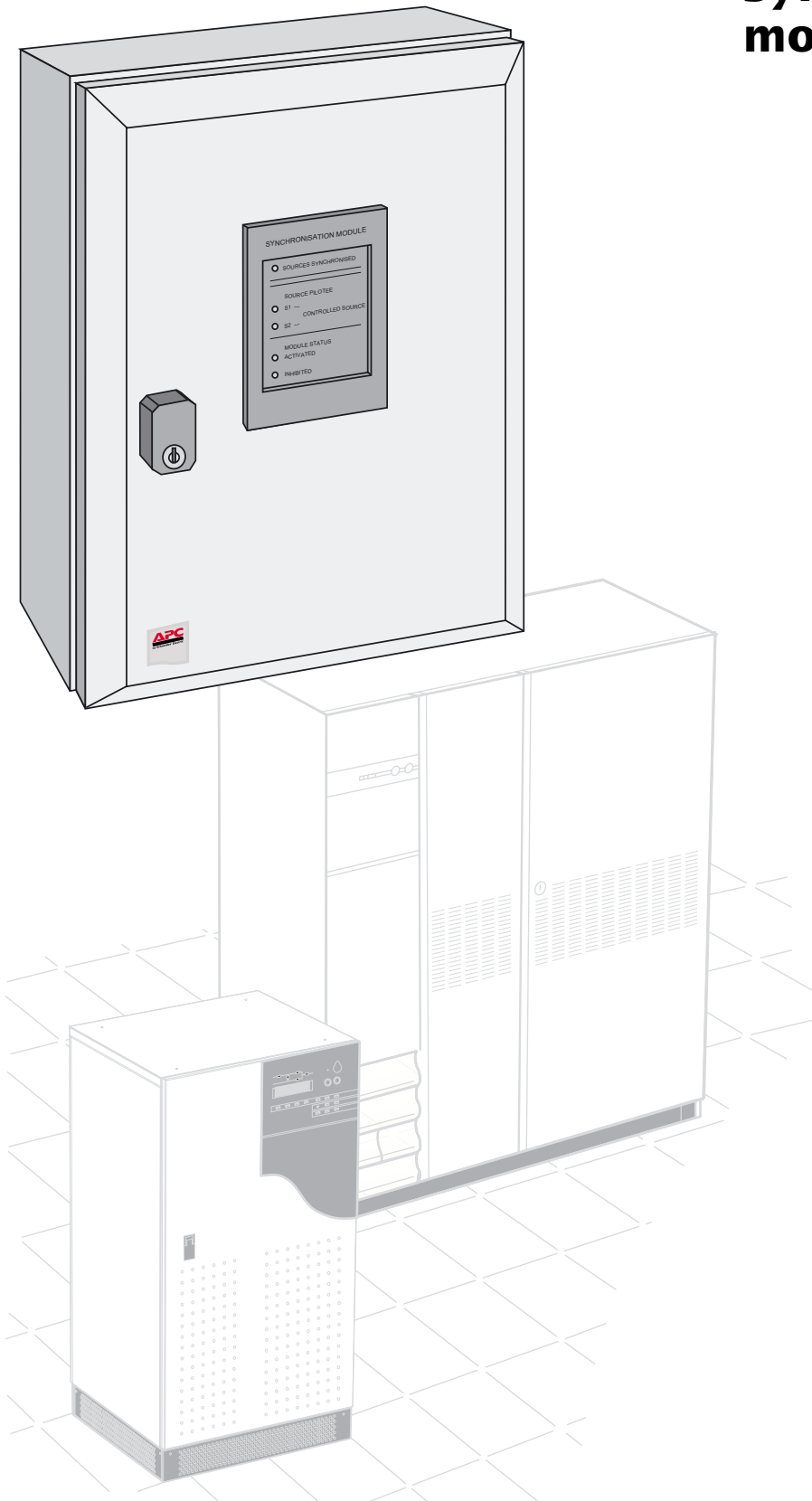


MGE™ Galaxy™ PW
MGE™ Galaxy™ 5000
MGE™ Galaxy™ 6000
MGE™ Galaxy™ 7000

Synchronisation module

**Installation and user
manual**



APC[®]

by Schneider Electric

Foreword

Pictograms



Important instructions that must always be followed.



Information, advice, help.



Visual indication.



Action.

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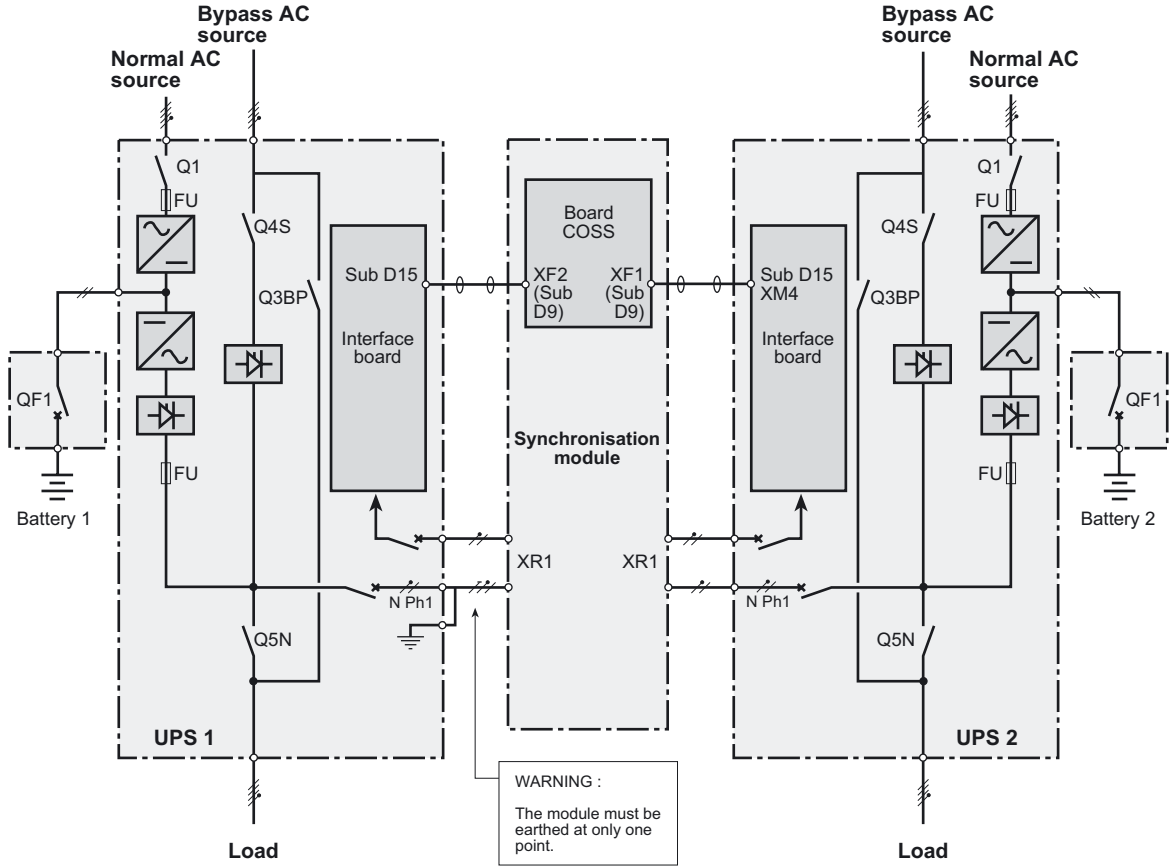
1. Installation

1.1 General

External synchronisation modules may be used with the following sources:

- ▶ MGE™ Galaxy™ PW UPSs (single units unit or parallel systems).
- ▶ MGE™ Galaxy™ 5000 UPSs (single units unit or modular or parallel systems).
- ▶ MGE™ Galaxy™ 7000 UPSs (single units unit or modular or parallel systems with centralised bypass).
- ▶ MGE™ Galaxy™ 6000 UPSs (single units unit or modular or parallel systems with centralised bypass).

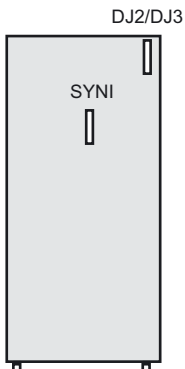
Single-line diagram



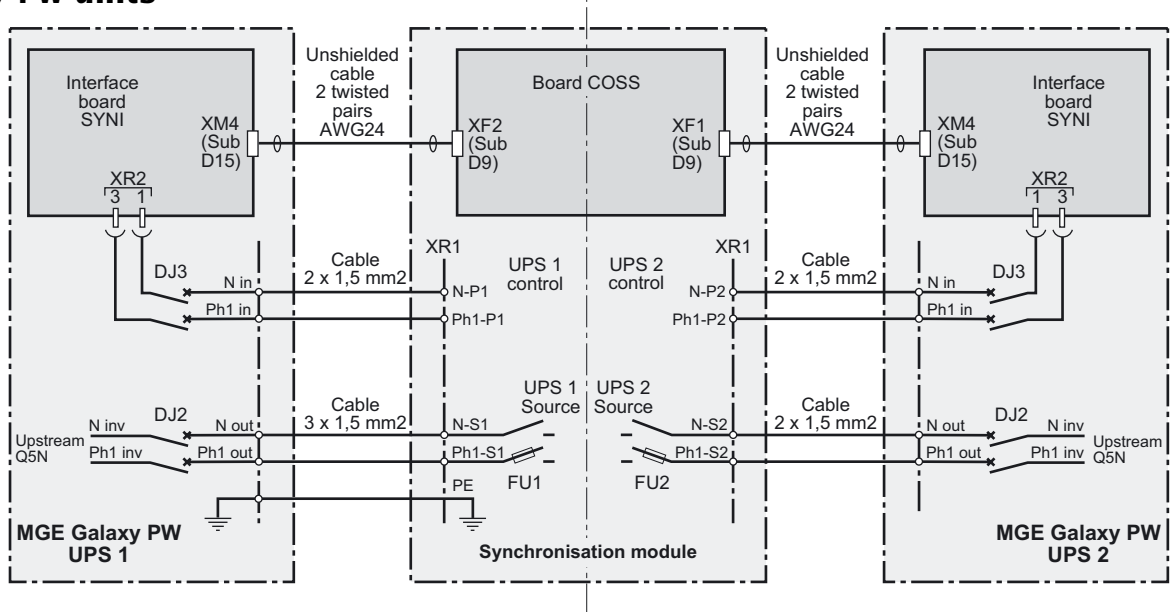
1. Installation (continued)

1.2 MGE™ Galaxy™ PW interconnections

UPS synchronisation board (SYNI) and breakers (DJ2/DJ3) location



Single Galaxy PW units



Note : for lengths > 20 m, use:

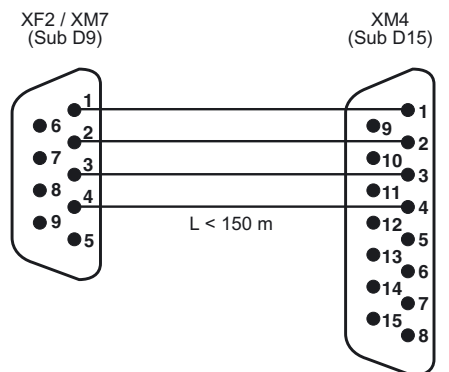
- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



Important: the synchronisation module must be earthed at one point only (see above).

