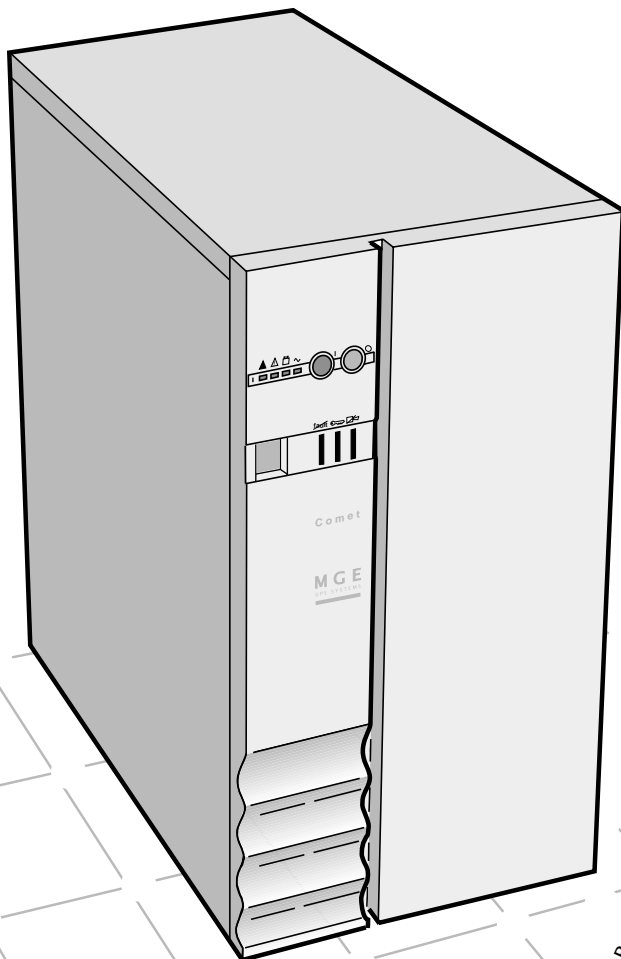


Comet™

5 - 30 kVA

Installation and user manual



THE UNINTERRUPTIBLE POWER PROVIDER

MGE
UPS SYSTEMS

Dear User,

This manual has been designed to provide you with all the information you need to install and use your **Comet** uninterruptible power supply.

Feel free to contact us for any further information you may require concerning special applications beyond the scope of this manual.

MGE UPS SYSTEMS

Safety recommendations

- ▶ **warning:** every **Comet** UPS is equipped with its own internal power source, i.e. the backup battery. Consequently the load may be energised even if the AC input power supply has been cut;
- ▶ the load is supplied with power as soon as the AC input power supply is connected, even if no LEDs are on;
- ▶ **danger:** dangerous voltage levels are present inside the **Comet** system. Any servicing requiring removal of the protection panels must be carried out by qualified personnel certified by **MGE UPS SYSTEMS**;
- ▶ **Comet** must be earthed;
- ▶ **Comet** must not be installed near liquids or in an excessively humid environment;
- ▶ **Comet** must be protected from penetration by liquids or extraneous objects;
- ▶ ventilation grates must remain free;
- ▶ **Comet** must not be placed in direct sunlight or near a heat source;
- ▶ **Comet** contains sealed lead-acid battery cells that must be disposed of in accordance with applicable environmental regulations;
- ▶ prior to installation, store **Comet** in a dry location. Storage temperatures must be between: -20°C and $+45^{\circ}\text{C}$;
- ▶ if **Comet** must remain unused for a long period, monthly re-energising for a 24-hour period is advised to recharge the battery. Otherwise, the battery may be damaged irreversibly;
- ▶ in accordance with standard EN 50091-1, **Comet** UPS users must affix warnings on all primary power isolating devices installed at a certain distance from the UPS in order to alert maintenance personnel of the presence of a UPS on the circuit; the warning must display the following text or its equivalent: **"an uninterruptible power supply is present and must be isolated before carrying out any work on this circuit"**;
- ▶ **warning:** this is a product for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances.

Contents

Introduction to Comet

Safety information	1.1
Identification to Comet	1.1
Configuration	1.1
Functional diagram	1.2

Installation

General	2.1
Final positioning	2.1
Special precautions	2.2
Connections	2.2

Controls and indications

Basic controls and indications	3.1
Controls and diagnostics display	3.4

Start-up

Preliminary checks	4.1
Powering up	4.1
Inverter start-up	4.2

Shutdown

Inverter shutdown	5.1
Powering down	5.1

Operation

Normal operation	6.1
Operation on battery power	6.1
Overload	6.3

Alarms

Alarm indications table	7.1
Manual bypass	7.3

Communication

Standard functions	8.1
Options	8.2

Maintenance and servicing

Safety reminder	9.1
Preventive maintenance by user	9.1
Maintenance by the local representative certified by MGE UPS SYSTEMS ..	9.1
Customer training	9.1
Maintenance contracts	9.2

Options

Extended battery cabinet	10.1
Emergency off	10.3
Full galvanic isolation transformer	10.4
Separate Mains 2 transformer (AC bypass input)	10.5
Frequency converter	10.6
Hot standby system	10.7
Harmonics filter	10.8
Combined options	10.9

Appendices

General characteristics	11.1
Range characteristics	11.1
Comet series 11 general characteristics	11.2
Comet series 31 general characteristics	11.3
Comet series 33 general characteristics	11.4
Selection of cable cross-sections	11.5
Selection of protection devices	11.6
Connection of cable shielding	11.8

Glossary

.....	12.1
-------	------

Comet and the options presented in this manual must be installed only by qualified personnel. Other operations may be carried out by any person having read this manual.

All **Comet** products are protected by patents. They implement original MGE UPS SYSTEMS technology not available to other manufacturers.

Due to evolving standards and technology, products may be modified without notice. Indications concerning technical characteristics and dimensions are not binding unless confirmed by MGE UPS SYSTEMS.

This document may be copied only with the prior written consent of MGE UPS SYSTEMS. Authorized copies must be marked "**Comet** MGE UPS SYSTEMS installation and user manual nr. 6761200XT".

Safety information

Danger: high voltages are present inside the **Comet** system. Any servicing requiring removal of the protection covers may be undertaken only by qualified personnel certified by MGE UPS SYSTEMS.

Comet S11, S31 : 5 / 7,5 / 10kVA

Identification to Comet

Read the label (figure 1) on the back of **Comet** or inside the door to familiarise yourself with the characteristics of your UPS.

Identification plate

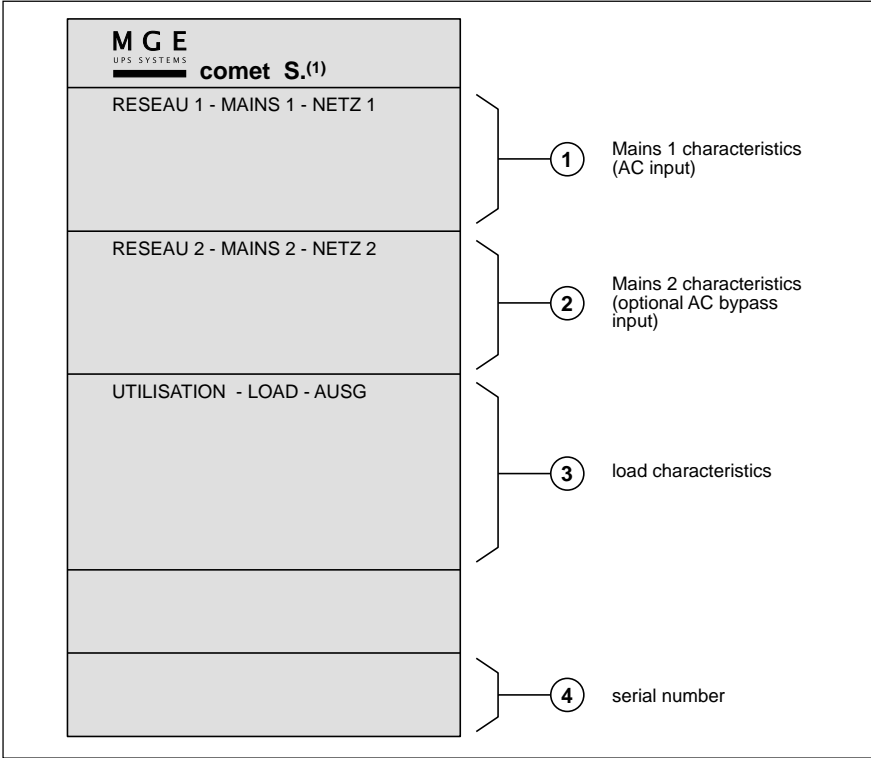


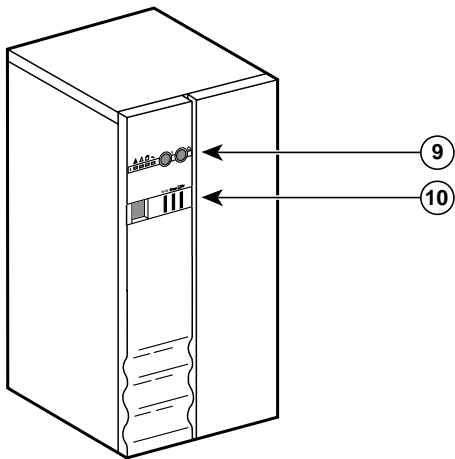
Fig. 1

- (1): **Comet** model number:
- **S11 (series 11)**: single-phase input power and single-phase load;
 - **S31 (series 31)**: three-phase input power and single-phase load;
 - **S33 (series 33)**: three-phase input power and three-phase load.

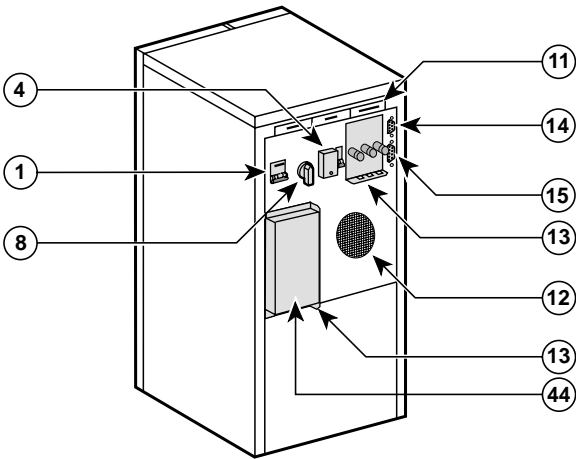
Configuration

A configuration sheet, included with the UPS, indicates all the factory settings. Keep the sheet in a safe place as it may be required by the after-sales support technicians if you wish to modify parameters.

Comet S11 - S31 5kVA (fig./Abb. 2)
Front view / Vue avant / Vorderansicht
Vista anteriore / Vista delantera / Vooraanzicht



Rear view / Vue arrière / Rückansicht
Vista posteriore / Vista trasera / Achteraanzicht



Functional diagram

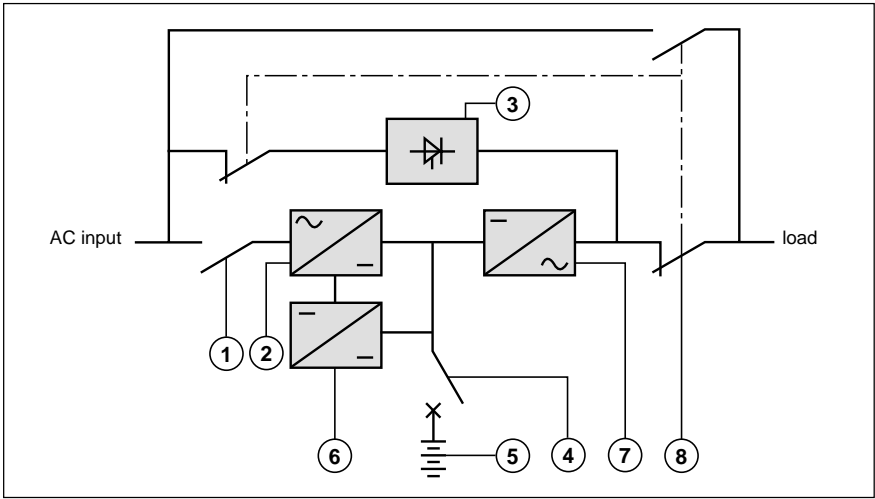
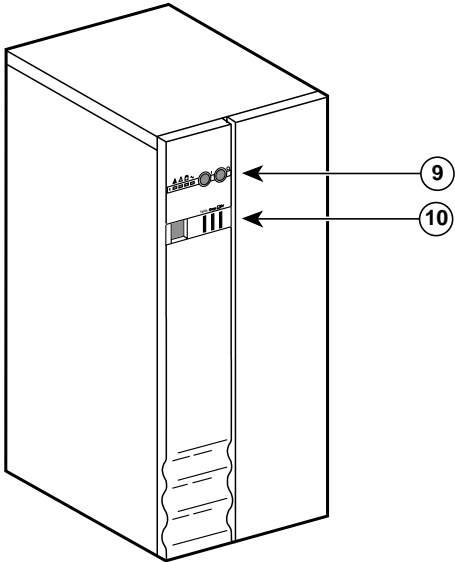
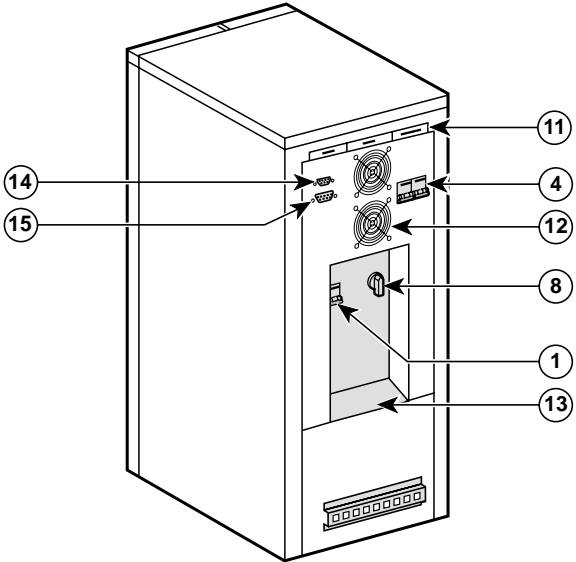


Fig. 7

Comet S11 - S31 7,5/10kVA (fig./Abb. 3)
Front view / Vue avant / Vorderansicht
Vista anteriore / Vista delantera / Vooraanzicht



Rear view / Vue arrière / Rückansicht
Vista posteriore / Vista trasera / Achteraanzicht



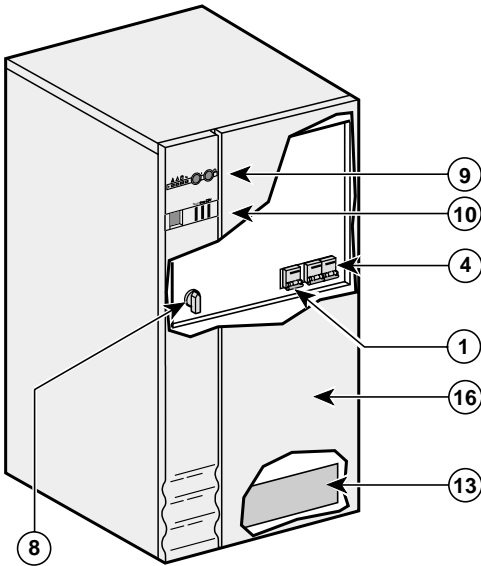
Key for figures 2 to 3

- ① input power switch,
- ② rectifier module,
- ③ "static bypass" module,
- ④ battery circuit breaker (switch and fuse for 5 kVA **Comet S11** or **S31**),
- ⑤ battery,
- ⑥ charger module,
- ⑦ inverter module,
- ⑧ "manual maintenance bypass" switch,
- ⑨ basic control and indication panel,
- ⑩ special command and diagnostic display,
- ⑪ location of the optional communication ports,
- ⑫ fans,
- ⑬ connection cover panel,
- ⑭ diagnostics and configuration connector (reserved for after-sales support),
- ⑮ standard communication port,
- ⑯ switchgear cover panel,
- ⑰ protection panel,
- ⑱ protective cover.

