

MBSM

Multiple Bus Synchronization Module

USER AND INSTALLATION MANUAL

10H52160PUMC - rev. 6

All rights, including rights of translation, reproduction by printing, copying or similar methods, even of parts, are reserved.

Offenders will be liable for damages.

All rights, including rights created by patent grant or registration of utility model or design, are reserved.

Delivery subject to availability. Right of technical modification reserved

1. ABOUT THESE OPERATION INSTRUCTIONS	5
2. SAFETY.....	7
3. EQUIPMENT DELIVERY AND STORAGE	9
3.1. TRANSPORTATION.....	9
3.2. STORAGE.....	9
4. INSTALLATION PREPARATIONS	11
4.1. UNPACKING.....	11
4.2. TRANSPORTING WITHOUT PACKAGING MATERIALS.....	11
4.3. SELECTING AN INSTALLATION SITE	11
4.4. PLACEMENT	11
5. INSTRUCTION FOR USER.....	13
5.1. INTRODUCTION.....	13
5.2. DUAL BUS UPS SYSTEMS	14
5.3. PHASE ERROR CONTROL.....	15
5.4. GENERATOR OPERATION.....	17
5.5. APPLICATION LIMITS	18
5.6. SELECTING THE PRIORITY.....	19
5.7. REMOTE COMMANDS.....	20
6. INSTRUCTION FOR INSTALLATION	21
6.1. MBSM INTERNAL LAYOUT	21
7. UPS SET UP	23
7.1. MBSM FUNCTION ACTIVATION	23
7.2. MBSM INTERCONNECTIONS	23
7.3. POWER INTERCONNECTIONS.....	23
7.4. SIGNALS INTERCONNECTIONS.....	24
7.5. REMOTE CONTACTS.....	24
8. APPENDIX A - 90-NET	25
8.1. GENERATOR FUNCTION ACTIVATION (CU INPUT X8).....	25
8.2. P75.21 OFFSET COMPENSATION TUNING	25
9. APPENDIX B - 80-NET	27
9.1. GENERATOR FUNCTION ACTIVATION (CU2 INPUT DIGITAL X8)	27
9.2. P67.1 OFFSET COMPENSATION TUNING	27

2. SAFETY

Intended use

This device is used to maintain voltages from 2 separate sources in phase, even under extremely critical condition. This function increases the energy availability at the output of the static transfer system, while the synchronised sources upstream of the device are always available for transfer. It complies with all relevant safety regulations governing information technology equipment.



Nota

Thanks to its compact size, MBSM can be wall-mounted close to the UPS. If the area contains or if there is present in the area, any equipment containing in excess of 25 litres of inflammable liquids, refer to HD 384.4.42 S1 A2, chapter 42 (corresponds to DIN VDE 0100, Part 420), it must be ensured that burning liquids or their combustion products cannot spread through the building.

Safety Notices



Carefully read the following safety notices!



Warning

Dangerous voltages are present within the device when in operation, failure to comply with the warning notices may result in death, severe injury, or considerable damage to property. This device must be installed, connected, commissioned, maintained and repaired by qualified personnel. These personnel must be familiar with all repair and maintenance tasks described in these operating instructions. Error-free and safe operation of this device requires proper transport, storage, placement, installation and connection, as well as careful operation and maintenance.



Danger

Mains over-voltage: this MBSM must be protected against over-voltages deriving from the mains supply. The device was developed in accordance with the product normative IEC EN 62040-2, which relates to the IEC 1000-4-5. Over-voltages must be planned for in the power supply system, including those caused by lightning strikes as well as those produced internally as the result of switching inductive or capacitive loads, such as power transformers or capacitor banks, or as the result of short-circuit shutdowns.



In addition to the warning notices given in the respective sections, pay particular attention to the following notices:

- When selecting a location for the device and before operation, observe the notices concerning environmental conditions.
- When disconnecting the mains voltage, the connected loads continue to be supplied with voltage by the battery, and return voltage is present at the input terminals of the UPS.
- During thunderstorms, data transfer cables must not be connected or disconnected.
- Ensure that no objects (e.g. drilling chips, screws etc.) are left inside of the device.

Danger Areas

For reasons of safety the Operator MUST NOT REMOVE the front panel.

If, for any reason, it is necessary to remove this panel, the installation must be switched off and de-energised, otherwise complete safety cannot be guaranteed.

When the MBSM is closed, parts which carry voltage must not be touched. After removing the protective panels or terminal field covering, the connection terminals and rails, as well as exposed metal parts and other components carrying dangerous voltages are no longer protected against accidental contact!

When working on an open UPS device, the corresponding safety measures must be observed.

3. EQUIPMENT DELIVERY AND STORAGE

3.1. TRANSPORTATION

**Warning**

Pay attention to the markings indicating the centre of gravity of the device. Use suitable means of transportation and secure the UPS against tipping over when transporting. Improper transportation can result in damage to the UPS and battery cabinet as well as injury to personnel.

The MBSM is placed, on its back, on a pallet measuring 1200mm x 800mm (200mm high), and secured by 4 tap bolts inserted through its mounting brackets. Therefore, it must be wrapped in protective plastic sheeting and supported by protective angular brackets. The resulting package measures 1200mm x 800mm x 500mm (h) and weighs 66kg.



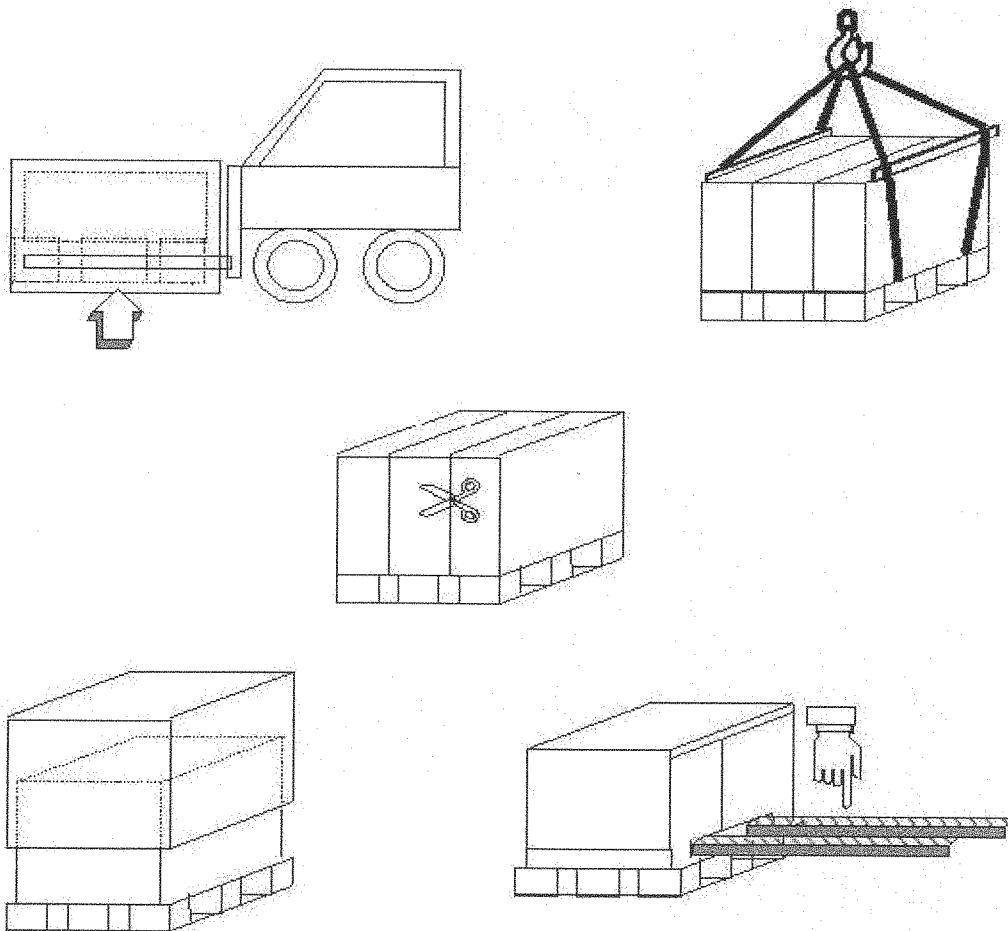
Transport the MBSM to the storage or installation site on the pallet in the original packaging.