Note:

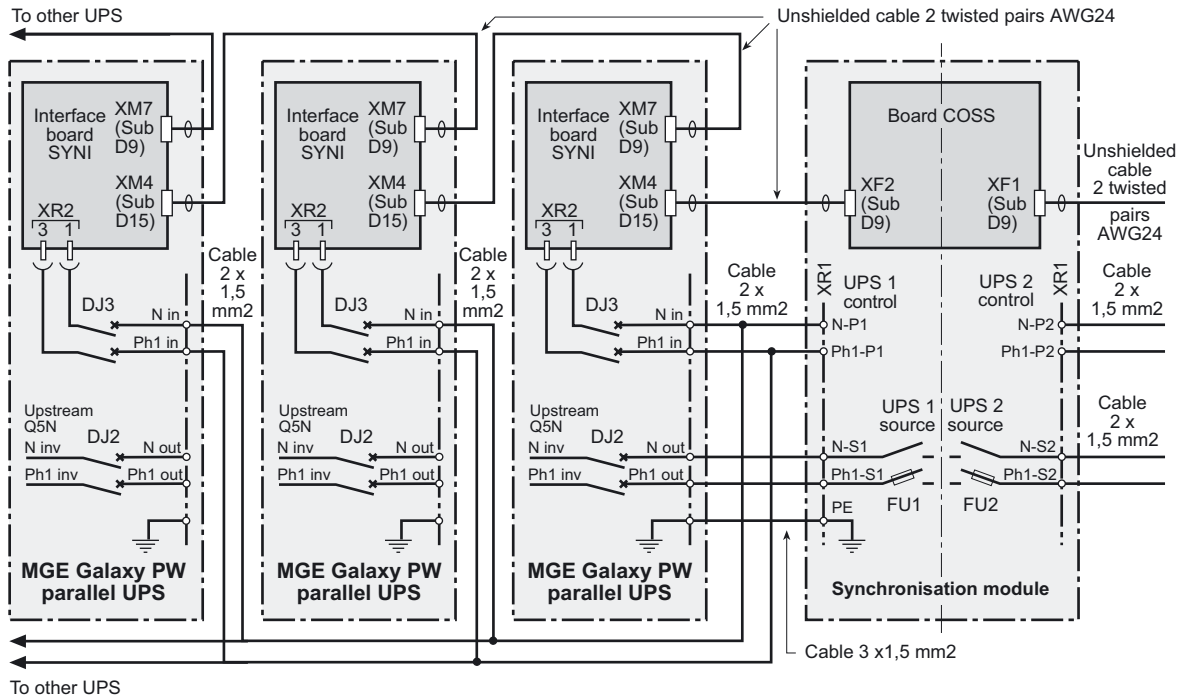
- ▶ **No personalisation required.**
- ▶ A synchronisation board (SYNI) is installed on the left side of the circuit board rack of each UPS.
- ▶ A 12m long Sub D9 / Sub D15 cable is supplied with the option. If this is too short, you can make a longer cable using the pinout diagram below and **connecting only the 4 twisted wires shown.**
- ▶ The maximum length is 150 m.



1. Installation (continued)

Parallel MGE™ Galaxy™ PW units

Three MGE™ Galaxy™ PW units in parallel:



To other UPS

Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



Note:

- ▶ A Sub D9 / Sub D15 connection cable is provided for each UPS unit of a parallel UPS system equipped with the "External synchronisation" option. These cables are used to connect one of the UPS units to the external synchronisation module and to interconnect the others in a daisy-chain arrangement (see above).
- ▶ **No personalisation required.**
- ▶ To make maintenance on the UPS, Stop the synchronisation box (Switch "Unit state" on "Disable reset" position).



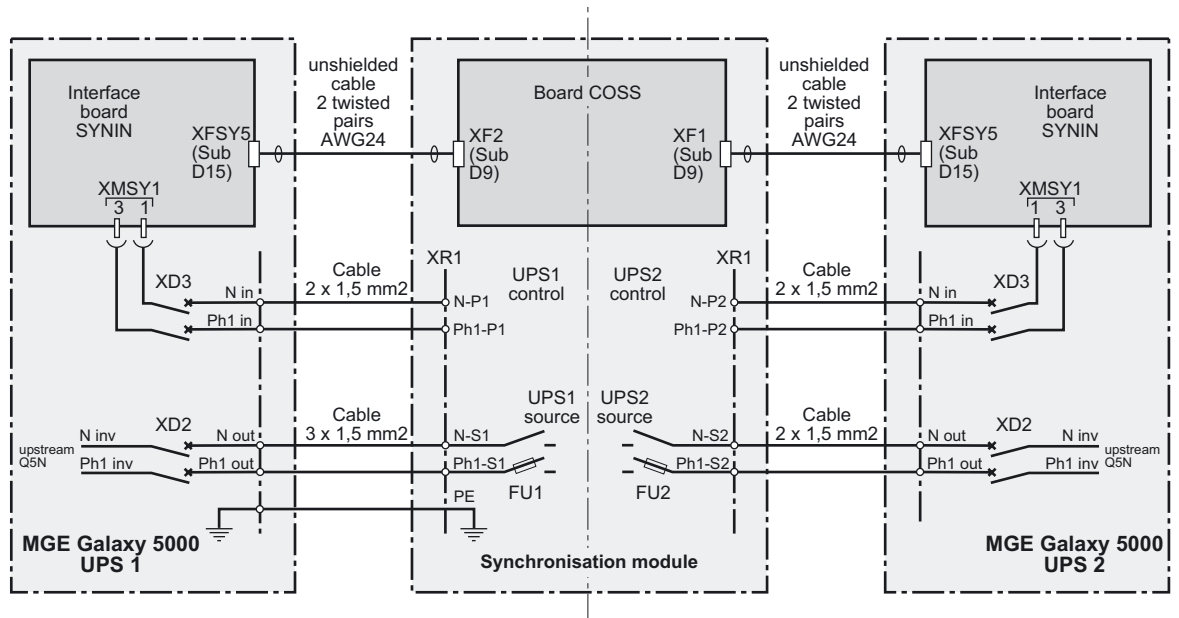
1. Installation (continued)

1.3 MGE™ Galaxy™ 5000 interconnections

UPS synchronisation board (SYNIN) and breakers (XD2, XD3) location



Single Galaxy 5000 units



Note : for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.

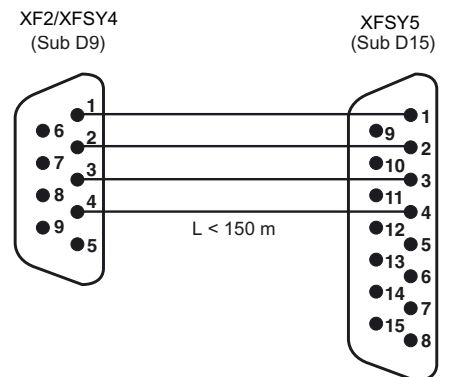


Important: the synchronisation module must be earthed at one point only (see single-line diagram, page 4).



Note:

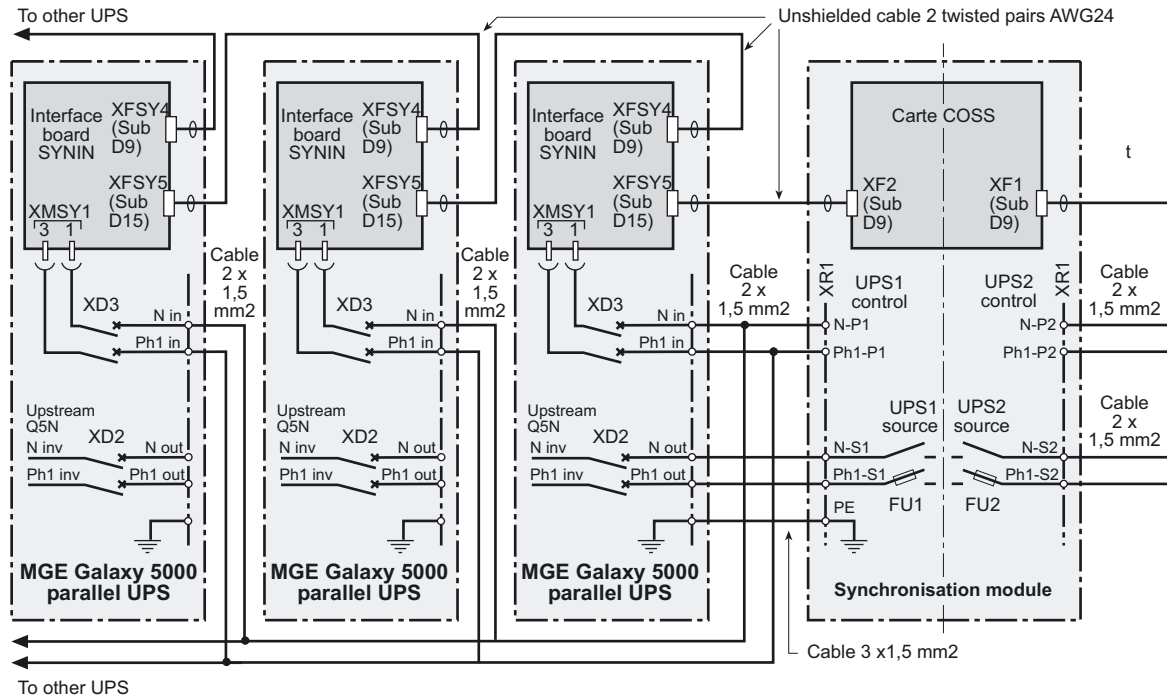
- ▶ **UPS personalisation: set external synchronisation source parameter to "Yes" with "Ups Tuner"**
- ▶ A synchronisation board (SYNIN) is installed on the left side of the circuit board rack of each UPS.
- ▶ A 12m long Sub D9 / Sub D15 cable is supplied with the option. If this is too short, you can make a longer cable using the pinout diagram below and **connecting only the 4 twisted wires shown**.
- ▶ The maximum length is 150 m.



1. Installation (continued)

Parallel MGE™ Galaxy™ 5000 units

Three MGE™ Galaxy™ 5000 units in parallel:



Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



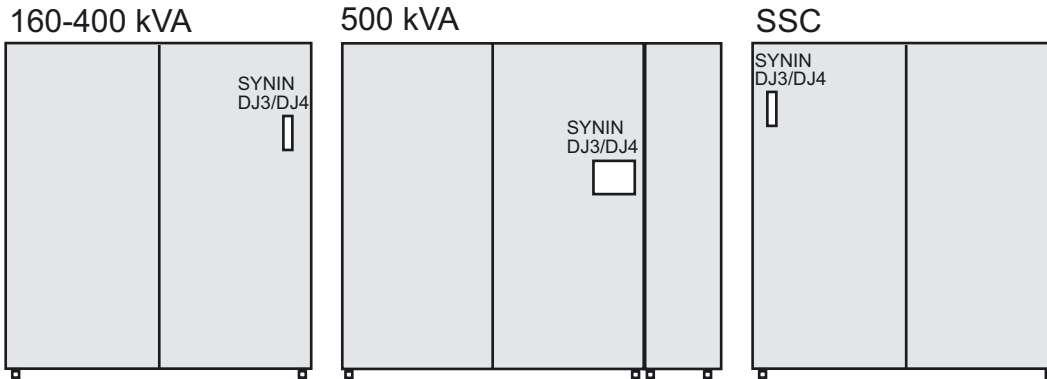
Note:

- ▶ A Sub D9 / Sub D15 connection cable is provided for each UPS unit of a parallel UPS system equipped with the "External synchronisation" option. These cables are used to connect one of the UPS units to the external synchronisation module and to interconnect the others in a daisy-chain arrangement (see above).
- ▶ **UPS personalisation: set external synchronisation source parameter to "Yes" with "Ups Tuner"**
- ▶ To make maintenance on the UPS, Stop the synchronisation box (Switch "Unit state" on "Disable reset" position).