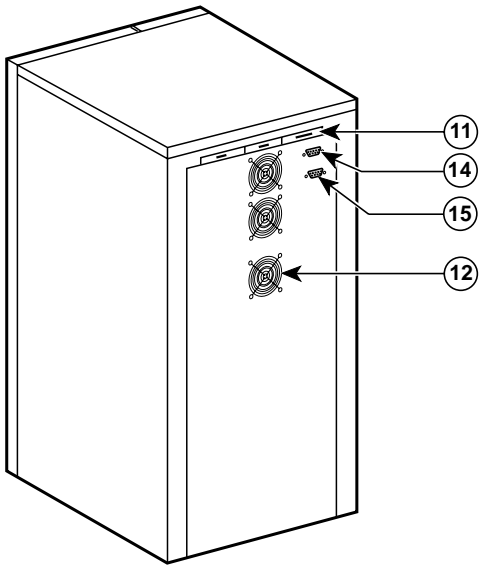
Comet S31 : 15/20kVA
Comet S33 : 10/15kVA

Comet S31 15/20kVA (fig./Abb. 4)

Front view / Vue avant / Vorderansicht
Vista anteriore / Vista delantera / Vooraanzicht



Rear view / Vue arrière / Rückansicht
Vista posteriore / Vista trasera / Achteraanzicht



Functional diagram

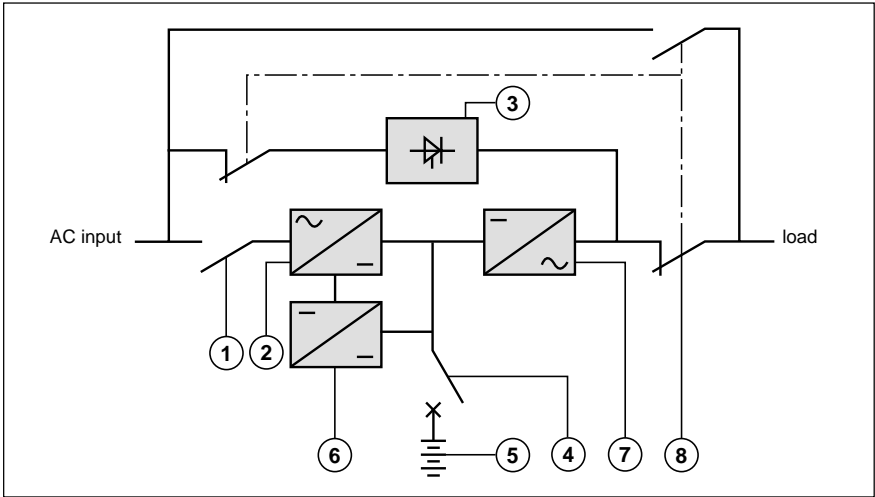


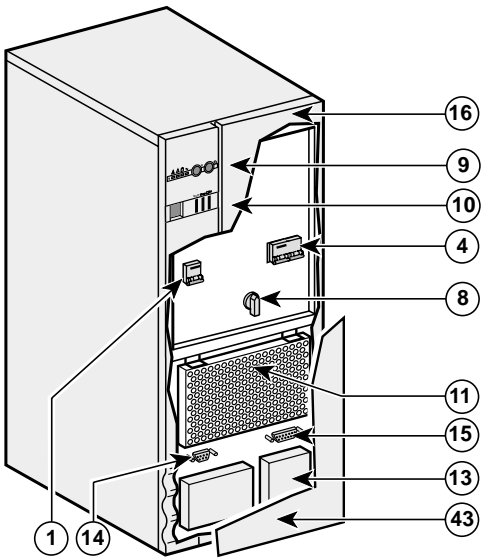
Fig. 7

Key for figures 4 to 5

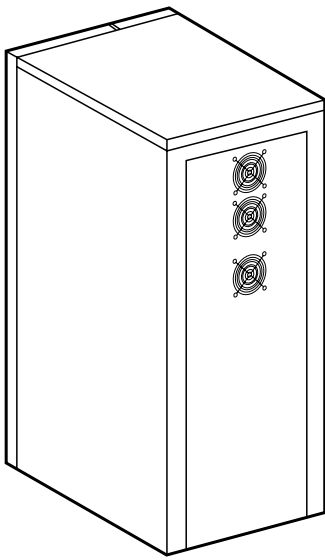
- ① input power switch,
- ② rectifier module,
- ③ "static bypass" module,
- ④ battery circuit breaker (switch and fuse for 5 kVA **Comet S11** or **S31**),
- ⑤ battery,
- ⑥ charger module,
- ⑦ inverter module,
- ⑧ "manual maintenance bypass" switch,
- ⑨ basic control and indication panel,
- ⑩ special command and diagnostic display,
- ⑪ location of the optional communication ports,
- ⑫ fans,
- ⑬ connection cover panel,
- ⑭ diagnostics and configuration connector (reserved for after-sales support),
- ⑮ standard communication port,
- ⑯ switchgear cover panel,
- ⑰ protection panel,

Comet S33 10/15kVA (fig./Abb. 5)

Front view / Vue avant / Vorderansicht
Vista anteriore / Vista delantera / Vooraanzicht

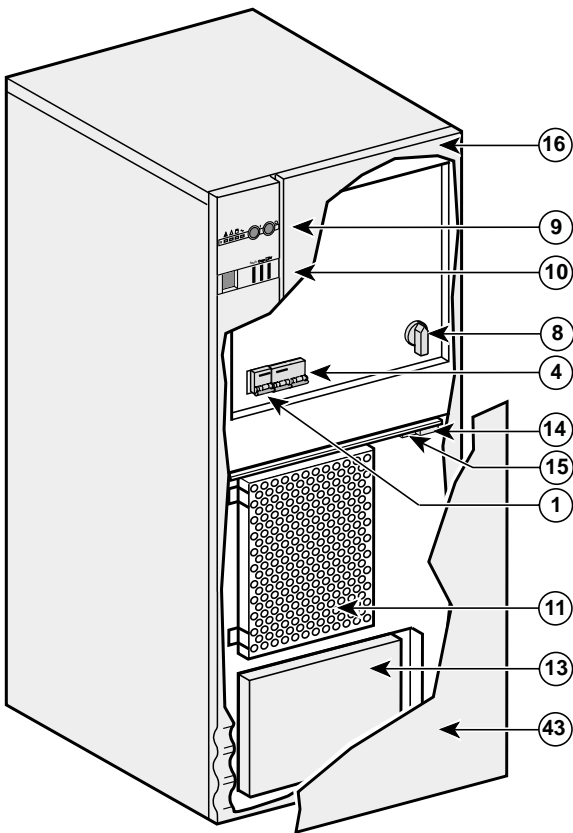


Rear view / Vue arrière / Rückansicht
Vista posteriore / Vista trasera / Achteraanzicht

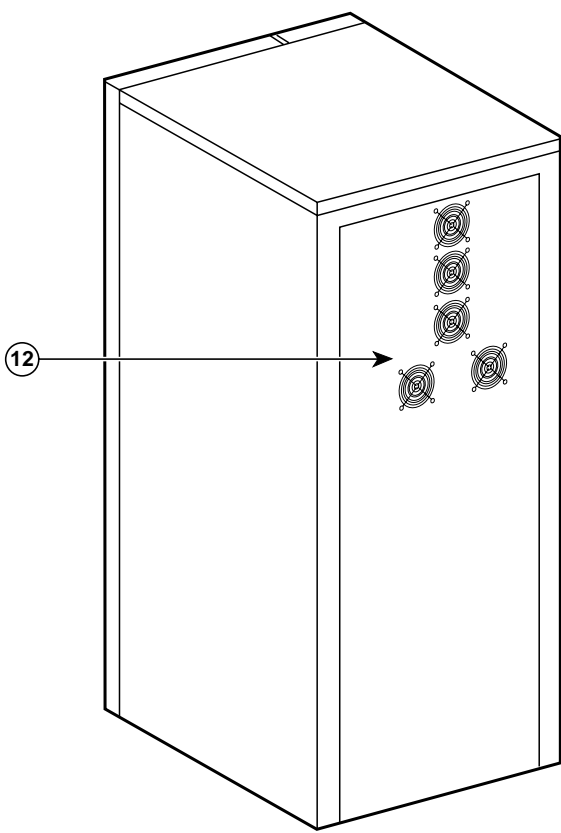


Comet S33 : 20/30kVA

Comet S33 20/30kVA (fig./Abb. 6)
 Front view / Vue avant / Vorderansicht
 Vista anteriore / Vista delantera / Vooraanzicht



Rear view / Vue arrière / Rückansicht
 Vista posteriore / Vista trasera / Achteraanzicht



Functional diagram

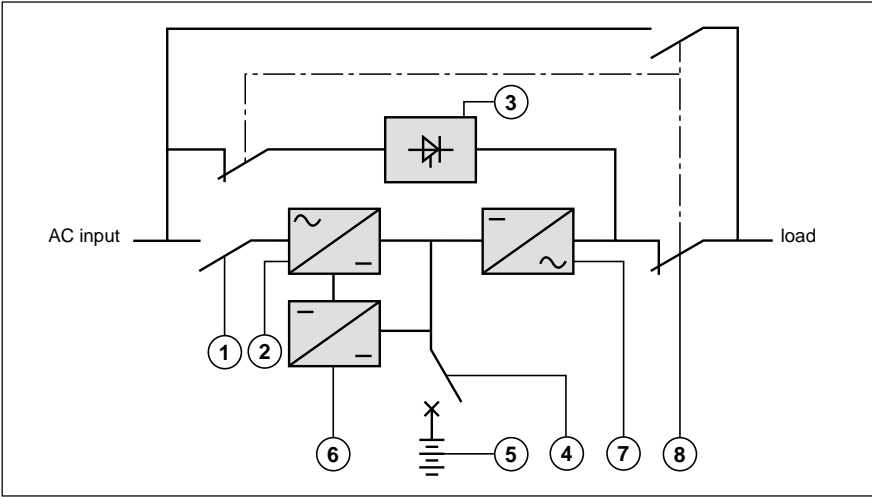


Fig. 7

Key for figures 6 to 7

- ① input power switch,
- ② rectifier module,
- ③ "static bypass" module,
- ④ battery circuit breaker (switch and fuse for 5 kVA **Comet S11** or **S31**),
- ⑤ battery,
- ⑥ charger module,
- ⑦ inverter module,
- ⑧ "manual maintenance bypass" switch,
- ⑨ basic control and indication panel,
- ⑩ special command and diagnostic display,
- ⑪ location of the optional communication ports,
- ⑫ fans,
- ⑬ connection cover panel,
- ⑭ diagnostics and configuration connector (reserved for after-sales support),
- ⑮ standard communication port,
- ⑯ switchgear cover panel,
- ⑰ protection panel,

General

- ▶ **"Comet"** cubicles are equipped with 4 wheels for moving over short distances and with jacks to immobilize the unit. The jacks must be raised prior to repositioning a cubicle;
- ▶ operating temperature range: 0° to 30°C at rated output.

Important:

- ▶ **the battery is of the sealed type. Battery storage or prolonged shutdown of Comet should never exceed 3 months at 20°C without recharging, for a battery initially at 100% charge. Battery recharge requires system start-up. The battery warranty is void if the 6 month recharge interval is not respected;**
- ▶ **battery life is extended when it is installed in a room with an ambient temperature of 15 to 25°C. Above 25°C, battery life reduced by 50% for every additional 10°C;**
- ▶ heat loss resulting from **Comet** operation must be taken into account when sizing the ventilation system. See the Appendices;
- ▶ connections are made through the bottom section in the back or the front, depending on the type of **Comet**;
- ▶ warning in compliance with EN 50091-2: this product is sold through limited sales channels to installers or well-informed users. Installation restrictions or additional measures may be necessary to prevent electromagnetic disturbances.

Final positioning (figure 8)

"Comet" layout seen from above

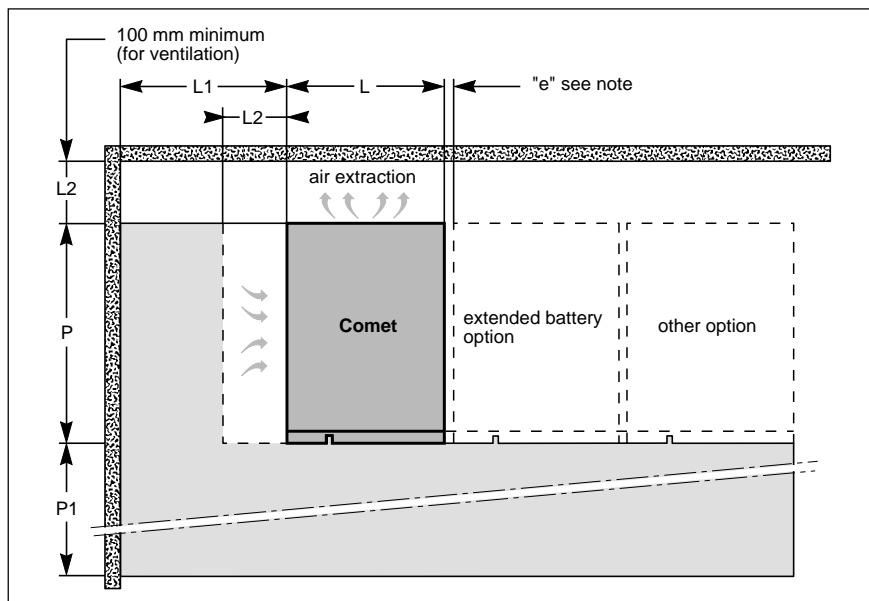


Fig. 8

Note:

- For **Comet series 31** 15/20kVA and **Comet series 33** units, a clearance "e" of 5mm is required to the left of the optional cubicles for door opening.
- ▶ ensure that clearance L1 to the left of **Comet** is greater than L for access to the battery cells and L2 greater than 100mm (for ventilation);
 - ▶ ensure that clearance P1 in front of **Comet** is greater than P for servicing via the front;
 - ▶ connection cables **must be of the flexible type** and sufficiently long to enable forward movement of **Comet** without disconnection (allow an extra 1.5 meters);
 - ▶ additional cubicles (extended battery, auxiliaries, etc.) must be placed to the right of **Comet**. **If the above installation conditions are not respected, maintenance and servicing of the unit may require system shutdown.**

Special precautions

- ▶ load cables must be run separately from all other cables (power supply or computer system interconnection cables). They should not pass near interference-emitting equipment or sensitive loads;
- ▶ if **Comet** is installed with the "Teleservice" option, a telephone connector and power supply must be provided for the modem used with it.

Connections

Connection cables should enter at the bottom:

- ▶ in the back for **Comet series 11** and **series 31** 5/7.5/10kVA;
- ▶ in front for **Comet series 31** 15/20 kVA and **series 33** 10/15/20/30kVA.

Electrical diagram for power connections

Figure 9 presents a single-line electrical diagram for a typical installation. The power cables requiring connection are shown as bold lines (see the "Appendices" for information on selecting cable cross-sections).

Connection diagram for a single AC input

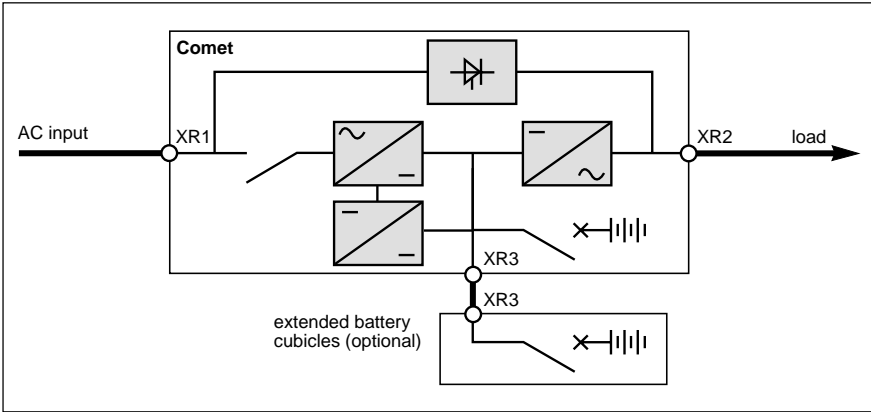


Fig. 9

Connection of power cables (figures 10 to 14)

Make sure the unit is **powered down and disconnected from all input power** before making connections to the terminal blocks at the front or back of the cubicle (depending on the type of **Comet**).

For protection of life and property, earth wires should always be connected first.

For Comet 31 series or Comet 33 series devices, the Mains power supply must be with a neutral cable.

For **Comet 33 series**, the neutral may be reconstituted by a complete insulation transformer option (a transformer with a triple-point structure).

Neutral system: identical upstream and downstream neutral systems (no galvanic isolation). **Comet** can be used with all types of neutral systems, on the condition that standard practices be respected.

- ▶ check that AC input power circuit breaker, installed upstream on the low voltage switchboard, is in off (O) position;
- ▶ check that the input power switch ① and the battery circuit breaker ④ are in off (O) position.

Connection sequence for 5 kVA Comet:

- ▶ open the protective cover ④④ (secured by 2 screws) and the connection cover panel ⑬ (secured by 6 screws);
- ▶ strip the duct of the AC input power and load cables over a length of 7 cm;
- ▶ strip each wire over a length of 1 cm;
- ▶ insert the cables of the AC input power and load through the bushings of the connection cover panel;
- ▶ connect the cables of the AC input power to "Mains 1" XR1 terminal block **in the order shown on the label**;
- ▶ connect the load cables to the "load" XR2 terminal block in the order shown on the label;
- ▶ connect the various options as shown in the relevant section for each one in this manual;
- ▶ when the cables have been connected, the duct of each cable must be tightened by a binding band against the horizontal binding bar placed beneath the terminal block in order to protect the conductors from tensile loads;
- ▶ put back the connection cover panel ⑬ and the protective cover ④④.

