MGE™ Galaxy™ 5000
20 – 120 kVA

Installation and user manual
Thank you for selecting an APC by Schneider Electric product to protect your electrical equipment.

The MGE™ Galaxy™ 5000 range has been designed with the utmost care.
We recommend that you take the time to read this manual to take full advantage of the many features of your UPS.

APC by Schneider Electric pays great attention to the environmental impact of its products.
Measures that have made MGE™ Galaxy™ 5000 a reference in environmental protection include:

◗ the eco-design approach used in product development;
◗ the elimination of harmonic disturbances reinjected into the AC source;
◗ production in an ISO 14001 certified factory;
◗ recycling of the MGE™ Galaxy™ 5000 at the end of its service life.

To discover the entire range of APC by Schneider Electric products and the options available for the MGE™ Galaxy™ 5000 range, we invite you to visit our web site, www.apc.com, or contact your local APC by Schneider Electric representative.

All products in the MGE™ Galaxy™ 5000 range are protected by patents. They implement original technology not available to competitors of APC by Schneider Electric.

To take into account evolving standards and technology, equipment may be modified without notice. Indications concerning technical characteristics and dimensions are not binding unless confirmed by APC by Schneider Electric.

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Safety rules

Safety of persons

The UPS must be installed in a room with restricted access (qualified personnel only, according to standard 62040-1-2). A UPS has its own internal power source (the battery). Consequently, the power outlets may be energised even if the UPS is disconnected from the AC-power source.

Dangerous voltage levels are present within the UPS. It should be opened exclusively by qualified service personnel. The UPS must be properly earthed. The battery supplied with the UPS contains small amounts of toxic materials.

To avoid accidents, the instructions below must be observed.

- Never operate the UPS if the ambient temperature and relative humidity are higher than the levels specified in the documentation.
- Never burn the battery (risk of explosion).
- Do not attempt to open the battery (the electrolyte is dangerous for the eyes and skin).
- Comply with all applicable regulations for the disposal of the battery.
- Caution, wait five minutes before opening the UPS to allow the capacitors to discharge.
- Caution, there is high leakage current, the earthing conductor must be connected first.
- The product must be installed on a non-inflamable surface (e.g. concrete).
- Caution, battery replacement must be carried out by qualified personnel.

Product safety

A protection circuit breaker must be installed upstream and be easily accessible.

- Never install the UPS near liquids or in an excessively damp environment.
- Never let a liquid or foreign body penetrate inside the UPS.
- Never block the ventilation grates of the UPS.
- Never expose the UPS to direct sunlight or a source of heat.
- When replacing battery cells, use the same type and number of cells.

Special precautions

- The UPS connection instructions contained in this manual must be followed in the indicated order.
- Check that the indications on the rating plate correspond to your AC-power system and to the actual electrical consumption of all the equipment to be connected to the UPS.
- If the UPS must be stored prior to installation, storage must be in a dry place.
- The admissible storage temperature range is -25° C to +45° C.
- If the UPS remains de-energised for a long period, we recommend that you energise the UPS for a period of 24 hours, at least once every month. This charges the battery, thus avoiding possible irreversible damage.
- The UPS is designed for normal climatic and environmental operating conditions concerning the altitude, ambient operating temperature, relative humidity and ambient transport and storage conditions.
- Using the UPS within the given limits guarantees its operation, but may affect the service life of certain components, particularly that of the battery and its autonomy. The maximum storage time of the UPS is limited due to the need to recharge its integrated battery.
- Unusual operating conditions may justify special design or protection measures:
  - harmful smoke, dust, abrasive dust,
  - humidity, vapour, salt air, bad weather or dripping,
  - explosive dust and gas mixture,
  - extreme temperature variations,
  - bad ventilation,
  - conductive or radiant heat from other sources,
  - cooling water containing acid or impurities which may cause scale, silt, electrolysis or corrosion of converter parts exposed to water,
  - strong electromagnetic fields,
  - radioactive levels higher than those of the natural environment,
  - fungus, insects, vermin, etc.,
  - battery operating conditions.
- The UPS must always be installed in compliance with:
  - the requirements of standard IEC 60364-4-42: Protection from thermal effects.
  - standard IEC 60364-4-41: Protection from electric shock.
  - standard IEC 60364-4-482: Electrical installations of buildings.
  - in France, the requirements of standard NFC 15-100.
Foreword

Pictograms

<table>
<thead>
<tr>
<th>Document</th>
<th>Display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Danger, these instructions are imperative.</td>
<td>Vertical selection</td>
</tr>
<tr>
<td>Information, advice, help</td>
<td>Other selection</td>
</tr>
<tr>
<td>Visual indication</td>
<td>Enter / Confirm</td>
</tr>
<tr>
<td>Action</td>
<td>Event scroll in log</td>
</tr>
<tr>
<td>Audio signal</td>
<td>Page scroll in log</td>
</tr>
<tr>
<td>LED OFF</td>
<td>Fast forward</td>
</tr>
<tr>
<td>LED flashing</td>
<td>Forward</td>
</tr>
<tr>
<td>LED ON</td>
<td>Details</td>
</tr>
<tr>
<td>Earth cables</td>
<td>Circular menu</td>
</tr>
<tr>
<td>Other cables</td>
<td>Graphical display</td>
</tr>
<tr>
<td></td>
<td>Return to previous display</td>
</tr>
<tr>
<td></td>
<td>Delete</td>
</tr>
<tr>
<td></td>
<td>Access to measurements</td>
</tr>
<tr>
<td></td>
<td>Buzzer off</td>
</tr>
</tbody>
</table>

Move up or down one page
Event selection in log by date and time
Increase
Decrease
Save
Alarm
Status conditions
Settings
Maintenance
Control
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1. Presentation

1.1 MGE™ Galaxy™ 5000

UPS cabinet

<table>
<thead>
<tr>
<th>UPS power rating (kVA)</th>
<th>Dimensions (H x W x D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/30/40/60 without battery</td>
<td>1900 x 712 x 850 mm</td>
</tr>
<tr>
<td>80/100/120 without battery</td>
<td>1900 x 712 x 850 mm</td>
</tr>
<tr>
<td>20/30/40/60/80 with internal battery</td>
<td>1900 x 1112 x 850 mm</td>
</tr>
</tbody>
</table>

Weight in kg (UPS without battery or with built-in battery)

<table>
<thead>
<tr>
<th>Backup time</th>
<th>UPS power rating (kVA)</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Without battery</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>520</td>
<td>520</td>
<td></td>
</tr>
<tr>
<td>5 min</td>
<td>808</td>
<td>808</td>
<td>958</td>
<td>1120</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 min</td>
<td>808</td>
<td>958</td>
<td>1045</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 min</td>
<td>958</td>
<td>1045</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 min</td>
<td>1045</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Weights highlighted in grey are for double cabinets.

External battery cabinet / auxiliary cabinet

<table>
<thead>
<tr>
<th>Dimensions (H x W x D) and weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet 700 mm (empty)</td>
</tr>
<tr>
<td>Cabinet 1000 mm wide (empty)</td>
</tr>
</tbody>
</table>

Weight in kg (cabinet alone)

<table>
<thead>
<tr>
<th>Backup time</th>
<th>UPS power rating (kVA)</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 min</td>
<td></td>
<td>885</td>
<td>980</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10 min</td>
<td></td>
<td>885</td>
<td>1142</td>
<td>1307</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15 min</td>
<td></td>
<td>885</td>
<td>1142</td>
<td>1307</td>
<td>1764</td>
<td></td>
</tr>
<tr>
<td>30 min</td>
<td></td>
<td>882</td>
<td>1307</td>
<td>1764</td>
<td>2439</td>
<td>2742</td>
</tr>
</tbody>
</table>

Weights highlighted in grey are for double cabinets.
1.2 Inside the UPS cabinet, access to connections

Example of version with built-in battery

1. Connectors for auxiliary interconnections of parallel UPS units (INTN card)
2. User-machine interface
3. Slot for relay communications card
4. Free slots for optional communication cards
5. Open cabinet door
6. Screw-type terminal block for connections of contacts and coils for two external battery circuit breakers
7. Screw-type terminal block for connection of emergency power off (EPO)
8. Q1: input switch for Normal AC input
9. Q4S: input switch for Bypass AC input
10. Q3BP: bypass switch
11. Q5N: UPS output switch
12. Protection cover for power-connection terminal blocks
13. QF1: battery circuit breaker (only versions with built-in battery)

Simplified diagram of power connections
1. Presentation

Power-connection terminal blocks (version with built-in battery)

View with terminal-block protection cover removed

(14) Terminal block for load output
(15) Terminal block for Bypass AC input
(16) Terminal block for Normal AC input
(17) Main earthing connector
(18) Secondary earthing connector (auxiliary cabinets)

Power-connection terminal blocks (version with external battery)

(14) Terminal block for load output
(15) Terminal block for Bypass AC input
(16) Terminal block for Normal AC input
(17) Main earthing connector
(18) Secondary earthing connector (auxiliary cabinets)

INTN card for auxiliary interconnections of parallel UPS units

(19) DB9 connectors: exchange-current information
(20) Screw connectors: position information on Q5N, Q4S and Q3BP switches, from the external bypass
(21) DB9 connectors: CAN communication information between UPSs

1.3 Cabinet layout (normal or false floor)

The four feet of the cabinet are cylindrical, 40 mm in diameter.
The measurements opposite include cabinet siding (panels and door).
1.4 User–machine interface

(30) Graphical display
(31) Load protected LED
(32) Minor fault LED
(33) Major fault LED
(34) Help key
(35) Function keys
(36) Menu key
(37) ON button
(38) OFF button
(40) UPS ON LED
(41) Operation on battery power LED
(42) Load supplied LED
(43) Bypass in operation LED
(39) PFC ON LED

1.5 Relay communication card

(50) Card cover screws
(51) Card screw holes
(52) Card cover
(53) Cable entry holes
(54) Output terminal block
(55) Input terminal block
(56) Cable clamping screws
2. Installation

2.1 Location

To ensure correct ventilation, leave nothing on top of the UPS.
Leave one meter of free space in front of the UPS for door opening.
The cabinet rests on four cylindrical feet, 40 mm in diameter, positioned in the four corners of the cabinet to spread the weight.