3.2. STORAGE

If the MBSM is not to be installed immediately, they may be kept in storage. Observe the following:

- Store the MBSM in its original packaging.
- The storage conditions described in the appendix must be observed.

Fig. 1 - Transporting the MBSM



4. INSTALLATION PREPARATIONS

4.1. UNPACKING

**Notice**

The device should be unpacked at the installation site since the packaging provides additional protection during transportation

**Unpack the device as follows:**

- Check the MBSM for physical damage and in the event of problems, inform the forwarding agent and if necessary, your CHLORIDE agent.
- Check the nameplates on the MBSM against the delivery papers and your order.
- Loosen the fastening screws on the pallet.
- Slowly lift the MBSM from the pallet.
- Keep the pallet for repackaging or transportation at a later time.



Dispose of the remaining packaging material in accordance with local regulations

4.2. TRANSPORTING WITHOUT PACKAGING MATERIALS

The cabinets can easily be moved to their final destinations with lifting devices.

**Warning**

Stones, or irregularities in the floor can block the fork lift. Moving the cabinets too quickly can damage them, causing them to fall over and injure personnel.

4.3. SELECTING AN INSTALLATION SITE

Pay attention to the following conditions when selecting an installation site.

4.3.1. Ambient temperature

The ambient temperature should be between 0°C and +40°C.

4.3.2. Environmental conditions

Avoid harmful environmental conditions such as:

- vibration
- dust
- corrosive atmospheres
- high humidity

4.3.3. Space requirements

Provide the following minimum distances:

- no limitations on either side of the device

4.4. PLACEMENT

**Danger**

Whenever the devices are moved they must be secured against sideways tipping

5. INSTRUCTION FOR USER

5.1. INTRODUCTION

The MBSM is a device which is basically studied to provide on its outputs a frequency reference signal (spitted in a certain number of channels = normally 6). This signal is a square wave generated by an incoming source reference or by an internal quartz. Each UPS connected to the MBSM is able to receive the frequency reference signal and, under particular conditions, to automatically phase lock the inverter to this reference.

5.1.1. Concepts, basic architecture

Fig. 2 - Block diagram of a UPS system with MBSM

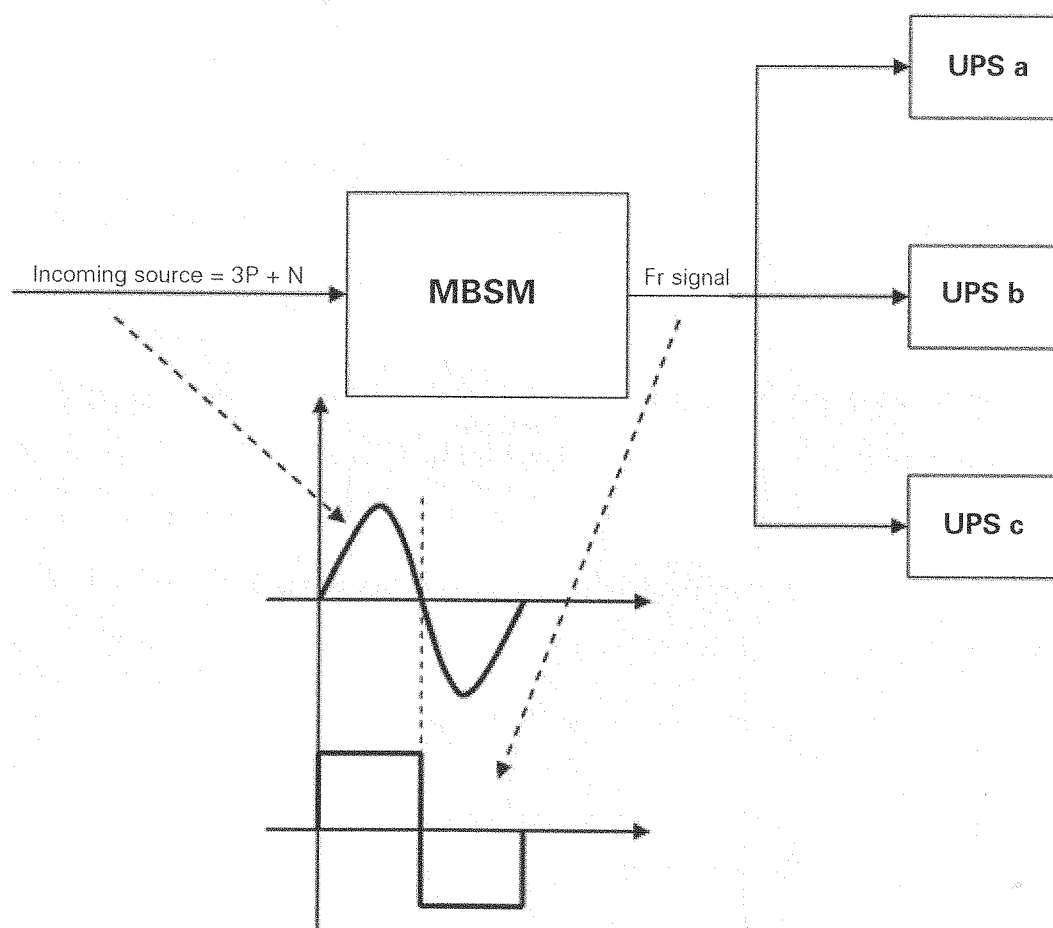


Fig. 2 shows the typical block diagram of a UPS system with MBSM. It is very important to understand the basic concept at the base of this architecture:

Each UPS composing the system is supplied by a common electrical bus; the UPS synchronisation source(reference) is per default the power source connected on its reserve input and, as a consequence, being the power source common to all the UPS, the inverters outputs will be in synchronism.

Once the main power(reserve inputs) shall fail, each UPS will synchronize the inverter to the signal coming from the MBSM (Fref.) and, as a result, the inverters are still in synchronism. Shall be the Fref. not available(or the MBSM not installed), each UPS will synchronize the local internal quartz, therefore the inverters outputs would be, in this case, asynchronous.

It is than clear that the MBSM has a simple PASSIVE rule in relation to the UPS. The UPS will decide with maximum independence the source of synchronisation on the base of the following priority scale:

HIGHEST PRIORITY = LOCAL RESERVE INPUT

MEDIUM PRIORITY = MBSM REFERENCE

LOWEST PRIORITY = LOCAL QUARTZ OSCILLATOR

5.2. DUAL BUS UPS SYSTEMS

The most recent and modern solutions for critical loads power supply are designed following the dual bus architecture (Fig. 3) .

This structure is composed basically by two UPS systems (N+N) supplied by two independent power sources. The two systems outputs are connected to a number of STS which provide the automatic selection of one of the two UPS sources to the critical loads.

The STS switching transient does not affect the critical load only if the UPS sources are synchronised.