Connections for Comet series 11 5kVA

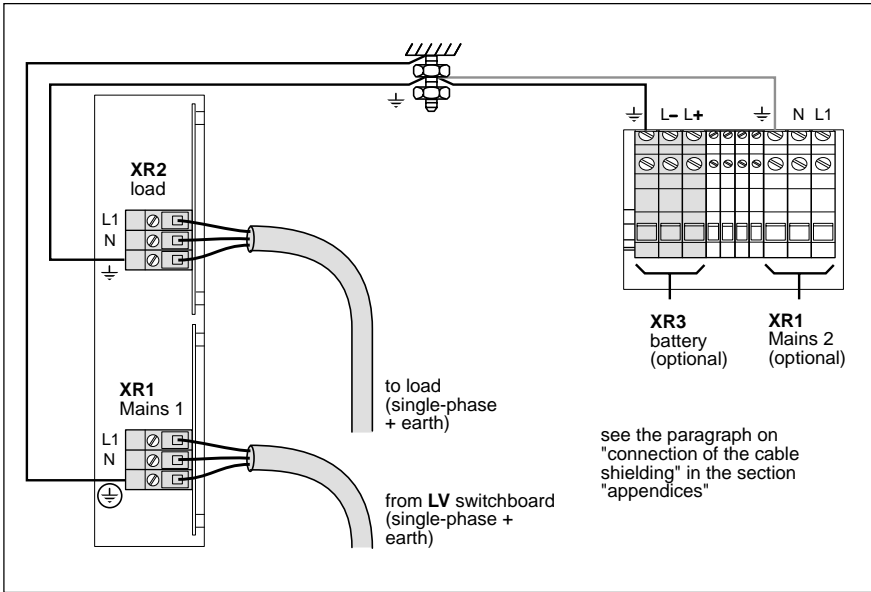


Fig. 10

Connections for Comet series 31 5kVA

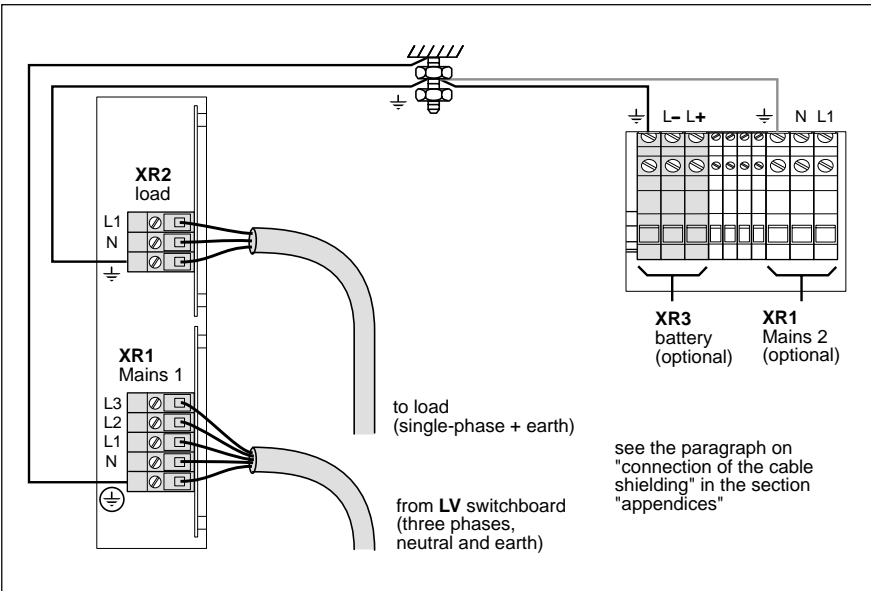


Fig. 11

Connection sequence for Comet other than 5kVA:

- ▶ remove the connection cover panel (13) that is secured with screws;
- ▶ connect the AC input cables to Mains 1 terminal block XR1, **carefully respecting earth, neutral and phase correspondence as indicated on the label**;
- ▶ connect the load cables to load terminal block XR2 carefully respecting the earth, neutral and phase correspondence as indicated on the label;
- ▶ connect the various options as indicated in the corresponding sections of this manual;
- ▶ once the cables have been connected, each cable's sleeving must be secured against the horizontal hooping bar located above the terminal block by a hoop in order to protect the conductors from eventual tensile stress;
- ▶ refit the connection cover panel.

Connections for Comet series 11 7.5/10kVA

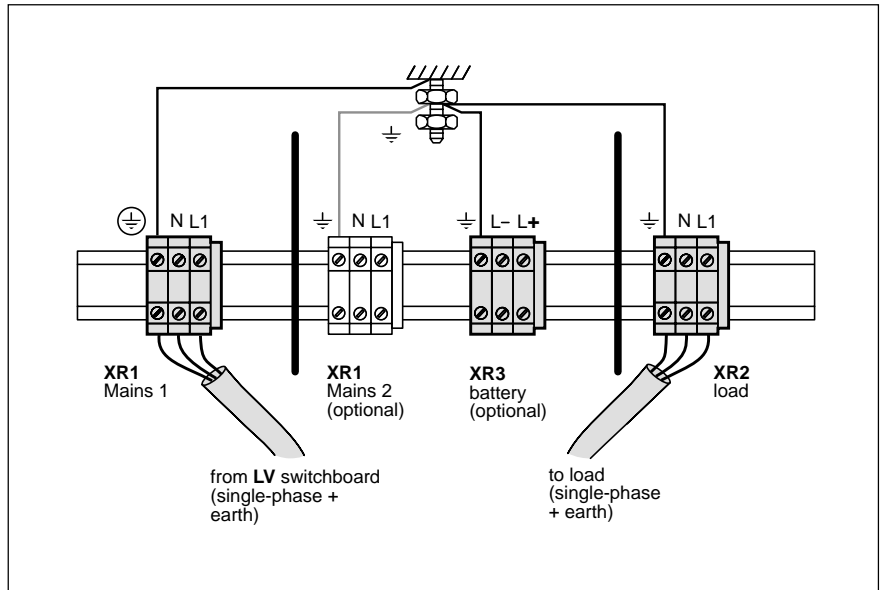


Fig. 12

Connections for Comet series 31 7.5/10/15/20kVA

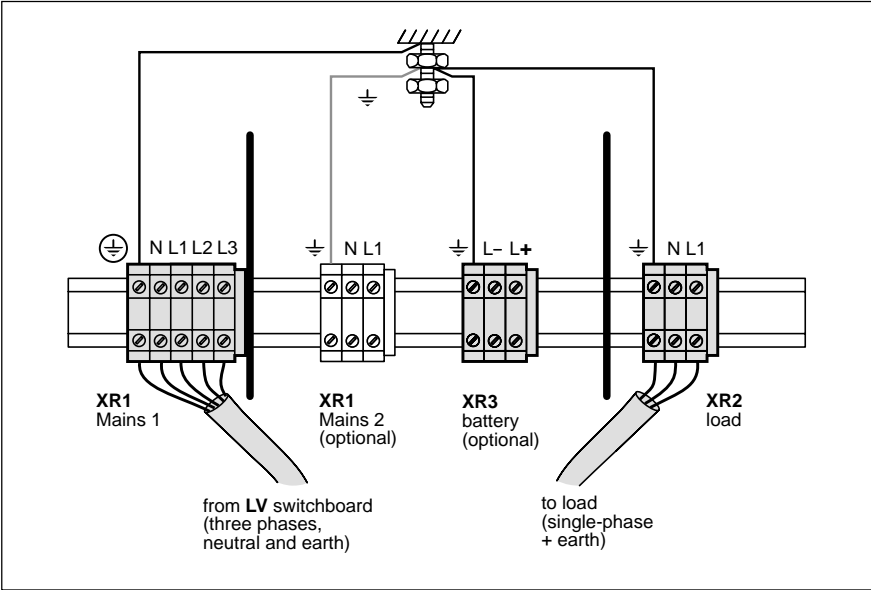


Fig. 13

Connections for Comet series 33 10/15/20/30kVA

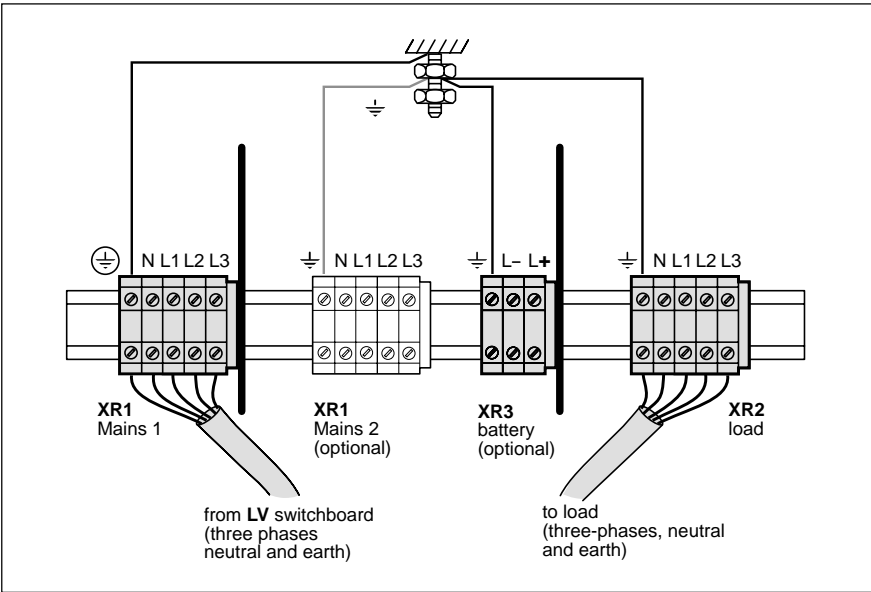


Fig. 14

General

- ▶ **"Comet"** cubicles are equipped with 4 wheels for moving over short distances and with jacks to immobilize the unit. The jacks must be raised prior to repositioning a cubicle;
- ▶ operating temperature range: 0° to 30°C at rated output.

Important:

- ▶ **the battery is of the sealed type. Battery storage or prolonged shutdown of Comet should never exceed 3 months at 20°C without recharging, for a battery initially at 100% charge. Battery recharge requires system start-up. The battery warranty is void if the 6 month recharge interval is not respected;**
- ▶ **battery life is extended when it is installed in a room with an ambient temperature of 15 to 25°C. Above 25°C, battery life reduced by 50% for every additional 10°C;**
- ▶ heat loss resulting from **Comet** operation must be taken into account when sizing the ventilation system. See the Appendices;
- ▶ connections are made through the bottom section in the back or the front, depending on the type of **Comet**;
- ▶ warning in compliance with EN 50091-2: this product is sold through limited sales channels to installers or well-informed users. Installation restrictions or additional measures may be necessary to prevent electromagnetic disturbances.

Final positioning (figure 8)

"Comet" layout seen from above

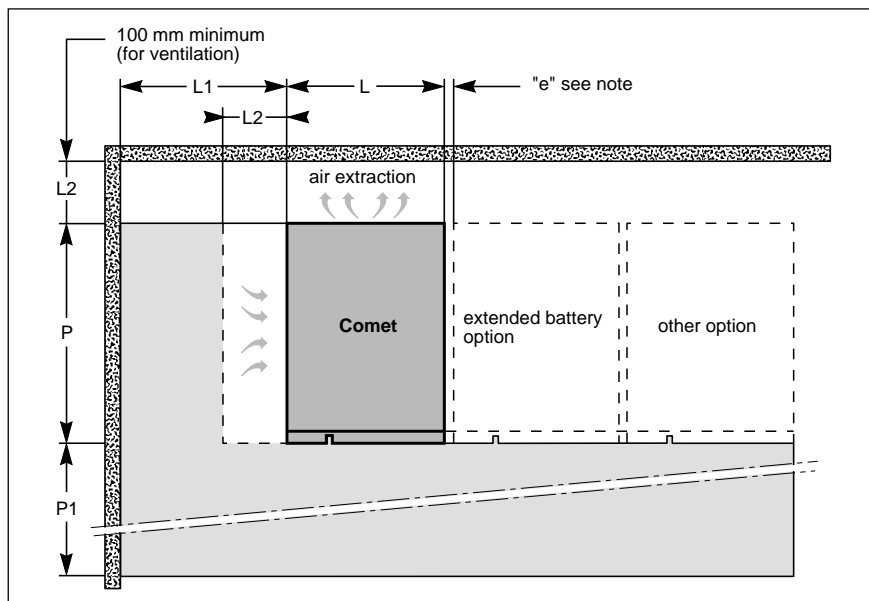


Fig. 8

Note:

- For **Comet series 31** 15/20kVA and **Comet series 33** units, a clearance "e" of 5mm is required to the left of the optional cubicles for door opening.
- ▶ ensure that clearance L1 to the left of **Comet** is greater than L for access to the battery cells and L2 greater than 100mm (for ventilation);
 - ▶ ensure that clearance P1 in front of **Comet** is greater than P for servicing via the front;
 - ▶ connection cables **must be of the flexible type** and sufficiently long to enable forward movement of **Comet** without disconnection (allow an extra 1.5 meters);
 - ▶ additional cubicles (extended battery, auxiliaries, etc.) must be placed to the right of **Comet**. **If the above installation conditions are not respected, maintenance and servicing of the unit may require system shutdown.**

Special precautions

- ▶ load cables must be run separately from all other cables (power supply or computer system interconnection cables). They should not pass near interference-emitting equipment or sensitive loads;
- ▶ if **Comet** is installed with the "Teleservice" option, a telephone connector and power supply must be provided for the modem used with it.

Connections

Connection cables should enter at the bottom:

- ▶ in the back for **Comet series 11** and **series 31** 5/7.5/10kVA;
- ▶ in front for **Comet series 31** 15/20 kVA and **series 33** 10/15/20/30kVA.

Electrical diagram for power connections

Figure 9 presents a single-line electrical diagram for a typical installation. The power cables requiring connection are shown as bold lines (see the "Appendices" for information on selecting cable cross-sections).

Connection diagram for a single AC input

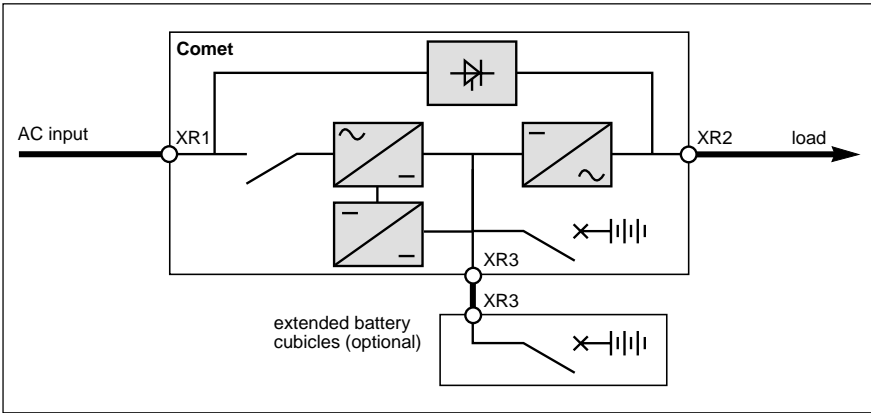


Fig. 9

Connection of power cables (figures 10 to 14)

Make sure the unit is **powered down and disconnected from all input power** before making connections to the terminal blocks at the front or back of the cubicle (depending on the type of **Comet**).

For protection of life and property, earth wires should always be connected first.

For Comet 31 series or Comet 33 series devices, the Mains power supply must be with a neutral cable.

For **Comet 33 series**, the neutral may be reconstituted by a complete insulation transformer option (a transformer with a triple-point structure).

Neutral system: identical upstream and downstream neutral systems (no galvanic isolation). **Comet** can be used with all types of neutral systems, on the condition that standard practices be respected.

- ▶ check that AC input power circuit breaker, installed upstream on the low voltage switchboard, is in off (O) position;
- ▶ check that the input power switch ① and the battery circuit breaker ④ are in off (O) position.

Connection sequence for 5 kVA Comet:

- ▶ open the protective cover ④④ (secured by 2 screws) and the connection cover panel ⑬ (secured by 6 screws);
- ▶ strip the duct of the AC input power and load cables over a length of 7 cm;
- ▶ strip each wire over a length of 1 cm;
- ▶ insert the cables of the AC input power and load through the bushings of the connection cover panel;
- ▶ connect the cables of the AC input power to "Mains 1" XR1 terminal block **in the order shown on the label**;
- ▶ connect the load cables to the "load" XR2 terminal block in the order shown on the label;
- ▶ connect the various options as shown in the relevant section for each one in this manual;
- ▶ when the cables have been connected, the duct of each cable must be tightened by a binding band against the horizontal binding bar placed beneath the terminal block in order to protect the conductors from tensile loads;
- ▶ put back the connection cover panel ⑬ and the protective cover ④④.

Connections for Comet series 11 5kVA

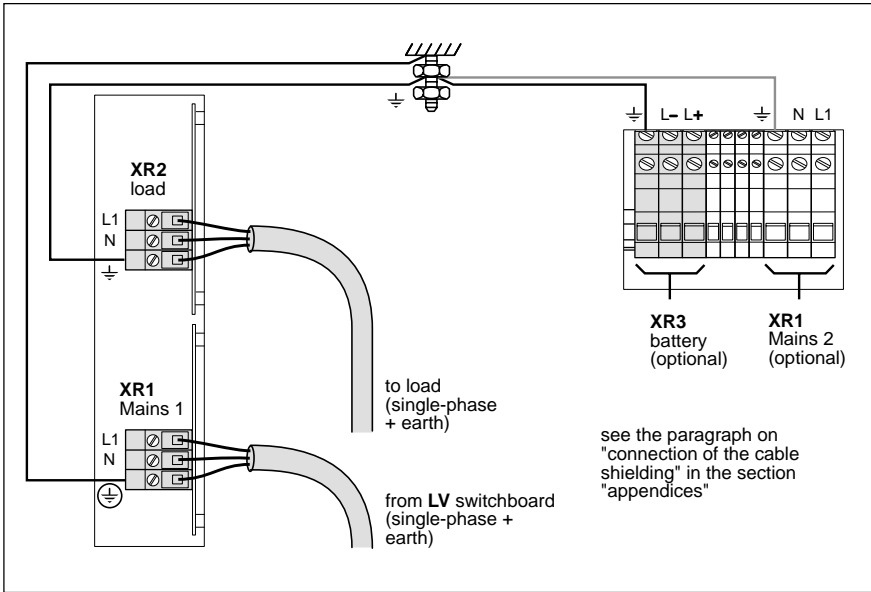


Fig. 10

Connections for Comet series 31 5kVA

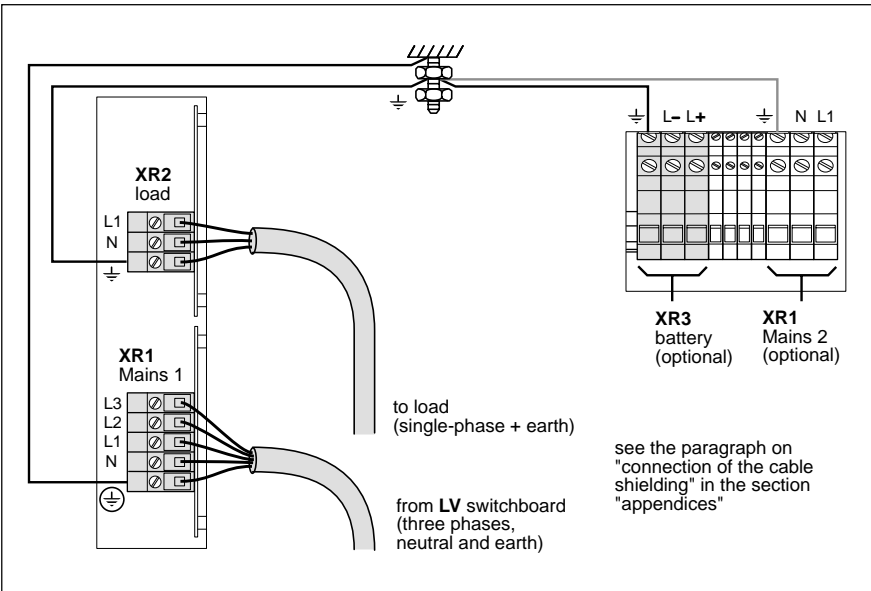


Fig. 11

Connection sequence for Comet other than 5kVA:

- ▶ remove the connection cover panel (13) that is secured with screws;
- ▶ connect the AC input cables to Mains 1 terminal block XR1, **carefully respecting earth, neutral and phase correspondence as indicated on the label**;
- ▶ connect the load cables to load terminal block XR2 carefully respecting the earth, neutral and phase correspondence as indicated on the label;
- ▶ connect the various options as indicated in the corresponding sections of this manual;
- ▶ once the cables have been connected, each cable's sleeving must be secured against the horizontal hooping bar located above the terminal block by a hoop in order to protect the conductors from eventual tensile stress;
- ▶ refit the connection cover panel.