If 500 mm of free space is not maintained above the UPS, abnormal temperature rise may occur.

The UPS must be installed in a room with restricted access (qualified personnel only).

(*) The UPS can operate correctly back to the wall, but it is preferable to leave some space for easier maintenance.

2.2 Layout of cabinets
2. Installation

2.3 Removing the cardboard protecting the batteries

In the UPS

The cardboard protecting the batteries must always be removed once the equipment is installed in its final location.

1 - Remove the ties holding the cardboard (1).
2 - Remove the cardboard (2).
3 - Remove the struts (3).

In the external battery cabinet

The cardboard protecting the batteries must always be removed once the equipment is installed in its final location.

1 - Remove the battery support upright (1).
2 - Remove the ties holding the cardboard (2) (1000 mm external battery cabinet).
3 - Remove the cardboard protecting the batteries (3).
4 - Remove the ties holding the batteries (4).
2. Installation

2.4 Required protective devices and cable sizes

Recommended upstream protection

<table>
<thead>
<tr>
<th>UPS power rating</th>
<th>Upstream circuit-breaker on separate Normal AC input</th>
<th>Upstream circuit-breaker on separate Bypass AC input</th>
<th>Upstream circuit-breakers on common bypass and Normal AC input</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kVA</td>
<td>C60L - 50 A</td>
<td>NS100N 4P-TM100A</td>
<td>NS100N 4P-TM100A</td>
</tr>
<tr>
<td>30 kVA</td>
<td>C60L - 63 A</td>
<td>NS100N 4P-TM100A</td>
<td>NS100N 4P-TM100A</td>
</tr>
<tr>
<td>40 kVA</td>
<td>NS100N 3P-TM80A</td>
<td>NS100N 4P-TM100A</td>
<td>NS100N 4P-TM100A</td>
</tr>
<tr>
<td>60 kVA</td>
<td>NS125E 3P-TM125A</td>
<td>NS125E 4P-TM125A</td>
<td>NS125E 4P-TM125A</td>
</tr>
<tr>
<td>80 kVA</td>
<td>NS160N 3P-TM160A</td>
<td>NS160N 4P-TM160A</td>
<td>NS160N 4P-TM160A</td>
</tr>
<tr>
<td>100 kVA</td>
<td>NS250N 3P-TM200A</td>
<td>NS250N 4P-TM250A</td>
<td>NS250N 4P-TM250A</td>
</tr>
<tr>
<td>120 kVA</td>
<td>NS250N 3P-TM250A</td>
<td>NS250N 4P-TM250A</td>
<td>NS250N 4P-TM250A</td>
</tr>
</tbody>
</table>

The circuit breakers recommended above respect the requirements for discrimination with the UPS fuses.

Stick a label with the following text on each upstream circuit breaker: "Isolate Uninterruptible Power Supply (UPS) before working on this circuit".

Recommended downstream protection

<table>
<thead>
<tr>
<th>UPS power rating</th>
<th>Downstream circuit breaker</th>
<th>Trip unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-30-40 kVA</td>
<td>C60N</td>
<td>C 16A</td>
</tr>
<tr>
<td></td>
<td>C60N</td>
<td>B 25A</td>
</tr>
<tr>
<td>60 kVA</td>
<td>C60N</td>
<td>C 20A</td>
</tr>
<tr>
<td></td>
<td>C60N</td>
<td>B 32A</td>
</tr>
<tr>
<td>80 kVA</td>
<td>C60N</td>
<td>C 25A</td>
</tr>
<tr>
<td></td>
<td>C60N</td>
<td>B 50A</td>
</tr>
<tr>
<td>100-120 kVA</td>
<td>C60N</td>
<td>C 32A</td>
</tr>
<tr>
<td></td>
<td>C120N</td>
<td>B 63A</td>
</tr>
<tr>
<td></td>
<td>NS100</td>
<td>TMG 50A</td>
</tr>
</tbody>
</table>

Curve N for the downstream circuit breaker may be replaced by curve H or L, depending on the installation. The indicated protection ensures discrimination for each output circuit downstream of the UPS, whether supplied by via the normal or the Bypass AC source. If these recommendations are not followed, a short-circuit on an output circuit can result in a break in power longer than 20 milliseconds on all the other output circuits.

Note. See the simplified diagrams in the appendix for common or separate AC inputs, indicating the positions of the protection devices, the characteristics of the internal UPS fuses and UPS line currents under overload conditions.

Earth-leakage current

UPS earth-leakage current is 1 A.
### Required cable sizes

Cable sizes are determined for copper conductors (for aluminium conductors, increase the size by 30%). Size calculations also take into account a voltage of 400 V and grouping of four cables.

<table>
<thead>
<tr>
<th>UPS power rating</th>
<th>Minimum sizes for separate Normal AC input copper cables (&lt;100 m)</th>
<th>Minimum sizes for separate Bypass AC input copper cables (&lt;100 m)</th>
<th>Minimum sizes for common bypass and Normal AC input copper cables (&lt;100 m)</th>
<th>Minimum sizes for copper load-circuit cables (&lt;100 m)</th>
<th>Battery/terminal connection (&lt;15 m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kVA</td>
<td>10 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>30 kVA</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>40 kVA</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>16 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>35 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>60 kVA</td>
<td>25 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>25 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>80 kVA</td>
<td>50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>95 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>100 kVA</td>
<td>50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>2 x 50 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>120 kVA</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
<td>2 x 70 mm&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

Connections are made to pre-drilled terminals.
Hole diameter: 6.5 mm (8.5 mm for 120 kVA).
Earthing cables connect to the earthing plate.
Hole diameter: 6.5 mm (8.5 mm for 120 kVA).
2. Installation

Required cable sizes for parallel UPS installations with an external bypass

<table>
<thead>
<tr>
<th>Rated power of each UPS unit</th>
<th>Number of parallel UPS units</th>
<th>Total rated power of the UPS</th>
<th>Bypass AC input or load line current</th>
<th>Cable size(1) in mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kVA</td>
<td>2</td>
<td>40 kVA</td>
<td>58 A</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>60 kVA</td>
<td>87 A</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>80 kVA</td>
<td>116 A</td>
<td>50</td>
</tr>
<tr>
<td>30 kVA</td>
<td>2</td>
<td>60 kVA</td>
<td>80 A</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>90 kVA</td>
<td>129 A</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>120 kVA</td>
<td>172 A</td>
<td>70</td>
</tr>
<tr>
<td>40 kVA</td>
<td>2</td>
<td>80 kVA</td>
<td>116 A</td>
<td>35</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>120 kVA</td>
<td>174 A</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>160 kVA</td>
<td>232 A</td>
<td>120</td>
</tr>
<tr>
<td>60 kVA</td>
<td>2</td>
<td>120 kVA</td>
<td>174 A</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>180 kVA</td>
<td>261 A</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>240 kVA</td>
<td>348 A</td>
<td>185</td>
</tr>
<tr>
<td>80 kVA</td>
<td>2</td>
<td>160 kVA</td>
<td>232 A</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>240 kVA</td>
<td>348 A</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>320 kVA</td>
<td>464 A</td>
<td>2 x 120</td>
</tr>
<tr>
<td>100 kVA</td>
<td>2</td>
<td>200 kVA</td>
<td>288 A</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>300 kVA</td>
<td>432 A</td>
<td>2 x 95</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>400 kVA</td>
<td>576 A</td>
<td>2 x 150</td>
</tr>
<tr>
<td>120 kVA</td>
<td>2</td>
<td>240 kVA</td>
<td>348 A</td>
<td>185</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>360 kVA</td>
<td>522 A</td>
<td>2 x 150</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>480 kVA</td>
<td>696 A</td>
<td>2 x 185</td>
</tr>
</tbody>
</table>

The table opposite is an example for an installation with up to four UPS units.

For installations with redundant units, take into account only the number of units required to supply the loads (e.g. in a three-unit installation where one unit is redundant, only two units count in determining the input and load currents).

This table is valid for 400 V input and load phase-to-phase voltages, at rated load with a power factor of 0.8. For voltages of 380 or 415 V, multiply the current values by 1.05 or 0.96 respectively and, if necessary, modify the cable sizes accordingly.

The cable sizes in this table concern the bold sections in the diagram below.

(1) Cable sizes are determined for U1000 R02V type copper conductors (for aluminium conductors, increase the size by 30%). Size calculations also take into account a voltage of 400 V and grouping of four cables.
2.5 System earthing arrangements

This chapter lists the main system earthing arrangements and their wiring requirements. For system earthing arrangements which are not listed in this document, please refer to the “SEA guide” reference 34002636XT..

TNS upstream and TNS downstream installation

For separate Normal AC and Bypass AC lines from a single source.

**Without differential circuit breaker:**

![Diagram of TNS upstream and TNS downstream installation without differential circuit breaker]

**With differential circuit breaker:**

The Normal and Bypass AC lines must be galvanically isolated

The upstream differential rating must be at least 3A, and conditions defined in IEC 364-4-41 must be respected.

![Diagram of TNS upstream and TNS downstream installation with differential circuit breaker]
2. Installation

TNC upstream, TNC,TNS or TT downstream

For separate Normal AC and Bypass AC lines from a single source

1. The UPS internal PEN bar must be connected to the Q4S neutral upstream of Q4S
2. The UPS internal PEN bar must be connected to the Q5N neutral downstream of Q5N
3. The UPS internal PE bar must be transformed into a PEN bar (cables supplied for TNC options)

![Diagram of TNC upstream, TNC,TNS or TT downstream installation]

Installation with IT upstream and IT downstream

For separate Normal AC and Bypass AC lines from a single source

![Diagram of Installation with IT upstream and IT downstream]

In normal operating mode:
The IMD1 controls the whole installation, including downstream from the UPS. Power to the IMD2 is switched off by the R2 relay which controls voltage presence upstream from the UPS.