Fig. 3 - Dual bus UPS systems

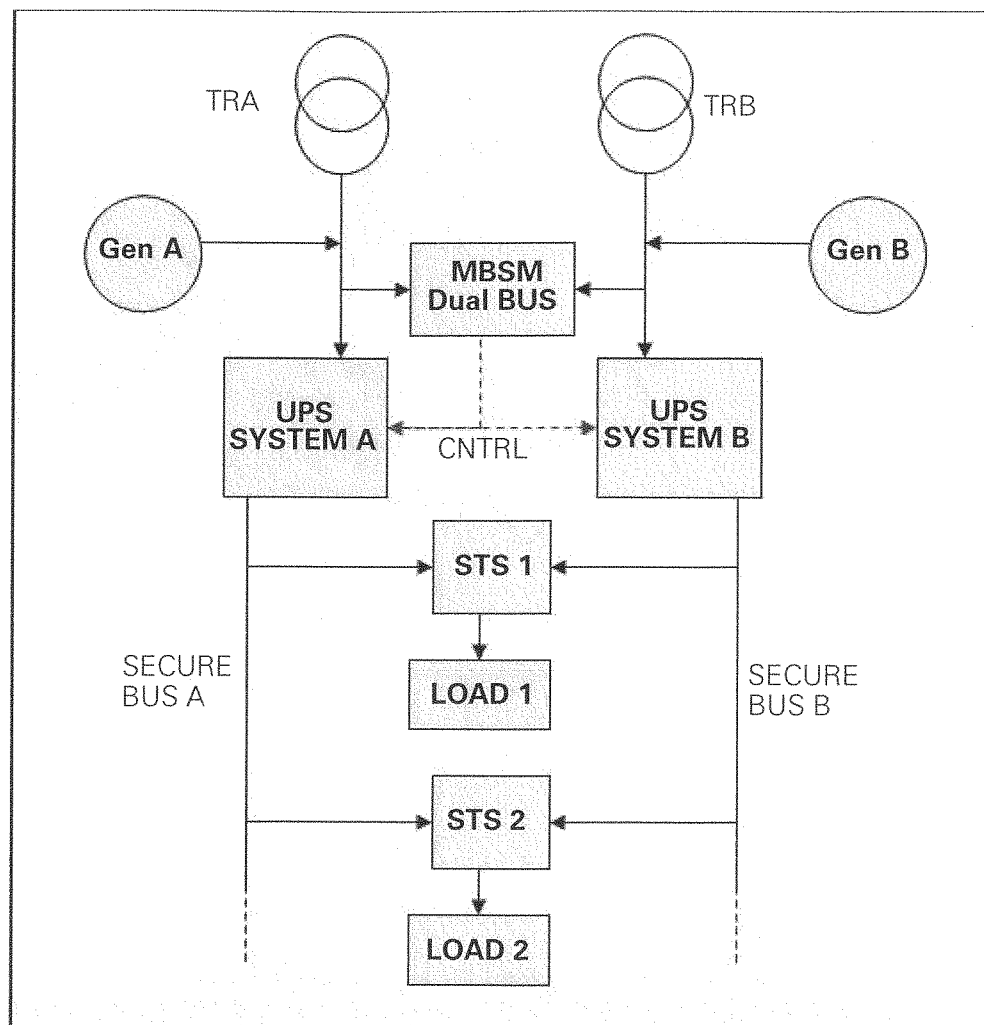


Fig. 4 -

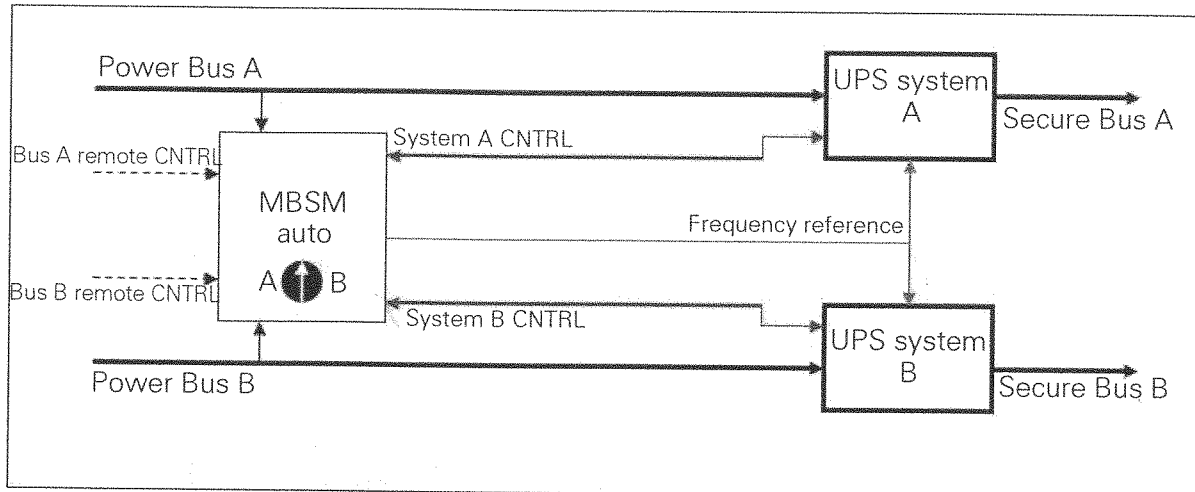


Fig. 4 illustrates the main synchronisation function components from the system shown in Fig. 3.

5.2.1. Normal operating condition

During normal operation it is assumed that commercial power is present both on bus A and B and UPS systems A and B running. Each UPS system performs in real time the analysis of the commercial power present on the relative BUS (amplitude and frequency) and gives a feedback signal to the MBSM confirming or not the availability of the BUS within the specific electrical limits.

If one UPS system is completely shut down, the power bus control is not available: under this condition the power bus related to the UPS system shut down is always considered inside limits (feedback signal to the MBSM locked to OK condition).

The MBSM will select one of the two bus to generate the frequency reference. The reference bus selection is random in case both of them are inside preset limits; however it is possible to give a priority on one specific BUS by a manual selector present on the device. This manual selector has three possible positions :

- a Automatic (no priority)
- b Priority on BUS A.
- c Priority on BUS B.

Should the selected BUS fail, the MBSM will automatically select the other BUS independently from the preferred source selection eventually done.

If both the buses are not available (not present at all or declared out of limits by the UPS systems) the MBSM will source the frequency reference by an internal quartz oscillator tuned on the system nominal frequency.

5.3. PHASE ERROR CONTROL

During normal operation, each UPS system will synchronize its inverter output to the input power bus; the MBSM will constantly monitor the phase error between the two buses making so on an indirect measure of the two secure bus phase difference.

Should the phase error overtake a certain preset limit (customizable between 5° to 15°), the MBSM will switch to the active mode of operation.

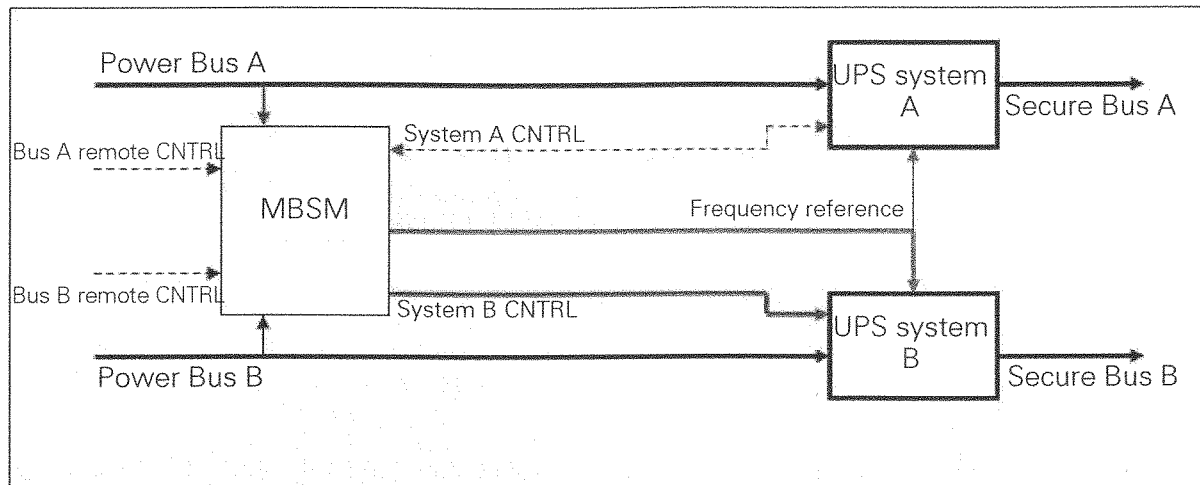
5.3.1. MBSM activation on BUS A

Both the power buses are inside limits and the MBSM is set on the BUS A; this means that the frequency reference generated by the MBSM is actually phase referred to the BUS A.

If the phase difference between the two buses is detected over the set limit, the MBSM will send a signal to the UPS system B forcing it to synchronise the generated frequency reference (Fig. 5).

The UPS A is naturally synchronised with its incoming BUS A, while UPS B is forced by the MBSM to synch the frequency reference generated on the BUS A phase reference. The UPS B is actually un- synch with its own input power bus. Shall the UPS B be in need to transfer the critical bus B on static bypass input (input power bus B this will be possible with limited critical bus interruption (20ms).

Fig. 5 -



Shall the phase error between the two Power buses naturally come back to set limits , the MBSM will release the CNTRL command letting the system B back to natural operation (MBSM back to passive operation).