Connections for Comet series 11 7.5/10kVA

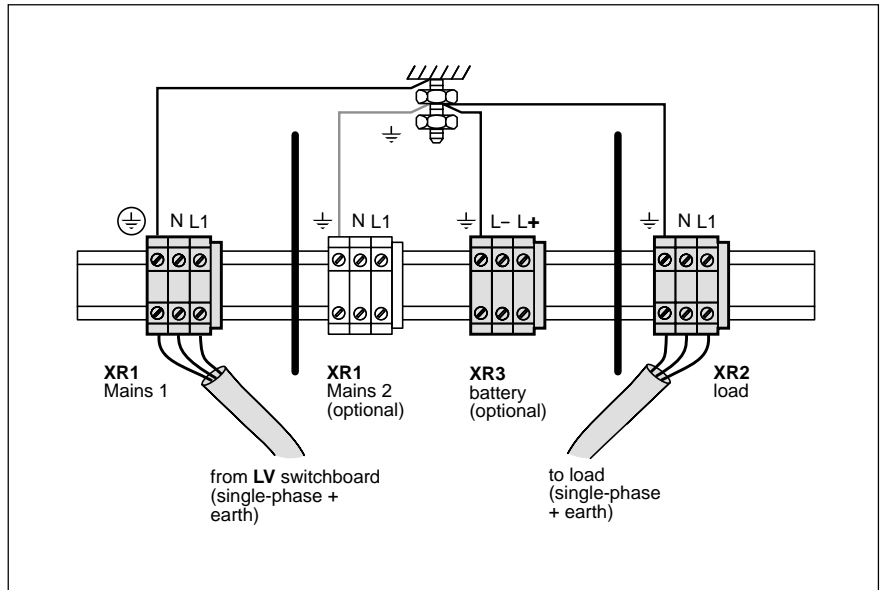


Fig. 12

Connections for Comet series 31 7.5/10/15/20kVA

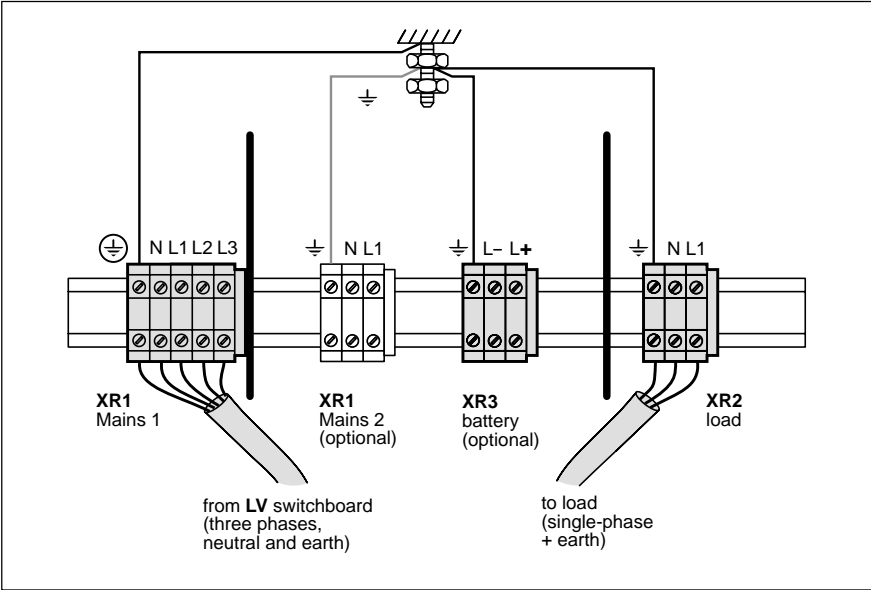


Fig. 13

Connections for Comet series 33 10/15/20/30kVA

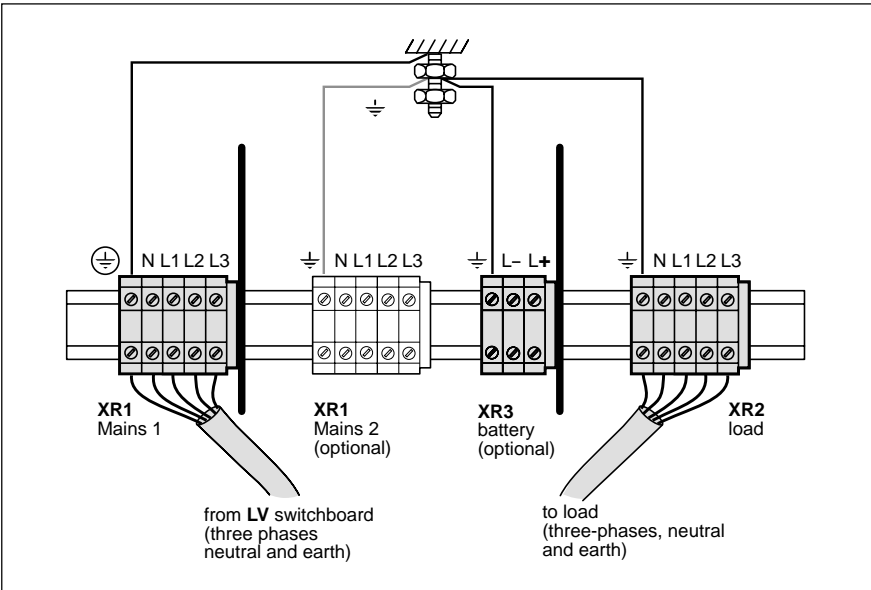


Fig. 14

Controls and indications

Comet operating controls are made up of (see figure 15):

- ▶ basic controls and indications **⑨** concerning the overall operating status of the UPS;
- ▶ the special command and diagnostic display panel **⑩** include specific controls and a 2-digit display for the UPS fault numbers. These numbers provide UPS diagnostics.

Controls and indications

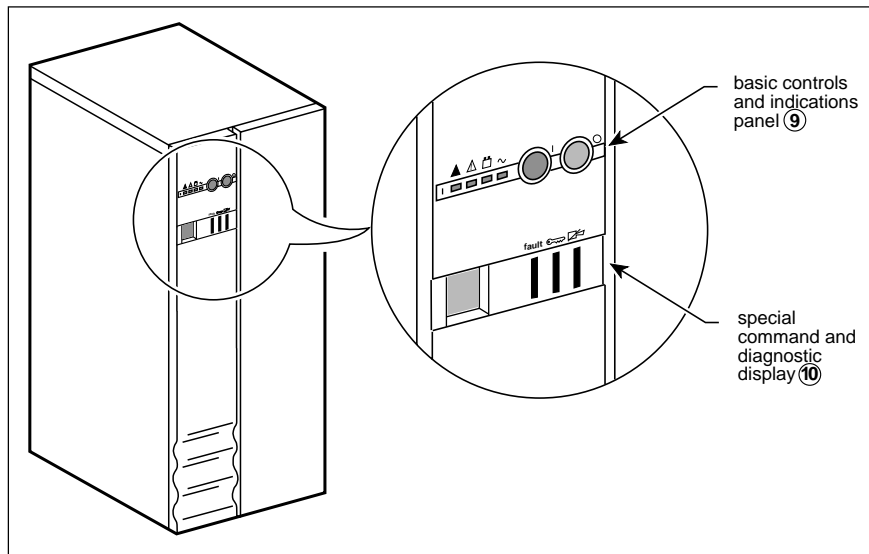


Fig. 15

Basic controls and indications

Positioned in the upper left-hand corner of the front panel, this panel provides information on the operating status of the system (see figure 16).

Interpretation of signals is very easy and requires no special training.

They indicate:

- ▶ normal operation (load protected);
- ▶ downgraded operation (fault);
- ▶ danger of a break in the supply of power to the load (load not protected);
- ▶ operation on battery power.

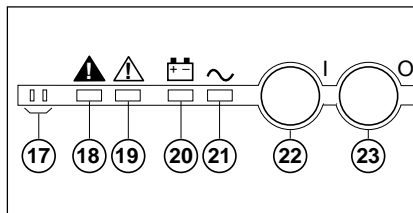


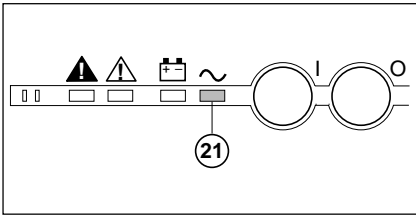
Fig. 16

Key to figure 16 :

- ⑪** buzzer,
- ⑱** "load not protected" light,
- ⑲** "fault" light,
- ⑳** "battery status or operation on battery power" light,
- ㉑** "load protected" light,
- ㉒** "inverter on" button,
- ㉓** "inverter off" button.

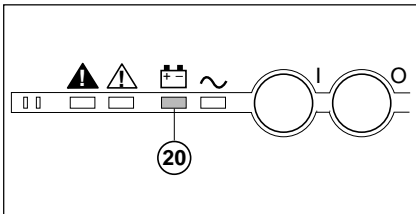
Controls and indications (cont')

"Load protected" light 21



This light indicates that **Comet** is operating normally. The load is supplied by via the inverter output 7. This light also goes on during normal start-up of **Comet**.

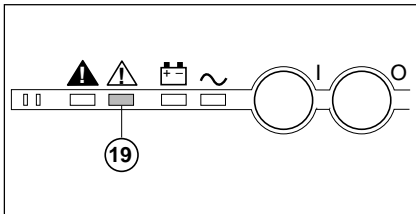
"Battery status" light 20



This orange light indicates:

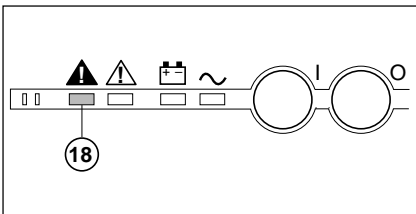
- ▶ inverter 7 operation on battery power following an AC input failure or detection of an AC input voltage outside tolerances;
- ▶ it flashes to indicate that the low battery shutdown warning level has been reached. If the light flashes when the battery is not in self-operating phase, this indicates that the battery status should be checked by an After-Sales representative.

"Fault" light 19



This orange light indicates an operating fault or an environment fault. However, the load continues to be supplied by the inverter 7.

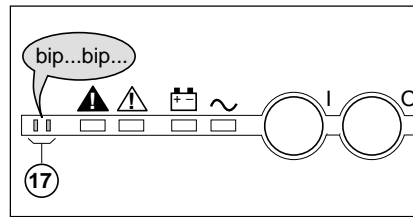
"Load not protected" light 18



This red light indicates:

- ▶ direct supply of power to the load by AC input power via the "static bypass" 3 due to inverter 7 shutdown (voluntary or following an overload or an internal fault);
- ▶ battery power is not available because the battery circuit breaker 4 is in "off" position.

Buzzer ⑰



The buzzer is activated in the following situations:

- ▶ the load is supplied directly by AC input power via the "static bypass" ③;
- ▶ the inverter is operating on battery ⑤ power;
- ▶ operating faults.

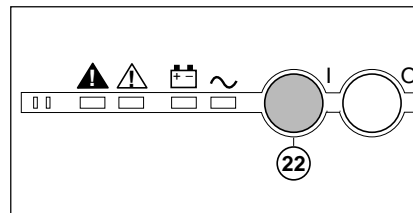
It beeps softly and slowly for minor faults and during inverter operation on battery power. When the low battery shutdown warning level has been reached, the level and the frequency of the beeps increases.

In the event of an inverter shutdown, a continuous load alarm is emitted.

A buzzer reset button ②④ is provided on the controls and diagnostics display panel ⑩.

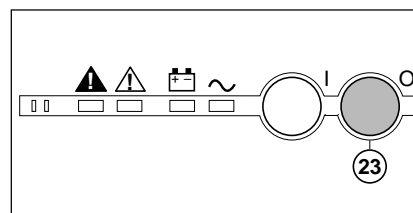
Detection of a new fault will set the buzzer off again.

"Inverter on" button ②②



This green button is used to start the inverter ⑦.

"Inverter off" button ②③



This grey button is used to stop the inverter ⑦.

Controls and indications (cont')

Controls and diagnostics display (figure 17)

The controls and diagnostics display panel (10) includes:

- ▶ display of environment faults;
- ▶ display of faults concerning one of the **Comet** sub-assemblies;
- ▶ specific controls.

Faults are displayed only when the user presses (once) one of the control buttons (24), (25) or (26).

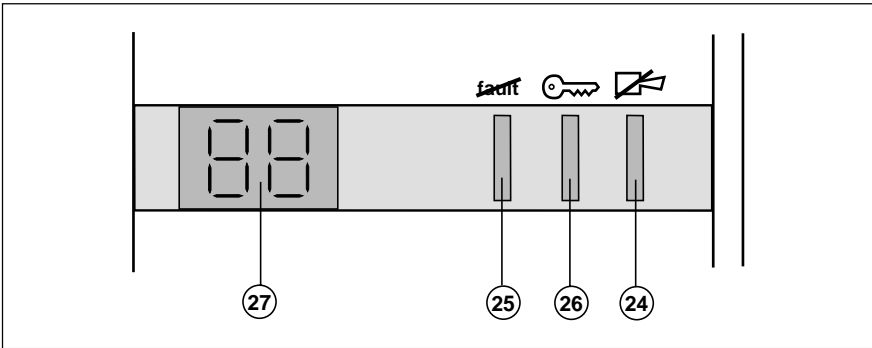


Fig. 17

Buzzer reset (24)

This button enables the user to stop buzzer (17) operation. Detection of a new alarm will set the buzzer off again.

Fault reset (25)

This button clears the faults stored in memory. Clearing of alarms in memory is accepted only once the alarm conditions themselves have been cleared.

Security button (26)

This button authorises forced operation or shutdown of the inverter (7).

Forced shutdown: press simultaneously and for three seconds the security button (26) and the "inverter off" button (23).

Forced operation: press simultaneously and for three seconds the security button (26) and the "inverter on" button (22).

This key also controls a **battery manual test**: press simultaneously on the safety key (26) and on the buzzer stop key (24) for 3 seconds.

Important: this function causes the battery to discharge completely in order to update the battery monitoring parameters.

In the event of a network power cut, the uninterrupted battery power supply returns to normal operation. The self-operating time is thus reduced.

Diagnostics display (27)

Alarm, fault and status messages are displayed as numerical codes. See chapter "Alarms" for the meaning of the codes. The alarm-code equivalence table is also displayed on the door or at the back of **Comet**.

Start-up

Preliminary checks

- ▶ check the settings of the protection devices:
 - ▷ input power switch (1) in off (O) position,
 - ▷ battery circuit breaker (4) in off (O) position,
 - ▷ "manual bypass" (8) switch set to "NORMAL" position (see figure 18);
- ▶ check that nothing can block the ventilation system (air entry through the bottom and, where applicable, through the side vents);
- ▶ check that there is a minimum 100mm clearance at the back for ventilation;
- ▶ check that **Comet** no longer rests on its 4 wheels (lifting jacks in place);
- ▶ check that the load-circuit circuit breakers (where applicable) are in off (O) position.

"manual maintenance bypass" switch

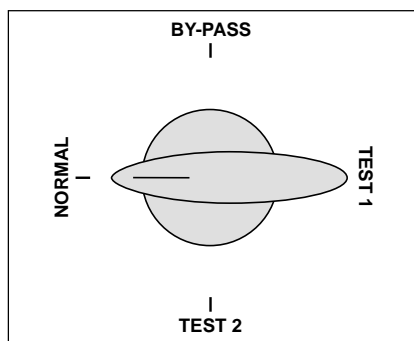
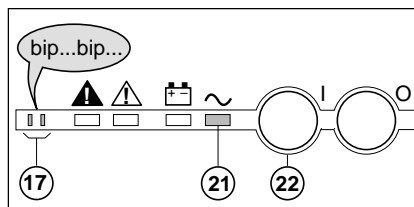


Fig. 18

Powering up to Comet

Caution:

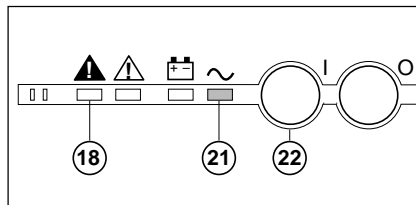
As soon as AC input power is supplied to Comet (upstream circuit breaker on the low voltage switchboard in "on" position), the load is supplied via the "static bypass" (3). No indications are given on the control panel.



- ▶ put first the input power switch (1) and then the battery circuit breaker (4) in "on" position:
 - ▷ the buzzer (17) sounds,
 - ▷ the green "load protected" light (21) goes on,
 - ▷ the rectifier (2) and the charger (6) start up,
 - ▷ the inverter (7) automatically starts up, except if the system is in "manual start-up" mode (optional). In this case, press the green "inverter on" button (22).

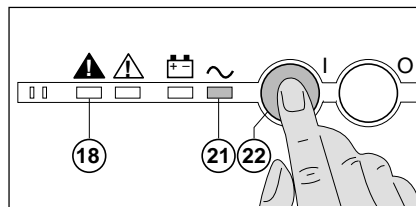
Start-up (cont')

If the transfer conditions (AC input power within tolerances) are correct, the inverter comes on line and supplies the load,
D the green "load protected" light (21) remains on,
In the event of a fault, the red "load not protected" light goes on. See the "alarms section".