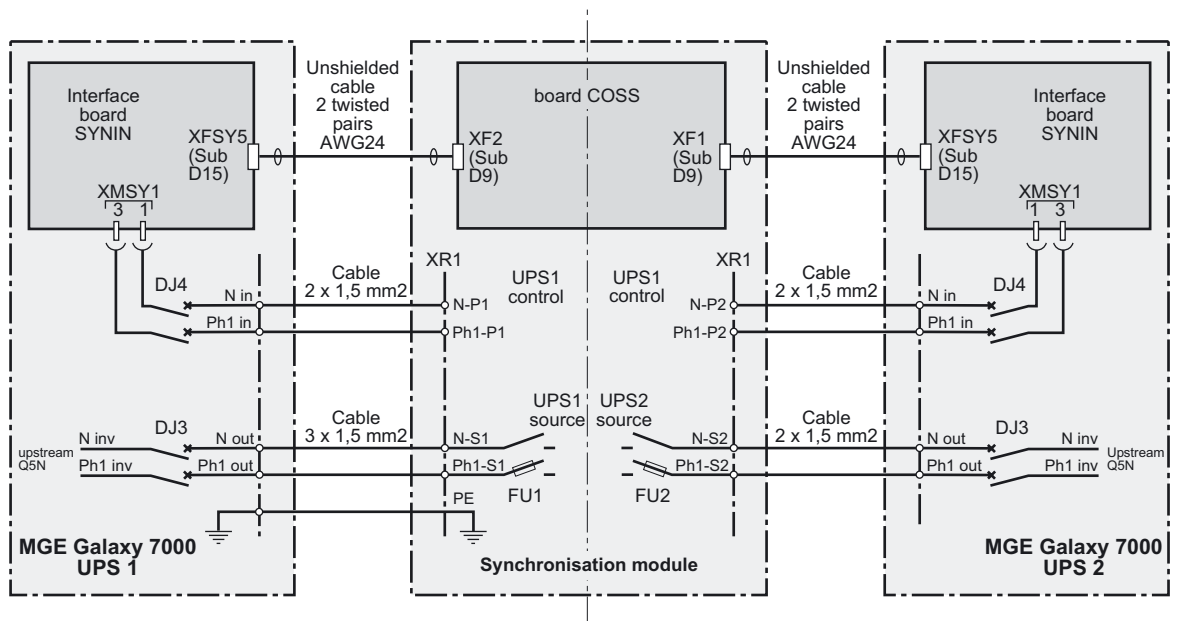
1. Installation (continued)

1.4 MGE™ Galaxy™ 7000 interconnections

UPS synchronisation board (SYNIN) and breakers (DJ3/DJ4) location



Single MGE™ Galaxy™ 7000 units



Note : for lengths > 20 m, use:

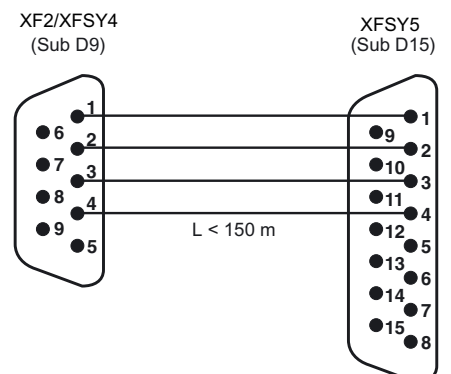
- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



Important: the synchronisation module must be earthed at one point only (see single-line diagram, page 4).

Note:

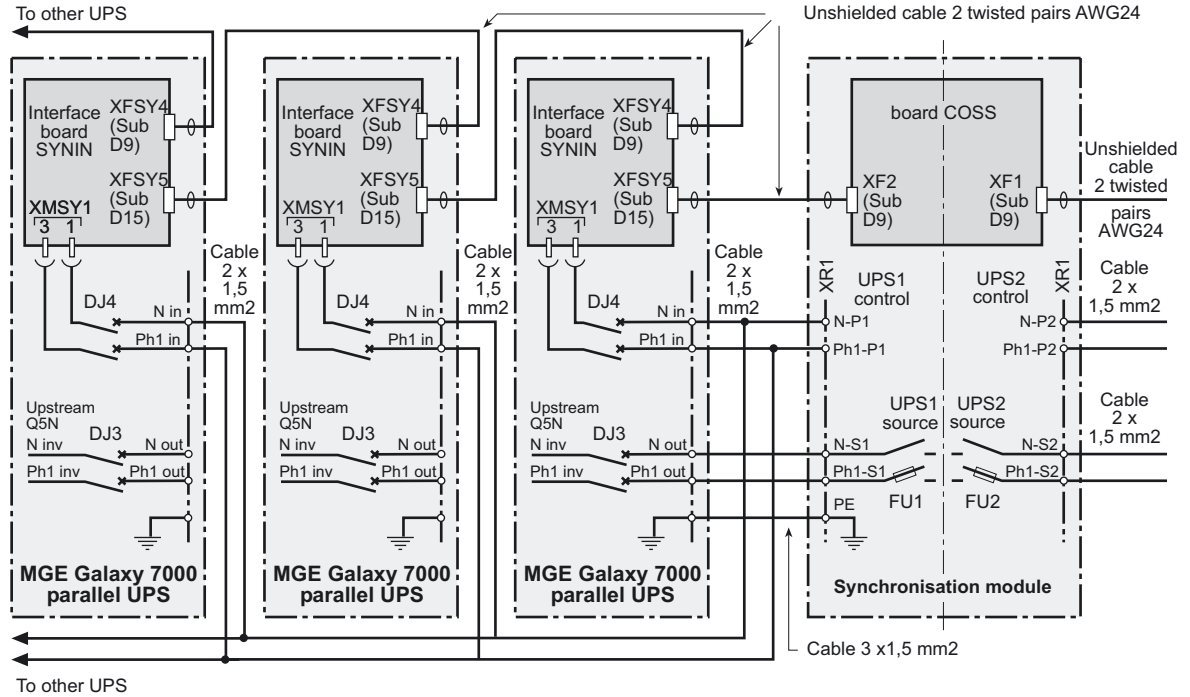
- ▶ **UPS personalisation:** set external synchronisation source parameter to "Yes" with "Ups Tuner"
- ▶ A 12m long Sub D9 / Sub D15 cable is supplied with the option. If this is too short, you can make a longer cable using the pinout diagram below and **connecting only the 4 twisted wires shown**.
- ▶ The maximum length is 150 m.



1. Installation (continued)

MGE™ Galaxy™ 7000 modular units

Three MGE™ Galaxy™ 7000 modular units in parallel:



Note : for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



Note:

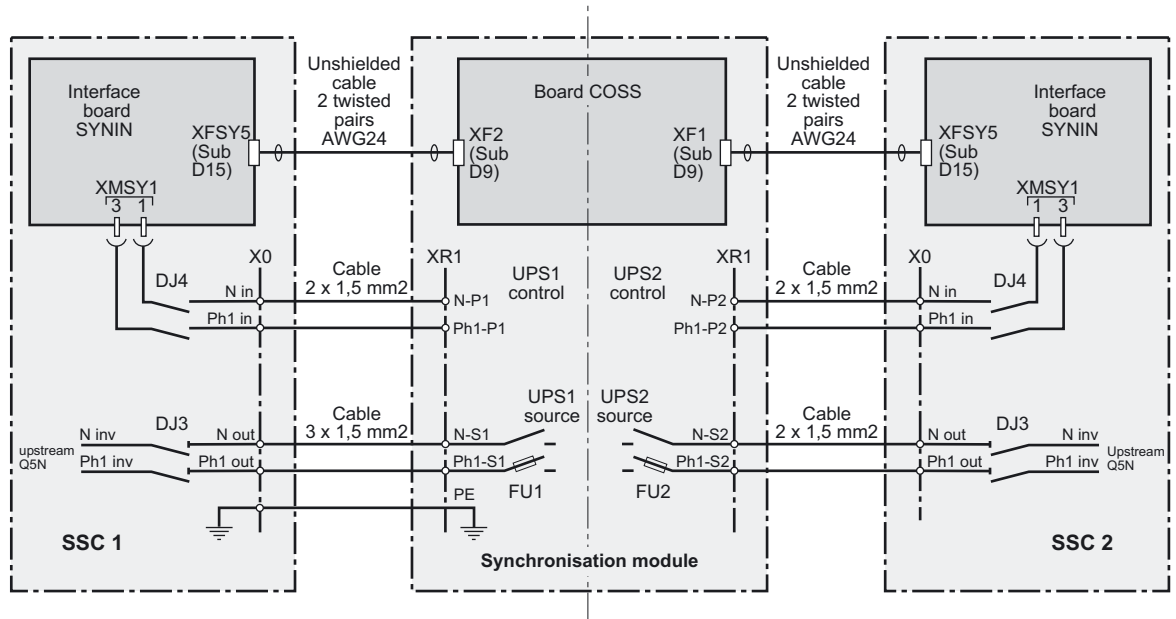
- ▶ A Sub D9 / Sub D15 connection cable is provided for each UPS unit of a parallel UPS system equipped with the "External synchronisation" option. These cables are used to connect one of the UPS units to the external synchronisation module and to interconnect the others in a daisy-chain arrangement (see previous page).
- ▶ **UPS personalisation: set external synchronisation source parameter to "Yes" with "Ups Tuner"**
- ▶ To make maintenance on the UPS, Stop the synchronisation box (Switch "Unit state" on "Disable reset" position).

1. Installation (continued)

Parallel MGE™ Galaxy™ 7000 unit with Centralised Bypass unit (SSC)



- When a source is a parallel UPS system with a centralised bypass, the SYNIN board is installed only in the centralised bypass unit.



Note: for lengths > 20 m, use:

- 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- unshielded 1,5 mm² cable for the other connections.

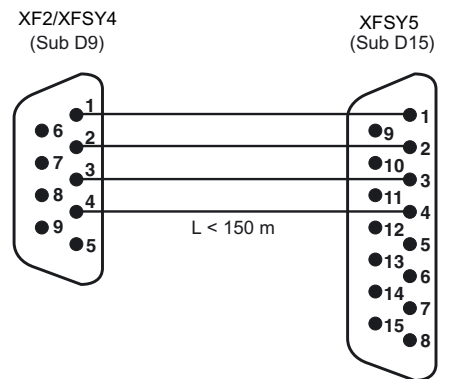


Important: the synchronisation module must be earthed at one point only (see single-line diagram, page 4).



