# INSTALLATION MANUAL
# FOR *DELPHYS* MP *and DELPHYS* MP *elite*
# UNINTERRUPTIBLE POWER SYSTEMS

**UPS/NTA GB/DELMP_INS.B**

**06/02/2006**

# ***Certificate of Warranty***

The warranty conditions are stipulated in the sales contract, if not the following points shall apply.

The manufacturer exclusively guarantees his own products against any defect in construction or operation arising from faulty design, materials or workmanship according to the conditions set down below.

The manufacturer, at his discretion, is entitled to adapt his product in order to comply with the warranty or replace the faulty parts. The manufacturer's warranty does not apply in the following cases:
- Defects arising either from designs or parts imposed or supplied by the Purchaser.
- Failure due to fortuitous circumstances or force majeure.
- Replacements or repairs resulting from normal wear of units and machinery,
- Damage or injuries caused by negligence, lack of inspection or maintenance, or improper use of the products.

The period of validity of the warranty may never exceed 12 months after delivery.

Replacements, repairs or modifications of parts during the warranty period cannot extend the duration of the warranty.

For these stipulations to be valid, the Purchaser must, within a maximum of 8 days beyond which the warranty lapses, expressly inform the Manufacturer of the faulty design, or the material or manufacturing defect, stating in detail the grounds for his complaint.

Defective parts replaced free of charge by the Manufacturer are to be put at his disposal, so that he may become the sole owner.

The warranty legally ceases if the Purchaser has, of his own initiative, undertaken modifications or repairs on the Manufacturer's products without the written consent of the latter.

The Manufacturer's liability is limited to the obligations as defined herein (repair or replacement), all other items of damage being formally excluded.

The Purchaser is liable for taxes or duties of any kind in compliance with either the European regulations, or those of the country of import or transit.

## FOREWORD

We thank you for the trust you have in Socomec Sicon's Uninterruptible Power Systems.

This equipment is fitted with up to date technology with power semiconductors (IGBT) including a digital micro-controller.

Our equipment complies with standard IEC 62040-2 and IEC 62040-1-2.
**CAUTION** : "This is a product for restricted sales distribution to informed partners. Installation restrictions or additional measures may be needed to prevent disturbances".

## SAFETY REQUIREMENTS

### Using conditions:

Do read carefully this manual and comply with the safety notes mentioned before using the UPS.

Whatever the repairs, they must be made only by authorised staff, who have been suitably trained.

It is recommended that the ambient temperature and the humidity of the UPS environment are maintained below the values specified by the manufacturer.

This equipment meets the requirements of the European directives applied to this product. As a consequence it is labelled as follows:

CE

## REGULATIONS CONCERNED WITH ENVIRONMENTAL ISSUES

**Recycling of electrical products and equipment.**
Provision is made in European countries to break up and recycle materials making up the system. The various components must be disposed of in accordance with the legal provisions in force in the country where the system is installed.

**Battery wastes**
Used batteries are considered as toxic wastes. It is therefore essential to entrust them solely and exclusively to firms specialised in their recycling. They can not be treated with other industrial or household wastes, as set out in local regulations in force.

# CONTENTS

Lexicon :

| | |
|---|---|
| UPS | : Uninterruptible Power Systems |
| Module | : set comprising a rectifier, a battery and an inverter in a central bypass system |
| UPS unit | : set comprising a rectifier, a battery, an inverter and a bypass in a parallel modular system |
| CIM | : Consulting, Inspection and Maintenance Department |
| DC | : Direct Current |
| ADC | : Advanced Dry Contacts |
| ACS | : Automatic Cross Synchronisation (optional for keeping the UPS synchronisation in specific conditions) |
| ESD | : Emergency Switching Device (as per standards) |

# CHAPTER 1: GENERAL

## 1.1 PURPOSE

This manual gives important information as regards safety, handling and connection of ***DELPHYS* MP** and ***DELPHYS* MP *elite*** UPS's.

## 1.2 POWER SUPPLY INPUTS

Three power supply inputs are needed to operate the system:

- voltage on input 1 for the supply to the rectifier,
- voltage on input 2 for the supply to the automatic bypass (depending on the system, inputs 1 and 2 can be common),
- the DC voltage (about 500Vdc) for the battery.

## 1.3 SAFETY NOTES

For the safety of personnel and equipment, do read very carefully this instruction manual.

| | |
|---|---|
| WARNING | **Take all precautions when handling the cabinets or the various components of the system, such as batteries.** |

| | |
|---|---|
| CAUTION | **Whatever the connections or the using and maintenance operations, they must be exclusively performed by authorised staff, who have been trained accordingly.** |

| | |
|---|---|
| CAUTION | **EMI filters inside the UPS induce high leakage currents. As a consequence, it is imperative to connect earth cables before any mains connection.** |

| | |
|---|---|
| CAUTION | The equipment can only be switched on or used if the following conditions are fulfilled :<br>- electrical connections comply with the regulation in force (earth bonding, appropriate protections and cross-section of cables)<br>- all means to comply with the protection index of the system are in place, such as side panels, doors, glands, shields or whatever...). |

**Caution**

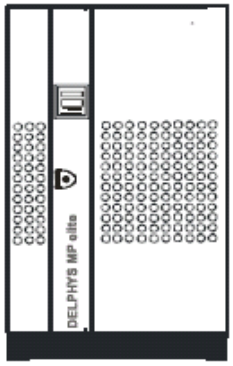
| | |
|---|---|
|  | While the UPS is operating, this label indicates that the parts are live and therefore the risk of electrical hazard. |