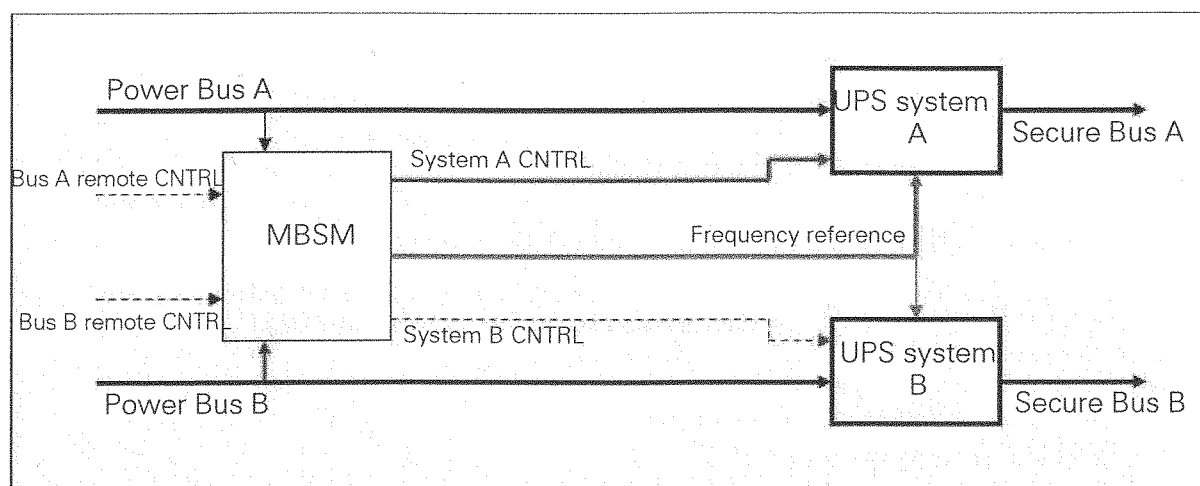
5.3.2. MBSM activation on BUS B

Both the power buses are inside limits and the MBSM is set on the BUS B; this mean that the frequency reference generated by the MBSM is actually phase referred to the BUS B.

If the phase difference between the two buses is detected over the set limit, the MBSM will send a signal to the UPS system A forcing it to synchronise the generated frequency reference (Fig. 6). The UPS B is naturally synchronised with its incoming BUS B, while UPS A is forced by the MBSM to synch the frequency reference generated on the BUS B phase reference.

The UPS A is actually un- synch with its own input power bus. Shall the UPS A be in need to transfer the critical bus A on static bypass input (input power bus A) this will be possible with limited critical bus interruption (20ms).

Fig. 6 -



Shall the phase error between the two Power buses naturally come back to set limits , the MBSM will release the CNTRL command letting the system A back to natural operation (MBSM back to passive operation).

5.4. GENERATOR OPERATION

If the two power buses are provided by generators back up as shown in Fig. 3, then the system behaviour are as follow:

5.4.1. BUS A failure

Supposing the power bus A totally fail during normal operation: the MBSM will automatically select the power BUS B letting the UPS system A to synchronise the available power BUS B throw the frequency reference. If after a while the faulty power bus A shall be powered back by the generator, the MBSM will sense that this new source is not synchronous (normally that is) with the power bus B and will keep the system A forced on frequency reference synch. This automatic behaviour is possible only if the local priority switch is in automatic position. Under these conditions, than, the MBSM is naturally capable to prefer the commercial power BUS B as a synchronisation source instead of the generator without external commands need.

This scenario is represented by Fig. 6 and correspond to the MBSM BUS B activation.

5.4.2. BUS B failure

Supposing the power bus B totally fail during normal operation: the MBSM will automatically select the power BUS A letting the UPS system B to synchronise the available power BUS A throw the frequency reference. If after a while the faulty power bus B shall be powered back by the generator, the MBSM will sense that this new source is not synchronous (normally that is) with the power bus A and will keep the system B forced on frequency reference synch. This automatic behaviour is possible only if the local priority switch is in automatic position. Under these conditions, than, the MBSM is naturally capable to prefer the commercial power BUS B as a synchronisation source instead of the generator without external commands need.

This scenario is represented by Fig. 5 and correspond to the MBSM BUS A activation.

5.4.3. Both power BUS failure

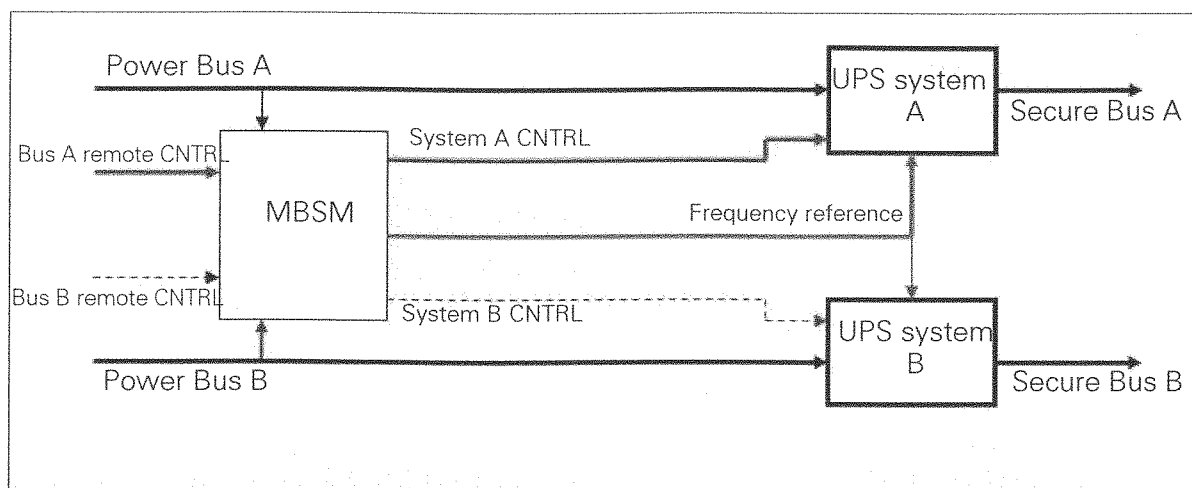
Shall both power buses be replaced by generator after a fault sequence of both the power buses, the MBSM will do :

- a If local priority switch is in auto , the MBSM will select one of the two generators as a source for system synchronisation.
- b If local priority switch shall be on a preferred source, that source will be selected, unless the voltage and frequency values shall be outside preset limits; under this last condition the second available source will be selected anyway, independently from the switch position.
- c If both sources are detected outside set limits, the MBSM will generate the frequency reference by the local quartz oscillator.
- d If the two power buses are supplied from a common generator and inside set limits, the MBSM will operate as per normal conditions and checks

5.4.4. Remote commands

During particular operating conditions as the generator supply is, there are two remote commands available: each command is capable to exclude one power bus reference overriding the MBSM controls and forcing the related UPS system to phase lock the MBSM frequency reference. If both the power bus are excluded by the remote commands, the UPS systems will phase lock the frequency reference self generated by the MBSM internal quartz. Example on Fig. 7 shows the BUS A remote control activation.

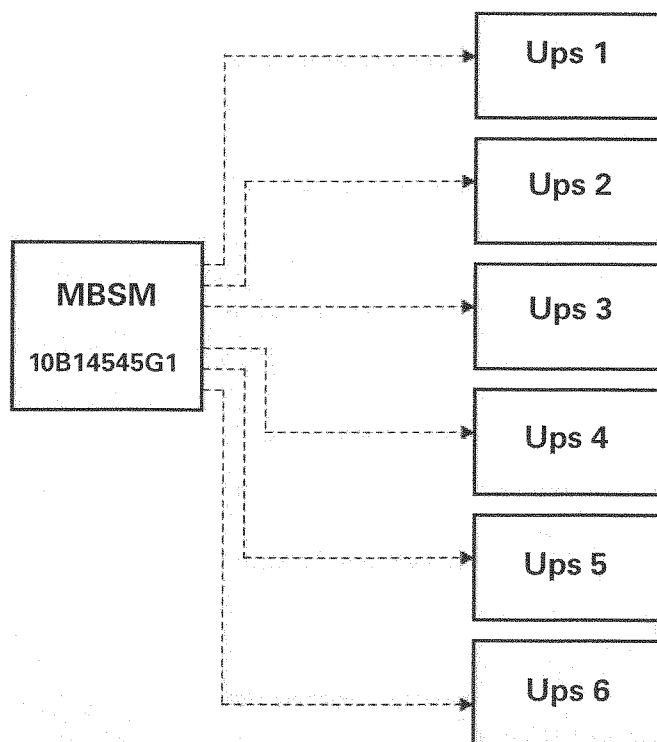
Fig. 7 -



5.5. APPLICATION LIMITS

The MBSM with phase control 10B14545G1 is applicable for systems composed by 6 UPS module in total.