If the voltage is cut or the protection is opened upstream:
The R1 relay cuts the IMD1 circuit and the R2 relay closes the IMD2 circuit thus maintaining control downstream of the UPS.

Installation with upstream TT and downstream TT (with upstream differential protection)

For separate Normal AC and Bypass AC lines from the same source

The upstream differential rating must be at least 3A, and conditions defined in IEC 364-4-41 must be respected.

![Diagram of Installation with upstream TT and downstream TT (with upstream differential protection)]
Frequency converter (without Bypass AC input)

The UPS installation may be equipped with earth-leakage protection upstream on the condition that the protection apply to:
- the normal and Bypass AC inputs
- all the parallel-connected UPSs.

**Upstream and downstream: TT, TN or IT system with neutral distributed**

**Upstream and downstream: Neutral not distributed**

**Parallel configuration without external bypass cabinet and with common normal and Bypass AC inputs (maximum two units in parallel)**

The UPS installation may be equipped with earth-leakage protection upstream on the condition that the protection apply to:
- the normal and Bypass AC inputs
- all the parallel-connected UPSs.

Upstream and downstream earth protection cables must be connected in compliance with the single UPS system earthing arrangement.

For TNC upstream configuration, TNC option must be connected into each UPS.
2. Installation

Parallel configuration without external bypass cabinet and with separate normal and Bypass AC inputs (maximum two units in parallel)

- If the UPS installation is equipped with earth-leakage protection upstream then you must install an isolated transformer on each Bypass AC (A) and each Normal AC (B) sources.

- Upstream and downstream earth protection cables must be connected in compliance with the single UPS system earthing arrangement.

- For TNC upstream configuration, TNC option must be connected into each UPS.
Parallel UPS with external bypass cabinet and separate Normal and Bypass AC network inputs (6 UPS in parallel for 4PN)

If the UPS installation is equipped with earth-leakage protection upstream then you must install an isolated transformer on both Bypass AC (A) and Normal AC (B) sources.

Upstream and downstream earth protection cables must be connected in compliance with the single UPS system earthing arrangement.

For TNC upstream configuration, TNC option must be connected into each UPS.

Connection for the Bypass AC input and the output cables to the external bypass cabinet must use cables having the same length and size to ensure correct balancing of the Bypass AC input currents.
2. Installation

2.6 Connection of power cables in a single UPS unit

Interconnecting the cabinet earths

All the cabinet earths must be interconnected: external Bypass cabinet, external battery cabinet, etc.

UPS units with common normal and Bypass AC inputs

To access the connection terminal blocks, see section 1.2.
1 - The earthing conductors must be connected to the UPS earthing-plate connectors (17) and (18).
2 - Connect the four conductors of the Normal AC source to terminal block (15).
3 - Connect the three phases of the Normal AC input (16) with the three phases of the Bypass AC input (15).
4 - Connect the four conductors supplying the load to terminal block (14).
5 - Tie the cables down to the frame.
6 - Put the cover back in place (see section 1.2).

UPS units with separate normal and Bypass AC inputs

To access the connection terminal blocks, see section 1.2.
1 - The earthing conductors must be connected to the UPS earthing-plate connectors (17) and (18).
2 - Connect the three phases of the Normal AC source to terminal block (16).
3 - Connect the four conductors of the Bypass AC source to terminal block (15).
4 - Connect the four conductors supplying the load to terminal block (14).
5 - Tie the cables down to the frame.
6 - Put the cover back in place (see section 1.2).

Frequency converter

To access the connection terminal blocks, see section 1.2.
1 - The earthing conductors must be connected to the UPS earthing plate.
2 - Connect the neutral conductor of the Normal AC source to the neutral terminal on terminal block (15).
3 - Connect the three phases of the Normal AC source to terminal block (16).
4 - Connect the four conductors supplying the load to terminal block (14).
5 - Connect the neutral on terminal block (15) with the neutral of the supplied loads on terminal block (14).
6 - Tie the cables down to the frame.
7 - Put the cover back in place (see section 1.2).

Do not connect anything to the three phases on the Bypass AC source terminal block (15).
2.7 Earth-cable connection for a TNC earthing system

This operation must be done for single UPSs, parallel UPSs and external bypass.

1. Connect the power network cable PEN to the UPS earthing terminal
2. Connect the usage cable PEN to the UPS earthing terminal
3. Connect the Q4S (15) neutral terminal to the UPS earth using the cable supplied
4. Connect the Q5N (14) neutral terminal to the UPS earth using the cable supplied
2. Installation

2.8 Connection of power cables for parallel UPS units

Equipotential bonding between parallel-connected units
Connect the exposed conductive parts (ECP) of the parallel-connected UPS units using an additional earthing cable (not supplied) with the following characteristics:
- size equivalent to that of the supply cables,
- as short as possible.

Connection of earth cable and tying of cables

Connections must be made according to the diagram below:
2. Installation

Redundant parallel configuration (maximum two UPS units for Pn)

This configuration does not have an external bypass.

For TNC upstream installation, you must connect the earth-cable. See “Earth-cable connection for a TNC earthing system”, page 23.

UPS units with common normal and Bypass AC inputs

To access the connection terminal blocks, see section 1.2.

UPS units with separate normal and Bypass AC inputs

To access the connection terminal blocks, see section 1.2.

1 - The earthing conductors must be connected to the earthing plate of each UPS.
2 - Connect the four conductors of the Bypass AC source to terminal block (15) in each UPS unit.
3 - Connect the three phases of the Normal AC input (16) with the three phases of the Bypass AC input (15) in each UPS unit.
4 - Connect the four conductors of the supplied loads to terminal block (14) in UPS1.
5 - Connect terminal block (14) in UPS2 to terminal block (14) in UPS1 using the four load conductors.
6 - Tie the cables down to the cabinet frames.
7 - Put the covers back in place (see section 1.2).

Caution. If the two UPSs are placed side by side, connect as indicated above. In the other configurations, always make sure that the cables between the UPSs and Bypass AC source have the same cross-section and the same length. The same is true for the cables between the UPSs and the load.
2. Installation

Frequency converter

For TNC upstream installation, you must connect the earth-cable, See “Earth-cable connection for a TNC earthing system”, page 23.

To access the connection terminal blocks, see section 1.2.

1 - The earthing conductors of each UPS must be connected to the UPS earthing plate.
2 - Connect the neutral conductor of the Normal AC source to the neutral terminal on terminal block (15) of UPS1.
3 - Connect the three phases of the Normal AC source to terminal block (16).
4 - Connect terminal block (16) in UPS1 to terminal block (16) in UPS2 using the three conductors of the Normal AC source.
5 - Connect the neutral cable on terminal block (15) in UPS1 to terminal block (15) in UPS2.
6 - Connect the four conductors supplying the load to terminal block (14).
7 - Connect terminal block (14) in UPS1 to terminal block (14) in UPS2 using the four load conductors.
8 - Connect the neutral on terminal block (15) with the neutral of the supplied loads on terminal block (14).
9 - Tie the cables down to the frame.
10 - Put the cover back in place (see section 1.2).

Do not connect anything to the three phases on the Bypass AC source terminal block (15).
UPS units with separate normal and Bypass AC inputs

For TNC upstream installation, you must connect the earth-cable, See “Earth-cable connection for a TNC earthing system”, page 23.

To access the connection terminal blocks, see section 1.2.
1 - The earthing conductors must be connected to the earthing plate of each UPS.
2 - Connect the three phases of the Normal AC source to terminal block (16) in each UPS unit.
3 - Connect the four conductors of the Bypass AC source to terminal (61) in the bypass cabinet.
4 - Connect terminal blocks (15) in each UPS unit to terminal (60) in the bypass cabinet, using cables with identical lengths and sizes.
5 - Connect the four load conductors to terminal (62) in the bypass cabinet.
6 - Connect terminal blocks (14) in each UPS unit to terminal (63) in the bypass cabinet, using cables with identical lengths and sizes.
7 - Tie the cables down to the frames of the UPS cabinets and the bypass cabinet.
8 - Put the covers back in place (see section 1.2).

The cables marked A must be identical, i.e. same size and length.
Similarly, the cables marked B must be identical, i.e. same size and length.

To avoid errors, it is advised to remove the handle on switch Q3BP (10) in each UPS.
2. Installation

2.9 Connection of the 150 kVA external bypass cabinet

For TNC upstream installation, you must connect the earth-cable. See “Earth-cable connection for a TNC earthing system”, page 23.

Key
A: top view of cabinet
B: front view of cabinet
C: 317 x 120 mm opening for cable running
D: connection of Bypass AC source to the UPSs
E: connection of auxiliary wires for position of Q4S, Q3BP and Q5N switches
F: connection of UPS load outputs
G: connection of Bypass AC source
H: connection of the load
2.10 Connection of the 360 kVA external bypass cabinet

For TNC upstream installation, you must connect the earth-cable, See “Earth-cable connection for a TNC earthing system”, page 23.

Key
AA: section AA of cabinet
B: front view of cabinet
C: front
D: connection of Bypass AC source to the UPSs
E: connection of auxiliary wires for position of Q4S, Q3BP and Q5N switches
F: connection of UPS load outputs
G: connection of Bypass AC source
H: connection of the load
I: ventilation grate for air exit from cabinet
J: cable running through top, 460 x 197 mm opening and gland plate
K: protection fuses for RC voltage surge suppressor on the Bypass AC line (must be replaced when LED is ON)
L: top view of cabinet
2. Installation

2.11 Connection of the 600 kVA external bypass cabinet

For TNC upstream installation, you must connect the earth-cable. See “Earth-cable connection for a TNC earthing system”, page 23.