## 1.4 TECHNICAL DATA

| Power in kVA | 60 | 80 | 100 | 120 | 160 | 200 |
|---|---|---|---|---|---|---|
| **RECTIFIER INPUT** | | | | | | |
| Rated input voltage and max. tolerances | 380V / 400V / 415V ± 10% [1] | | | | | |
| Rated input frequency and max. tolerances | 50 Hz / 60 Hz ± 10% | | | | | |
| Input power factor | > 0.93 | | | | | |
| **INVERTER OUTPUT** | | | | | | |
| Rated output active power | 48kW | 64kW | 80kW | 96kW | 128kW | 160kW |
| Rated output voltage | 380 V / 400 V / 415 V + N * | | | | | |
| Rated output frequency | 50 Hz / 60 Hz | | | | | |
| Max. frequency tolerances:<br>input present<br>input absent | ± 2 Hz settable<br>± 0,2 % | | | | | |
| Maximum overload capacity admitted | 110 % 60 min – 125 % 10 min – 150 % 1 min | | | | | |
| Inverter short-circuit capacity | Up to 3.5 In | | | | | |
| **BYPASS** | | | | | | |
| Maintenance bypass | Built-in | | | | | |
| Maximum overload capacity admitted | 110 % 60 min – 125 % 10 min – 150 % 1 min | | | | | |
| Bypass short-circuit capacity | Up to 25 In | | | | | |
| **BATTERIES** | | | | | | |
| Technology | VRLA – open lead –Nickel Cadmium | | | | | |
| **ENVIRONMENT** | | | | | | |
| Protection index (IEC 60529) | IP 20 → IP 32 [2] | | | | | |
| Service temperature | 0 to 35°C | | | | | |
| Recommended ambient temperature | 25°C | | | | | |
| Relative humidity | 95 % max without condensation | | | | | |
| Acoustic noise measured at 1m (ISO3746) | about 72 dBA | | | | | |

[1] 208-220-480V upon request. Please refer to the data label on the UPS
[2] For different protection index, please seek advice from the factory.

## 1.5 LAYOUT OF DELPHYS MP UPS

| DELPHYS MP | DELPHYS MP elite |
|---|---|
|  |  |
| Width of the UPS cabinet alone: 800 mm | Width of the UPS cabinet alone: 1000 mm |

## 1.6 GENERAL PACKAGING CONDITIONS FOR UPS AND BATTERIES

### 1.6.1 UPS packaging

| Packaging category | Packing | Applications |
|---|---|---|
| **Standard BULLPACK packaging** | **Equipment is protected by two layers of cellular plastic (or three for non-domestic destinations) fastened with scotch tape.** | **Road transport for domestic market or forwarding to neighbouring countries.** |
| **CPA-type packaging (cardboard pallet)** | **At customer's request and in addition to the BULLPACK two-layer protection, extra packaging consists of fastening the equipment to a wooden pallet and to protect it with a cardboard fixed to the pallet.<br>Under specific request, a corrosion proofing barrier can replace the Bullpack protection.** | **Road transport for UE countries or air freight for worldwide destinations.** |
| **Packaging SEI 4C (called NEFAB)** | **The packaging consists of crates with closed joints and physical-chemical protection. The corrosion protection is guaranteed by a VCI wrapping (Vapour and Corrosion Inhibitor), resistant to considerable difference in temperature and by the addition of desiccant bags. Unless otherwise requested, the storage period is limited to 12 months.** | **Sea transport for equipment that might be stored for an extended period of time.** |

### 1.6.2 Battery packaging

Batteries are delivered on pallets, in pallets-cases or mounted in cabinets. Avoid striking battery cells and connection terminals.

# CHAPTER 2: GENERAL RECOMMANDATIONS FOR INSTALLATION

## 2.1 GENERAL RECOMMENDATIONS FOR INSTALLATION

### 2.1.1 Premises and location

The proposed location for the UPS should be as follows:
- there should be no obstacle lying on the floor,
- it should be dry, clean and dust-free,
- it should comply with a pollution index of class 2 (i.e. free from conductive dust)
- the installation of cables or conduits should be completed,
- the room must be large enough,
- ventilation should be sufficient to ensure a constant temperature to the UPS and to the batteries.
- the local should have a non-flammable floor,

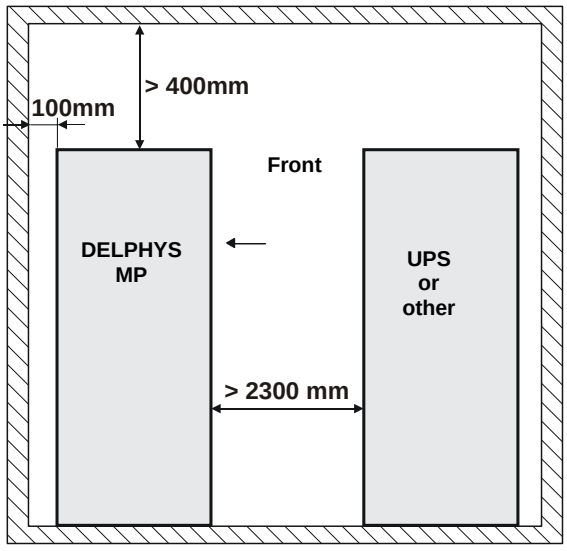
**The recommended ambient temperature is between 15°C and 25°C**

### 2.1.2 Constraint for cabinet location

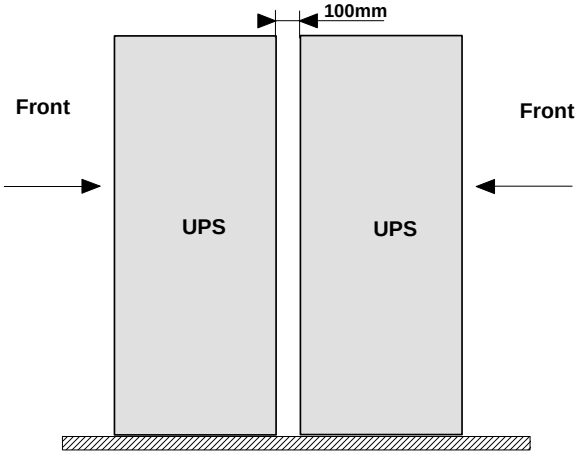
To ensure the proper ventilation of the equipment, always leave:
- a minimum clear distance of 100 mm with respect to the wall
- a minimum clear distance of 400 mm between the top of the cabinet and the ceiling.