COMBINATION	BUS A MAX UPS NUMBER	BUS B MAX UPS NUMBER
A	5	1
B	4	2
C	3	3
D	2	4
E	1	5

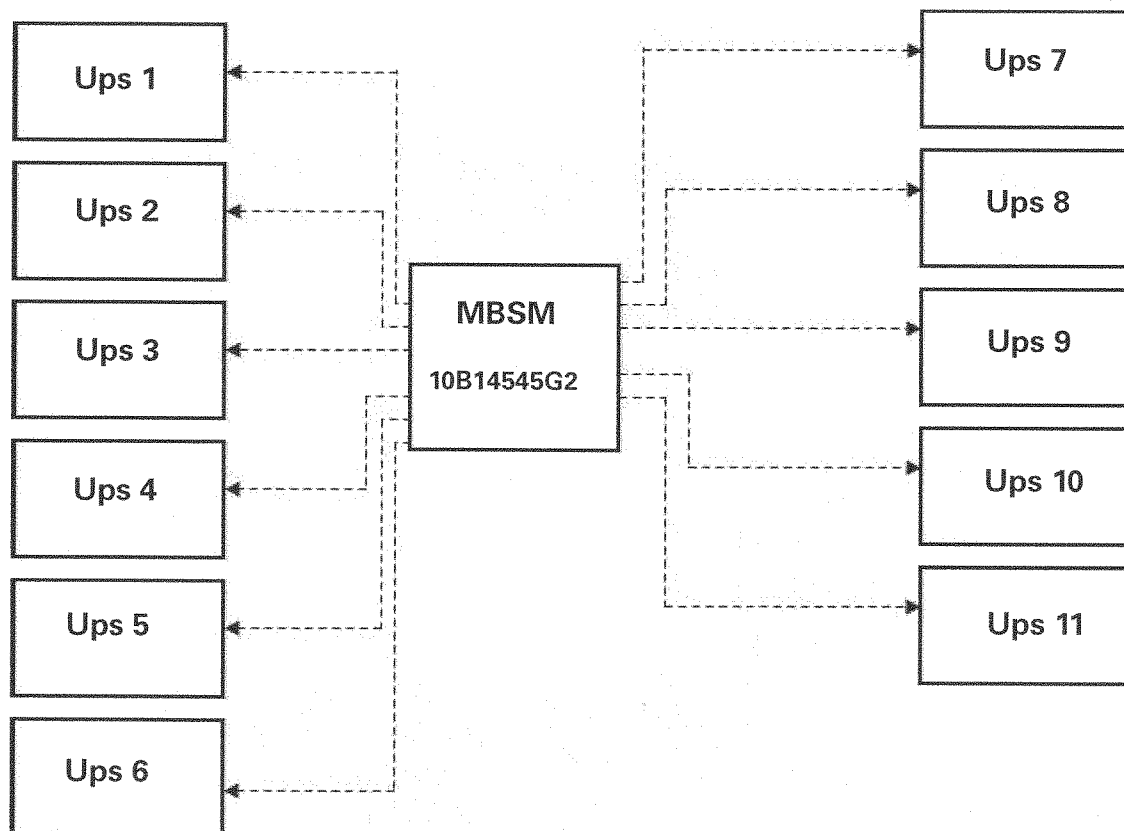


5.5.1. Special solution on demand

As a special application, on demand, it is possible to have a MBSM with phase control for applications with a maximum number of UP module up to 11(10B14545G2).

COMBINATION	BUS A MAX UPS NUMBER	BUS B MAX UPS NUMBER
A	8	3
B	7	4
C	6	5
D	5	6
E	4	7
F	3	8

Note that the max ups number in modular /centralized parallel is 8.



5.6. SELECTING THE PRIORITY

Use the selector switch on the front panel to select the desired operating mode:

1. AUTOMATIC (AUTOM.)

MBSM detects the reference BUS automatically, without assigning a priority; the first BUS to be detected is selected as the reference,

2. PRIORITY BUS A (PRIORITY A)

If BUS A is present it is selected as priority source. If it is not present, MBSM selects BUS B, if present,

3. PRIORITY BUS B (PRIORITY B)

If BUS B is present it is selected as priority source. If it is not present, MBSM selects BUS A, if present.

5.7. REMOTE COMMANDS

There are two N.O. (normally open) inputs provided on XT1 for remote commands.

5.7.1. Excluding BUS A

When the corresponding terminal voltage free contact is closed, the MBSM is forced on to BUS B and the UPS A system follows the reference signal generated by the MBSM.

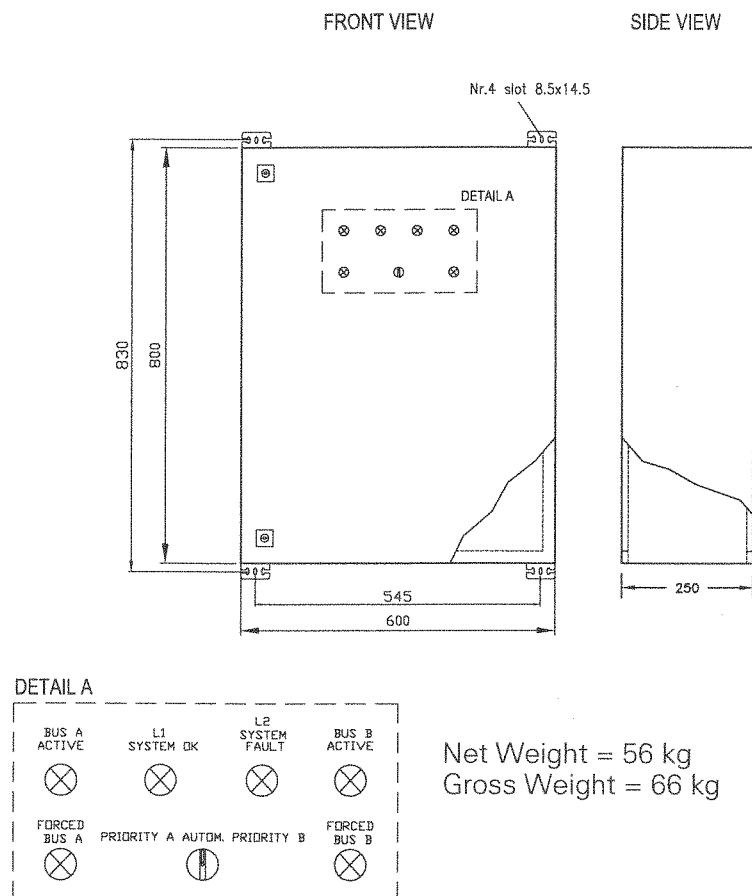
5.7.2. Excluding BUS B

When the corresponding terminal voltage free contact is closed, the MBSM is forced on to BUS A and the UPS B system follows the reference signal generated by the MBSM.

5.7.3. Excluding BUS A and B

When both contacts are closed the MBSM reference signal is generated by a quartz oscillator. Both UPS systems will follow the reference signal generated by the MBSM.