Key
AA: section AA of cabinet
B: front view of cabinet
C: front
D: connection of Bypass AC source to the UPSs
E: connection of auxiliary wires for position of Q4S, Q3BP and QSN switches
F: connection of UPS load outputs
G: connection of Bypass AC source
H: connection of the load
I: ventilation grate for air exit from cabinet
J: cable running through top, 460 x 197 mm opening and gland plate
L: top view of cabinet
2.12 Auxiliary interconnections between UPS units in parallel configurations

For security reasons, the connections of the auxiliary interconnections of the parallel UPSs must be carried out whilst all the UPSs are de-energised.

Redundant parallel configuration (maximum two UPS units)

Exchange-current interconnections
Link connectors XMS02 and XMS03 on the two UPS units.

CAN // interconnections:
Fit a blue plug on connector XMS06 on UPS1.
Link connector XMS07 on UPS1 to connector XMS06 on UPS2.
Fit a red plug on connector XMS07 on UPS2.

Note. The supplied cables (10 m) limit the distance between the two UPS units to approximately six meters.
2. Installation

Parallel configuration for increased capacity (maximum four UPS units)

Interconnections with the external bypass cabinet

- Interconnect terminals 1, 3 and 5 on the auxiliary terminal block in the cabinet.
- Create a loop between the cabinet and the UPS units for terminals 1, 2, 4 and 6 on the auxiliary terminal block in the cabinet. The order for the XMS04 and XMS05 connectors in each UPS unit, from right to left, is common, Q3BP, Q4S and Q5N.

Details of terminal blocks (11)

XMS 04 / XMS 05

Note. The interconnection cables for the external bypass cabinet are not supplied (size 2.5 mm² maximum).

Exchange-current interconnections (10):

Use the XMS02 and XMS03 connectors to create a loop between the UPS units (all the XMS02 and XMS03 connectors must be used).

CAN // interconnections (12):

Daisy-chain the UPS units using the XMS06 and XMS07 connectors. Fit a blue plug on the first UPS unit and a red plug on the last unit (all the XMS06 and XMS07 connectors must be used).

Note. The supplied cables are ten meters long.

To ensure sufficient isolation of exchange-current, CAN and external bypass cabinet cables, they must be run separately from the power cables.
2. Installation

Fitting the protection cover for the auxiliary interconnection cables

The protection cover supplied with the parallel connected UPS units protects the user against direct contact with voltages other than SELVs and ensures the auxiliary interconnection cables are maintained in position.

Note. Tie down the cables as indicated in the diagram in section 2.10.

2.13 Connection of general shutdown or emergency power off (EPO) terminal block

1 - Remove the wire from terminal block (7).
2 - Connect the general shutdown NC contact to terminals 1 and 2 (SELV).
3 - Tie the cable down as illustrated in section 2.10.

Caution.
In the UPS, pressing the general shutdown button causes UPS shutdown and opening of the battery circuit breaker (with opening of the bypass static switch depending on personalisation settings).
The Emergency Power Off (EPO) notion is applicable to installations where pressing the button also causes the upstream Normal AC source and Bypass AC source circuit-breakers to open.
In parallel configurations, there must be a single general shutdown button with a separate contact for each UPS unit.
2.14 Connection of the relay communications card

Isolate and lock-out all power sources for this card before making connections.
Never connect SELV (safety extra low voltage) and non-SELV circuits to the different outputs of the same card.

1 - Remove the cover (52) secured by the screws (50).
2 - Run the communications cables through the cable entry holes (53).
3 - Connect the conductors to the input (55) and output (54) terminal blocks.

4 - Put the cover back in place and secure it with the screws (50).
5 - Tighten the screws (56) to block the cables.
6 - Indicate the locations of the power sources on the labels.
7 - Insert the card in its slot.
8 - Secure the card with two screws (51).
2. Installation

Characteristics of the contacts on the relay communications card.

<table>
<thead>
<tr>
<th>Low battery warning</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Load on battery power</td>
<td>5</td>
</tr>
<tr>
<td>Load on automatic bypass</td>
<td>4</td>
</tr>
<tr>
<td>Load on UPS</td>
<td>3</td>
</tr>
<tr>
<td>Battery fault</td>
<td>2</td>
</tr>
<tr>
<td>General alarm</td>
<td>1</td>
</tr>
</tbody>
</table>

Characteristics of the output contacts:
Permissible voltage: 250V AC, 30V DC.
Permissible current: 2 A.
Cable: 4 x 0.93 mm², Ø 6.6 ± 0.3 mm.

Characteristics of the input contacts:
Switched voltage: 5 V DC
Consumption: 10 mA.
Cable: 4 x 0.34 mm², Ø 5 ± 0.5 mm.

Communications card connection example
If a SELV (safety extra low voltage) source is used, it must always be possible to isolate the communications card from the upstream source to ensure the safety of personnel working on the installation.

Adding communication cards

Disconnecting device that can be locked

UPS OFF
UPS ON

AC

communication card
2. Installation

2.15 Running the control/communications cables

Single UPS

The following assembly recommendations must be followed to ensure correct positioning and support of the various strands of the control and communication cables on the front face of the UPS.

- Separate the control and communication cables from the power cables.
- Run the cables together in front of the protection panels and tie them to the panels as indicated in the figure opposite.
- Slot for relay communications card
- Free slot for optional communication cards
- Screw-type terminal block for connection of EPO and battery circuit-breakers.
- Ties

<table>
<thead>
<tr>
<th>Cable description</th>
<th>Insulation level</th>
<th>Location on illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relay communication card</td>
<td>SELV or LV</td>
<td>3</td>
</tr>
<tr>
<td>Optional communication card</td>
<td>SELV</td>
<td>4</td>
</tr>
<tr>
<td>General-shutdown cable</td>
<td>SELV</td>
<td>6</td>
</tr>
<tr>
<td>External battery circuit-breaker cables</td>
<td>SELV</td>
<td>7</td>
</tr>
</tbody>
</table>

To ensure sufficient isolation of exchange-current, CAN and external bypass cabinet cables, they must be run separately from the power cables. Reinforce the insulation of these control and communication cables if any risk of contact with the power cables subsists.
Parallel UPS

Parallel-connection cables for connection to the external bypass cabinet (not supplied max. 2.5 mm²). The CAN and I exchange cables are supplied.

Relay communication card

Optional communications cards

Ties

General-shutdown cable (not supplied, max. 2.5 mm²) and external battery circuit breaker cable must be tied down separately

Ties

<table>
<thead>
<tr>
<th>Cable description</th>
<th>Insulation level</th>
<th>Location on illustration</th>
</tr>
</thead>
<tbody>
<tr>
<td>External bypass cabinet cable</td>
<td>ELV</td>
<td>1</td>
</tr>
<tr>
<td>CAN cables</td>
<td>SELV</td>
<td>1</td>
</tr>
<tr>
<td>Exchange-current cables</td>
<td>SELV</td>
<td>1</td>
</tr>
<tr>
<td>Relay communication card</td>
<td>SELV or LV</td>
<td>3</td>
</tr>
<tr>
<td>Optional communication card</td>
<td>SELV</td>
<td>4</td>
</tr>
<tr>
<td>General-shutdown cable</td>
<td>SELV</td>
<td>6</td>
</tr>
<tr>
<td>External battery circuit-breaker cables</td>
<td>SELV</td>
<td>7</td>
</tr>
</tbody>
</table>

To ensure sufficient isolation of exchange-current, CAN and external bypass cabinet cables, they must be run separately from the power cables. Reinforce the insulation of these control and communication cables if any risk of contact with the power cables subsists.
2. Installation

2.16 Power connections for an external battery cabinet

The earth on an external battery cabinet must be connected to the UPS.

2.17 Assembly and connection of an empty battery cabinet

Mounting the battery circuit breaker kit

The coil control wires and the position contact wires of circuit-breaker QF1 must be connected to the UPS (see page 24).

You must install Temperature sensor to obtain battery warranty and to optimize battery lifetime.

Secure:
1. The base plate (60) supporting the circuit breaker.
2. Connector XR1.
3. The temperature sensor (3).
4. The front plate (4), after connecting the batteries to the circuit breaker.

Only one circuit breaker is necessary even if there are several battery cabinets.

Please contact our Sales department when selecting the battery circuit breaker.
2. Installation

Mounting the shelves and the battery cells

**Caution.** Assembly of the battery cabinet must be carried out by certified personnel (standard EN 50091-1-2).

**Caution.** The minimum clearance between the top of battery cells and the next shelf is 150 millimeters.

1 - Secure the angle supports (6 screws per support).

For each shelf:
2 - position the shelf,
3 - secure the shelf with two screws in each angle,
4 - install the battery cells, secure and interconnect them.

5 - Interconnect all the shelves and then connect the overall battery assembly to the battery circuit breaker.
2. Installation

2.18 Control connections for an external battery cabinet

1 - Connect wires 1-2-3-4 on connector XR1 (QF1 position and coil) in the external battery cabinet to connector XMB07 (SELV) and wires 7-8-9-10 (temperature sensor) to connector XMD3 (SELV).

Note. The wires for the screw-type terminal block are not supplied (max. size 2.5 mm² and total length less than 100 m).
2.19 Connection of an input isolating transformer

A - Connection of an input transformer for common normal and Bypass AC source.
B - Connection of a Bypass AC input transformer for separate normal and Bypass AC sources.
C - Connection of a Normal AC input transformer for separate normal and Bypass AC sources.

2.20 Connection of an output isolating transformer
3. Operation

All operations concerning system start-up and compliance with standards and regulations, including those related to the battery cabinet, must be carried out by trained and certified personnel before using the UPS.

3.1 Shutting down a single UPS

The UPS remains energised unless it is shut down.