Inverter start-up (system in manual start-up mode)

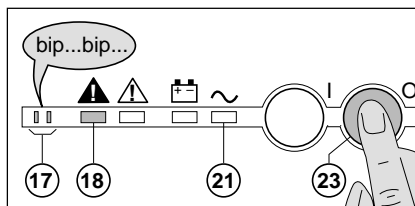
- ▶ press the green "inverter on" button (22):
- D the green "load protected" light (21) flashes,
- D the inverter (7) starts and if the transfer conditions are correct, the load is transferred to the inverter,
- D the red "load not protected" light (18) goes off,
- D the green "load protected" light (21) goes on.



Shutdown

Inverter shutdown

- ▶ press the "inverter off" button (23) for three seconds:
- ▷ the green "load protected" light (21) goes off,
- ▷ the red "load not protected" light (18) goes on,
- ▷ the buzzer (17) sounds,
- ▷ the inverter (7) stops if the transfer conditions are correct,
- ▷ the load is supplied directly by AC input power via the "static bypass" (3);
- ▶ in the event of fault, see the Alarms section.



Powering down

It is recommended not to power down **Comet** for long periods because the battery should remain charged. However, to carry out a power down, proceed as follows:

- ▶ shutdown the inverter (7);
- ▶ put the battery circuit breaker (4) in "off" position;
- ▶ turn off the input power switch (1);
- ▶ all the indicating lights on the control panel go off.

Caution:

The load is still supplied by AC input power via the "static bypass" (3);

- ▶ put the upstream circuit breaker(s) on the low voltage switchboard in "off" position.

Operation

Normal operation

The AC input power supply is present (figure 19):

- ▶ the green "load protected" light (21) is on;
- ▶ the power drawn by the load is supplied by AC input power via the rectifier (2) and inverter (7) modules. The charger (6) float charges or recharges the battery (5). The DC output voltage of the charger is temperature regulated to ensure an optimal charge voltage.

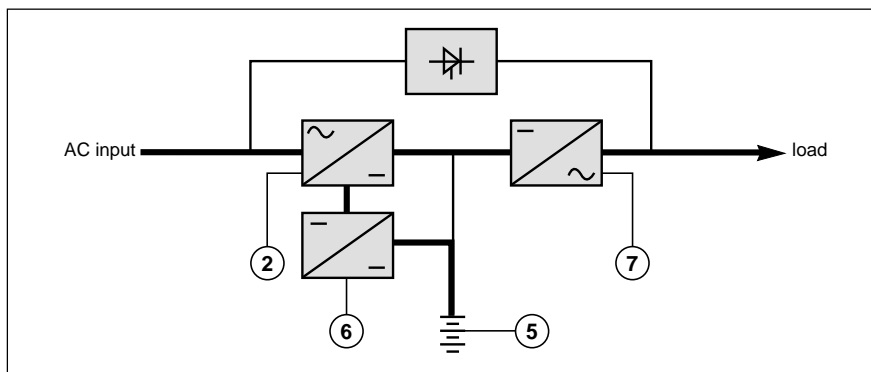
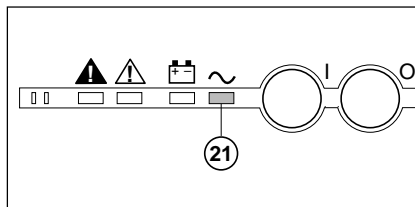


Fig. 19

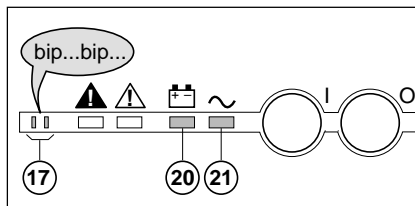
Operation on battery power (figure 20)

When AC input power fails or exceeds tolerances, the rectifier (2) and the charger (6) shut down. The battery (5) supplies the power required by the inverter (7) to supply the load.

The battery (5) discharges.

The green "load protected" light (21) is on.

The user is warned of operation on battery power by the buzzer (17) and by the orange "battery status" light (20). This information is also available via the standard communication connector (15).



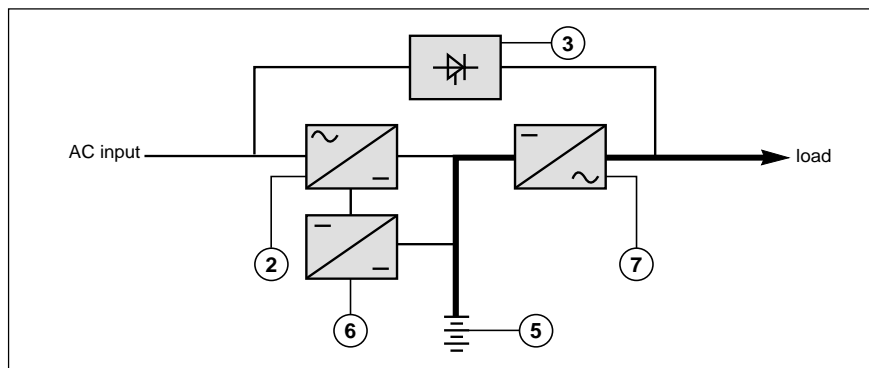


Fig. 20

Battery duration

During an AC input power failure, the duration of inverter operation on battery power depends on:

- ▶ the rated capacity of the battery;
- ▶ the power drawn by the load;
- ▶ the battery temperature;
- ▶ the age of the battery.

The rated backup time corresponds to a minimum for a new battery and with the inverter operating at the rated load.

The real backup time, which depends on the power drawn, may be greater if the inverter operates at less than full rated load. It is possible, during operation on battery power, to increase the battery backup time by reducing the power drawn by the load (shedding of non-priority circuits).

Comet has a battery monitoring function that calculates the remaining backup time. This function may be implemented with a communications option.

A low battery shutdown warning signal is available via the standard communication connector (15) for remote indications. It warns the user of upcoming battery shutdown at a user-determined level of remaining power. On the UPS itself, the buzzer (17) beeps louder and more rapidly, and the orange "battery status" light (20) flashes.

The end of battery power occurs when the battery is fully discharged. At this point, the inverter (7) shuts down.

The recharge time required to restore the battery to its rated backup power varies between 4 and 16 hours depending on the **Comet** model.

Return of AC input power

When the AC input power failure ends or power returns to within tolerances:

- ▶ if the end of battery backup power was not reached, **Comet** returns to the operating status described above (figure 19);
- ▶ if the end of battery backup power was reached, the rectifier (2), the charger (6) and the inverter (7) automatically start up (the inverter must be manually started if the system is in manual start mode).

Battery monitoring tests

- ▶ the battery is periodically checked every month. The message "17" on the diagnostics display (27) tells the user that the battery is in this operating mode;
 - ▶ it is recommended to carry out a complete discharge test on the battery once a year in order to update the battery monitoring parameters. This test is activated by the "battery manual test" control. It calls for a minimum service charge. The message "18" on the diagnostics display (27) tells the user that the battery is in this operating mode.
- In these operating modes, total battery failure is indicated by the alarm message "15" on the diagnostics display (27).

Overload (except for 5 kVA Comet S11 or S31)

- ▶ during a major temporary overload (greater than $1.5I_n$):
 - ▷ the load is supplied by AC input power via the "static bypass" (3),
 - ▷ return to the inverter (7) is automatic, following elimination of the overload;
 - ▶ the inverter can handle a minor overload for a given duration depending on the size of the overload. See figure 21;
 - ▶ when an overload occurs:
 - ▷ the buzzer (17) sounds,
 - ▷ the orange "fault" light (19) goes on,
 - ▷ the inverter (7) shuts down at the end of its corresponding overload time,
 - ▷ the load is supplied by AC input power via the "static bypass" (3),
 - ▷ the green "load protected" light (21) goes off,
 - ▷ the red "load not protected" light (18) goes on.
- If the overload continues during operation via the "static bypass" (3), the supply of power to the load is interrupted after a specified time. See figure 22.
- When **Comet** has shutdown due to an overload, the fault reset button must be pressed prior to return to normal operation.

Inverter (7) overload curve

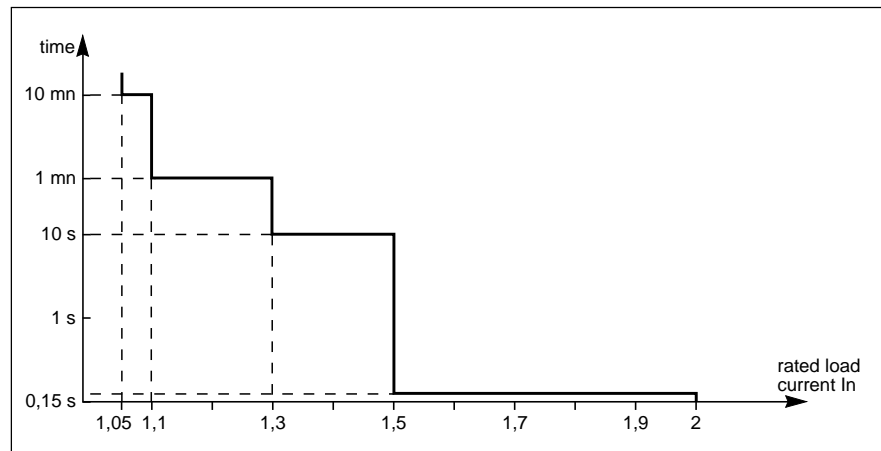


Fig. 21

"Static bypass" ③ overload curve

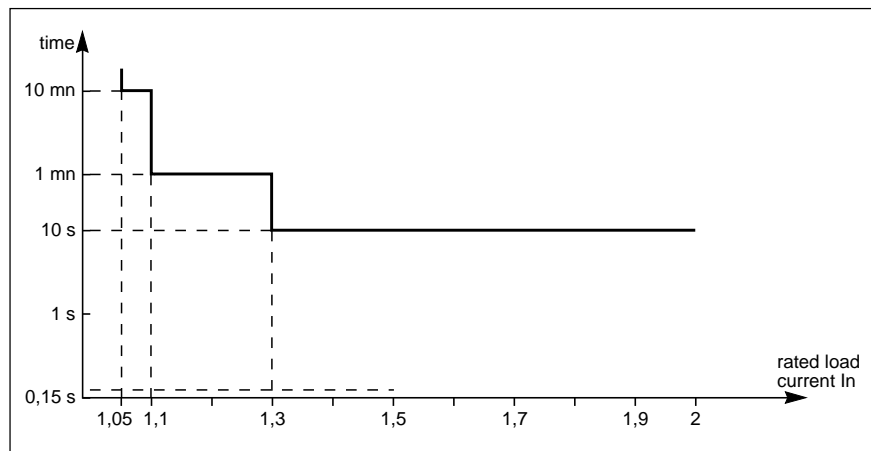


Fig. 22

Overloads on 5 kVA Comet S11 or S31

For a major temporary overload (greater than $1.5I_n$):

The load is transferred to AC input power via the "static bypass" ③ for 5 seconds. After that time, it is transferred back to the inverter.

If the overload persists, this sequence will be repeated 3 times in all before the inverter is shut down and the supply of power to the load interrupted.

For a minor overload:

Minor overloads can be supplied by the inverter for a duration defined in figure 21 for an ambient temperature of less than 30°C. Above this temperature, a derating coefficient k must be applied to the rated current and therefore to the overload curve in figure 21:

- ▶ from 30°C to 35°C: $k = 0.9$,
- ▶ from 35°C to 40°C: $k = 0.85$,
- ▶ above 40°C: $k = 0.8$.

Example: an overload current I can be supplied by the inverter for 1 minute under the following conditions:

- ▶ $1.1 I_n < I < 1.3 I_n$ for an ambient temperature of 25°C,
- ▶ $1.1 \times 0.9 I_n < I < 1.3 \times 0.9 I_n$ for an ambient temperature of 32°C,
- ▶ $1.1 \times 0.85 I_n < I < 1.3 \times 0.85 I_n$ for an ambient temperature of 37°C,
- ▶ $1.1 \times 0.8 I_n < I < 1.3 \times 0.8 I_n$ for an ambient temperature of 42°C.

When an overload occurs:

- ▶ the buzzer ⑪ sounds,
- ▶ the orange "fault" light ⑲ goes on,
- ▶ the inverter ⑦ shuts down at the end of its corresponding overload time,
- ▶ the load is supplied by AC input power via the "static bypass" ③,
- ▶ the green "load protected" light ⑳ goes off,
- ▶ the red "load not protected" light ⑱ goes on.

The load is supplied via the "static bypass" ③ for 5 seconds, after which it is transferred back to the inverter. If the overload persists, the inverter shuts down and the supply of power to the load is interrupted.

Mains 2 out of tolerance

Mains 2 (or the standby Mains) supplies the "static bypass" ③ (SS) and the manual maintenance bypass.









































- ▶ as standard it is connected to the same terminal block as power Mains 1;
- ▶ as option Mains 2 can be connected to a separate terminal block:
- ▷ the voltage tolerance of Mains 2 is defined with respect to the UPS rated output voltage and is +7%, -10% for rated voltages of 240V and 415V and +/- 10% for other voltages,
- ▷ the frequency tolerance of Mains 2 can be set between 1 and 4%.

A Mains 2 in tolerance allows UPS/Mains 2 transfers of the load without voltage breaks.






When Mains 2 is out of tolerance, transfers take place with a load voltage break of 0.5 second.

Alarms

Alarm indications table

 17	 18	 19	 20	 21	status or action producing the indication
					▶ inverter start-up phase prior to load transfer. The "inverter on" button 22 has been pressed.
					▶ normal operation; ▶ load supplied by Comet .
					▶ inverter 7 shutdown following pressing of the "inverter off" button 23 or a major fault; ▶ load supplied via the "static bypass" 3 .
					▶ operation on battery power; ▶ load supplied by Comet .
					▶ end of battery power or battery should be checked ⁽¹⁾ .
					▶ minor fault: load continues to be supplied via inverter.
					▶ inverter 7 shut down; ▶ input power switch 1 is in "off" position; ▶ battery circuit breaker 4 is in "off" position; ▶ load supplied via the "static bypass" 3 .

Legend of alarm indications table:

-  buzzer off,
-  light off,
-  buzzer on,
-  light on,
-  light flashing

(1): for standard replacement of batteries, a technician certified by MGE UPS SYSTEMS is required to update the parameters of the new battery so that the user continues to benefit from the "Battery Monitoring" function used to see the available or remaining battery autonomy.

Any state other than normal operation (green "load protected" light **21** on) is considered a fault by the diagnostics system.

Before undertaking any servicing or other action, note the status of the different lights and the number(s) of the fault(s) indicated on the diagnostics display **27**.

If the "Monitor Plus" option is installed, note as well the messages in the list on the screen.

Certain faults may result in the display not functioning.

If the load still functions, it is supplied via the "static bypass" **3**, i.e. it is not protected.

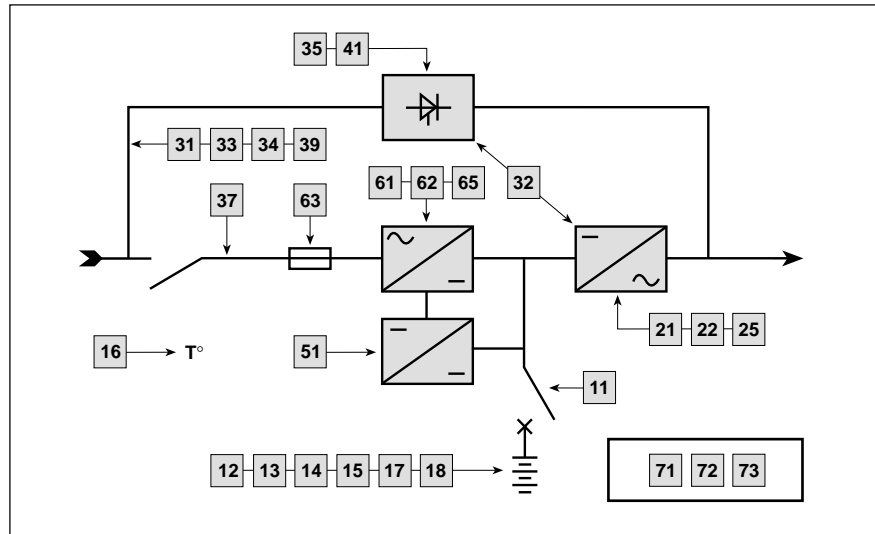


Fig. 23

► **"11" - battery circuit breaker in "off" position:**

indicates that the battery circuit is open (battery circuit breaker ④ is in "off" position). The load is no longer protected because battery power is no longer available in the event of an AC input power failure. In the case of the "battery-free frequency converter" option, it is normal for the "11" message to remain on;

► **"12" - check battery:** indicates that the battery should be checked (see "Battery maintenance" in the "Maintenance and servicing" section);

► **"13" - low battery shutdown warning:** indicates that battery power will end after a user-set time period. The user must take the required measures to secure the load (load shedding, file saving and system shutdown, etc.);

► **"14" - end of battery power;**

► **"15" - battery fault:** indicates a problem with the battery (see "Battery maintenance" in the "Maintenance and servicing" section);

► **"16" - ambient T° fault:** this display indicates that the ambient temperature is outside the tolerance range (<0°C or > 40°C);

► **"17" - battery periodic test:** this message indicates that the battery is in the process of being checked;

► **"18" - battery manual test:** this message indicates that the battery is in the process of being completely discharged in order to update the battery monitoring parameters;

► **"21" - inverter fault:** indicates a fault in the inverter module ⑦; contact the after-sales support department;

► **"22" - inverter overtemperature:** indicates overheating inside the UPS; check that the Comet ventilation system is working and that the ambient temperature is within tolerances (see "Appendices");

► **"25" - inverter overload:** indicates an overload when the load is being supplied via the inverter. Reduce the load;

► **"31" - Mains 2 voltage outside tolerance range:** this display indicates that the Mains 2 power supply voltage of the "static bypass" ③ is outside the tolerance range;

- ▶ **"32" - phase shift outside tolerance range:** this display indicates that the phase between the Mains 2 power supply of the "static bypass" (3) and the "inverter module" (7) is outside the tolerance range;
- ▶ **"33" - phase sequence fault:** informs the user that the phase sequence of the three-phase power supply is incorrect;
- ▶ **"34" - frequency of Mains 2 power supply to "static bypass" (3) outside tolerances:** the output inverter voltage is no more synchronised with Mains 2. load transfers may be carried out using the following procedure: press, for 3 seconds, simultaneously the security button (26) and:
 - ▷ the green "inverter on" button (22) to force transfer of the load to the inverter (7). Transfer results in a 0.5 second break in the supply of power to the load,
 - ▷ the grey "inverter off" button (23) to force transfer of the load to the "static bypass" (3). Transfer results in a 0.5 second break in the supply of power to the load;
- ▶ **"35" - "static bypass" overload:** indicates an overload when the load is being supplied via the "static bypass". Reduce the load;
- ▶ **"37" - Mains 1 voltage outside tolerance range:** this display indicates that the voltage of the Mains 1 power supply of the "rectifier module" (2) is outside the tolerance range;
- ▶ **"39" - installation fault:** indicates an incorrect connection at the frequency converter input; check the connection of the Mains 1 input source to terminal block XR1;
- ▶ **"41" - load supplied via "static bypass" (3)** (normal condition for certain configurations): this display indicates that the load is powered by the Mains 2 via the "static bypass" (3);
- ▶ **"51" - charger fault:** indicates a fault in the charger module (6); contact the after-sales support department;
- ▶ **"61" - rectifier or chopper fault:** indicates a fault in the rectifier module (2); contact the after-sales support department;
- ▶ **"62" - chopper overtemperature:** see fault "22";
- ▶ **"63" - fuses blown on Mains 1 input:** indicates that one or more fuses have blown in the rectifier module (2); contact the after-sales support department;
- ▶ **"65" - chopper overload:** indicates that the active power consumed is too high. Reduce the load;
- ▶ **"71" - internal communication fault:** indicates a **Comet** internal fault; contact the after-sales support department;
- ▶ **"72" - internal communication self-test fault:** see fault "71";
- ▶ **"73" - CPU board self-test fault:** see fault "71".