Fig. 8 - MBSM - Dimensions, drilling diagram and weight



LED TITLE	NORMAL CONDITION	NON CONDITION
BUS A Active	"Off"	"On" indicates syncro on BUS A and BUS B forced to A due to buses OOS detected
BUS B Active	"Off"	"On" indicates syncro on BUS B and BUS A forced to B due to buses OOS detected
L1 System OK	"On" System OK	
L2 System Fault	"Off"	"On" when both buses not available or system fault
Forced Bus A	"Off"	"On" indicates syncro on BUS A and BUS B forced to A by external command
Forced Bus B	"Off"	"On" indicates syncro on BUS B and BUS A forced to B by external command

6. INSTRUCTION FOR INSTALLATION

6.1. MBSM INTERNAL LAYOUT

Fig. 9 - MBSM internal layout

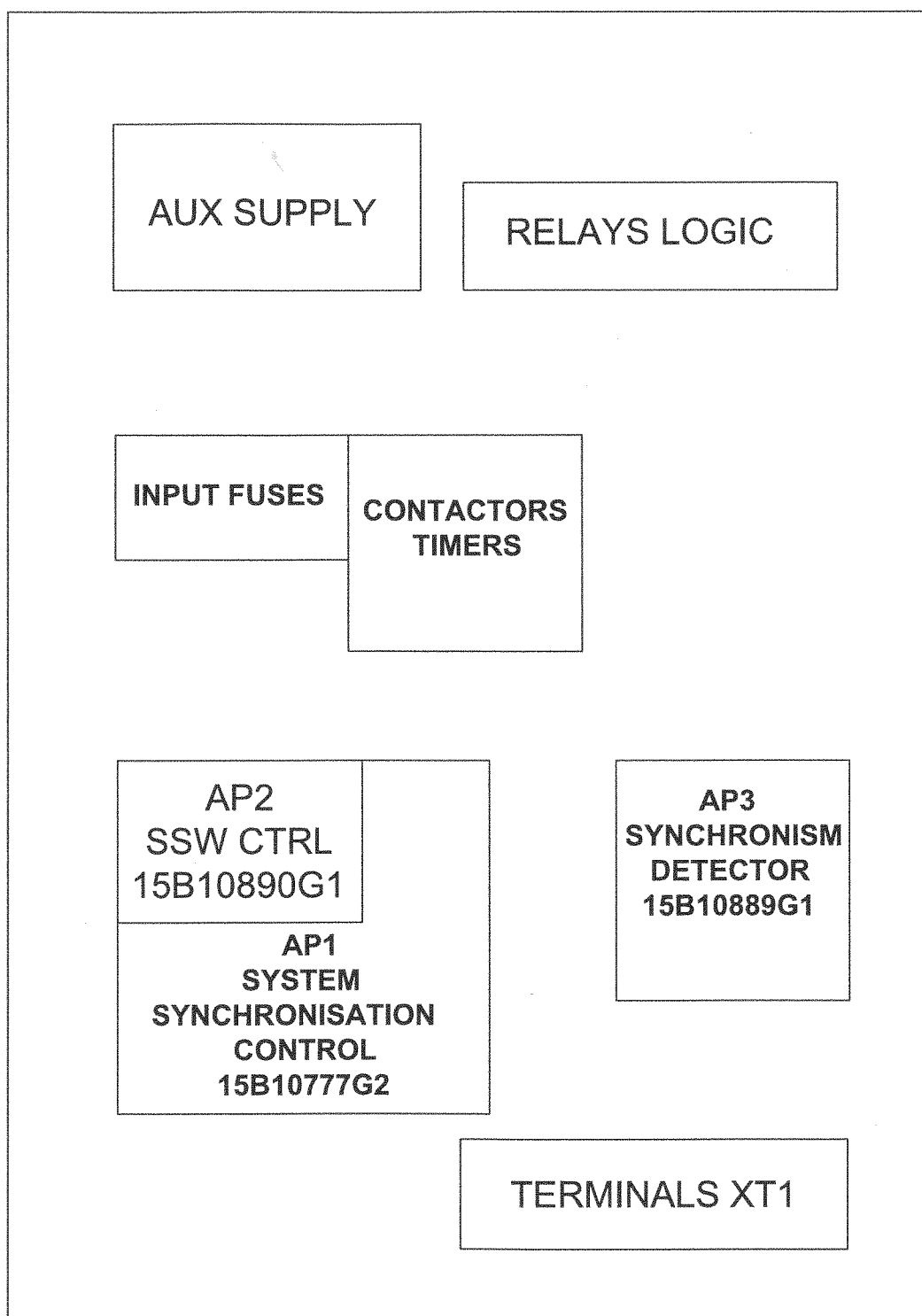
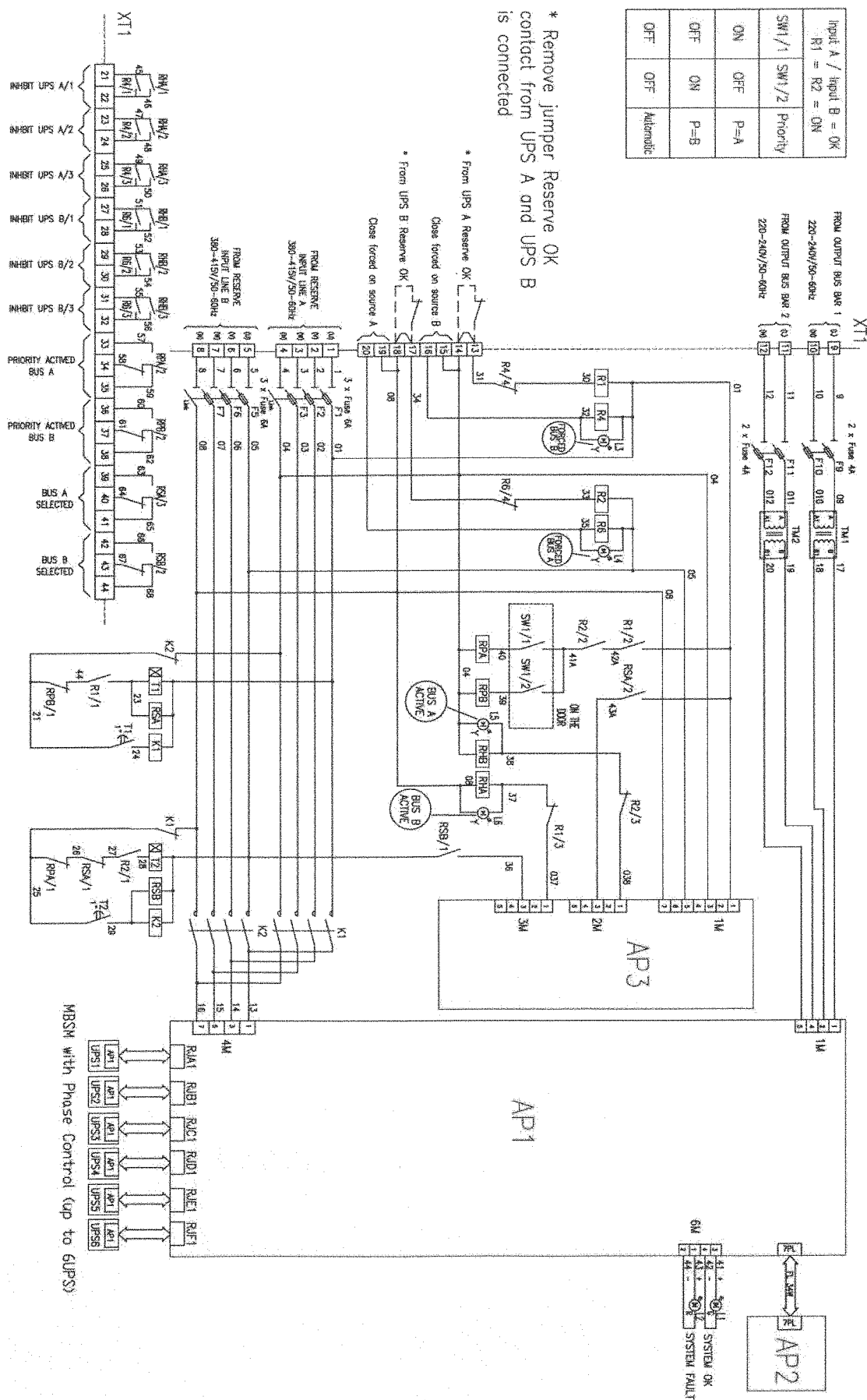


Fig. 10 - Schematic Diagram



7. UPS SET UP

Each UPS composing the system A and the system B, must be set via PPvis according with the following points.