Comment: two units can be placed back to back

When the cabinets are placed face to face, leave a clearance of 2,30 m to give free way[3] when the doors of the cabinets are opened.




**Layout of technical plant**




**Back to back cabinets**

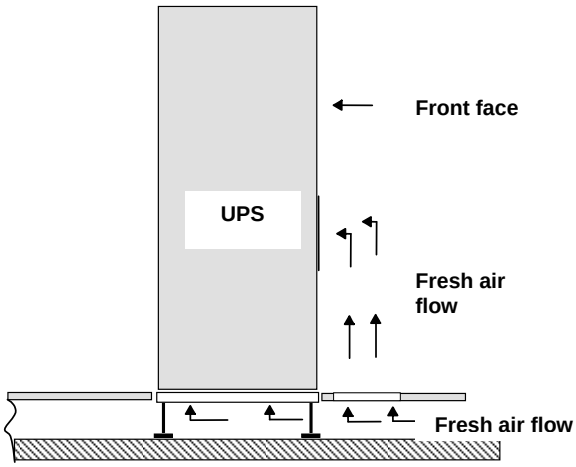
[3] Specifications as per standard IEC 60364 or NFC15100

### 2.1.3 Installation on a raised floor

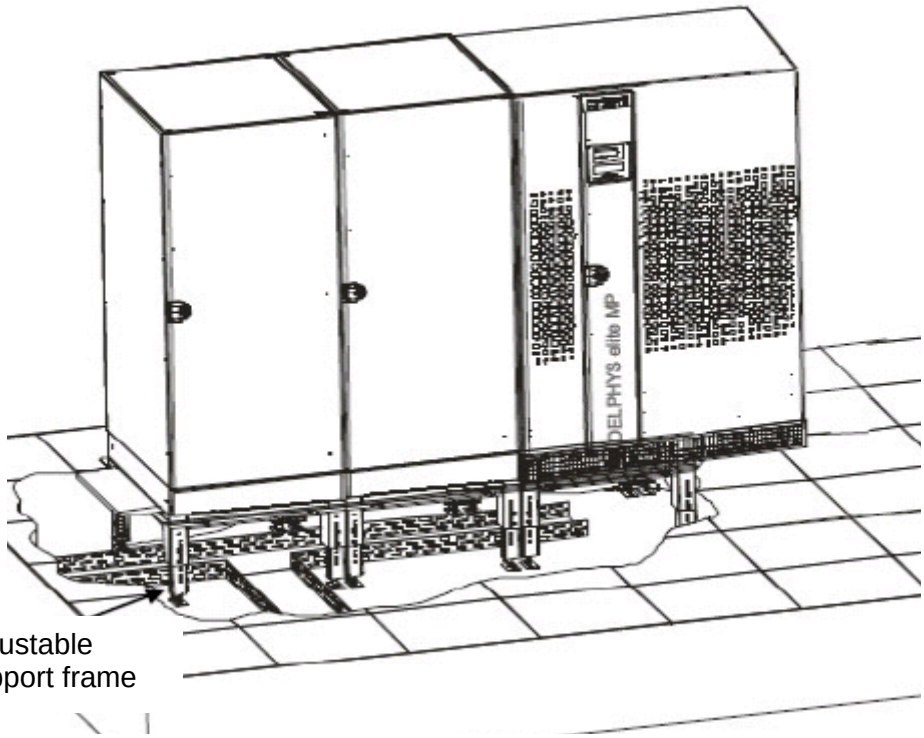
When for weight and space requirements, the UPS is installed on a specific base (Please see section 2.1.5).

Provide cut-outs in the raised floor for adequate ventilation.

For air flow and heat loss details, please refer to section 2.2




### 2.1.4 DELPHYS MP on a raised floor with adjustable support frame




Adjustable support frame

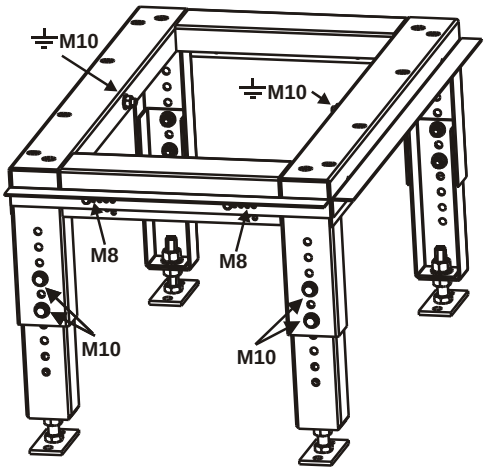
### 2.1.5 Adjustable frame

The adjustable frame is designed to support DELPHYS MP & MP elite UPS's installed on a raised floor.

**Installation**
The adjustable frame is delivered as a kit to be assembled with the assembling instructions.

Level adjustment

Three levels of adjustment are available:
Frame from 280 to 445 mm,
Frame from 420 to 560 mm,
Frame from 530 to 670 mm.
For any higher level, please seek advice from the factory.