1 - Press a button to exit sleep mode.
2 - Confirm by pressing the function key (38) for 3 seconds.

The load is no longer protected by the UPS. It is supplied via the bypass.

3 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
4 - Set the input circuit-breaker Q1 (8) to OFF.

The charger no longer operates to keep the batteries fully charged.

5 - Open the upstream circuit-breakers of the Normal AC source and Bypass AC source to completely power off the UPS.

3.2 Restarting a single UPS

Check that switches Q4S (9) and Q5N (11) are closed. If this is the case, continue with this procedure, otherwise refer to paragraph 4.4 "Return to the Normal position, Single UPS".

1 - Set the Normal AC source input switch Q1 (8) to the ON position.
2 - Wait until the end of the start sequence.
3 - Set the battery circuit breaker QF1 (13) (or the battery circuit breakers in the auxiliary cabinets) to the ON position.

The UPS unit starts automatically.

LED (31) is ON.

The load is protected by the UPS.

If LED (31) remains OFF, press the ON button (37)

If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).
3. Operation

3.3 Shutting down a parallel configuration

1 - Press a button on each unit to exit sleep mode.
2 - Press the OFF button (38) on each unit for 3 seconds.

The load is no longer protected by the UPSs. It is supplied via the bypass.

3 - Set the battery circuit breaker QF1 (13) in each UPS unit to the OFF position (or trip the battery circuit breakers in the auxiliary cabinets if applicable).
4 - Set the input switch Q1 (8) in each UPS unit to the OFF position.

The charger no longer operates to keep the batteries fully charged.

5 - Open the upstream circuit-breakers of Normal AC source and Bypass AC source to completely power off the installation.

3.4 Restarting a parallel configuration

Check that switches Q4S (9) and Q5N (11) are closed. If this is the case, continue with this procedure, otherwise refer to paragraph 4.4 “Return to the Normal position, Parallel UPS...”.

1 - Check that the Bypass AC source input switch Q4S in the external bypass cabinet is closed.
2 - Check that the output switch Q5N in the external bypass cabinet is closed.
3 - Check that the bypass switch Q3BP in the external bypass cabinet is open.

Then carry out steps 4 to 6 below on all the UPS units.
4 - Set the Normal AC source input switch Q1 (8) to the ON position.
5 - Wait until the end of the start sequence.
6 - Set the battery circuit breaker QF1 (13) (or the battery circuit breakers in the auxiliary cabinets) to the ON position.

The UPS units start automatically. On each unit, LEDs (32) and (33) go OFF and LED (31) goes ON.

The load is protected by the UPSs.

If LED (31) remains OFF, press the ON button (37) on each UPS unit (the UPS is in manual start mode) and confirm if necessary by pressing the function key (35) marked .

If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).
3. Operation

3.5 Operation of mimic-panel LEDs

### Single UPS start sequence on Normal AC input

<table>
<thead>
<tr>
<th>Steps</th>
<th>Action</th>
<th>LED (39)</th>
<th>LED (40)</th>
<th>LED (41)</th>
<th>LED (42)</th>
<th>LED (43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Q1 open</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Close Q1</td>
<td>green</td>
<td>Off</td>
<td>red</td>
<td>Off</td>
<td>red</td>
</tr>
<tr>
<td>3</td>
<td>Close QF1</td>
<td>green</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>red</td>
</tr>
<tr>
<td>4</td>
<td>Close Q4S</td>
<td>green</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>green</td>
</tr>
<tr>
<td>5</td>
<td>Close Q5N</td>
<td>green</td>
<td>Off</td>
<td>Off</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>6</td>
<td>Open Q3BP</td>
<td>green</td>
<td>Off</td>
<td>green</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>7</td>
<td>Press ON button (37)</td>
<td>green</td>
<td>green</td>
<td>Off</td>
<td>green</td>
<td>Off</td>
</tr>
</tbody>
</table>

### Single UPS start sequence on Bypass AC input

<table>
<thead>
<tr>
<th>Steps</th>
<th>Action</th>
<th>LED (39)</th>
<th>LED (40)</th>
<th>LED (41)</th>
<th>LED (42)</th>
<th>LED (43)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Q4S open</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
<td>Off</td>
</tr>
<tr>
<td>2</td>
<td>Close Q4S</td>
<td>red</td>
<td>Off</td>
<td>red</td>
<td>Off</td>
<td>green</td>
</tr>
<tr>
<td>3</td>
<td>Close Q5N</td>
<td>red</td>
<td>Off</td>
<td>red</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>4</td>
<td>Open Q3BP</td>
<td>red</td>
<td>Off</td>
<td>green</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>5</td>
<td>Close Q1</td>
<td>green</td>
<td>Off</td>
<td>red</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>6</td>
<td>Close QF1</td>
<td>green</td>
<td>Off</td>
<td>green</td>
<td>green</td>
<td>green</td>
</tr>
<tr>
<td>7</td>
<td>Press ON button (37)</td>
<td>green</td>
<td>green</td>
<td>Off</td>
<td>green</td>
<td>Off</td>
</tr>
</tbody>
</table>
3.6 Operating modes

Normal (double conversion) mode

This is the standard operating mode, set by default in the factory. Two possible cases:

1 - Normal AC source available:
   LED (31) is ON.
   The load is protected by the UPS.

2 - Normal AC source not available:
   LED (32) is ON.
   The buzzer sounds intermittently.
   The load is supplied by the UPS from battery power.

The display indicates any anomalies related to the AC source or the UPS as well as remedial action if applicable. Press the function key (35) indicated by the display to turn the buzzer OFF.

ECO mode (single UPS only)

The main advantage of this mode is that it reduces the consumption of electrical power. ECO mode may be selected exclusively via the control panel on the UPS.

Three possible cases:

1 - Bypass AC source available:
   LED (31) is ON.
   The load is supplied in ECO mode.

2 - Bypass AC source not available:
   LED (31) is ON.
   The buzzer sounds intermittently.
   The load is automatically supplied in normal mode via the Normal AC input.

3 - Both normal and Bypass AC sources not available or out of tolerance:
   LED (32) is ON.
   The buzzer sounds intermittently.
   The load is supplied by the UPS from battery power.

The display indicates the UPS operating status conditions and the required action.
3. Operation

3.7 Load on battery power

The load continues to be protected by the UPS when the Normal AC source is not available. Power is supplied by the battery.

Transfer to battery power

LED (32) is ON.
The buzzer sounds intermittently.
The load is supplied by the battery.

End of battery power

LED (33) is ON.
The buzzer sounds intermittently.
The load is transferred on the Bypass AC input if it is present.

3.8 UPS personalisation

Access to the personalisation functions

Personalisation must be carried out with switches Q1 (8) and Q5N (11) open (OFF) and switches Q4S (9) and Q3BP (10) closed (ON).

1 - Press the menu key (36).
2 - Select “Settings”, then “Personalisation” using the function keys (35) ↑ or ↓.
3 - Confirm by pressing the function key (35) ©.
4 - Enter the password by successively selecting each icon using the corresponding function key.
5 - Confirm by pressing the function key (35) ©.
6 - To save the personalisation settings, confirm by pressing the function key (35) ©.

The password is factory set.

To change the password, see the Settings menu.
### Operating mode

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory setting</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS operating mode</td>
<td>NORMAL</td>
<td>ECO</td>
</tr>
<tr>
<td>UPS automatic start</td>
<td>Disabled</td>
<td>Enabled</td>
</tr>
<tr>
<td>Authorised number of starts</td>
<td>4</td>
<td>1 to 255</td>
</tr>
<tr>
<td>Delay before reset of number of executed automatic starts</td>
<td>4 seconds</td>
<td>1 to 60 seconds</td>
</tr>
</tbody>
</table>

### Frequency

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory setting</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPS output frequency</td>
<td>50 Hz</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Tolerance for Bypass AC source</td>
<td>8 %</td>
<td>0.5 - 1 - 2 - 4 %</td>
</tr>
<tr>
<td>Synchronisation speed with Bypass AC source</td>
<td>2 Hz / s</td>
<td>1 Hz / s</td>
</tr>
</tbody>
</table>

### Automatic bypass

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory setting</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transfer to Bypass AC source</td>
<td>Enabled</td>
<td>Disabled - disabled when limiting</td>
</tr>
<tr>
<td>Transfer to bypass with Bypass AC source out of tolerances</td>
<td>Enabled</td>
<td>Disabled</td>
</tr>
</tbody>
</table>

### Battery

<table>
<thead>
<tr>
<th>Function</th>
<th>Factory setting</th>
<th>Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low battery warning threshold if battery monitor inactive</td>
<td>40% remaining backup time</td>
<td>20 - 60 - 80 % remaining backup time</td>
</tr>
<tr>
<td>Low battery warning threshold if battery monitor active</td>
<td>4 minutes of battery backup time</td>
<td>1 to X minutes of battery backup time</td>
</tr>
<tr>
<td>Interval between two battery tests</td>
<td>30 days</td>
<td>1 to 180 days</td>
</tr>
</tbody>
</table>
3. Operation

3.9 Relay contacts (communications card)

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Factory setting</th>
<th>Options (available on all contacts)</th>
</tr>
</thead>
</table>
| 1.A    | UPS ON          | - Room temperature fault  
|        |                 | - Transfer to bypass disabled  
|        |                 | - Transfer to bypass disabled if Bypass AC source out of tolerance  
|        |                 | - Desynchronise UPS from Bypass AC source  |
| 1.B    | UPS OFF         |                                     |