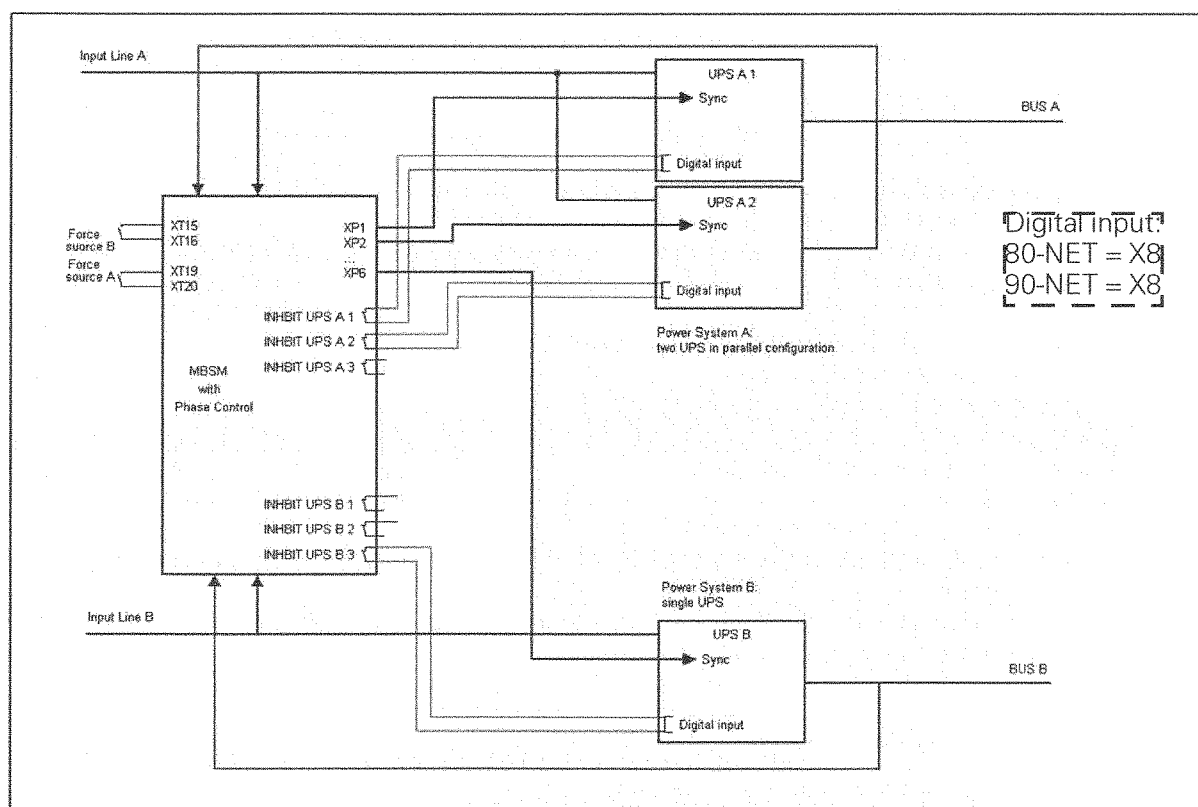
7.1. MBSM FUNCTION ACTIVATION

Verify that the parameter P579 is set to 1 (external synchronisation enabled). This setting should have been done in factory already.

If the MBSM installation is going to be done on a UPS system already in service and the synchronisation functionality was not present before, the only activation of the parameter P579 is **NOT** sufficient. The detailed procedure is available in appendix A.

7.2. MBSM INTERCONNECTIONS

Fig. 11 - dual Bus system



The above Fig. 10 is an example of a dual Bus system composed by a modular parallel on the bus A and from a single unit on the bus B.

7.3. POWER INTERCONNECTIONS

The MBSM is powered by the two main buses and from the two critical buses (UPS outputs)

Main BUS A is a three phase +N line to be interconnected to the MBSM XT1 terminals 1[a], 2[b], 3[c] and 4 [N]. The phase sequence **MUST** be the same of the UPS A reserve input.

Suggested wires size 1.5~2.5 mm², protected with 10A gGqL fuses or 10A C curve circuit breaker.

Main BUS B is a three phase +N line to be interconnected to the MBSM XT1 terminals 5[a], 6[b], 7[c] and 8 [N]. The phase sequence **MUST** be the same of the UPS B reserve input.

Suggested wires size 1.5~2.5 mm², protected with 10A gGdL fuses or 10A C curve circuit breaker.

AUX supply A is a single phase line coming from the UPS A output, to be interconnected to the MBSM XT1 terminals 9[L] 10[N].

Suggested wires size 1.5~2.5 mm², protected with 10A gGgL fuses or 10A C curve circuit breaker.

AUX supply B is a single phase line coming from the UPS B output, to be interconnected to the MBSM XT1 terminals 11[L] 12[N].

Suggested wires size 1.5~2.5 mm², protected with 10A gGgL fuses or 10A C curve circuit breaker.

7.4. SIGNALS INTERCONNECTIONS

UPS inhibition signals are contacts present in the MBSM to be wired to each digital input of each UPS installed.

BUS A UPS digital input must be wired to the MBSM outputs XT1 from 21 to 26.

BUS B UPS digital input must be wired to the MBSM outputs XT1 from 27 to 32.

See also Fig. 10 red signal interconnections.
Suggested wires size 0.75~1.5 mm².

Frequency reference signals are signals available on the MBSM RJ45 plugs XP1~XP6. Each UPS is equipped with an RJ45 on the control PCB.
Each UPS RJ45 must be interconnected to an RJ45 XPx plug on the MBSM using a cable with the following characteristics:

- cable type: category 5 shielded flexible stranded
- wires: 4 x 2 x AWG24 copper cable
- shielding: aluminium/polyester
- impedance: 100Ohm
- connectors: 2 x shielded RJ45 plugs
- connections: pin-to-pin

As the length of these cables depends upon the UPS system layout, these cables are not normally supplied by Chloride.

For this interconnection use only shielded RJ45 cables and, possibly, do not run these cables in the same conduit where the power cables are running.

The max theoretical length of each frequency reference cable shall not exceed 100m.

7.5. REMOTE CONTACTS

Two remote contacts are available for the customer use :

BUS A forced = XT1 19-20

BUS B forced = XT1 15-16

If these remote contacts/commands are not used, leave the mentioned terminals NOT wired. Once these inputs are open, the MBSM will logically behave normally.

8. APPENDIX A - 90-NET

8.1. GENERATOR FUNCTION ACTIVATION (CU INPUT X8)

Verify that the generator function on the input EK1 has been activated on all the UPSs. The function must be active as per following instruction:

P93 = 1 (Standby generator operation)

P94 = 0 (Default setting)

P123 = 5 (Charging and bypass enabled, inverter synchronisation disabled when SGS is in operation)

To enable the synchronisation option the P579 has to be set to 1 and the P75. 21 to 24 has to be configured as follow:

PNU 579 – External Synchronisation enable		
Range	Meaning	Description
0 (def)	No synchronisation with external system	The synchronisation with an external synchronisation signal is disabled.
1	Synchronisation with external system enabled	The synchronisation with an external synchronisation signal in case of bypass (reserve) mains failure or SGS operation is enabled (corresponding parametrization of PNU 123 Backup generator provided).

PNU 75 – Power Rating Class		
PNU	Meaning	Value
75.21	OFFSET = X_UR2_CRE	Offset compensation [0 = 0° - 0x10000 = 360°]
75.22	EXT_SYN_F_LIM = X_UR3_UV	1024
75.23	EXT_SYN_PHI_LIM = X_UR3_IV	1024
75.25	DELTA_F_GAIN = X_UR3_CRE	4096

8.2. P75.21 OFFSET COMPENSATION TUNING

The parameter P 75.21 has been designed to compensate the phase error, introduced by the UPS control, between the frequency reference coming from the MBSM and the inverter output signal. The value to be inserted to compensate the error is calculated applying one of the following formula:

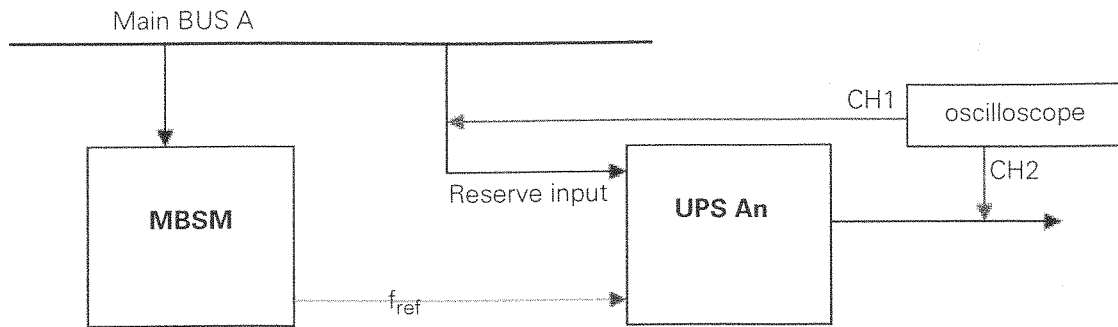
Hex input : P75.21 [Hex] = phase-error [°] * 0x10000 / 360 (0x10000 is 10000 in Hex format.)