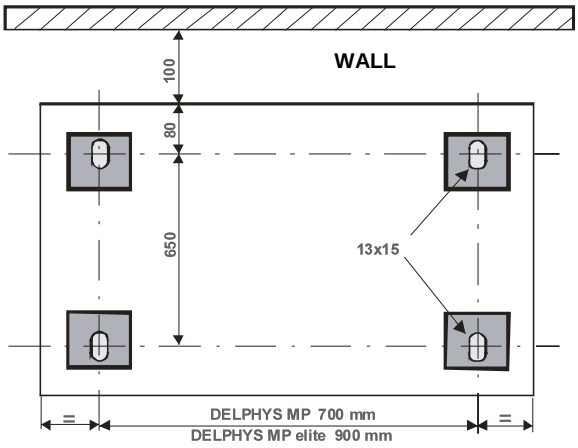



Maximum load

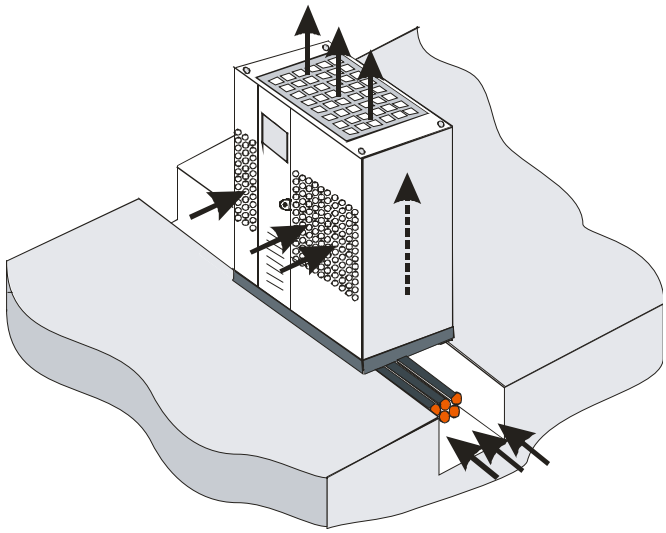
The maximum load that can be supported is 1,5 ton per frame.

### 2.1.6 Installation directly on the floor

**LAYOUT FOR FIXING TO THE FLOOR**




**INSTALLATION ON A RACEWAY**

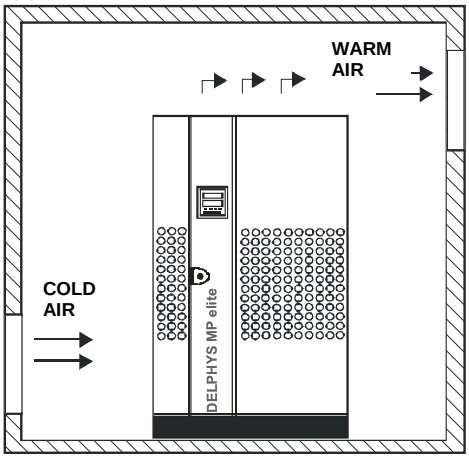


**4 elongated holes 13x15**
**clearance from the wall: 100mm minimum**

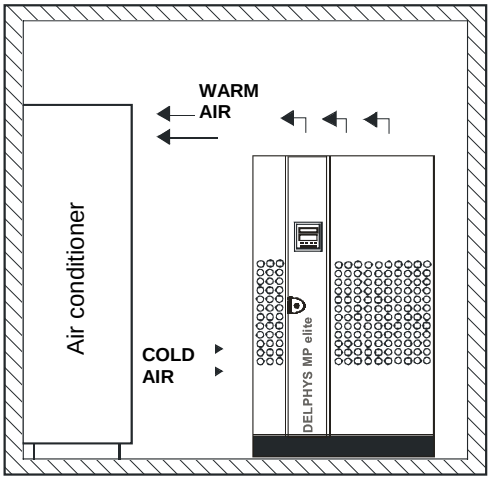
### 2.1.7 Ventilation and air conditioning constraints

Please respect the layout instructions for air flow.

**VENTILATION**




**AIR CONDITIONING**




## 2.2 HEAT LOSS AND VENTILATION CHARACTERISTICS

**The recommended ambient temperature is between 15 and 25°C.**

***DELPHYS* MP**

| POWER (kVA) | Bottom air flow (m3/h) | Door air flow (m3/h) | Total air flow (m3/h) | Heat loss at Pn - cos phi 0,8 (kW) | Heat loss at Pn (kcal/h) |
|---|---|---|---|---|---|
| 60 | 400 | 900 | 1300 | 3 | 2600 |
| 80 | 400 | 900 | 1300 | 5,5 | 4800 |
| 100 | 400 | 1100 | 1500 | 5,8 | 5000 |
| 120 | 400 | 1100 | 1500 | 7,5 | 6500 |
| 160 | 800 | 1100 | 1900 | 9,4 | 8100 |
| 200 | 800 | 1100 | 1900 | 13,1 | 11300 |

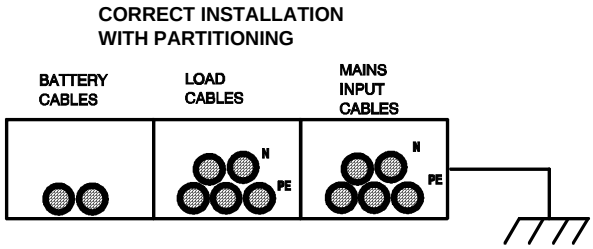
***DELPHYS* MP elite**

| POWER (kVA) | Bottom air flow (m3/h) | Door air flow (m3/h) | Total air flow (m3/h) | Heat loss at Pn - cos phi 0,8 (kW) | Heat loss at Pn (kcal/h) |
|---|---|---|---|---|---|
| 60 | 400 | 1600 | 2000 | 5,4 | 4700 |
| 80 | 400 | 1600 | 2000 | 6,5 | 5600 |
| 100 | 400 | 1600 | 2000 | 7,7 | 6700 |
| 120 | 400 | 1600 | 2000 | 8,6 | 7400 |
| 160 | 800 | 1600 | 2400 | 10,2 | 10300 |
| 200 | 800 | 1600 | 2400 | 15,4 | 13300 |

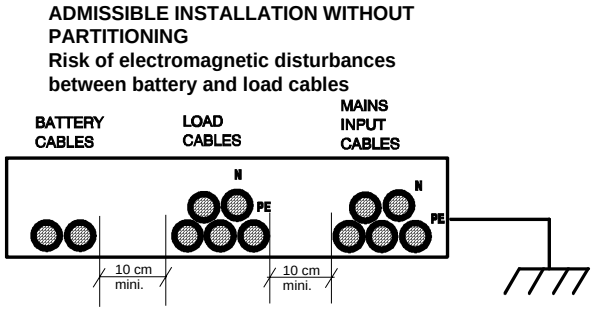
### 2.2.1 General rules for cable installation on tray

**Power cables**

Connection to the system cabinets:
All metallic cable trays must be grounded.
Divide the power cables into groups, according to the different circuits :
- mains input,
- battery input,
- connections to each unit,
- load output.