<table>
<thead>
<tr>
<th>Outputs</th>
<th>Factory setting</th>
<th>Options (available on all contacts)</th>
</tr>
</thead>
</table>
| 1.1     | General alarm   | - Overload  
|         |                 | - PFC fault  
|         |                 | - Inverter fault  
|         |                 | - Charger fault  
| 1.2     | Battery fault   | - Automatic-bypass fault  
|         |                 | - Bypass AC source out of tolerance  
|         |                 | - Battery-temperature fault  
|         |                 | - Fan fault  
| 1.3     | Load on NORMAL source | - Emergency power off activated  
|         |                 | - Battery circuit breaker(s) open (at least one)  
|         |                 | - Phase-sequence fault on normal or Bypass AC source  
| 1.4     | Load on automatic bypass | - Blown fuse(s)  
|         |                 | - Transfer to Bypass AC source disabled  
|         |                 | - Operation in ECO mode  
| 1.5     | Load on battery power | - UPS on manual bypass  
| 1.6     | Low battery warning |                                     |

The indications 1.X become 2.X for a second identical card in the UPS. Contacts are of the NO (normally open) type.
3. Operation

3.10 Display functions

Welcome screen
- Load protected
- 01/Jan/2000
- kVA
- 8.8 8.8 8.9
- 10:10
- min
- 32
- P1/P2/P3
- Battery

Main menu
- Select
- Measurements
- Alarms
- Status
- Settings
- Controls
- Maintenance

Press this key to return to the main menu
Help key for information on the pictogram functions (must be held down)

Measurements
- Battery measurements
- Voltage measurements
- Current measurements
- Power measurements
- Frequency measurements
- Ratios measurements
- Parallel measurements (option)

Alarms

Status
- Time stamped events
- Statistics

Settings
- Language
- Date / time
- Display contrast
- Buzzer volume
- Personalisation
- Output voltage
- Password
- Dry-contact settings

Controls
- Reset alarms
- Inverter on
- Inverter off
- Force load transfer to inverter
- Force load transfer to bypass
- Desynchronize inverter from bypass
- Resynchronize inverter and bypass
- Tests leds
- Buzzer OFF
- Enable LCM indications
- Disable LCM indications

Start-up
- UPS shutdown
- Transfer to manual bypass
4. Maintenance

4.1 Identification of alarms

Alarm conditions are identified by LEDs (31), (32), (33) and the buzzer.

<table>
<thead>
<tr>
<th>LED (31)</th>
<th>LED (32)</th>
<th>LED (33)</th>
<th>Buzzer</th>
<th>Signification</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Intermittent</td>
<td>Normal AC source not available</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Intermittent</td>
<td>UPS shut down following end of battery power</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Intermittent</td>
<td>UPS shut down on fault requiring servicing by after-sales support</td>
</tr>
</tbody>
</table>

Detailed information on all alarms is supplied on the display.
1 - On the screen, select the alarm for which information is required.
2 - Hold down the corresponding function key to display the possible causes of the fault and the required action.

4.2 Life Cycle Monitoring (LCM)

The “Life Cycle Monitoring” function provides UPS maintenance advice to guarantee installation availability for the user.

The display gives 3 messages enabling the following to be identified:
- The end of the contractual legal warranty: "End of warranty check recommended".
- Regular maintenance requirements and the end of service life for consumable components: "Technical check recommended".
- The end of the battery service life: "Battery check required".

In addition to these messages, the minor fault LED (32) lights up and the buzzer sounds. These messages can be deleted by pressing the function key (35). This also causes LED (32), to go out, the buzzer to stop and the removal of the “Global Alarm” remote signalling.

To completely disable LCM indications, use the display to enter the password required to disable the function.
4. Maintenance

4.3 UPS isolation

Single UPS

To isolate the UPS from the electrical power source and supply the load directly by the normal or Bypass AC source, follow the instructions below.

1. Press a button to exit sleep mode.
2. Shut down the UPS by pressing the OFF button (38) for 3 seconds.

The load is no longer protected by the UPS.

3. Set bypass switch Q3BP (10) to ON.
4. Set output switch Q5N (11) to OFF.
5. Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
6. Set the input circuit-breaker Q1 (8) to OFF.
7. Set the input circuit-breaker Q4S (9) to OFF.
8. Wait until the display and LEDs go off.

The load is no longer protected by the UPS, but continues to be supplied with AC power.

UPS maintenance or servicing can now be carried out.

Frequency converter

1. Press a button to exit sleep mode.
2. Shut down the UPS by pressing the OFF button (38) for 3 seconds.

The load is no longer protected by the unit.

3. Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
4. Set the input circuit-breaker Q1 (8) to OFF.
5. To ensure operator safety, open all Q4S (9) and Q5N (11) switches.

UPS maintenance or servicing can now be carried out.

UPS operating in ECO mode

If supplied by the network via the Bypass AC channel:

1. Check that the load is operating via the Bypass AC input.
2. Set bypass switch Q3BP (10) to ON.
3. Set output switch Q5N (11) to OFF.
4. Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
5. Set the input circuit-breaker Q1 (8) to OFF.
6. Set the input circuit-breaker Q4S (9) to OFF.

The load is no longer protected by the UPS, but continues to be supplied with AC power.

UPS maintenance or servicing can now be carried out.
4. Maintenance

If the load is supplied by the UPS with Bypass AC source present:

1 - Press a button to exit sleep mode.
2 - Shut down the UPS by pressing the OFF button (38) for 3 seconds.
3 - Set bypass switch Q3BP (10) to ON.
4 - Set output switch Q5N (11) to OFF.
5 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
6 - Set the input circuit-breaker Q1 (8) to OFF.
7 - Set the input circuit-breaker Q4S (9) to OFF.
8 - Wait until the display and LEDs go off.

The load is no longer protected by the UPS, but continues to be supplied with AC power. UPS maintenance or servicing can now be carried out.

Parallel UPS configuration without external bypass cabinet

Shutdown and isolation of the first UPS unit:

1 - Check that the two UPS units are operating.
2 - Press a button to exit sleep mode.
3 - Shut down the UPS by pressing the OFF button (38) for 3 seconds.

4 - Set output switch Q5N (11) to OFF.
5 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
6 - Set the input circuit-breaker Q1 (8) to OFF.
7 - Set the input circuit-breaker Q4S (9) to OFF.
8 - Wait until the display and LEDs go off.

The load is still protected by the other UPS unit. Maintenance or servicing can now be carried out on the UPS unit that has been shut down.

Shutdown and isolation of the second UPS unit:

1 - Press a button to exit sleep mode.
2 - Shut down the UPS by pressing the OFF button (38) for 3 seconds.
3 - Set bypass switch Q3BP (10) to ON.
4 - Set output switch Q5N (11) to OFF.
5 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
6 - Set the input circuit-breaker Q1 (8) to OFF.
7 - Set the input circuit-breaker Q4S (9) to OFF.
8 - Wait until the display and LEDs go off.

The load is no longer protected by the UPS, but continues to be supplied with AC power. UPS maintenance or servicing can now be carried out.
### Parallel UPS configuration with external bypass cabinet

#### Shutdown and isolation of one UPS unit

1. First check that the total capacity of the remaining UPS units is sufficient to supply the connected load.
2. Press a button to exit sleep mode.
3. Shut down the UPS by pressing the OFF button (38) for 3 seconds.

![Diagram of UPS configuration]

4. Set output switch Q5N (11) to OFF.
5. Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
6. Set the input circuit-breaker Q1 (8) to OFF.
7. Set the input circuit-breaker Q4S (9) to OFF.
8. Wait until the display and LEDs go off.

The load is still protected by the other UPS units. Maintenance or servicing can now be carried out on the UPS unit that has been shut down.

#### Shutdown and isolation of all the UPS units:

1. On each UPS unit, press a button to exit sleep mode.
2. Shut down each UPS unit by pressing their OFF buttons (38) for 3 seconds.
3. Set switch Q3BP (65) in the external bypass cabinet to ON.
4. Set switch Q5N (66) in the external bypass cabinet to OFF.
5. Set switch Q4S (64) in the external bypass cabinet to OFF.
6. Set output switch Q5N (11) of each UPS unit to OFF.
7. Set the battery circuit-breaker QF1 (13) of each UPS unit (or set the battery circuit-breakers of the auxiliary cabinets if any) to OFF.
8. Set the input circuit-breaker Q1 (8) of each UPS unit to OFF.
9. Set switch Q4S (9) of each UPS unit to OFF.
10. Wait until the control electronics of all UPS units have fully shut down.

The load is no longer protected by the UPS, but continues to be supplied with AC power. Maintenance or servicing can now be carried out.
4. Maintenance

4.4 Return to the normal position

**Single UPS**

1 - Check that bypass switch Q3BP (10) is ON and that all other switches are OFF.
2 - Set input switch Q4S (9) to ON.
3 - Set output switch Q5N (11) to ON.
4 - Wait until the display goes on and check that there are no faults on the static-switch on the bypass line.
5 - Set bypass switch Q3BP (10) to OFF.
6 - Set the input circuit-breaker Q1 (8) to ON.
7 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to ON.

The UPS unit starts automatically.
LED (31) is ON.

If LED (31) remains OFF, press the ON button (37) (the system is in manual start mode).

If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).

**Frequency converter**

1 - Check that all switches are set to OFF.
2 - Set the input circuit-breaker Q4S (9) to ON (check that no cable is connected on phase 1, phase 2 and phase 3).
3 - Set the input circuit-breaker Q1 (8) to ON.
4 - Set output switch Q5N (11) to ON.
5 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to ON.

6 - Press the ON button (37).
If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).
Parallel UPS configuration without external bypass cabinet

Restart the UPS unit for which switch Q3BP (10) is ON and the other switches are OFF.

Caution. It is imperative to restart this UPS unit. Otherwise, load power is cut if the other two UPSs are shut down.

1 - Set the input circuit-breaker Q4S (9) to ON.
2 - Set output switch Q5N (11) to ON.
3 - Check that the UPS is listed by the display, then confirm by pressing the function keys (35).
4 - Set bypass switch Q3BP (10) to OFF.
5 - Set the input circuit-breaker Q1 (8) to ON.
6 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to ON.