Manual bypass

- ▶ **if the load is no longer supplied,** a manual bypass operation enabling supply is possible, while waiting for the after-sales support personnel;
- ▶ proceed as follows:
 - ▷ turn off the input power switch (1),
 - ▷ switch the battery circuit breaker (4) to "off" position,
 - ▷ check that all lights are off,
 - ▷ turn the "manual bypass" switch (8) as indicated in figure 24 from the **"NORMAL"** position to the **"BYPASS"** position.

"Manual bypass" switch

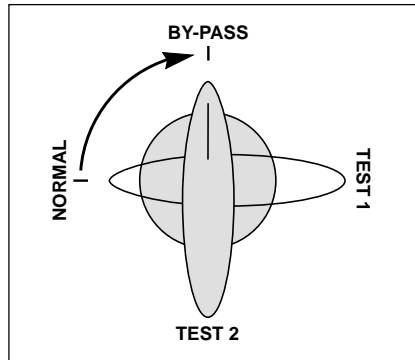


Fig. 24

Note:

The TEST 1 and TEST 2 positions are reserved for the after-sales support personnel. Leave the switch set to the "BYPASS" position until the arrival of the after-sales support personnel.

Use of the switch other than as indicated above may damage Comet and render void the warranty.

This function is not available for frequency converters.

Standard functions

The communication connector (15), positioned on the back for **Comet series 11** and **series 31** 5/7.5/10/15/20kVA and on the front for the other models, supplies the following information:

- ▶ operation on the "static bypass";
- ▶ low battery shutdown warning;
- ▶ load supplied by the inverter;
- ▶ operation on battery power.

This connector enables communication with the most common computer systems (AS400, NOVELL, etc.).

Figure 25 indicates the pin-outs for the SUB-D 15-pin female connector (front view).

SUB-D 15-pin connector connection

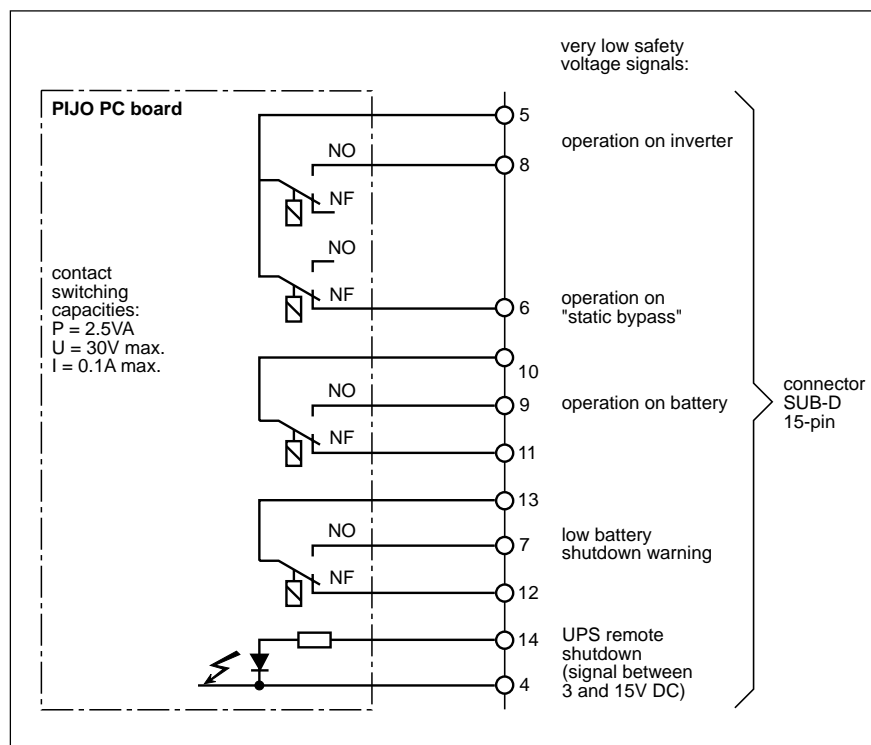
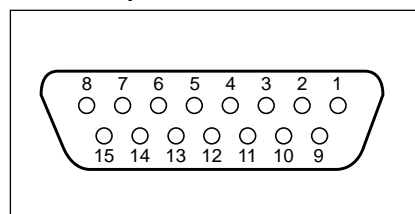


Fig. 25

SUB-D 15-pin connector



Note: the remote UPS shutdown command is valid when the inverter is supplied by the AC input source or the battery. The inverter shuts down after 2-minute delay.

Communication (cont')

Options

Three options may be used simultaneously on **Comet**, thus enabling communication with a wide number of computers and control devices.

Monitor Plus ⁽¹⁾

Mini terminal for control and display of AC input power and system parameters. Can be installed locally or remotely.

Contact 5

This option offers communication of five different signals via dry relay contacts:

- ▶ operation on battery;
 - ▶ operation on "static bypass";
 - ▶ low battery shutdown warning;
 - ▶ load supplied by the inverter;
 - ▶ general alarm;
- Relay-contact breaking capacities: 250V AC, 125V DC, 1A.

U-TALK ⁽¹⁾

This option manages an **RS232** serial interface using an **ASCII** protocol. This option is supplied with the CD-ROM "Solution Pac"™ which integrates a range of management software for MGE UPS SYSTEMS Uninterruptible Power Supply under SNMP.

JBUS / RS232 and JBUS / RS485 ⁽¹⁾

These options enable remote monitoring of **Comet**.

BatiBUS

This option provides a link between **Comet** and a **BatiBUS** network.

(1): these options can be used with the battery monitoring function which provides information on:

- ▶ available battery power during normal operation;
- ▶ remaining battery power during operation on battery power.

Maintenance and servicing

Preventative maintenance for the **Comet** is limited to the strict minimum. However, the list below indicates important procedures to ensure continuous and correct operation.

Safety reminder

Danger: high voltages are present in the **Comet** system. Any servicing requiring removal of the protection covers may be undertaken only by qualified personnel certified by MGE UPS SYSTEMS.

Preventive maintenance by user

Visual check

- ▶ check the installation and operating conditions:
 - ▷ distance from wall,
 - ▷ ventilation inlet and outlet vents free,
 - ▷ operating temperature, particularly for the batteries;
- ▶ no faults signalled by the lights.

Maintenance by the local representative certified by MGE UPS SYSTEMS

Consult the after-sales support department for further information concerning the services presented below requiring special tools, in particular the "Soft Tunor" software.

Battery maintenance

Battery status is monitored by **Comet**. When the orange "operation on battery" light (20) flashes and fault number "12" is indicated on the diagnostics display (27), the battery should be checked.

When the red "load not protected" light (18) flashes and fault number "15" is indicated on the diagnostics display (27), a battery fault is present.

To clear these alarms, press the "security" (26) and "fault reset" (25) buttons at the same time.

Caution: clearing the alarms in this way disables the battery monitoring and backup time calculation functions (Monitor Plus option); contact the after-sales support department to check the condition of the battery and replace it if necessary. The after-sales support technician will reactivate the battery monitoring and backup time calculation functions.

Environmental protection

The battery cells contain substances which are dangerous for the environment. Following replacement, the after-sales support department forwards old batteries to special organizations for recycling and disposal.

Maintenance and servicing (cont')

Annual check

This complete check-up can be run only by qualified personnel certified by MGE UPS SYSTEMS.

Customer training

Training courses offered by MGE UPS SYSTEMS enable personnel to monitor the system and undertake basic maintenance.
Contact your MGE UPS SYSTEMS distributor for the list of courses offered.

Maintenance contracts

Your MGE UPS SYSTEMS contact can supply you with the catalogue of maintenance contracts that indicate out how you can transfer responsibility for maintenance to qualified technicians always on call.

Options

Extended battery cabinet

As standard equipment, **Comet** comes with a battery providing a backup time (at full rated load and a power factor of 0.6) of 8 minutes for the 5 kVA **Comet S11** and **S31** and 10 minutes for the other **Comet** models. This time can be increased by installing 1 or 2 additional battery cabinets.

If **Comet** was not factory-set for the additional cabinets, the new configuration must be entered by a MGE UPS SYSTEMS after-sales support technician.

Additional battery cell characteristics

Battery cells for an overall operating range of 30 mm
(at rated output power with a power factor of 0.6):

Comet	Battery cell characteristics	rated output of device (kVA)					
		5	7,5	10	15	20	30
series 11	height (mm)	730	910	910			
	width (mm)	360	400	400			
	depth (mm)	420	550	550			
	weight (kg)	72	118	149			
series 31	height (mm)	730	910	910	1085	1085	
	width (mm)	360	400	400	560	560	
	depth (mm)	420	550	550	680	680	
	weight (kg)	72	118	149	270	340	
series 33	height (mm)			1085	1085	1385	1385
	width (mm)			460	560	610	610
	depth (mm)			680	680	780	780
	weight (kg)			176	270	355	480

Battery cells for an overall operating range of 50 mm
(at rated output power with a power factor of 0.6):

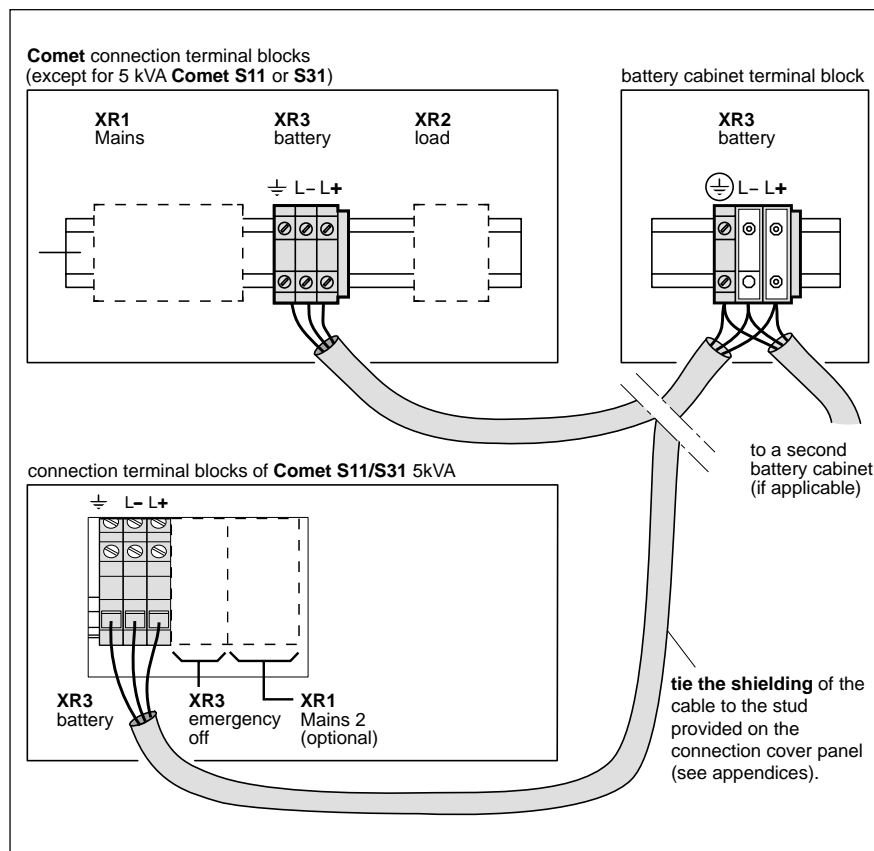
Comet	Battery cell characteristics	rated output of device (kVA)					
		5	7,5	10	15	20	30
series 11	height (mm)	730	910	910			
	width (mm)	360	400	400			
	depth (mm)	420	550	550			
	weight (kg)	115	215	276			
series 31	height (mm)	730	910	910	1085	1085	
	width (mm)	360	400	400	2 x 560	2 x 560	
	depth (mm)	420	550	550	680	680	
	weight (kg)	115	215	276	2 x 270	2 x 340	
series 33	height (mm)			1085	1085	1385	1385
	width (mm)			460	2 x 560	2 x 610	2 x 610
	depth (mm)			680	680	780	780
	weight (kg)			281	2 x 270	2 x 355	2 x 480

Connection of an additional battery cabinet

Prior to any operations, check that the protection devices are in the following positions:

- ▶ upstream circuit breaker off;
 - ▶ input power switch ① off;
 - ▶ battery circuit breaker ④ off;
 - ▶ "manual bypass" switch set to the "NORMAL" position.
-
- ▶ position the battery cabinet on the right side of **Comet**;
 - ▶ connect the terminal block in the battery cabinet to the XR3 terminal block in **Comet** as follows:
 - ▷ yellow/green cable (earth) to the yellow/green terminal on XR3,
 - ▷ red cable (+ pole) to the L+ terminal on XR3,
 - ▷ blue cable (– pole) to the L– terminal on XR3;
 - ▶ position the two enclosures with the front panels aligned;
 - ▶ turn on the circuit breaker in the battery cabinet.

Connection of an additional battery cabinet



Emergency off

Installation of an emergency off function must be carried out in compliance with applicable regulations. When an external emergency off function is activated, the AC input to **Comet** must be cut to ensure protection of life and property.

However, this action does not cut the supply of power to the load protected by **Comet** because the system continues to operate on battery power.

To power down the entire installation via an emergency off function, the action must also turn off the following via a single device:

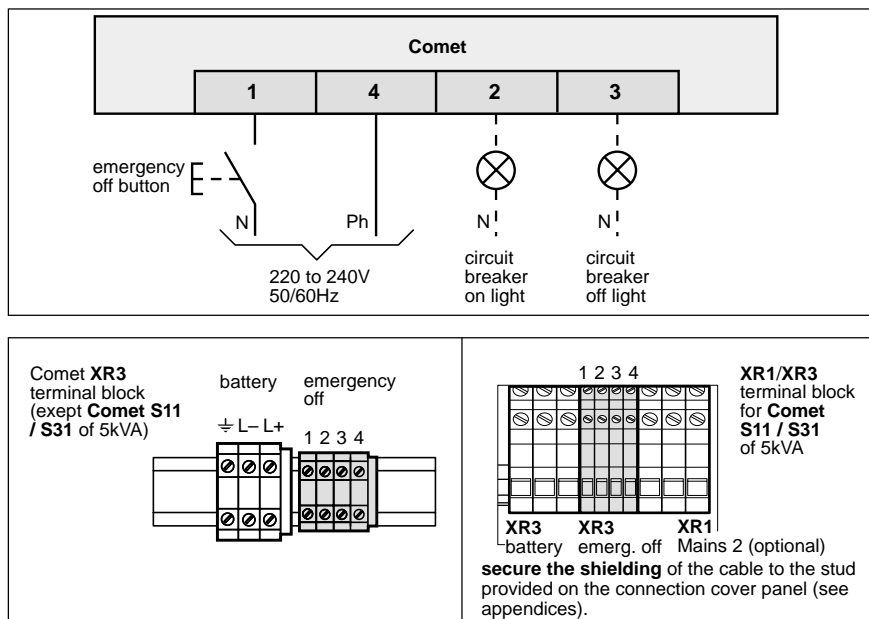
- ▶ the battery circuit breaker ④;
- ▶ the circuit breaker for the additional battery cabinet(s), if applicable;
- ▶ and a circuit breaker placed downstream of the UPS, otherwise the UPS output remains live for approximately 3 seconds after the emergency off function has been activated.

This requires installation of an MX shunt trip.

Shunt trip connection

- ▶ check that the upstream circuit breaker on the low voltage switchboard is in "off" position;
- ▶ check that the input power switch ① and the battery circuit breaker ④ are in "off" position;
- ▶ remove the connection cover panel ⑬ from the **Comet**;
- ▶ supply the shunt trip coil with AC power across terminals 1 and 4;
- ▶ terminals 2 and 3 may be used to supply (using a voltage identical to that of the shunt trip) lights indicating the position of the battery circuit breaker ④ (breaking capacity of contacts is 1300VA);
- ▶ once the connections are made, reposition the connection cover panel.