Note:

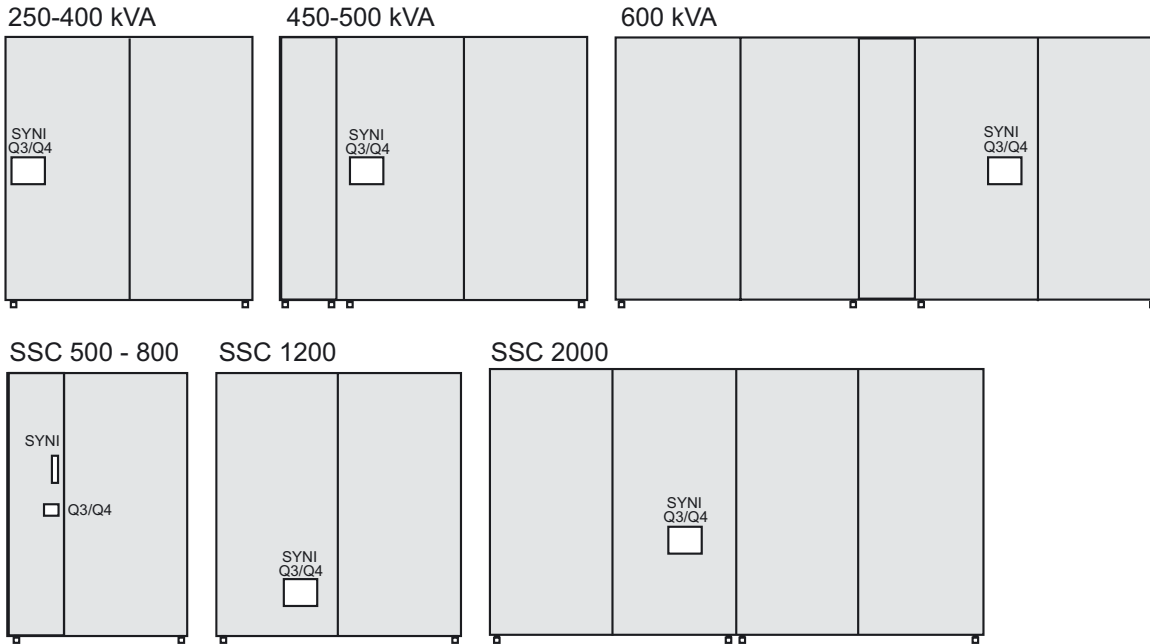
- A 12m long Sub D9 / Sub D15 cable is supplied with the option. If this is too short, you can make a **longer cable using the pinout diagram**.
- The maximum length is 150 m.
- UPS personalisation: set external synchronisation source parameter to "Yes" with "Ups Tuner"**



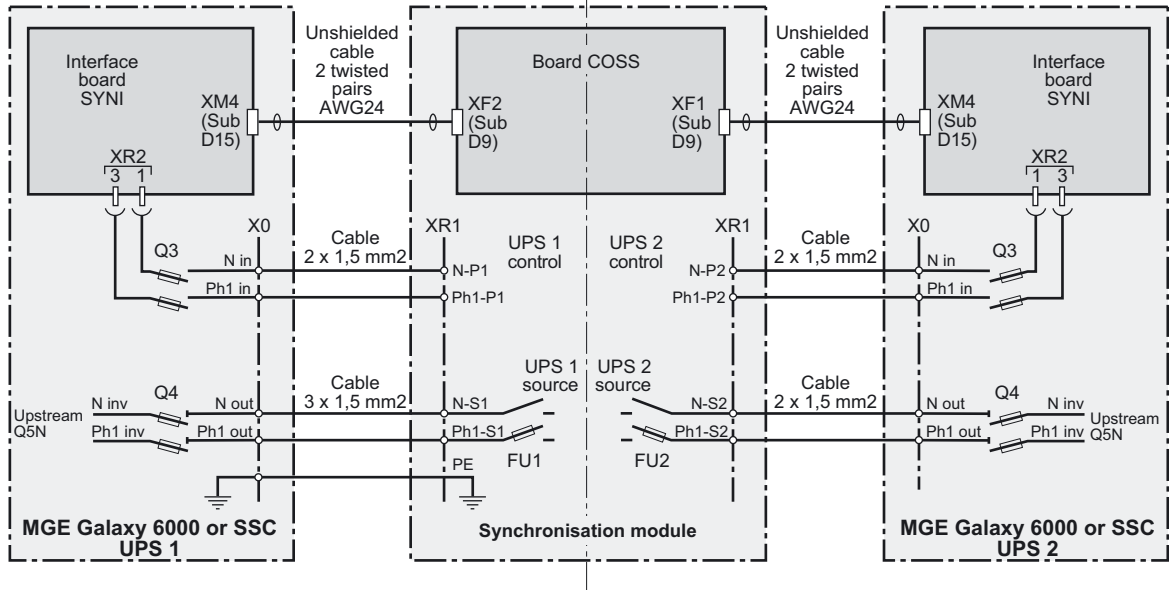
1. Installation (continued)

1.5 MGE™ Galaxy™ 6000 interconnections

UPS synchronisation board (SYNI) and breakers (Q3/Q4) location



Single MGE™ Galaxy™ 6000 unit or Centralised Bypass unit (SSC)



Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.



Important: the synchronisation module must be earthed at one point only (see single-line diagram, page 4).



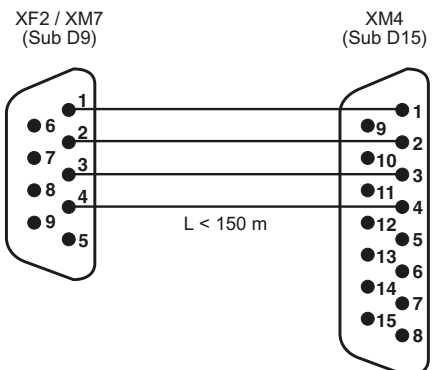
Note:

- ▶ A 12m long Sub D9 / Sub D15 cable is supplied with the option. If this is too short, you can make a **longer cable using the pinout diagram**.
- ▶ The maximum length is 150 m.
- ▶ **UPS personalisation:** set auxiliary contact OBEZ to "Transfer disabled" with "Ups Tuner".



Use with centralised bypasses:

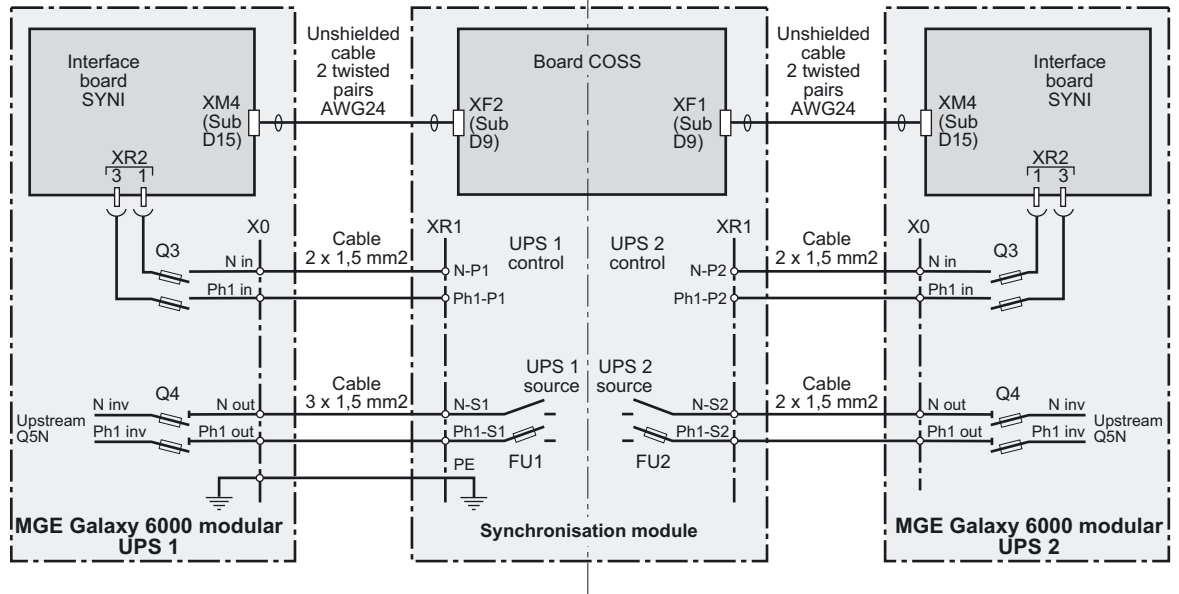
- ▶ When a source is a parallel UPS system with a centralised bypass, the SYNI board is installed only in the centralised bypass unit.



1. Installation (continued)

MGE™ Galaxy™ 6000 modular unit

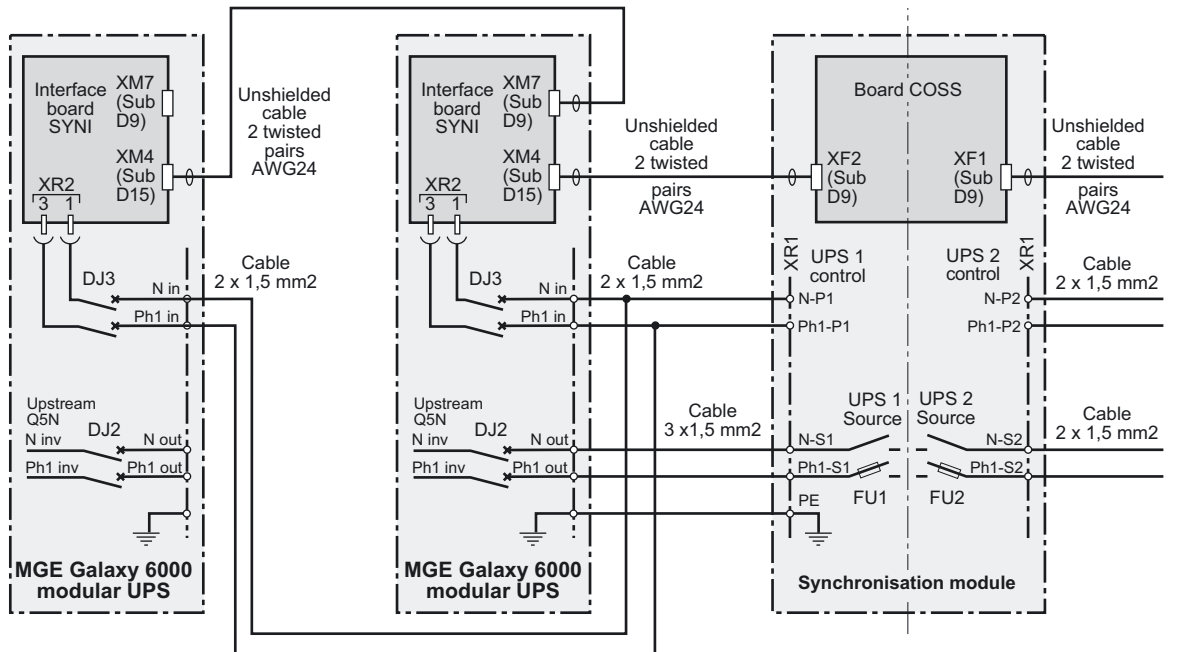
Single MGE™ Galaxy™ 6000 Modular unit:



Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.

Two MGE™ Galaxy™ 6000 modular units in parallel:

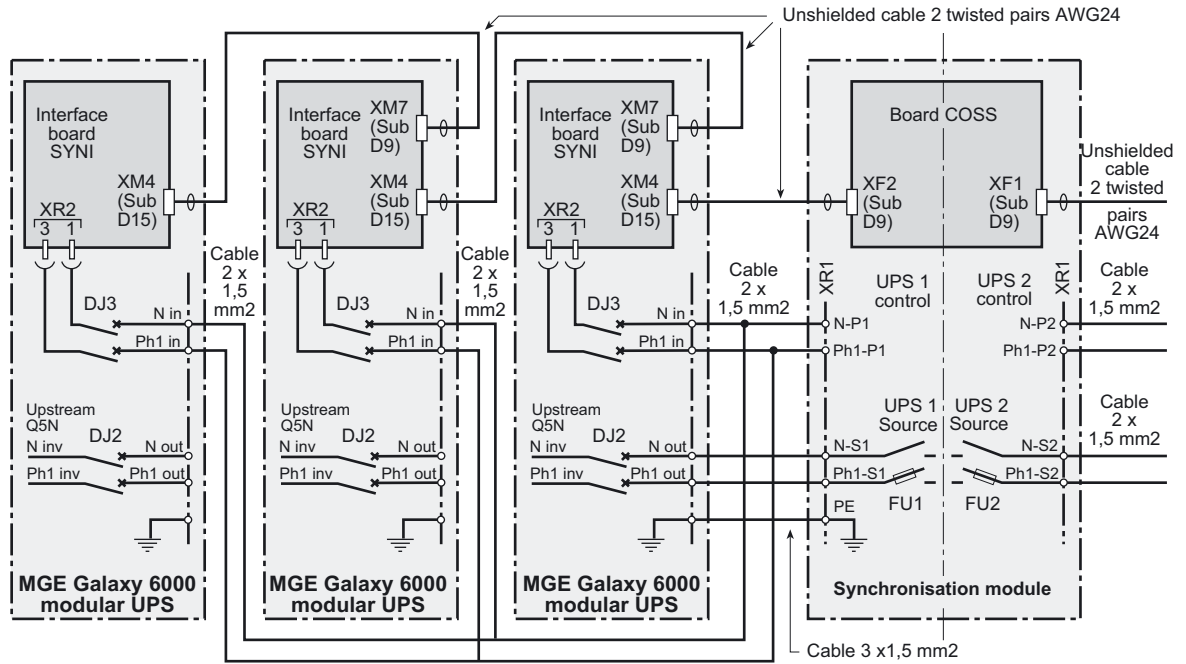


Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.