Decimal input: P75.21 [Dec] = phase-error [°] * 65536 / 360

To carry out this procedure an oscilloscope between reserve input and inverter output has to be used. The MBSM must be already installed and interconnected to the UPS system. The P579 must be already loaded and set to 1.

The P75.21 calibration must be done on each UPS composing the system.

Fig. 12 - Example of layout for calibrating the P75.21 on UPS An



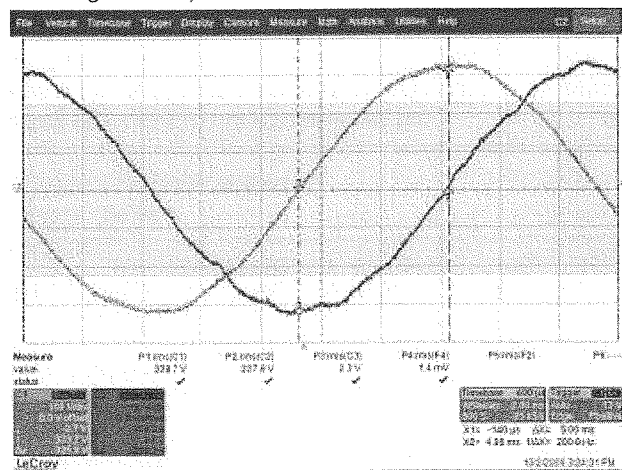
- The MBSM priority switch must be in A BUS priority

Start the inverter, wait load on inverter than and open the reserve input switch QS2.

Verify the phase error between inverter and bypass.

P75.21 = 0 _ Offset compensation [0 = 0° - 0x10000 = 360°] (see Fig. 13)

Fig. 13 - Synchro Error 88,56 [°] . P75.21 = 0



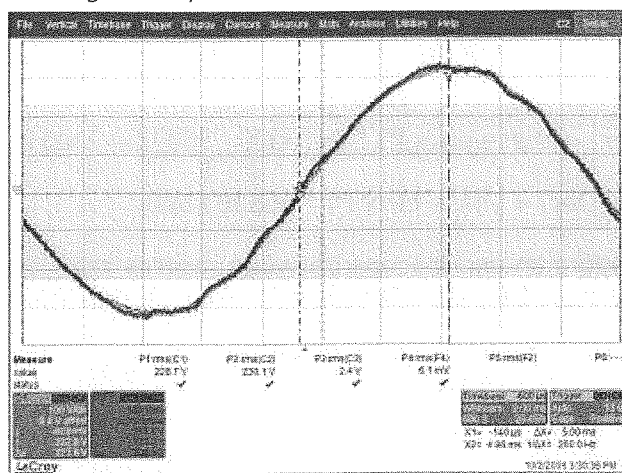
Decimal input: P75.21[Dec] = phase-error [°] * 65536 / 360

Decimal input: P75.21[Dec] = 4,92/20 * 360 * 65536 / 360

Decimal input: P75.21[Dec] = 88,56 [°] * 65536 / 360 = 16121 (see Fig. 14)

Load the calculated value and repeat the test to verify the result.

Fig. 14 - Synchro Error 0 [°] . P75.21 = 16121



9. APPENDIX B - 80-NET

9.1. GENERATOR FUNCTION ACTIVATION (CU₂ INPUT DIGITAL X8)

Verify that the generator function on the input EK1 has been activated on all the UPSs. The function must be active as per following instruction:

P93 = 1 (Standby generator operation)

P94 = 0 (Default setting)

P123 = 5 (Charging and bypass enabled, inverter synchronisation disabled when SGS is in operation)

To enable the synchronisation option the P579 has to be set to 1 and the P67.1 has to be configured as follow:

PNU 579 – External Synchronisation enable		
Range	Meaning	Description
0 (def)	No synchronisation with external system	The synchronisation with an external synchronisation signal is disabled.
1	Synchronisation with external system enabled	The synchronisation with an external synchronisation signal in case of bypass (reserve) mains failure or SGS operation is enabled (corresponding parametrization of PNU 123 Backup generator provided).

PNU 67 – Power Rating Class		
PNU	Meaning	Value
67.1	OFFSET = X_UR2_CRE	Offset compensation [0 = 0° - 0x10000 = 360°]
67.2	EXT_SYN_F_LIM = X_UR3_UV	1024
67.3	EXT_SYN_PHI_LIM = X_UR3_IV	1024
67.4	DELTA_F_GAIN = X_UR3_CRE	4096

9.2. P67.1 OFFSET COMPENSATION TUNING

The parameter P67.1 has been designed to compensate the phase error, introduced by the UPS control, between the frequency reference coming from the MBSM and the inverter output signal. The value to be inserted to compensate the error is calculated applying one of the following formula:

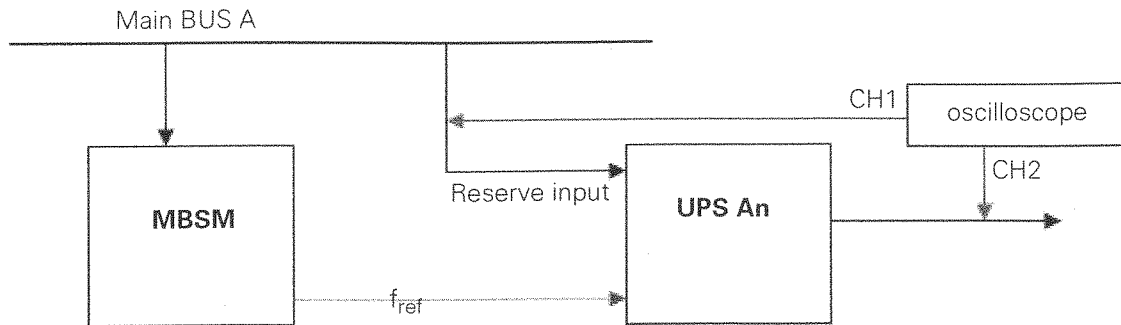
Hex input : P67.1 [Hex] = phase-error [°] * 0x10000 / 360 (0x10000 is 10000 in Hex format.)

Decimal input: P67.1 [Dec] = phase-error [°] * 65536 / 360

To carry out this procedure an oscilloscope between reserve input and inverter output has to be used. The MBSM must be already installed and interconnected to the UPS system. The P579 must be already loaded and set to 1.

The P67.1 calibration must be done on each UPS composing the system.

Fig. 15 -



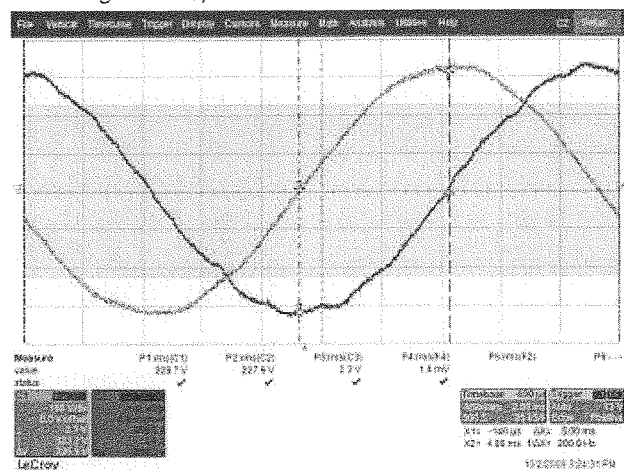
- The MBSM priority switch must be in A BUS priority

Start the inverter, wait load on inverter than and open the reserve input switch QS2.

Verify the phase error between inverter and bypass.

P67.1= 0 _ Offset compensation [0 = 0° - 0x10000 = 360°] (see Fig. 16)

Fig. 16 - Synchro Error 88,56 [°] . P671= 0



Decimal input: P67.1[Dec] = phase-error [°] * 65536 / 360

Decimal input: P67.1[Dec] = 4,92/20 * 360 * 65536 / 360

Decimal input: P67.1[Dec] = 88,56 [°] * 65536 / 360 = 16121 (see Fig. 17)

Load the calculated value and repeat the test to verify the result.

Fig. 17 - Synchro Error 0 °] . P671 = 16121

