 Optional Equipment

The following items are available as options for the UPS:

- External battery packs
- Dry contact relay card
- SNMP card
- Bypass panel
- Server racks and rack mount accessories
- Alternative input leads
- Output leads and power distribution units
- Replacement batteries and battery cartridges

Appendix 4 Alarm and Fault Reference Codes

Alarm code	Fault	~	+	+	!	Beeps
1	Rectifier fault				!	Continuous
2	Inverter fault (including shorted inverter bridge)				!	Continuous
9	Fan fault				!	Continuous
12	Self-test fault				!	Continuous
13	Battery charger fault				!	Continuous
15	DC bus overvoltage				!	Continuous
16	DC bus below voltage				!	Continuous
17	DC bus imbalance				!	Continuous
18	Soft start failure				!	Continuous
19	UPS over temperature				!	Every ½ s
20	Heatsink over temperature				!	Every ½ s
26	Battery overvoltage				!	Every 1 s
29	Output short-circuit				!	Every 1 s
30	Input current limit				!	Every 1 s
31	Bypass overcurrent			+		Every 1 s
32	Overload	~		+		Every 1 s
33	No battery		+			Every 1 s
34	Battery under voltage		+			Every 1 s
35	Battery low pre-warning		+			Every 1 s
36	Overload time out				!	Every 2 s
37	DC component over limit	~				Every 2 s
39	Mains voltage abnormal		+			Every 2 s
40	Mains frequency abnormal		+			Every 2 s
41	Bypass not available			+		
42	Bypass missing			+		
43	Inverter not started correctly					

~, +, +, ! LEDs on

~, +, +, ! LEDs flashing



Dale Power Solutions Ltd

Salter Road, Eastfield Industrial Estate, Scarborough, North Yorkshire, YO11 3DU, UK

hello@dalepowersolutions.com | www.dalepowersolutions.com | +44 (0) 330 999 3000