1. Installation (continued)

Three MGE™ Galaxy™ 6000 modular units in parallel:



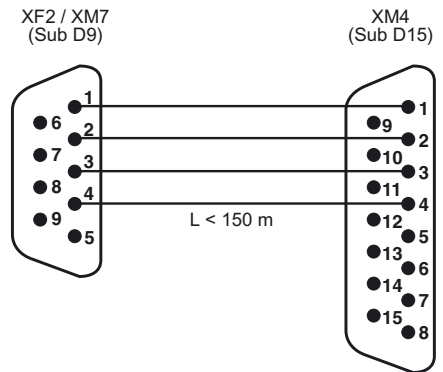
Note: for lengths > 20 m, use:

- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.

Important: the synchronisation module must be earthed at one point only (see single-line diagram, page 4).

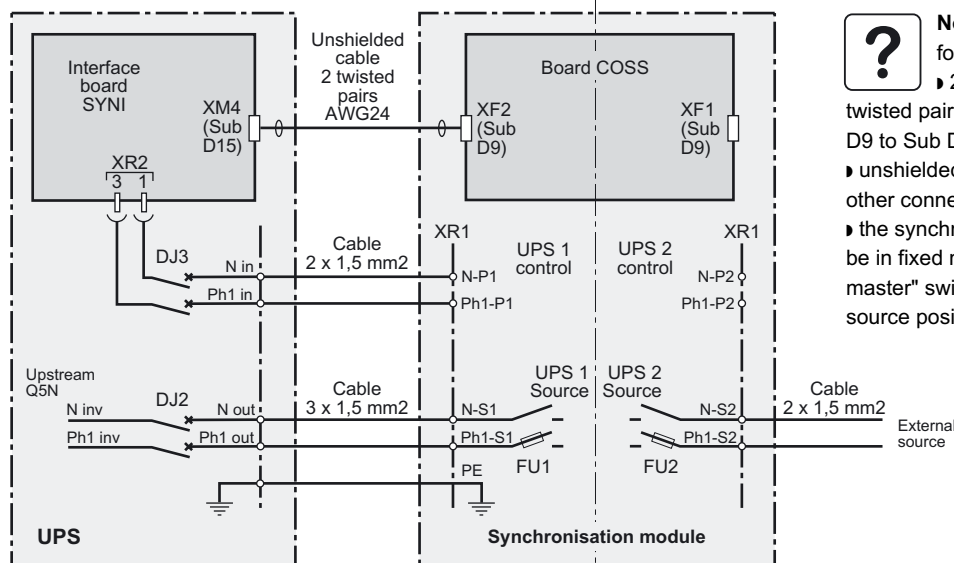
Note:

- ▶ A 12m long Sub D9 / Sub D15 cable is supplied with the option.
- If this is too short, you can make a longer cable using the opposite pinout diagram and **connecting the 4 wires showed only**.
- ▶ The maximum length is 150m.
- ▶ **No personalisation required.**
- ▶ To make maintenance on the UPS, Stop the synchronisation box (Switch Unit state on Disable reset position).



1.6 Synchronisation on external source

Interconnections



Note:

- for lengths > 20 m, use:
- ▶ 2 unshielded AWG18 twisted pairs for connection of Sub D9 to Sub D15.
- ▶ unshielded 1,5 mm² cable for the other connections.
- ▶ the synchronisation module must be in fixed mode, the "preferred master" switch on the external source position.

Important: the synchronisation module must be earthed at one point only (see above).

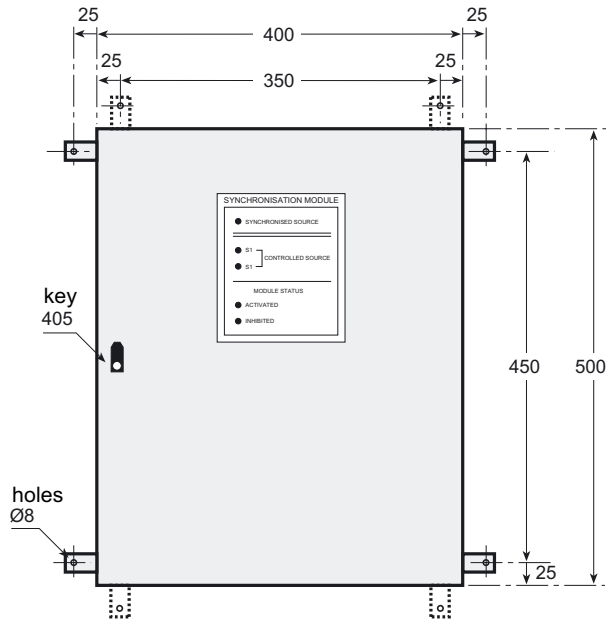


1. Installation (continued)

1.7 External synchronisation module

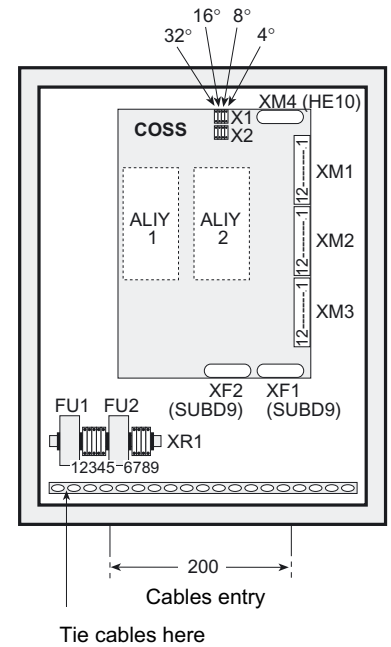
Module dimensions and mounting

Front view

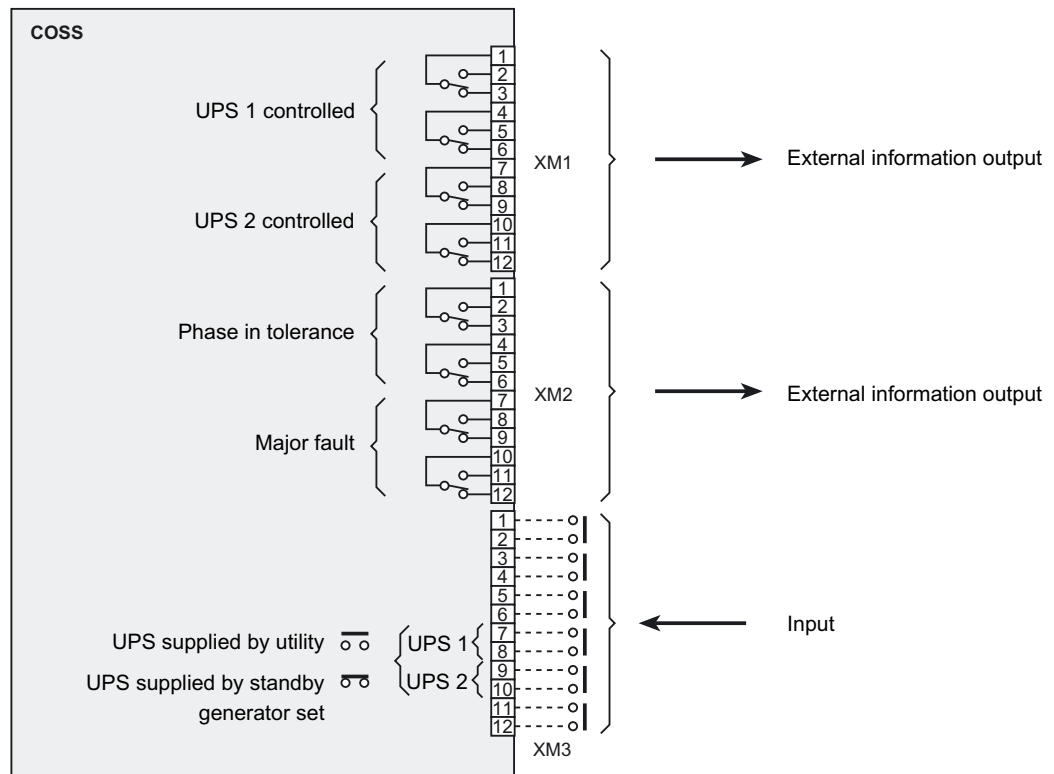


Module depth: 218 mm

Internal layout



Customer connections



The contacts are represented in unactuated state.

The "Phase in tolerance", "Major fault", "UPS1 controlled" and "UPS2 controlled" relay contacts have a breaking capacity of 30W maximum (on resistive load) for a current of 2A maximum.

Permissible voltage: SELV only.

2. Operation

2.1 Definition of the synchronisation function

This function synchronises two or more power sources supplying a static transfer switch.

The synchronisation function is designed for:

- Installations with **Galaxy** or **Galaxy PW** UPSs.
- Each source may be a single UPS unit or parallel UPS system with a centralised bypass or a modular UPS for **Galaxy** and a single or parallel system for **Galaxy PW**.

There are two possible operating modes:

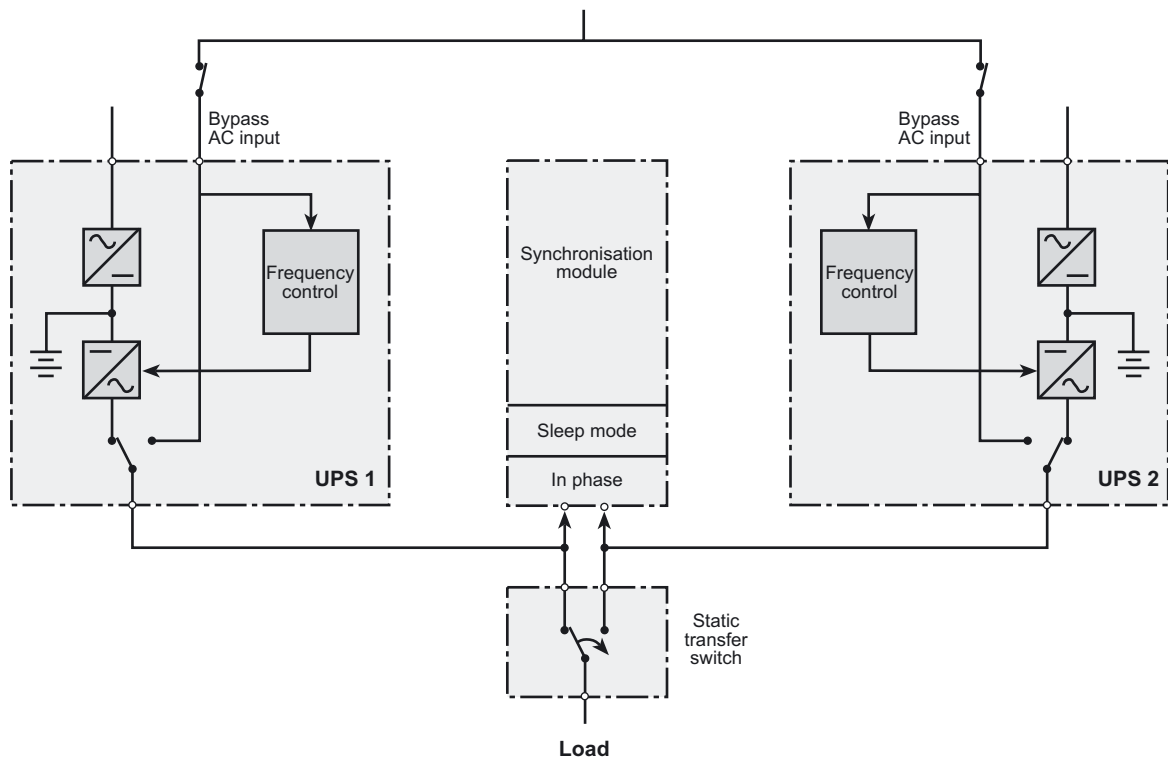
- Automatic-source mode (see fig.1), the preferred solution when both sources can be controlled.
- Fixed-source mode, used when either one source cannot be controlled (see fig.2) or when two or more sources must be synchronised with a reference source (see fig.3).