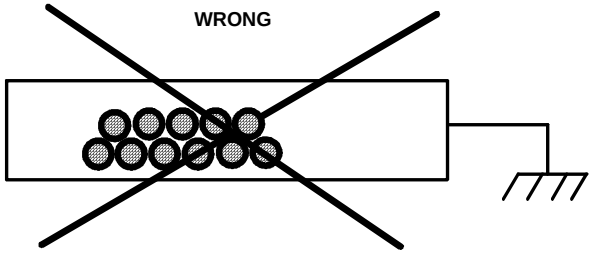



Gather all poles of a power circuit in the same group :
- poles + and - for the battery,
- 3 phases + PE for a three-phase distribution (rectifier supply),
- 3 phases + neutral + PE for the bypass supply or the downstream distribution,
- 3 phases + PE for the bypass supply through an isolation transformer.



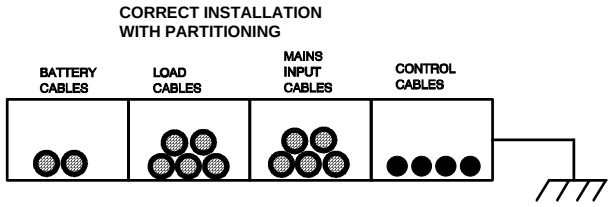

CAUTION :

All metallic cable trays -either fixed to the wall or in a raised floor- must be grounded and connected to the corresponding cabinets.

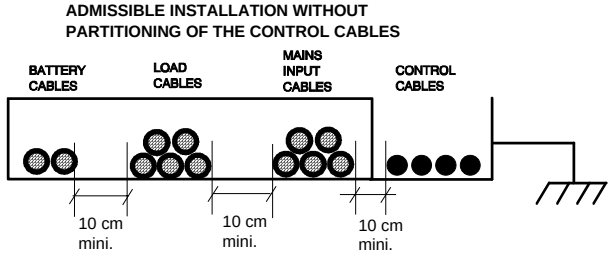



**Control cables and low power connections:**

This category includes :
- the connections between the cabinets and each unit,
- the transfer of alarms,
- the remote control connection,
- the connections to the BMS (Building Management System),
- the emergency stop,
- the connection to the generator set.

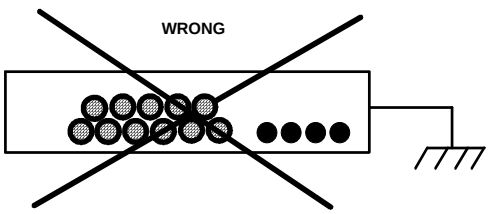



Do not place power and control cables together in the same tray and same group.




**CAUTION** :

**ALL METALLIC CABLE TRAYS, MUST BE GROUNDED AND CONNECTED TO THE CORRESPONDING CABINETS.**



# CHAPTER 3: HANDLING

## 3.1 DIMENSIONS AND WEIGHTS

The packed weight of each item is shown:
- with paint on wooden crates,
- with indelible felt pen on cellular plastics if standard packing is used. Weight can be over values specified if packing is specific or if options are provided.

### 3.1.1 UPS cabinets and modular units for Delphys MP (parallel system).

| POWER (kVA) | 60-80 3-ph | 100-120 3-ph | 160 3-ph | 200 3-ph |
|---|---|---|---|---|
| WEIGHT MP (kg) | 650 | 850 | 940 | |
| WIDTH (mm) | 800 | | | |
| DEPTH (mm)<br>- floor requirement | 800 | | | |
| - overall dimensions with door handle | 850 | | | |
| - door, handle and rear panel excluded | 795 | | | |
| HEIGHT (mm) | 1930 | | | |

### 3.1.2 UPS cabinets and modular units for Delphys MP elite (parallel system).

| POWER (kVA) | 60-80 3-ph | 100-120 3-ph | 160-200 3-ph |
|---|---|---|---|
| WEIGHT MP elite (kg) | 700 | 840 | 1000 |
| WIDTH (mm) | 1000 | | |
| DEPTH (mm)<br>- floor requirement | 800 | | |
| - overall dimensions with door handle | 850 | | |
| - door, handle and rear panel excluded | 795 | | |
| HEIGHT (mm) | 1930 | | |

### 3.1.3 Central bypass cabinet

| POWER (kVA) | 500 3-ph | 800 3-ph | 1200 3-ph |
|---|---|---|---|
| WEIGHT (kg) | 315 | 420 | 600 |
| WIDTH (mm) | 810 | 1010 | 1310 |
| DEPTH (mm)<br>- floor requirement | 815 | 815 | 815 |
| - overall dimensions with door handle | 845 | 845 | 845 |
| - door, handle and rear panel excluded | 800 | 800 | 800 |
| HEIGHT (mm) | 1930 | 1930 | 1950 |

**Note 1:**
The central bypass cabinet of 800kVA allows cable input from the front. No rear or side access is required.

**Note 2:**
The central bypass cabinets of 500kVA and 1200kVA require either rear or side access for cable connection.

### 3.1.4 Bypass isolating transformer (for linear loads)

Note: for supplying non-linear loads, please seek advice from the factory.

| POWER (kVA) | 80 3-ph | 120 3-ph | 200 3-ph |
|---|---|---|---|
| WEIGHT (kg) | 450 | 550 | 850 |
| WIDTH (mm) | 600 | 600 | 800 |
| DEPTH (mm)<br>- floor requirement<br><br>- overall dimensions with door handle<br><br>- door, handle and rear panel excluded | 815<br><br>845<br><br>800 | | |
| HEIGHT (mm) | 1930 | | |

### 3.1.5 Battery cabinets

Note: the number of battery cabinets depends on the power of the UPS and the duration of the back up time.