Connection diagram for MX shunt trip to terminal block XR3



Full galvanic isolation transformer (standard Comet equipment)

This option is required to achieve a downstream neutral system different from the upstream neutral system. The transformer, installed in a cubicle of the same design as the **Comet** cubicle, must be positioned:

- ▶ between the low voltage switchboard and the input power switch for **Comet series 11 and series 33** (see figure 26);
- ▶ between the **Comet** load output terminals and the load for **Comet series 31** (see figure 27).

Power connection diagrams

The cables requiring connection are indicated as bold lines.
For information on cable cross-sections, see the "Appendices": "Selection of cable cross-sections" (the connection cable between **Comet** and the option is supplied).

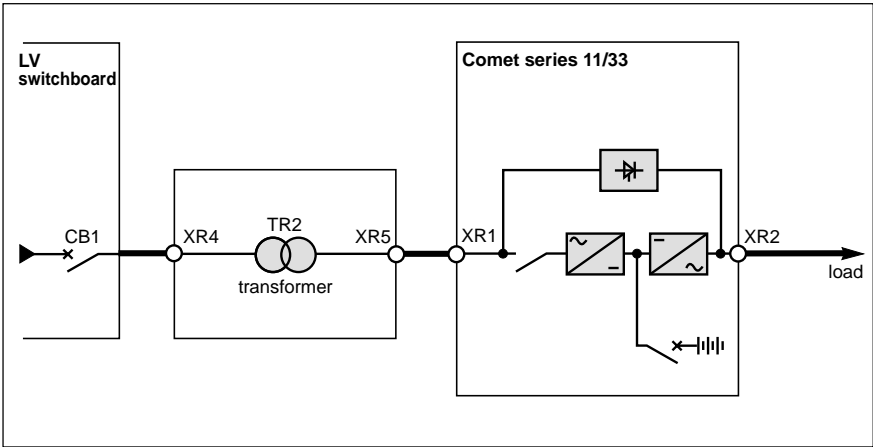


Fig. 26

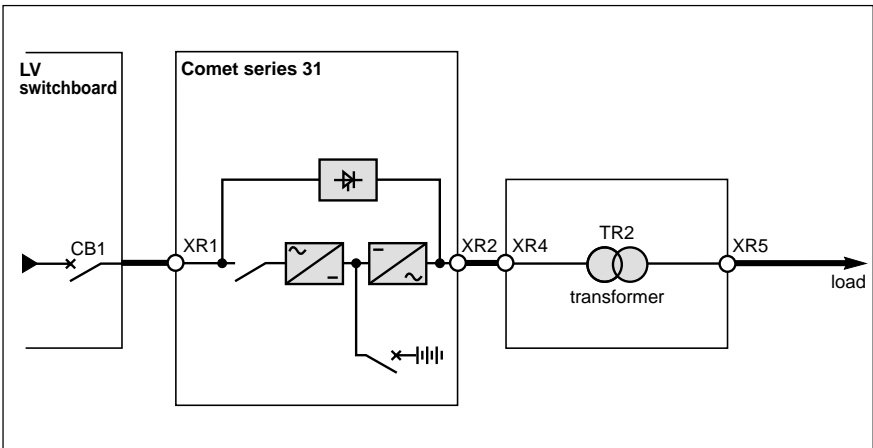


Fig. 27

Separate Mains 2 transformer (AC bypass input)

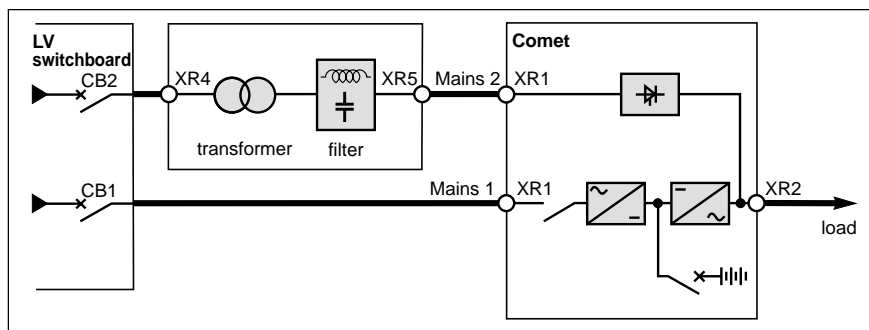
This option can be used to connect the "static bypass" ③ to a second AC input circuit, if the two AC input come from different sources or if they are fitted with separate protective devices.

This requires installation of the optional "separate Mains 2 galvanic isolation transformer".

Power connection diagram

The cables requiring connection are indicated as bold lines.

For information on cable cross-sections, see the "Appendices": "Selection of cable cross-sections" (the connection cable between **Comet** and the option is supplied).



This option comprises a high-frequency filter which limits the disturbances transmitted to the AC input power supply and guarantees compatibility with the standards in force. This guarantee is no longer provided if the transformer is used on its own (without a filter).

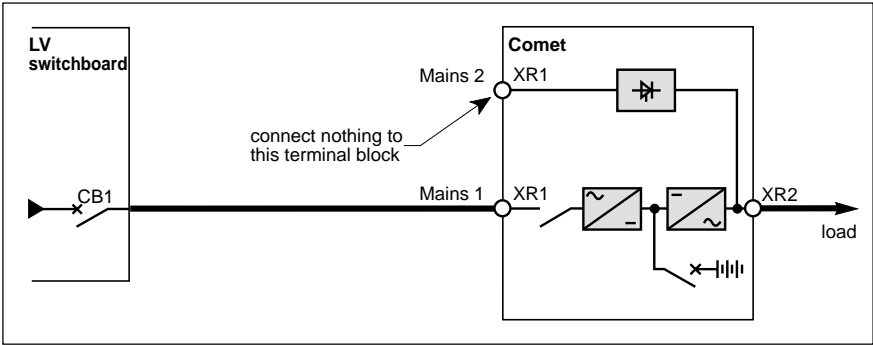
Note: for a 5 kVA **Comet S11** or **S31**, the shielding of the Mains 2 cable must be secured to the stud provided on the connection cover panel (see "Appendices").

Frequency converter

This option can be used to obtain different input and output frequencies.
The frequency converter is supplied with a separate Mains 2.
This option is delivered either with or without a battery.

Power connection diagram

The cables requiring connection are indicated as bold lines.
For information on cable cross-sections, see the "Appendices" (Selection of cable cross-sections).



Hot standby system

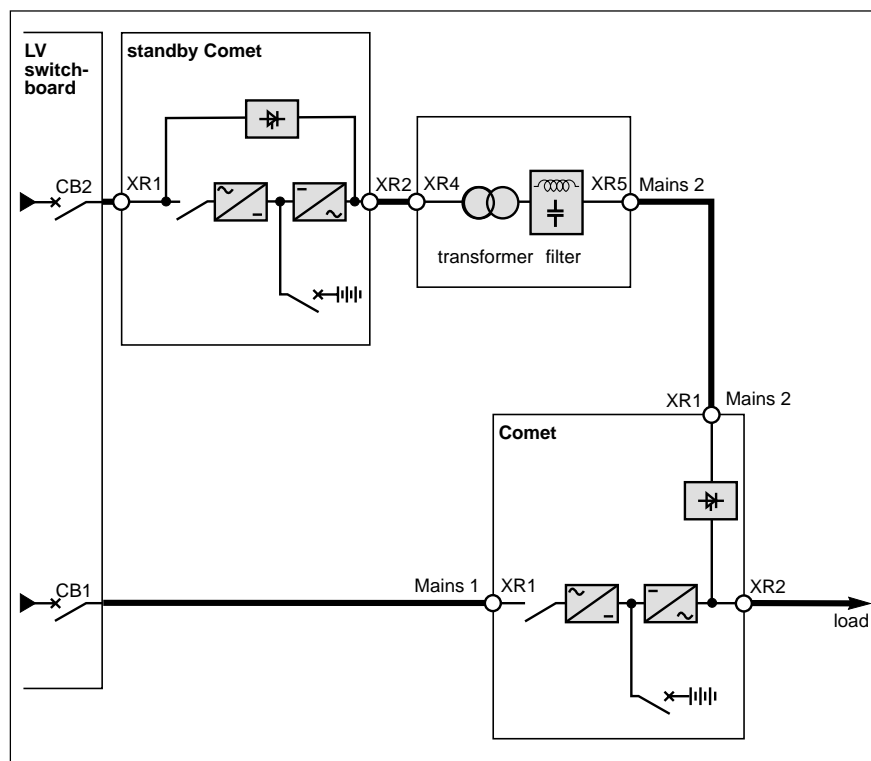
This option increases the reliability of the power supply to the load. It requires a **special configuration** of the **main Comet** (with separate Mains 2).

For the "separate Mains 2" option on the **standby Comet**, see the "separate Mains 2" section above.

Power connection diagram

The cables requiring connection are indicated as bold lines.

For information on cable cross-sections, see the "Appendices": "Selection of cable cross-sections" (the connection cables between **Comet** and the option are supplied).

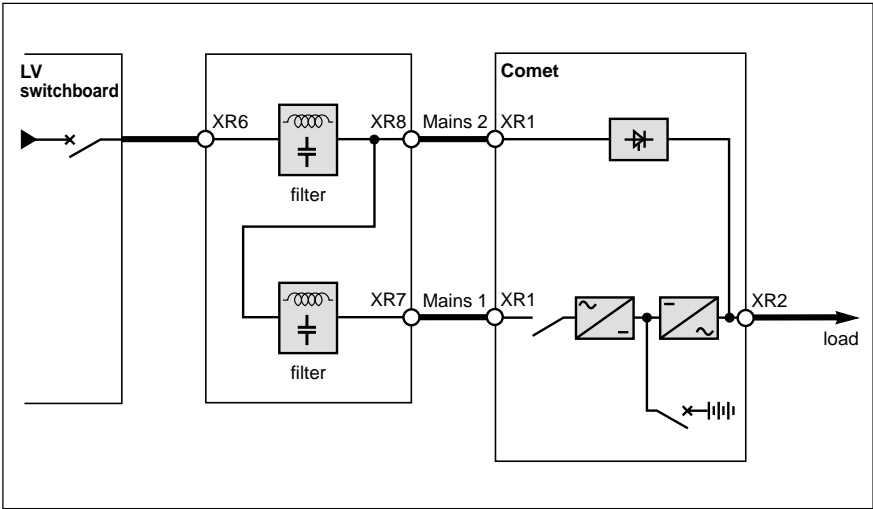


Harmonics filter

It is possible to install a harmonics filter between the AC input power source and **Comet** in order to reduce the level of current harmonics absorbed by the source. This option is available only for **Comet series 31** and **series 33** units with a rated output at least equal to 15kVA.

Power connection diagram

The cables requiring connection are indicated as bold lines.
For information on cable cross-sections, see the "Appendices": "Selection of cable cross-sections" (the connection cables between **Comet** and the option are supplied).

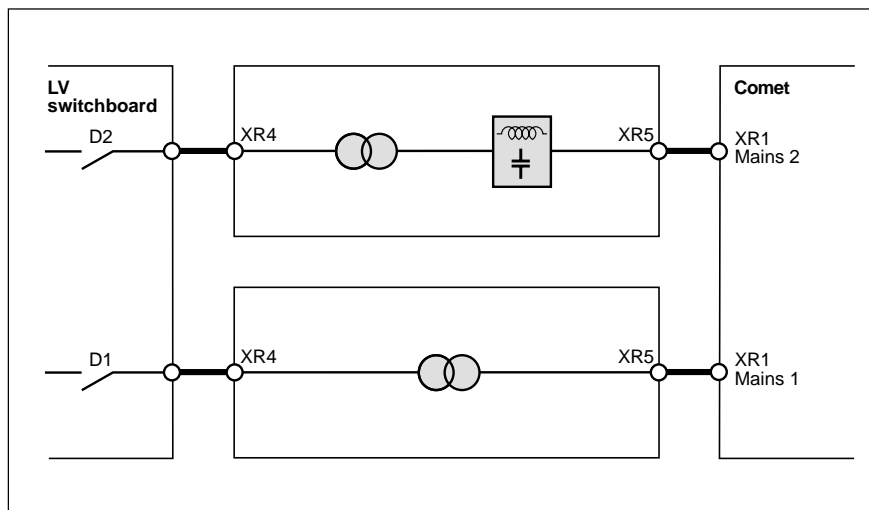


This option comprises a high-frequency filter which limits the disturbances transmitted to the AC input power supply.

Combined options

Full isolation transformer and separate Mains 2 transformer

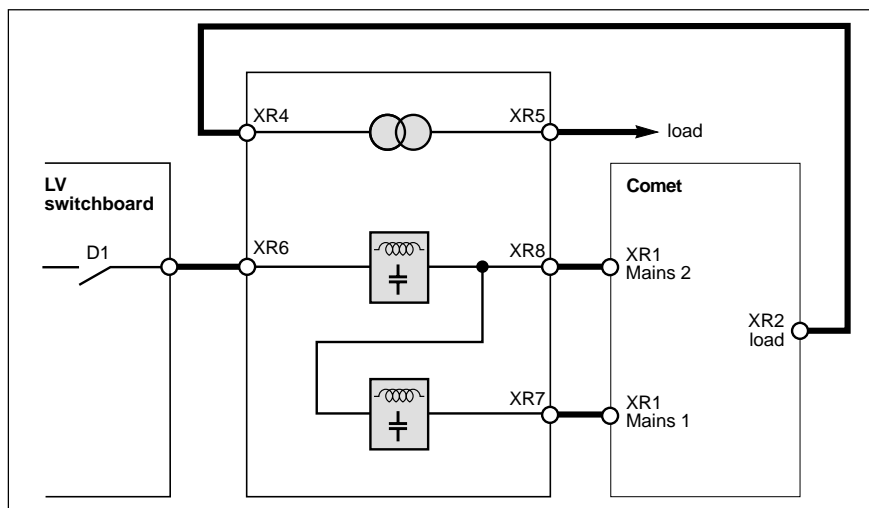
To implement a power supply via a separate Mains 2 and isolation of **Comet** from Mains 1, the two options, full isolation transformer and separate Mains 2 transformer, must be combined. Each option requires its own cubicle.



Full isolation transformer and harmonics filter

Example of a Comet series 31

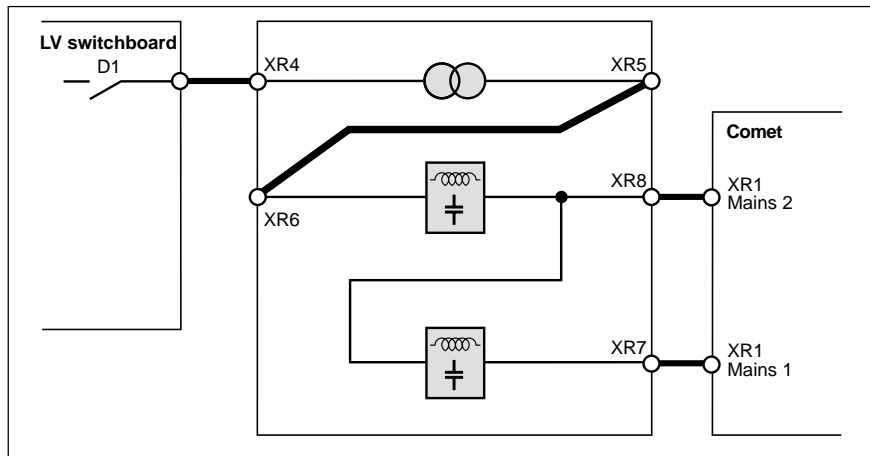
The two options are supplied in the same cubicle:



Options (cont')

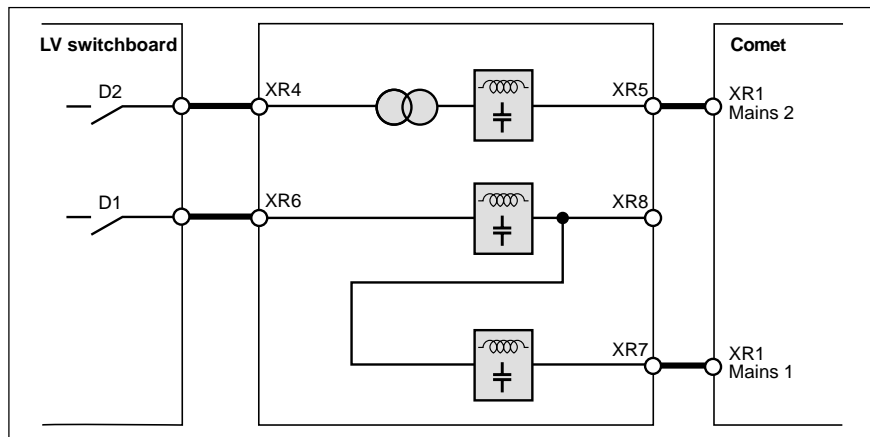
Example of a Comet series 33

The two options are supplied in the same cubicle. Connection between XR5 and XR6 is inside the cubicle:



Separate Mains 2 transformer and harmonics filter

The two options are supplied in the same cubicle:



No connections are to be made to terminal block XR8.

Relative positions of the various cubicles

If several option cubicles are combined, they must be placed to the right of the UPS cubicle in the following order (from left to right):

- ▶ battery cabinet(s);
- ▶ harmonics filter cubicle (with transformer where applicable);
- ▶ separate Mains 2 isolation transformer cubicle;
- ▶ full galvanic isolation transformer cubicle.

Appendices

General characteristics

- ▶ the **Comet** range is made up of three types of uninterruptible power supplies:
 - ▷ **Comet series 11** (single-phase input, single-phase output),
 - ▷ **Comet series 31** (three-phase + neutral input, single-phase output),
 - ▷ **Comet series 33** (three-phase + neutral input, three-phase + neutral output);
- ▶ each UPS may be configured in a number of manners via a special interface ⁽¹⁴⁾.

On the following pages, standard configuration parameters are indicated in bold type.

A modification in the configuration requires on-site servicing by the after-sales support department;

- ▶ except where indicated, the data provided are typical values corresponding to:
 - ▷ a rated single-phase voltage of 230V and a rated three-phase voltage of 400V,
 - ▷ a linear rated load with a power factor of 0.8.