The operating mode is set using the "SOURCES SYNCHRO MODE" switch on the rear panel of each synchronisation module (see section 2.6).



Automatic-source mode (two controllable sources)

Figure 1:



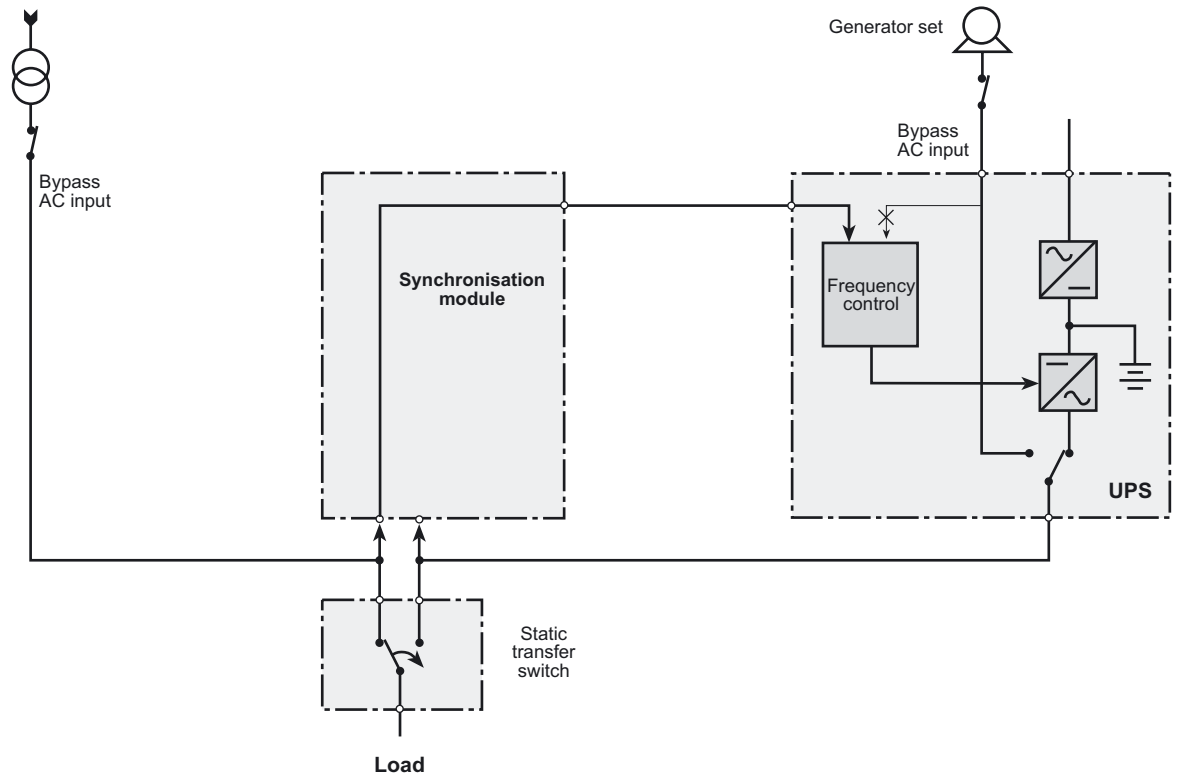
In automatic source mode, the external synchronisation module defines which source is to be controlled according to the installation status.

2. Operation (continued)

Fixed-source mode (one controllable source)

When only one of the sources can be controlled, the external synchronisation module controls that source to keep it synchronised with the source that cannot be controlled.

Figure 2:

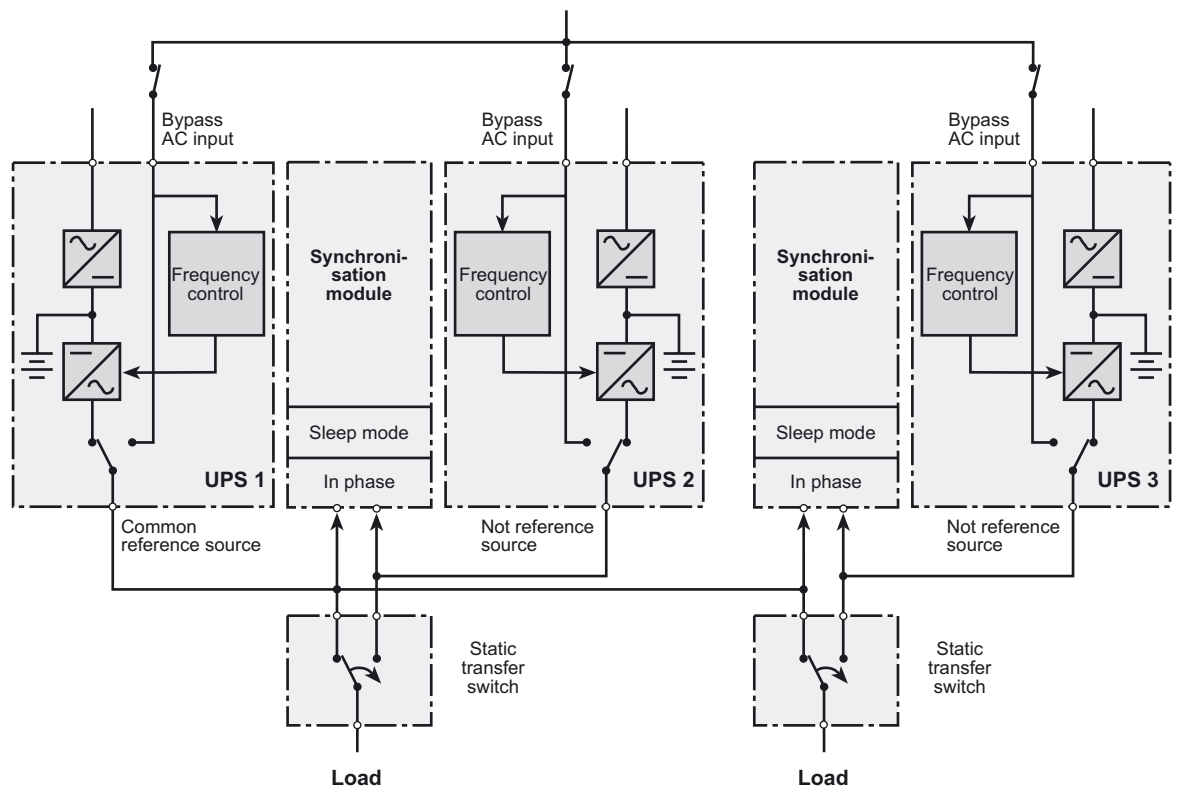


Fixed-source mode (two or more controllable sources)



To synchronise two or more controllable sources with another source (referred to as the reference source), an external synchronisation module is required for each controllable source. Each external synchronisation module must be set to fixed source mode (see section 2.6).

Figure 3:

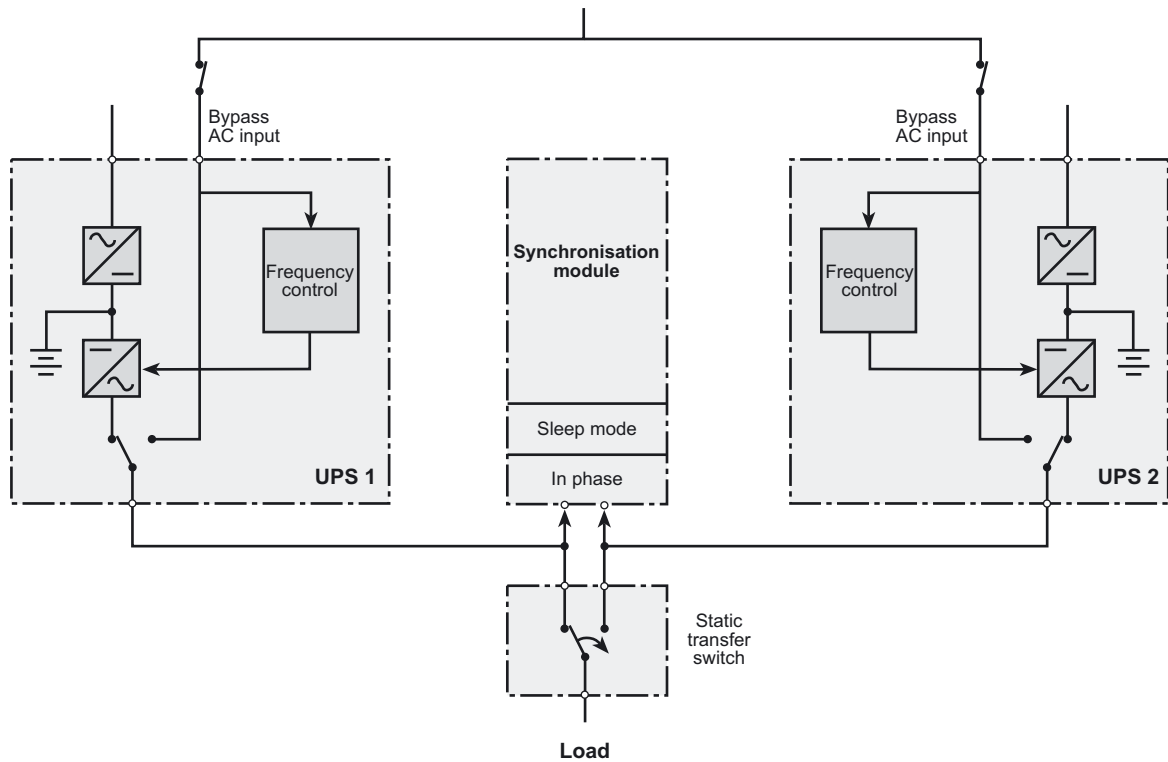


2. Operation (continued)

2.2 Automatic-source mode

General operating principle

Common UPS bypass source



► **Bypass source in tolerance:**

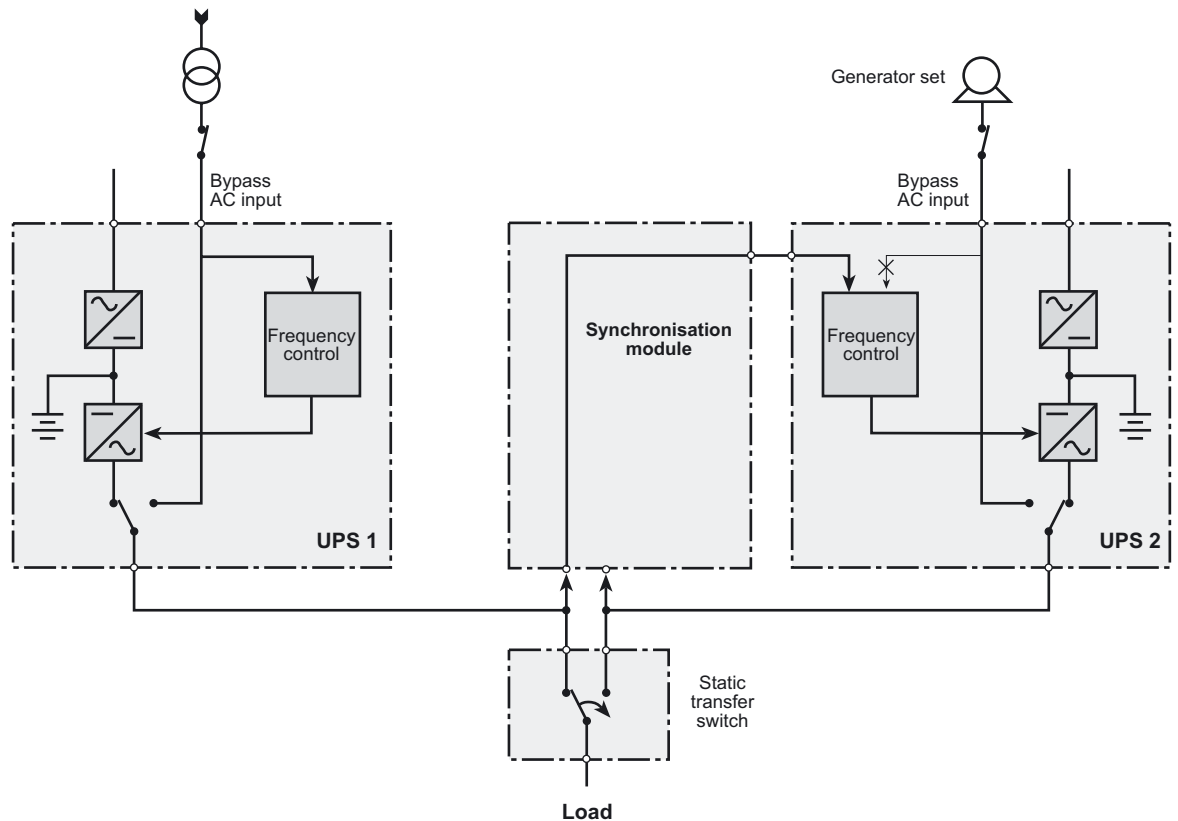
When a common bypass source (utility or generator set) is used for both UPSs supplying the static transfer switch and when this source is present and within frequency and amplitude tolerances, both UPSs automatically synchronise with it and are therefore normally synchronised between themselves. The synchronisation unit simply checks that this is the case and the external synchronisation function remains in sleep mode.

► **Bypass source out of tolerance:**

When the common bypass source disappears or is out of tolerance, the synchronisation function steps and controls one of the UPSs to re-establish synchronisation with the other. The position of the reference source switch ("PREFERRED MASTER") determines which source is controlled (the preferred master source is not controlled, see section 2.6).

2. Operation (continued)

Different UPS bypass sources



► Both bypass sources in tolerance:

If the synchronisation function detects any phase deviation between the UPS outputs, it steps in and controls one of the UPSs to re-establish synchronisation with the other. If information on the type of UPS bypass source (utility or genset) is available, the UPS with the generator-supplied bypass will be controlled (see section 2.7). If this information is not available, the position of the reference source switch ("PREFERRED MASTER") determines which source is controlled (the preferred master source is not controlled, see section 2.6).

► One of the two UPS bypass sources out of tolerance:

When the bypass source of one UPS disappears or goes out of tolerance, the synchronisation function steps in and controls that UPS to re-establish synchronisation with the other UPS.

► Both UPS bypass sources out of tolerance:

When the bypass sources of both UPSs disappear or go out of tolerance, the synchronisation function steps in and controls one of the UPSs to re-establish synchronisation with the other. The position of the reference source switch ("PREFERRED MASTER") determines which source is controlled (the preferred master source is not controlled, see section 2.6).

Operation in detail

► During normal operation, each UPS synchronises with its bypass source. The external synchronisation module remains in sleep mode, but continues to monitor the two UPSs to detect any phase deviation.

► When it detects a phase deviation between the two UPSs lasting more than nine seconds, it controls one of the UPSs. The controlled UPS synchronises with the other UPS and is therefore independent with respect to its own bypass source.

► **Consequently, transfer from the inverter to the automatic bypass is disabled for the controlled UPS.**

► Normally, the synchronisation function controls the UPS for 2 minutes, stops control and checks whether the UPSs remain in phase. If they remain in phase for 17 seconds, the external synchronisation function returns to sleep mode. However, if after twenty seven seconds of control, the two UPSs remain out of phase, the synchronisation module reverses to control the other UPS.

If the external synchronisation module is unable to control either UPS to eliminate the phase deviation, it returns to sleep mode.

2. Operation (continued)

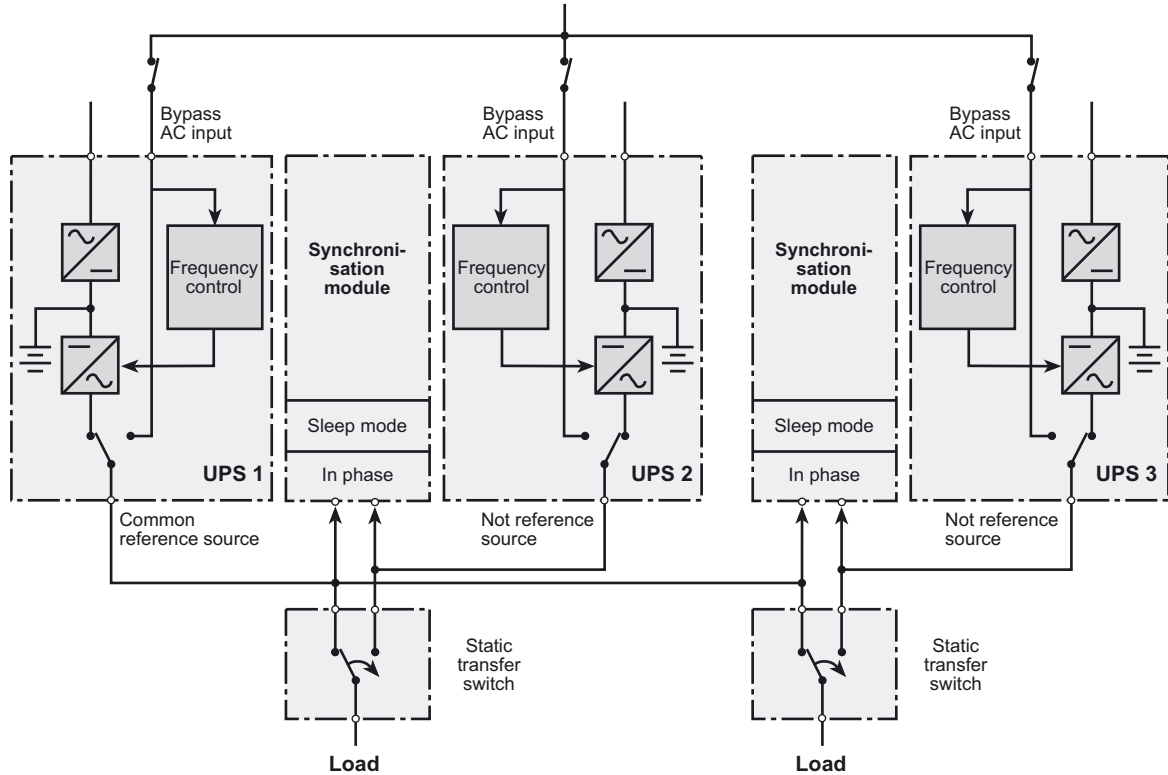
2.3 Fixed source mode

General operating principle



In "fixed source" mode, it is important to define the reference source (with "preferred master" switch, see section 2.6, there can be only one reference source).

Common Bypass AC sources



► **Bypass source in tolerance:**

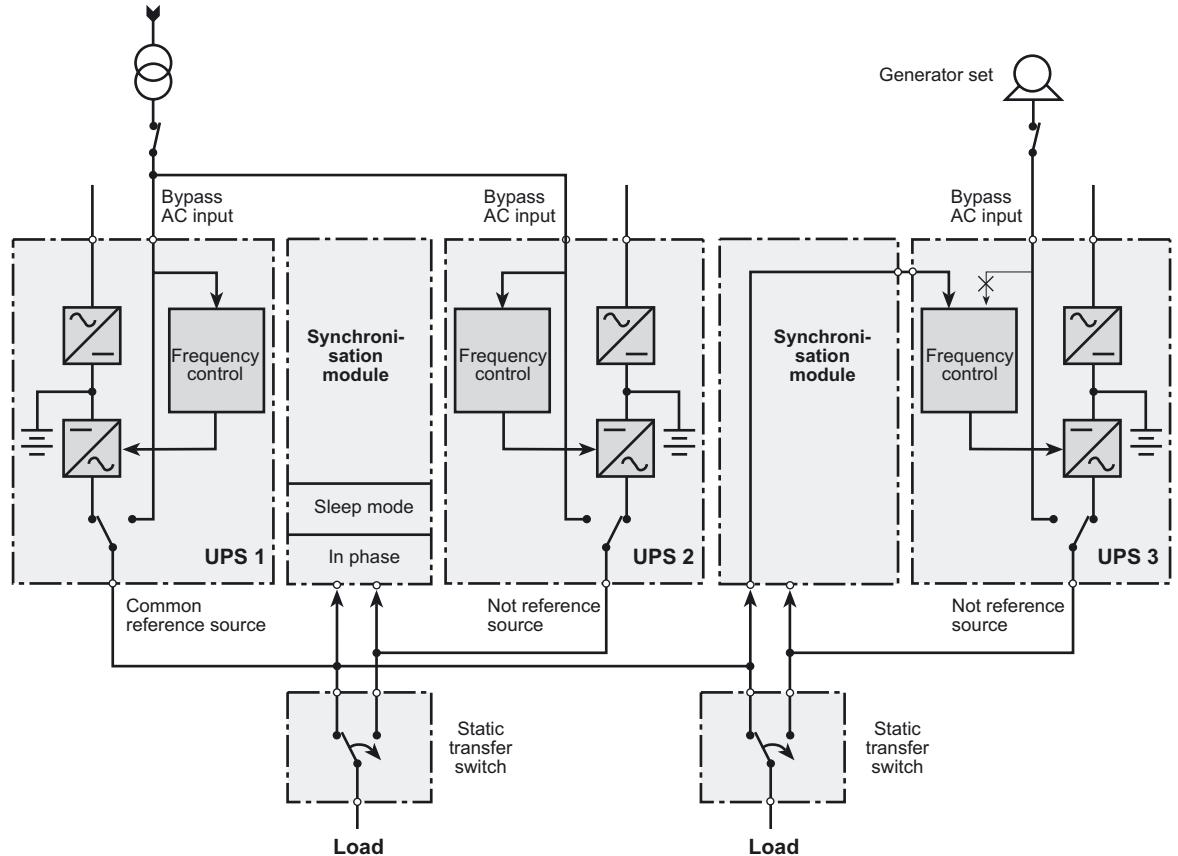
When a common bypass source (utility or generator set) is used for both UPSs supplying the static transfer switch and when this source is present and within frequency and amplitude tolerances, both UPSs automatically synchronise with it and are therefore normally synchronised between themselves. The synchronisation unit simply checks that this is the case and the external synchronisation function remains in sleep mode.

► **Bypass source out of tolerance:**

When the common bypass source disappears or goes out of tolerance, the synchronisation function steps and controls the UPS or UPSs not defined as the reference source (see the reference source setting in section 2.6).

2. Operation (continued)

Different UPS bypass sources



► Both bypass sources in tolerance:

If the synchronisation function detects any phase deviation between the UPS outputs, it steps and controls the UPS or UPSs not defined as the reference source (see the reference source setting in section 2.6).

► Bypass sources out of tolerance:

When one or more bypass sources disappear or go out of tolerance, the synchronisation function steps in and the synchronisation function steps and controls the UPS or UPSs not defined as the reference source (see the reference source setting in section 2.6).