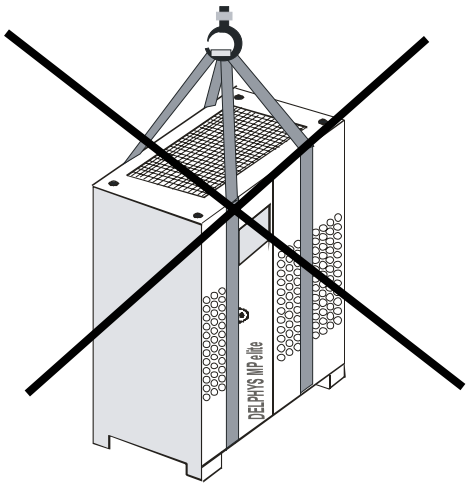
| MAXIMUM WEIGHT FOR TRANSPORT (kg) | 1250 |
|---|---|
| Maximum weight per shelf (kg) | 300 |
| Maximum weight with the 5 shelves (kg) | 1550 |
| WIDTH (mm) | 800 |
| DEPTH (mm)<br>- floor requirement<br><br>- Overall dimensions with door handle<br><br>- door, handle and rear panel excluded | 815<br><br>845<br><br>800 |
| HEIGHT (mm) | 1930 |

### 3.2 HANDLING FROM ABOVE

For weight and dimensions of the UPS, please see section 3.1. Please, take into account the instructions provided for handling, so as to avoid damage to the equipment.

THE USE OF STRAPS
IS PROHIBITED

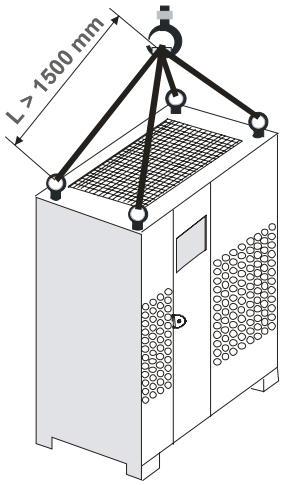
IMPORTANT:
THE CABINETS MUST BE KEPT IN AN UPRIGHT POSITION WHEN SHIPPED OR HANDLED.




**HANDLING BY USING SLINGS**

Slings can be used, provided that they are ≥ 1,5 meter-long.

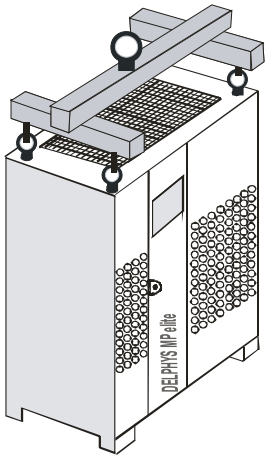
CAUTION : lift the cabinet up and down carefully and smoothly.




NOTE : eye screws of M16 type with 30-mm inner diameter are supplied on request. Remove the screw or plastic part protecting the thread and insert the eye screws. In order to meet the protection index specified, do no forget to replace the screws or plastic parts after removing the eye screws.

**HANDLING BY USING A LIFTING BEAM**

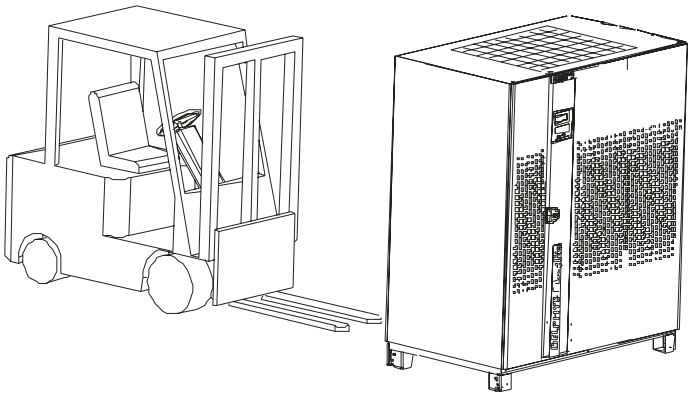
If the height under ceiling does not allow the use of slings, it is preferable to use a lifting beam.



### 3.3 HANDLING FROM UNDERNEATH

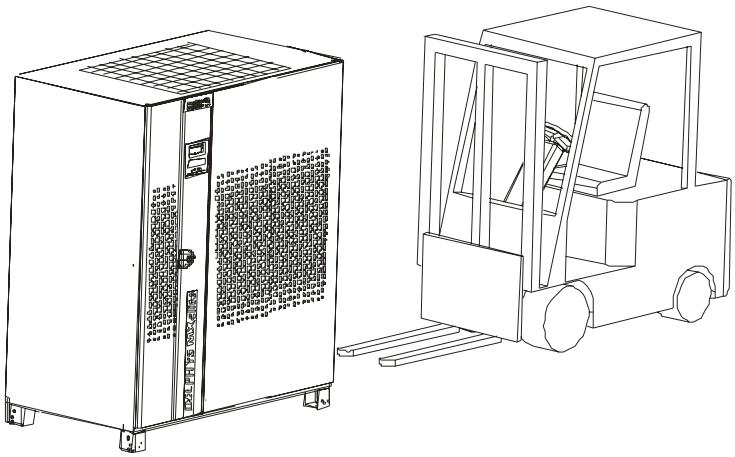
Remove the grilles on the front and rear of the cabinet and introduce the fork under the unit.