The UPS unit starts automatically. LED (31) is ON. The load is protected by the UPS.

If LED (31) remains OFF, press the ON button (37)
If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).

Restart the UPS unit for which all switches are set to OFF.

1 - Set the input circuit-breaker Q4S (9) to ON.
2 - Set output switch Q5N (11) to ON.
3 - Check that all the UPS units present in the installation are included in the list on the display and confirm by pressing the function buttons (35).
4 - Set the input circuit-breaker Q1 (8) to ON.
5 - Set the battery circuit-breaker QF1 (13) (or set the battery circuit-breakers of the auxiliary cabinets if any) to ON.

The UPS restarts and LED (31) is ON.

If LED (31) remains OFF, press the ON button (37) (the system is in manual start mode).
If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).
4. Maintenance

Parallel UPS configuration with external bypass cabinet

1 - Check that all switches on the UPS units are set to OFF.
2 - Set switch Q4S in the external bypass cabinet to ON.
3 - Set switch Q4S (9) on each UPS unit to ON.
4 - Set output switch Q5N (11) on each UPS unit to ON.
5 - Check that all the UPS units present in the installation are included in the list on the display and confirm by pressing the function button (35) on each UPS unit.
6 - Set switch Q5N in the external bypass cabinet to ON.
7 - Set switch Q3BP in the external bypass cabinet to OFF.
8 - Set the input circuit-breaker Q1 (8) on each UPS unit to ON.
9 - Set the battery circuit-breaker QF1 (13) on each UPS unit to ON (or set the battery circuit-breakers of the auxiliary cabinets if any)

The UPS units start automatically. LED (31) is ON.
The load is protected by the UPS.

If LED (31) remains OFF, press the ON button (37) on each UPS unit (the system is in manual start mode).

If LED (31) still remains OFF and either of LEDs (32) or (33) is ON, a fault has occurred (see section 4.1).
4.5 Training centres

To allow you to use APC by Schneider Electric products effectively and carry out basic maintenance, we offer a complete range of technical training courses in English and French.

<table>
<thead>
<tr>
<th>Schneider Critical Power &amp; Cooling Services 50 Hz training centres</th>
<th>Schneider Critical Power &amp; Cooling Services 50-60 Hz training centre</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>France Training Centre</strong></td>
<td><strong>Brazil Training Centre</strong></td>
</tr>
<tr>
<td>140, Avenue Jean Kuntzmann</td>
<td>Al. Xingu, 850-Alphaville</td>
</tr>
<tr>
<td>Innovallée</td>
<td>06455-030 Barueri, São Paulo</td>
</tr>
<tr>
<td>38334 - St Ismier Cedex - FRANCE</td>
<td>Brazil</td>
</tr>
<tr>
<td>Tél : +33 (0)4 76 18 34 14</td>
<td>Tél : +55 11 4689-8600</td>
</tr>
<tr>
<td>Fax : +33 (0)4 76 18 45 21</td>
<td></td>
</tr>
</tbody>
</table>

| **Denmark Training Centre**                                       |                                                               |
| Silicon Allé                                                     |                                                               |
| 6000 Kolding                                                     |                                                               |
| Denmark                                                          |                                                               |
| Tél : +45 72 19 03 12                                             |                                                               |

| **Singapore Training Centre**                                    |                                                               |
| 10 Ang MO Kio Street 65, #03-06/10                               |                                                               |
| Techpoint Building                                               |                                                               |
| Singapore 569059                                                 |                                                               |
| Tél : +65 6389 6792                                              |                                                               |

| **China Training Centre**                                        |                                                               |
| Floor 3, Building B10, Universal Plaza                          |                                                               |
| 10 juxianqiao Road                                               |                                                               |
| Chaoyang District, Beijing 100016                               |                                                               |
| Tél : +86 10 6431 8899                                           |                                                               |

Internet : http://powerlearning.apc.com
Catalogue and registration available on line.
5. Environment

APC by Schneider Electric has implemented an environmental-protection policy. Products are developed according to an eco-design approach.

Substances
This product does not contain CFCs, HCFCs or asbestos.

Packing
To improve waste treatment and facilitate recycling, separate the various packing components. The cardboard we use includes over 50% of recycled cardboard. Sacks and bags are made of polyethylene. Packing materials are recyclable and bear the appropriate identification symbol.

<table>
<thead>
<tr>
<th>Material</th>
<th>Abbreviation</th>
<th>Symbol number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene terephthalate</td>
<td>PET</td>
<td>01</td>
</tr>
<tr>
<td>High-density polyethylene</td>
<td>HDPE</td>
<td>02</td>
</tr>
<tr>
<td>Polyvinyl chloride</td>
<td>PVC</td>
<td>03</td>
</tr>
<tr>
<td>Low-density polyethylene</td>
<td>LDPE</td>
<td>04</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>PP</td>
<td>05</td>
</tr>
<tr>
<td>Polystyrene</td>
<td>PS</td>
<td>06</td>
</tr>
</tbody>
</table>

Follow all local regulations for the disposal of packing materials.

End of Life
APC by Schneider Electric will process products at the end of their service life in compliance with local regulations. APC by Schneider Electric works with companies in charge of collecting and eliminating our products at the end of their service life.

Product
The product is made up of recyclable materials. Dismantling and destruction must take place in compliance with all local regulations concerning waste. At the end of its service life, the product must be transported to a processing center for electrical and electronic waste. Make the product unusable by cutting the internal supply cables.

Battery
The product contains lead-acid batteries that must be processed according to applicable local regulations concerning batteries. The battery may be removed to comply with regulations and in view of correct disposal. The "Material Safety Data Sheets" (MSDS) for the batteries are available on our web site*.

(*) For more information or to contact the Product Environmental manager, use the "Environmental Form" on the site: http://environment.apc.com
6. Available options

Backfeed option
This option opens the Bypass AC input or the Normal AC input if power fails. This option is mandatory to meet standard IEC 62040-1-2. If an external backfeed protection system is used, it must comply with the requirements indicated in Annex L of standard IEC 62040-1-2.

NMC (Network Management Card) option
This option is a communications card for supervision and protection of a three-phase device. Each UPS can be equipped with a maximum of four NMC communications cards.

Optional communications card with additional power relay
The UPS is already equipped with a relay communications card. But it is possible, with this option, to add another card with programmable power-relay functions.

Optional serial communications card
This option is an RS232 or RS485 serial communications card operating under the JBUS protocol.

Telpac Power Services option
This option consists of a communications card operating under the JBUS protocol for Teleservice functions.

AS4I option
This option consists of a low-power relay card for shut-off and scheduling functions.

Multislot option
This option consists of communications cards to concentrate the communication of two parallel-connected UPSs.

External synchronisation module option
With this option, a SYNIN communications card and two circuit breakers are added to each UPS unit. The external synchronisation module issues a reference frequency used to synchronise the UPS units. For more information, see document no. 34000346.

⚠️ Check the different input/output signal levels (LV, ELV, SELV) on the optional communication cards (4) and use appropriate wiring.

IP32 option
This option protects the UPS against solid objects larger than 2.5 mm and falling drops of water from up to 15° from vertical. For roof installation, see “IP32 installation”, page 67.
7. Appendices

7.1 Technical sheets

Center of gravity

<table>
<thead>
<tr>
<th>UPS power rating (kVA)</th>
<th>H (mm)</th>
<th>W (mm)</th>
<th>D (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/30/40/60 kVA</td>
<td>950</td>
<td>350</td>
<td>360</td>
</tr>
<tr>
<td>80/100/120 kVA</td>
<td>950</td>
<td>350</td>
<td>360</td>
</tr>
</tbody>
</table>

Tip angle (to the rear)

<table>
<thead>
<tr>
<th>UPS power rating (kVA)</th>
<th>UPS on feet</th>
<th>UPS on pallet</th>
</tr>
</thead>
<tbody>
<tr>
<td>20/30/40/60 kVA</td>
<td>17.5°</td>
<td>22°</td>
</tr>
<tr>
<td>80/100/120 kVA</td>
<td>17.5°</td>
<td>22°</td>
</tr>
</tbody>
</table>
7. Appendices

Electrical characteristics

Selection of protection devices

UPS unit with common normal and Bypass AC inputs

UPS unit with separate normal and Bypass AC inputs

When sizing the upstream circuit breakers, the parameters presented below must be taken into account:

Time/current curves for UPS input and output fuses:

UPS short-circuit current with inverter coupled and By-pass AC source out of tolerances:

<table>
<thead>
<tr>
<th>Sn</th>
<th>20 kVA</th>
<th>30 kVA</th>
<th>40 kVA</th>
<th>60 kVA</th>
<th>80 kVA</th>
<th>100 kVA</th>
<th>120 kVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>29 A</td>
<td>43 A</td>
<td>58 A</td>
<td>87 A</td>
<td>115 A</td>
<td>144 A</td>
<td>173 A</td>
</tr>
<tr>
<td>Limitation</td>
<td>190 A</td>
<td>190 A</td>
<td>190 A</td>
<td>240A</td>
<td>360 A</td>
<td>480 A</td>
<td>480 A</td>
</tr>
</tbody>
</table>
7. Appendices

### Line current values

<table>
<thead>
<tr>
<th>Rated power of each UPS unit</th>
<th>Continuous input current at U=400V</th>
<th>Input current at U=400V overload = 1.25 in limited to 10 min.</th>
<th>Input current at U=400V overload = 1.5 in limited to 1 min.</th>
<th>Input/output fuse ratings</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kVA</td>
<td>32 A</td>
<td>39 A</td>
<td>47 A</td>
<td>80 A</td>
</tr>
<tr>
<td>30 kVA</td>
<td>45 A</td>
<td>56 A</td>
<td>68 A</td>
<td>80 A</td>
</tr>
<tr>
<td>40 kVA</td>
<td>58 A</td>
<td>72 A</td>
<td>87 A</td>
<td>80 A</td>
</tr>
<tr>
<td>60 kVA</td>
<td>87 A</td>
<td>108 A</td>
<td>130 A</td>
<td>125 A</td>
</tr>
<tr>
<td>80 kVA</td>
<td>115 A</td>
<td>145 A</td>
<td>174 A</td>
<td>160 A</td>
</tr>
<tr>
<td>100 kVA</td>
<td>144 A</td>
<td>181 A</td>
<td>217 A</td>
<td>315 A</td>
</tr>
<tr>
<td>120 kVA</td>
<td>173 A</td>
<td>217 A</td>
<td>260 A</td>
<td>315 A</td>
</tr>
</tbody>
</table>