Range characteristics

▶ standards

▷ design:	CEI 146
▷ product:	EN 50091
▷ safety:	CEI 950
▷ protection:	CEI 529 (IP 215)
▷ electromagnetic compatibility:	CEI 801 EN 55011 EN 55022 EN 50091-2

▶ environment conditions

▷ ambient temperature ⁽¹⁾ :	< 25°C recommended 0 to 30°C permanent 35°C up to 24 hours 40°C up to 8 hours
▷ relative humidity (%):	0 to 95
▷ maximum altitude without derating:	< 1000m

▶ configuration

▷ low battery shutdown warning (minutes):	1, 2, 3, 4 , 5, ...20
▷ inverter start-up:	automatic or manual
▷ battery charger:	internal or external
▷ transfer to bypass outside tolerances:	yes / no
▷ frequency converter:	yes / no

▶ colour

▷ standard:	RAL 9002
-------------	----------

(1): for a 5 kVA **Comet S11** or **S31**, see the "overload" section.

Comet series 11 general characteristics

▶ apparent power (kVA):	5	7.5	10
▶ active power (kW):	4	6	8
▶ efficiency (%):	91	91	91
▶ heat losses (W):	445	668	890
▶ noise level (dBa):			
▷ on RL load:	45	46	46
▷ on RCD load:	50	53	53
▶ battery backup time (minutes):			
▷ at rated load (power factor 0.6):	8	10	10
▶ maximum leakage current (mA):			
▷ directly earthed neutral system (TT):	10	23	23
▷ during a fault with an impendent neutral system:	28	60	60
▶ dimensions and weight			
▷ height (mm):	730	910	910
▷ width (mm):	360	400	400
▷ depth (mm):	420	550	550
▷ weight (kg):	90	190	210
▶ AC input			
▷ number of phases:	1		
▷ voltage (V):	187 to 257		
▷ frequency (Hz):	47 to 63		
▷ power factor:	> 0.99		
▷ current distortion (%):	< 5	< 3	< 3
▷ inrush current:	< In		
▶ AC output			
▷ number of phases:	1		
▷ voltage (V):	220 / 230 / 240		
▷ voltage tolerance (%):	± 1		
▷ frequency (Hz):	50 / 60		
▷ frequency tolerance (free-running) (%):	± 0.1		
▷ frequency tolerance (synchronized) (%):	± 1 / ± 1.5 / ± 2 / ± 3 / ± 4		
▷ synchronization rate (Hz/s):	1 / 2		

Comet series 31 general characteristics

▶ apparent power (kVA):	5	7.5	10	15	20
▶ active power (kW):	4	6	8	12	16
▶ efficiency (%):	91	91	91	92	92
▶ heat losses (W):	445	668	890	1335	1780
▶ noise level (dBa):					
▷ on RL load:	45	46	46	50	50
▷ on RCD load:	50	53	53	53	53
▶ battery backup time (minutes):					
▷ at rated load (power factor 0.6):	8	10	10	10	10
▶ maximum leakage current (mA):					
▷ directly earthed neutral system (TT):	5	11	11	24	24
▷ during a fault with an impedent neutral system:	23	45	45	102	102
▶ dimensions and weight					
▷ height (mm):	730	910	910	1085	1085
▷ width (mm):	360	400	400	560	560
▷ depth (mm):	420	550	550	680	680
▷ weight (kg):	90	190	210	390	450
▶ AC input					
▷ number of phases:	3				
▷ voltage (V):	323 to 444				
▷ frequency (Hz):	47 to 63				
▷ power factor:	> 0.95				
▷ current distortion (%):	< 26				
▷ inrush current:	< In				
▶ AC output					
▷ number of phases:	1				
▷ voltage (V):	220 / 230 / 240				
▷ voltage tolerance (%):	± 1				
▷ frequency (Hz):	50 / 60				
▷ frequency tolerance (free-running) (%):	± 0.1				
▷ frequency tolerance (synchronized) (%):	± 1 / ± 1.5 / ± 2 / ± 3 / ± 4				
▷ synchronization rate (Hz/s):	1 / 2				

Comet series 33 general characteristics

▶ apparent power (kVA):	10	15	20	30
▶ active power (kW):	8	12	16	24
▶ efficiency (%):	92	92	92	92
▶ heat losses (W):	890	1335	1780	2670
▶ noise level (dBa):				
▷ on RL load:	51	51	51	51
▷ on RCD load:	52	52	52	52
▶ battery backup time (minutes):				
▷ at rated load (power factor 0.6):	10	10	10	10
▶ maximum leakage current (mA):				
▷ directly earthed neutral system (TT):	23	23	23	23
▷ during a fault with an impendent neutral system:	90	90	250	250
▶ dimensions and weight				
▷ height (mm):	1085	1085	1385	1385
▷ width (mm):	460	460	610	610
▷ depth (mm):	680	680	780	780
▷ weight (kg):	275	350	510	600
▶ AC input				
▷ number of phases:	3			
▷ voltage (V):	323 to 444			
▷ frequency (Hz):	47 to 63			
▷ power factor:	> 0.95			
▷ current distortion (%):	< 26			
▷ inrush current:	< In			
▶ AC output				
▷ number of phases:	3			
▷ voltage (V):	380 / 400 / 415			
▷ voltage tolerance (%):	± 1			
▷ frequency (Hz):	50 / 60			
▷ frequency tolerance (free-running) (%):	± 0.1			
▷ frequency tolerance (synchronized) (%):	± 1 / ± 1.5 / ± 2 / ± 3 / ± 4			
▷ synchronization rate (Hz/s):	1 / 2			

Selection of cable cross-sections

The cross-section of cables depends on:

- ▶ current levels (temperature rise);
- ▶ permissible line voltage drop (3% for AC circuits, 1% for battery circuits);
- ▶ installation (cable rack, troughs, etc.).

Consult the applicable standards to determine the minimum cross-sections for the desired currents.

Each of the above parameters, for a given type of **Comet**, is important in determining the minimum permissible cross-sections.

When confronted with several possibilities, always select the larger value. Cables must be flexible type.

The currents indicated below are maximum values given for minimum voltages:

Comet	Comet rated output (kVA)	absorbed line currents (A)		
		AC input current (XR1)	AC output current (XR2)	battery option (XR3)
series 11	5	26	23	30
	7.5	40	35	48
	10	52	46	46
series 31 (1)	5	23 (9)	23	30
	7.5	35 (14)	35	48
	10	46 (18)	46	46
	15	69 (27)	69	76
	20	91 (36)	91	75
series 33 (2)	10	18 (26)	15 (26)	46
	15	27 (40)	23 (40)	76
	20	36 (52)	30 (52)	75
	30	54 (78)	45 (78)	112

Note 1: when a "separate Mains 2" option is installed on **Comet series 31** for the AC bypass input, the values in parentheses correspond to Mains 1 line currents and the others to Mains 2 line currents.

Note 2: for **Comet series 33**, during operation on the "static bypass" at rated output for a non-linear load, the values in parentheses correspond to the current in the AC input line neutral.

For connections to the AC input power supply and to the load, **Comet** terminal blocks accept the following cable cross-sectional areas:

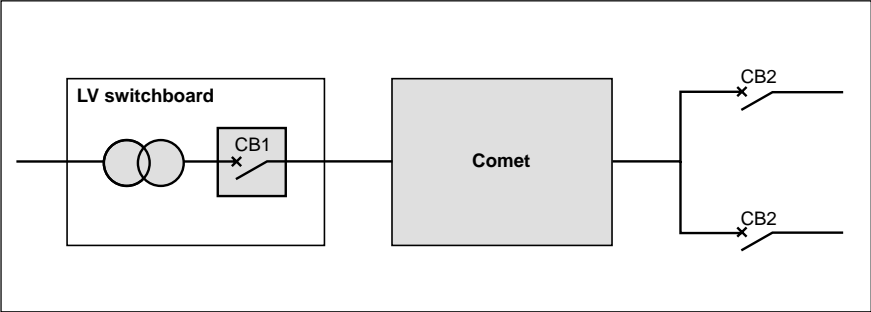
Comet	Comet rated output (kVA)	cross-sectional areas (mm ²)	
		flexible cables	rigid cables
series 11 and series 31	5	0 to 4	0 to 6
series 31	7.5 and 10	0 to 10	0 to 16
series 31	15 and 20	16 to 35	16 to 35
series 33	10 and 15	6 to 16	6 to 25
	20 and 30	16 to 35	16 to 35

Selection of protection devices

Selection of protection devices installed upstream (CB1) or downstream (CB2) from **Comet** depends on:

- the rated line current;
- the required breaking capacity.

Schematic diagram for protection devices



To ensure discrimination during overloads or short-circuits, the following protection devices are recommended:

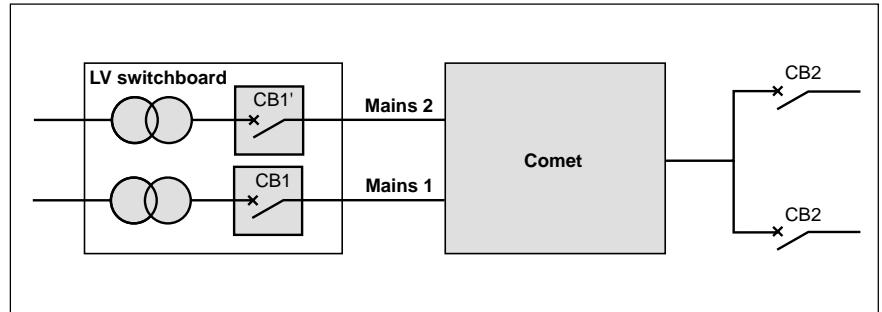
Comet	Comet rated output (kVA)	Merlin Gerin circuit breaker CB1	Merlin Gerin circuit breaker CB2
series 11	5	C60N 32A (curve D)	C60L ≤ 6A (curve Z)
	7.5	C60N 40A (curve D)	C60N ≤ 10A (curve B)
	10	C60N 63A (curve D)	C60N ≤ 10A (curve B)
series 31	5	C60N 25A (curve D)	C60L ≤ 6A (curve Z)
	7.5	C60N 40A (curve D)	C60N ≤ 10A (curve B)
	10	C60N 50A (curve D)	C60N ≤ 10A (curve B)
	15	NC100H 80A (curve D)	C60N ≤ 25A (curve B)
	20	NC100H 100A (curve D)	C60N ≤ 25A (curve B)
series 33	10	C60N 40A (curve D)	C60L ≤ 6A (curve Z) or C60N ≤ 6A (curve B)
	15	C60N 40A (curve D)	C60L ≤ 6A (curve Z) or C60N ≤ 5A (curve B)
	20	C60N 63A (curve D)	C60L ≤ 16A (curve Z) or C60N ≤ 10A (curve B)
	30	NC100H 80A (curve D)	C60L ≤ 16A (curve Z) or C60N ≤ 10A (curve B)

Note:
 The breaking capacity of the protection devices must be greater than the prospective short-circuit current.
 Consult the Schneider Electric Low Voltage Application Guide for further details.

Selection of the trip units for the circuit breakers installed upstream of the transformers must take the inrush currents (10 to 14In) into account.

If the configuration includes the "separate Mains 2" option, the protection devices recommended for Mains 1 and Mains 2 are the same as those of circuit breaker CB1 in the table above for **Comet series 11** and **Comet series 33**.
For **Comet series 31**, the recommended protection devices are given in the table below:

Schematic diagram for protection devices ("separate Mains 2" option)



Comet	Comet rated output (kVA)	Merlin Gerin circuit breaker CB1 (Mains 1)	Merlin Gerin circuit breaker CB1' (Mains 2)
series 31	5	C60N 10A (curve D)	C60N 25A (curve D)
	7,5	C60N 16A (curve D)	C60N 40A (curve D)
	10	C60N 20A (curve D)	C60N 50A (curve D)
	15	C60N 32A (curve D)	NC100H 80A (curve D)
	20	C60N 40A (curve D)	NC100H 100A (curve D)

Note:

The breaking capacity of the protection devices must be greater than the prospective short-circuit current.
Consult the Schneider Electric Low Voltage Application Guide for further details.

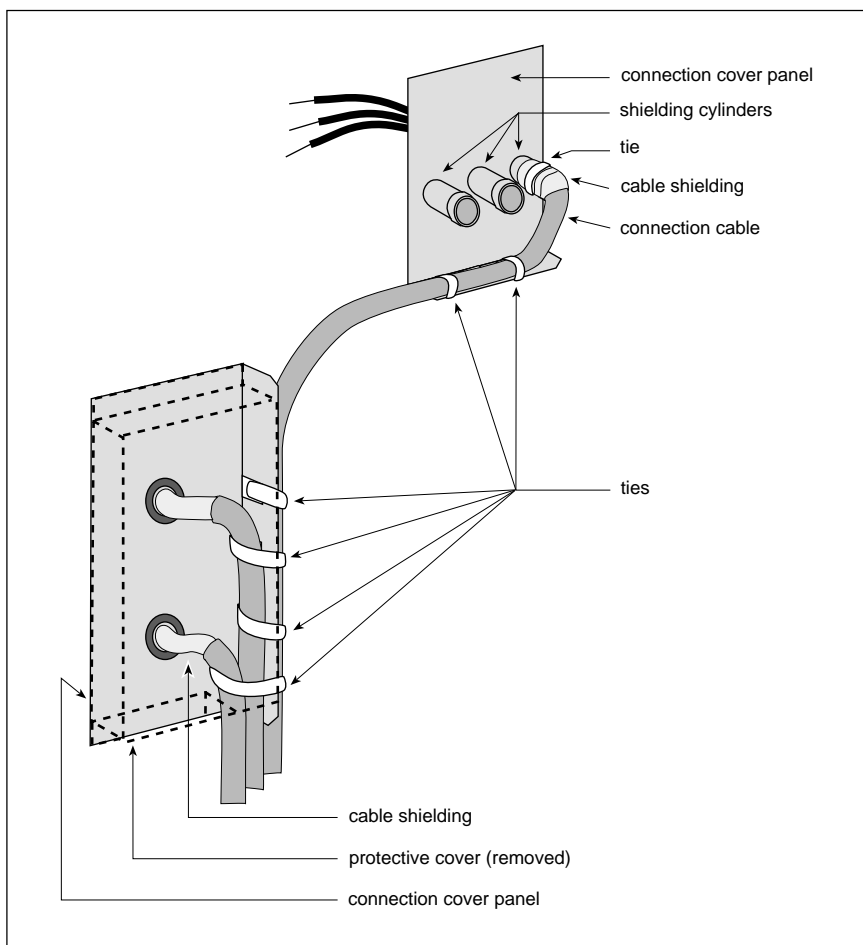
Selection of the trip units for the circuit breakers installed upstream of the transformers must take the inrush currents (10 to 14In) into account.

Connection of the cable shielding

The battery, emergency off and Mains 2 cables of 5 kVA **Comet S11** or **S31** UPSs must be shielded. This shielding must be secured to the studs provided on the connection cover panel, on the back of the UPS (see figure 2).

Each connection must be made as follows (see figure below):

- ▶ introduce the cable wires into the cylinder and keep the cable shielding outside the cylinder,
- ▶ tie the cable shielding to the cylinder, behind its shouldered part,
- ▶ connect the wires to the corresponding terminal block,
- ▶ put the connection cover panel back into place and secure it with screws,
- ▶ tie the cable(s) to the lower angle bracket of the connection cover panel and to the vertical angle bracket of the other connection cover panel with mains 1 cable and the load cable.



Glossary

Battery: a number of electrolytic cells connected together to supply electrical power. The cell electrodes operate in a liquid or gel type electrolyte.

Battery Circuit breaker: DC-power circuit breaker that protects the battery circuit (fused switch for 5 kVA **Comet S11** or **S31**).

Backup time: the duration over which **Comet** can supply full rated load without AC input power. This time depends on the battery.

Charger: device supplying the battery with DC power to recharge and/or maintain the battery at the rated charge level.

Cubicle: enclosure housing **Comet** constituent parts (rectifier, charger, inverter, "static bypass", battery, etc.).

Forced operation: user-initiated connection of the load to the inverter with a 0.5 second interruption in the supply of power.

Forced shutdown: user-initiated shutdown of the inverter due to incorrect AC input (Mains 1 or Mains 2) characteristics and resulting in a 0.5 second interruption in the supply of power.

Input power switch: switching device installed at **Comet** input and enabling rectifier shutdown.

Inverter: module that transforms input DC power into a virtually perfect sine wave (regulated, no-break current).

Load: all devices connected to **Comet** output terminals.

Load not protected: load is supplied via the "static bypass", i.e. without battery protection.

Load protected: load is supplied via the inverter, i.e. with battery protection.

Low battery shutdown warning: signal indicating the upcoming end of battery power and the resulting inverter shutdown and interruption in the supply of power to the load.

LV switchboard: low voltage switchboard upstream from **Comet**.

Mains 1 (AC input power): primary source of power for the rectifier and the inverter.

Mains 2 (AC bypass input power): source of power for the load in the event of an inverter shutdown.

Manual bypass: manual switch enabling supply of power to the load directly from AC input power during maintenance or servicing.

Output Pu: apparent power P_u supplied by **Comet** under given load conditions. It is less than or equal to the rated output P_n . The ratio P_u/P_n defines the **Comet** load level.

Overload: power drawn by the load in excess of the **Comet** rated output.

Powered down: no power is present on **Comet** circuits (battery circuit breaker off, upstream circuit breaker off).

Rated current In: rated current supplied by **Comet** (power factor 0.8).

Rated output P_n: apparent power P_n supplied by **Comet** under given load conditions (power factor 0.8).

Rectifier: device drawing from the power required by **Comet** from the AC input source. The AC input power is transformed (rectified) into DC power.

"Static bypass": power electronics equipment for switching from one power source to another without an interruption in supply. Example: transfer from inverter to bypass line or back.

Transfer: load switching from "static bypass" to the inverter or vice versa.

Transfer to bypass: load switching from the inverter to the "static bypass".

Transfer to inverter: load switching from the "static bypass" to the inverter.