**HANDLING FROM THE FRONT OR THE REAR**



Lateral handling is also possible, provided that the bottom side panels are removed.

**LATERAL HANDLING**



| | |
|---|---|
| **IMPORTANT** | Given the cabinets are heavy, handling using a pallet truck on slopes or ramps – even only slightly inclined, is hazardous and can cause severe accidents. Take all required precautions and use adapted means and tools. |

## 3.4 WEIGHT AND HANDLING OF BATTERY CABINETS

### WEIGHT

Weight of empty cabinet: 65kg.
The weight of the cabinet for transport, handling and positioning shall not exceed 1250 kg.
If each shelf can support 300kg, the maximum weight of the cabinet installed on site shall not exceed 1550 kg, which means that one out of the 5 shelves shall support less than 300kg).

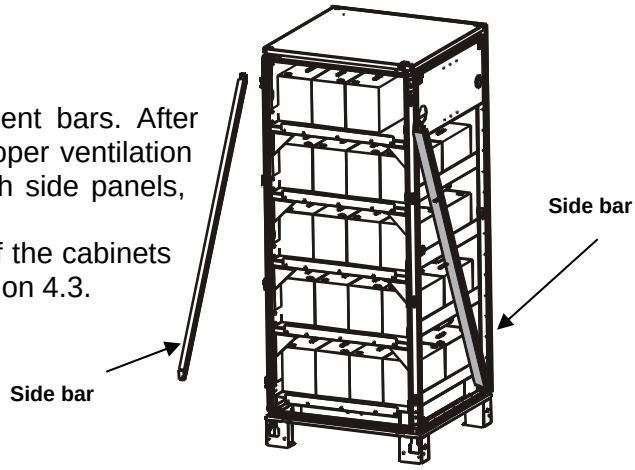
### HANDLING FROM UNDERNEATH

Handling can be from the bottom using a lifting truck. Front, rear as well as side bottom panels are available on the top of the cabinet.

### HANDLING FROM ABOVE

Handling can be by using 4 slings that are at least 1 meter long. The total weight shall not exceed 800 kg, i.e. 200 kg per eye screw, so please adapt to the weight to be lifted accordingly.

NOTE
Each battery cabinet has two side reinforcement bars. After unloading, they must be removed to ensure proper ventilation of battery blocks. If the cabinet is provided with side panels, they shall be removed first.
For advice regarding safety, fixing to the floor of the cabinets and adjusting of fastening rods, please see section 4.3.



# CHAPTER 4: INSTALLATION AND CABINET POSITIONING

## 4.1 INSTALLATION

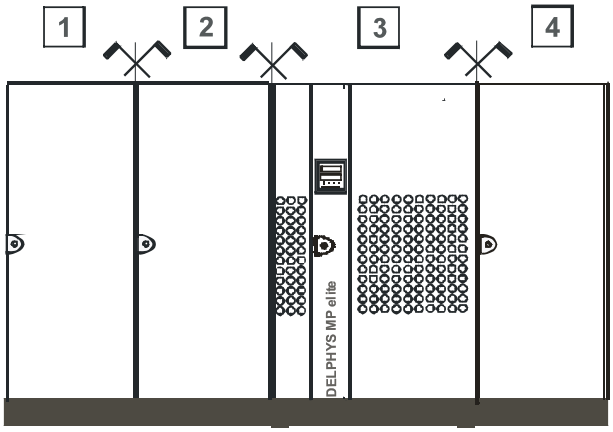
### 4.1.1 Cabinet positioning

**To make transport and handling easier, the system is separated into cabinets (or cabinet sets).**

**The 'X' symbol on the front face indicates the separation points between the cabinets.**

**The individual cabinet position should correspond with sequence / numbers indicated on the front view of the system.**

**(The number of each cabinet is indicated on the right top corner on the inside of the door).**




**Note** : reference should be made to the technical details in the drawing file.

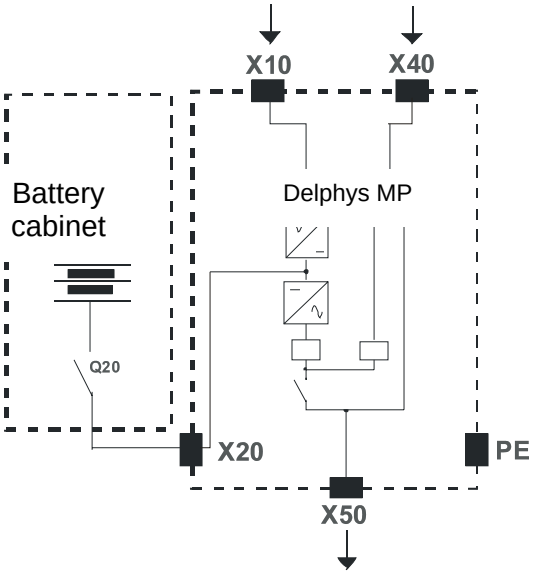
### 4.1.2 Layout of power connections

**When assembling the cabinets, the "■" symbols mentioned on the basic scheme indicate the power connections to be achieved.**

**PE : earth bonding,**
**X10 : rectifier power input,**
**X20 : battery input,**
**X40 : bypass power input,**
**X50 : output to the load.**