### Input / output characteristics

**Normal AC source / Bypass AC source**

<table>
<thead>
<tr>
<th>Uin</th>
<th>Standard UPS</th>
<th>UPS with backfeed protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>380 to 443 V</td>
<td>380 to 443 V</td>
<td>380 to 443 V</td>
</tr>
<tr>
<td>Input voltage range permitted by the standard according to the curve below</td>
<td>250 to 470 V</td>
<td>340 to 470 V</td>
</tr>
<tr>
<td>Fin</td>
<td>45 to 65 Hz</td>
<td>45 to 65 Hz</td>
</tr>
</tbody>
</table>

### Load output

<table>
<thead>
<tr>
<th>Uout</th>
<th>380 V</th>
<th>400 V</th>
<th>415 V</th>
<th>+ 3%</th>
<th>- 3%</th>
</tr>
</thead>
</table>

### Power supplied as a function of input voltage

![Graph of power supplied as a function of input voltage]

### Permissible UPS overloads as a function of time

![Graph of permissible UPS overloads as a function of time]
7. Appendices

Maximum allowable power for parallel UPS units

Without external bypass cabinet:

\[= 1 \times P_n\]

\[+ \]

\[= 1 \times P_n\]

With external bypass cabinet:

\[+\]

\[= 2 \times P_n\]

\[+\]

\[+\]

\[= 3 \times P_n\]

\[+\]

\[+\]

\[+\]

\[= 4 \times P_n\]

\[+\]

\[+\]

\[+\]

\[+\]

\[= 4 \times P_n\]

\[+\]

\[+\]

\[+\]

\[+\]

\[= 4 \times P_n\]
7. Appendices

The maximum allowable power for 4 parallel UPS units is limited to 4 x Pn.

Restrictions to parallel operation

<table>
<thead>
<tr>
<th></th>
<th>Single UPS</th>
<th>Parallel UPS</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMC level</td>
<td>Category C3</td>
<td>Category C3</td>
</tr>
<tr>
<td>ECO mode</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Frequency converter</td>
<td>Yes</td>
<td>Yes (for two UPSs)</td>
</tr>
<tr>
<td>Compatibility with the synchronisation module</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

(*) : except in ECO mode or bypass mode.

Thermal characteristics

- The operating temperature range is 0°C to +40°C (0°C to 30°C for overload conditions), however optimum operation is within the +20°C to +25°C range.
- Battery backup time is adversely affected by high and low temperatures. It is significantly reduced at temperatures under 10°C.
- Above 25°C, battery service life is cut in half every 10°C. Above 40°C, battery manufacturers no longer guarantee operation due to the risk of thermal runaway.

<table>
<thead>
<tr>
<th>UPS power rating</th>
<th>Heat losses</th>
<th>Recommended air throughput</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 kVA</td>
<td>2.4 kW</td>
<td>1 332 m³/h</td>
</tr>
<tr>
<td>30 kVA</td>
<td>3 kW</td>
<td>1 332 m³/h</td>
</tr>
<tr>
<td>40 kVA</td>
<td>3.4 kW</td>
<td>1 332 m³/h</td>
</tr>
<tr>
<td>60 kVA</td>
<td>4.9 kW</td>
<td>1 332 m³/h</td>
</tr>
<tr>
<td>80 kVA</td>
<td>5.8 kW</td>
<td>2 556 m³/h</td>
</tr>
<tr>
<td>100 kVA</td>
<td>7 kW</td>
<td>2 556 m³/h</td>
</tr>
<tr>
<td>120 kVA</td>
<td>8.4 kW</td>
<td>2 556 m³/h</td>
</tr>
</tbody>
</table>

Air enters through the bottom.
Air exits through the top.
# General characteristics of MGE™ Galaxy™ 5000 UPSs

<table>
<thead>
<tr>
<th>UPS power in kVA</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal AC input</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of conductors</td>
<td>3 phases</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference voltage at Pn</td>
<td>380 V to 443 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference frequency</td>
<td>45 Hz to 65 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THDI</td>
<td>Typically 3% at Pn</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Power factor</td>
<td>&gt;0.99</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bypass AC input</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of conductors</td>
<td>3 phases + neutral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference voltage at Pn</td>
<td>380 V to 443 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference frequency</td>
<td>45 Hz to 65 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Load output</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of conductors</td>
<td>3 phases + neutral</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set phase-to-phase voltages</td>
<td>380 V or 400 V or 415 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Set phase-to-neutral voltages</td>
<td>220 V or 230 V or 240 V</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage variation</td>
<td>± 1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjustable frequencies and tolerance (on battery power)</td>
<td>50 Hz or 60 Hz ± 0.1 Hz</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage variation for 0 to 100% load step change</td>
<td>± 1%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible overloads</td>
<td>150% for 1 minute, 125% for 10 minutes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>THDU Ph-to-Ph and Ph-to-N for nonlinear load</td>
<td>&lt; 2% Ph-to-Ph</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Battery</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard battery technology</td>
<td>Sealed lead-acid battery (gas-recombination)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inverter</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Active power (kW)</td>
<td>18</td>
<td>27</td>
<td>36</td>
<td>54</td>
<td>72</td>
<td>90</td>
<td>108</td>
</tr>
<tr>
<td>Heat losses in kW&lt;sup&gt;(1)&lt;/sup&gt;</td>
<td>2.7</td>
<td>3</td>
<td>3.54</td>
<td>4.7</td>
<td>5.31</td>
<td>6.5</td>
<td>7.64</td>
</tr>
<tr>
<td>Heat losses in calories/s</td>
<td>648</td>
<td>720</td>
<td>850</td>
<td>1128</td>
<td>1275</td>
<td>1560</td>
<td>1834</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>-25°C to +45°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range at Pn</td>
<td>0°C to 40°C</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative humidity</td>
<td>20% to 95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum operating altitude without derating</td>
<td>&lt; 1000 m</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>(1)</sup>Losses are calculated for n-1%.
7. Appendices

General characteristics of MGE™ Galaxy™ 5000 UPSs (cont.)

<table>
<thead>
<tr>
<th>UPS power in kVA</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>60</th>
<th>80</th>
<th>100</th>
<th>120</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise level (dBA)</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>65</td>
<td>63</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Width</td>
<td>710 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depth</td>
<td>850 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height</td>
<td>1900 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>400</td>
<td>520</td>
<td>520</td>
<td>520</td>
</tr>
<tr>
<td>Recommended upstream residual current protection</td>
<td>1 A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Product standards</td>
<td>IEC 62040</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Safety standards</td>
<td>IEC 62040-1-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Protection standards</td>
<td>IEC 62040-3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMC standards</td>
<td>IEC 62040-2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

UPS components

- IGBT charger + neutral leg
- IGBT PFC
- IGBT inverter
- EXTN board
- DC capacitors
- Normal AC SS board + battery
- Output fuse
- Bypass AC SS and inverter board
- DALIN board
- Output capacitors
- ALIN board
- Input fuse
- Input capacitors
- Inductor and SS fans
- Output-filter board
- ETON board
- Input-filter board
7.2 Options

IP32 installation

- Install the protection cover above the UPS.
- Install the spacers. The longer spacers must be positioned toward the front of the UPS.
- Install the roof.
- Install the side deflectors.
7. Appendices

7.3 Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Backup time</strong></td>
<td>Time that the connected loads can operate on battery power.</td>
</tr>
<tr>
<td><strong>Bypass AC source</strong></td>
<td>Source supplying the bypass line. The load can be transferred to the bypass line if an overload occurs on the UPS output, for maintenance or in the event of a malfunction.</td>
</tr>
<tr>
<td><strong>ECO mode</strong></td>
<td>Operating mode by which the load is supplied directly by the AC source if it is within the tolerances defined by the user. This mode reduces the consumption of electrical power.</td>
</tr>
<tr>
<td><strong>External synchronisation port</strong></td>
<td>Input used to synchronise the UPS to an external signal.</td>
</tr>
<tr>
<td><strong>Fin</strong></td>
<td>UPS input frequency (normal or Bypass AC input).</td>
</tr>
<tr>
<td><strong>Load</strong></td>
<td>Devices or systems connected to the UPS output.</td>
</tr>
<tr>
<td><strong>Normal (double conversion) mode</strong></td>
<td>The normal UPS operating mode in which the AC source supplies the UPS which in turn supplies the connected loads (after electronic double conversion).</td>
</tr>
<tr>
<td><strong>Normal AC source</strong></td>
<td>Normal source of power for the UPS.</td>
</tr>
<tr>
<td><strong>PFC</strong></td>
<td>Sinusoidal input module used to eliminate the harmonics reinjected by the UPS upstream.</td>
</tr>
<tr>
<td><strong>Relay contacts</strong></td>
<td>Contacts supplying information to the user in the form of signals.</td>
</tr>
<tr>
<td><strong>Uin</strong></td>
<td>UPS input voltage (normal or Bypass AC input).</td>
</tr>
<tr>
<td><strong>Uout</strong></td>
<td>UPS output voltage.</td>
</tr>
<tr>
<td><strong>UPS</strong></td>
<td>Uninterruptible Power Supply.</td>
</tr>
</tbody>
</table>