Operation in detail

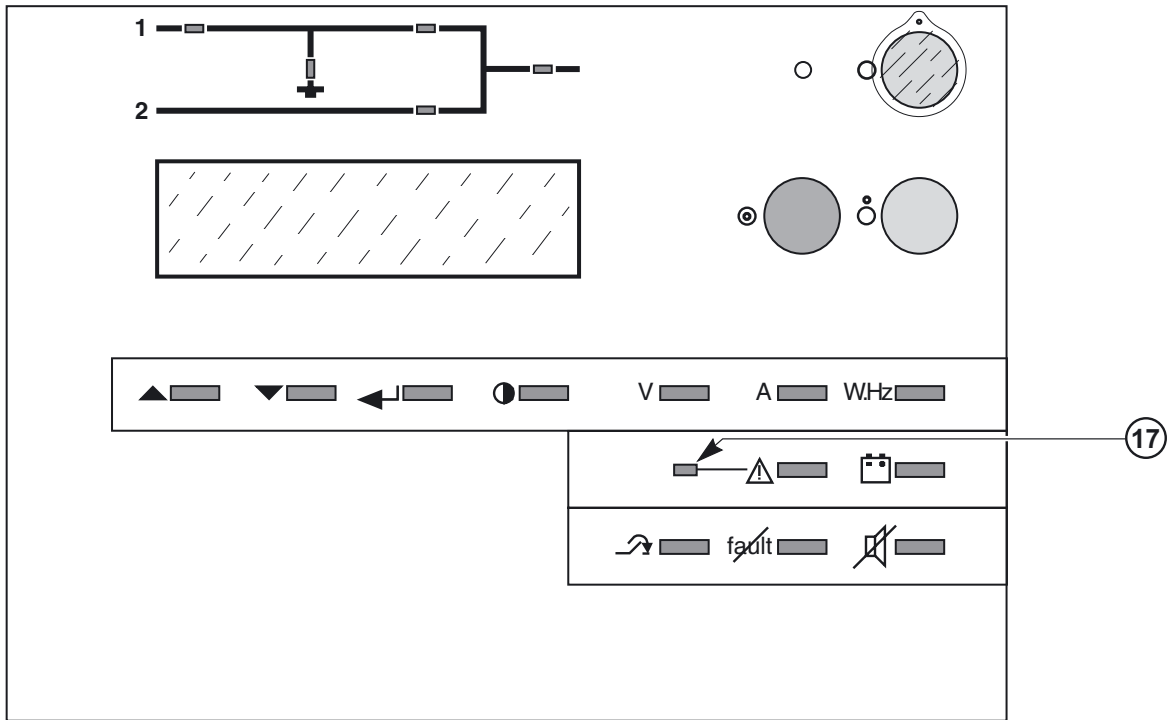
- During normal operation, each UPS synchronises with its bypass source. The external synchronisation function remains in sleep mode, but continues to monitor the sources to detect any phase deviation.
 - When it detects a phase deviation between one or more UPSs and the reference source lasting more than nine seconds, it immediately controls the UPS or UPSs that are out of phase (with respect to the reference source defined by the "PREFERRED MASTER" setting, see section 2.6).
 - A controlled UPS synchronises with the reference source and is therefore independent with respect to its own bypass source. **Consequently, transfer from the inverter to the automatic bypass is disabled for a controlled UPS.**
 - Normally, the synchronisation function controls the UPS for 2 minutes, stops control and checks whether the UPS remains in phase with respect to the reference source. If it remains in phase for 17 seconds, the external synchronisation function returns to sleep mode.
- However, if after twenty seven seconds of control, the controlled UPS remains out of phase with respect to the reference source, the synchronisation module returns to sleep mode.

2. Operation (continued)

2.4 UPS display

MGE™ Galaxy™ PW unit

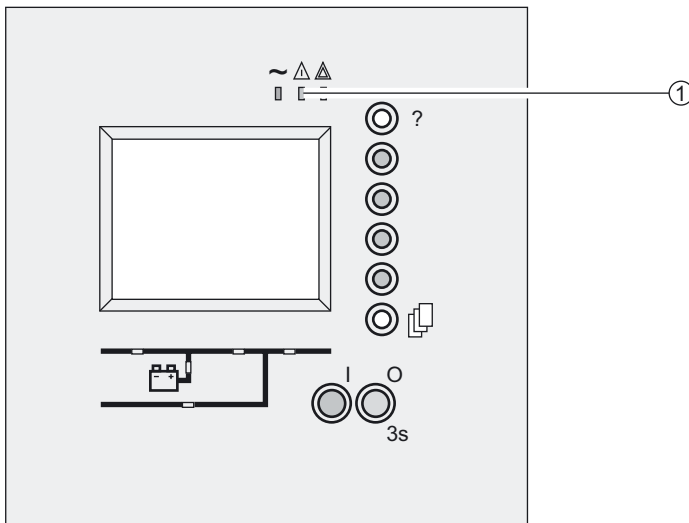
For further information on the MGE™ Galaxy™ PW display, see the user manual (document 51028230XT).



When a UPS is controlled by the external synchronisation module, alarm light ⑰ goes on and the message "Inverter operation forced by external command, transfer disabled" is displayed on the monitor.

MGE™ Galaxy™ 5000 unit

For further information on the MGE™ Galaxy™ 5000 display, see the user manual (document 34001813XT).

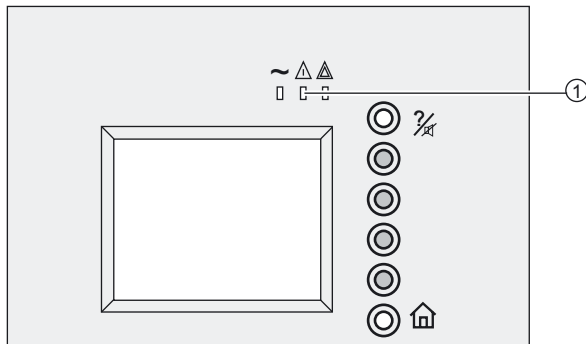


When a UPS is controlled by the external synchronisation module, alarm light ① goes on and the message "UPS on external synchronisation" is displayed on the status screen.

2. Operation (continued)

MGE™ Galaxy™ 7000 unit

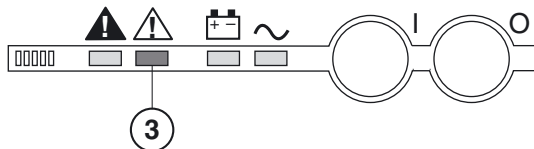
For further information on the MGE™ Galaxy™ 7000 display, see the user manual (document 34020847XT).



When a UPS is controlled by the external synchronisation module, alarm light 1 goes on and the message "UPS on external synchronisation" is displayed on the status screen.

MGE™ Galaxy™ 6000 unit

For further information on MGE™ Galaxy™ 6000 UPS or centralised bypass displays, see the user manual (document 6739380XT).



When a UPS (or a centralised bypass unit) is controlled by the external synchronisation module, light 3 goes on and the following messages are displayed:

- ▶ On a single MGE™ Galaxy™ 6000 UPS:
 - "Transfer disabled".
 - "Auxiliary control".
- ▶ On a MGE™ Galaxy™ 6000 parallel UPS system with centralised bypass:
 - ▷ Message displayed on centralised bypass unit:
 - "UPS imposed".
 - "Transfer disabled".
 - "Auxiliary control".
 - ▷ Message displayed on UPS:
 - "UPS imposed".
 - "Transfer disabled".
- ▶ On a MGE™ Galaxy™ 6000 modular:
 - "UPS imposed".
 - "Transfer disabled".
 - "Load protected, problem".

2.5 Display (front panel)

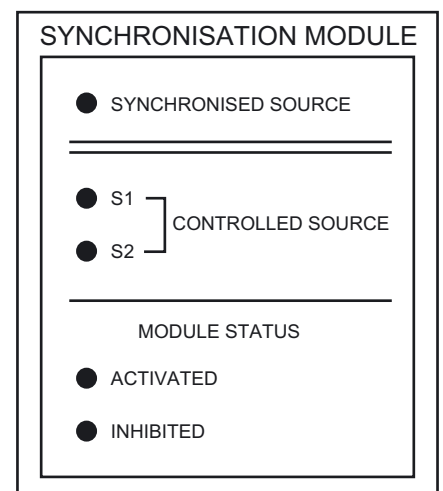


- ▶ **Sources synchronised:**
This LED is on when the phase deviation is within tolerances.
- ▶ **Controlled source:**
This LED indicates the controlled source.
- ▶ **Module status / Activated:**
The synchronisation function is activated (no minor or major faults, function not disabled).
- ▶ **Module status / Inhibited:**
The synchronisation function has been disabled or there is a minor or major fault.

Note: for minor or major faults, see section 2.7 (internal checks).



Front panel:



2. Operation (continued)

2.6 Controls (rear panel)

Preferred master:

▶ in automatic source mode:

The "PREFERRED MASTER" switch is used to select the reference source if the two UPS sources have the same status (Source S1 selected → S2 controlled).

▶ in fixed source mode:

The "PREFERRED MASTER" switch is used to select the reference source (Source S1 selected → S2 controlled).

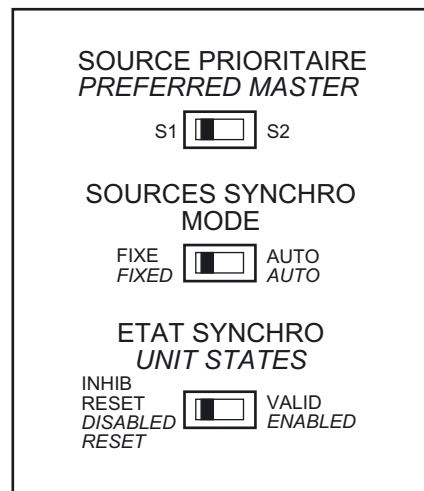
Auto / fixed source:

This "SOURCE SYNCHRO MODE" switch is used to select the operating mode (automatic source or fixed source).

Disabled / reset / activated:

The "UNIT STATE" switch is used to disable or reset the synchronisation function ("INHIB/RESET" setting) or to activate the synchronisation function ("VALID" setting).

Switch diagram:



2.7 External input-output signals

External input signals

The synchronisation function is informed of the source type by a relay contact (see section 1.4), the synchronisation module will know which source will be controlled (master being utility or generator set):

- ▶ **Utility:** contact open between 7 and 8 for source 1 and between 9 and 10 for source 2.
- ▶ **Engine generator set:** contact closed between 7 and 8 for source 1 and between 9 and 10 for source 2.

External output signals

The following information is indicated by relay contacts (see section 1.4):

▶ Sources synchronised:

Two relay contacts are actuated when the phase deviation between the two monitored sources is within tolerances.

▶ Source 1 controlled:

Two relay contacts are actuated when Source 1 is controlled.

▶ Source 2 controlled:

Two relay contacts are actuated when Source 2 is controlled.

▶ Major fault:

Two relay contacts are actuated when a major fault is detected.

A major fault is an internal fault resulting from a failure of the internal clock or the sequencer.

2.8 Internal checks



▶ The output voltage of each UPS is monitored:

- ▷ if a voltage disappears (**minor fault**), the synchronisation function is disabled and an alarm is issued (the "Inhibited" LED goes on).
- ▷ if a voltage is out of phase, an alarm is issued (the "**sources synchronised**" LED goes off and the "**major fault**" relay contact is actuated).

▶ The internal clock and the sequencer are monitored (**major fault**). If they fail, the synchronisation function is disabled and an alarm is issued ("Inhibited" LED goes on and "major fault" relay contact is actuated).



Note:

If the function is disabled, the module stops controlling all UPSs and goes to sleep mode.