**For connection arrangements, please see section 5.2.**

**Note : reference should be made to the technical details of the drawing file.**

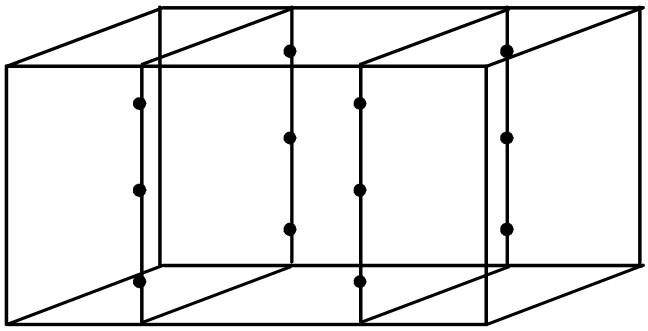



**Note** : For dimensions and designation of terminals and terminations, please see section 5.1.

## 4.2 GENERAL RULES FOR CABINET ASSEMBLING

### 4.2.1 Assembling of cabinets

Use tensilock screws - supplied by the manufacturer - to assemble the different cabinets.
These are 'welded structure-type cabinets', meeting all requirements as regards electromagnetic compatibility.
The tensilock screws bite into the paint and guarantee electric contact between the frame and the different cabinets.
They also guarantee equipotential grounding.



**Notes:**

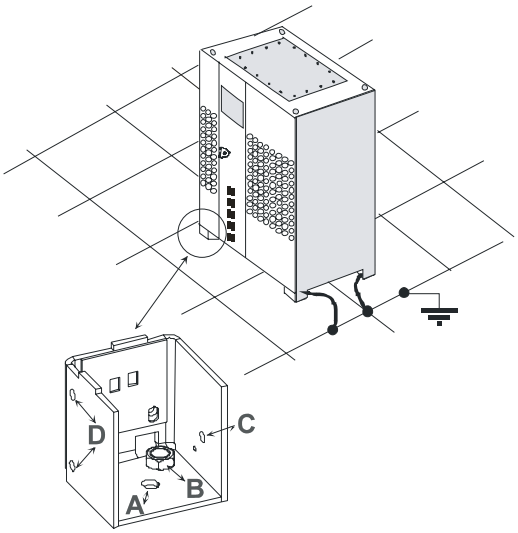
- **A rubber seal is placed between some of the cabinets to be assembled.**
- **If cabinets are placed against a wall, screw fixings located at the rear are not accessible; as a result only the screw on the top of the rear panel will be fixed.**

### 4.2.2 Fixing to a raised floor (or directly to the floor)

Each foot of the cabinet needs to be linked up to the metallic mesh network (if the cabinet is on a raised floor) or to have direct earth bonding (if the cabinet is directly positioned on the floor) by using short links with a cross-section ≥ 35 mm².

Use braidings to connect all the metallic feet of the raised floor and guarantee equipotential cabling.

A = fixing to the floor (hole ∅ 13),
B = screw THM 14 for level adjustment,
C = fixing of braidings,
D = fixing of the grille




### SEPARATED CABINETS

Avoid spaces between cabinets. Connect the cabinets to each other by using a conductor with a cross-section ≥ 35 mm² and not exceeding a 20-meter length. An accessible and grounded metallic mesh network can also be a solution if every cabinet is connected to this network.

## 4.3 BATTERY CABINETS

NOTE:

This page is relating to battery cabinets including sealed lead acid batteries (VRLA).
In case of a cabinet with open lead acid batteries, specific precautions and conditions shall be undertaken as per standard IEC 62040-1-2, part N (ventilation of battery blocks).

### 4.3.1 Safety

| | |
|---|---|
| ELECTRICAL SAFETY | **For safety reasons during transports and handling, batteries are disconnected at the level of each rack (or by sections not exceeding 150 V). Take all necessary precautions when reconnecting the cables.** |

| | |
|---|---|
| MECHANICAL SAFETY | **For batteries on racks or in cabinets, the cabinet must be fixed to the floor to prevent it from falling over. Each cabinet is fitted with pre-drilled feet - See dimensions below.** |

| | |
|---|---|
| CAUTION | **Connection must be performed by authorised staff, which have been previously trained. Connections to be performed are :**<br>**- grounding of battery cabinet,**<br>**- polarities + and – to the inverter,**<br>**- between battery sections and/or between shelves.** |

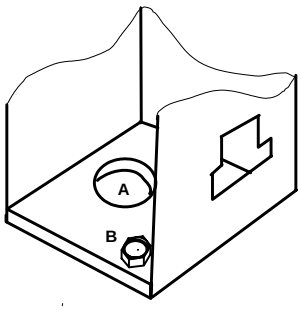
### 4.3.2 Protection of battery cabinets

The protection of the battery cabinet is located in either a specific enclosure or cabinet.

### 4.3.3 Cabinet fixing to the floor

**FEET OF BATTERY CABINET**

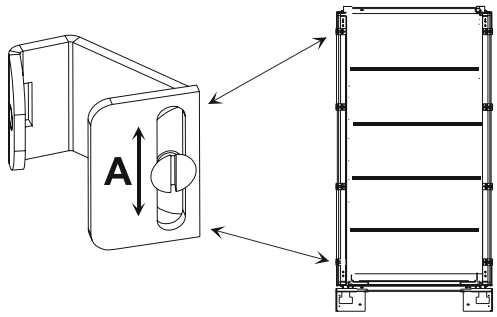
**Each foot has a floor fixing hole (labelled A : ∅ 13) and a welded nut for level adjusting (labelled B : screw THM12 not supplied).**




CAUTION : When the battery cabinet is installed, cut and remove the plastic fastening of battery cells in order to release the safety valve.

### 4.3.4 Adjusting the fastening rod of auxiliary cabinets

Adjust part marked "A" to your needs in order to adapt the insert of the fastening rod.




### 4.3.5 Replacement of batteries

| | |
|---|---|
| **ADVICE** | **When replacing the batteries, use the same type and number of battery blocks.** |

| | |
|---|---|
| **CAUTION** | **Do not dispose of into a fire due to risk of explosion.**<br><br>**Do not try to open or break up batteries. The electrolyte is toxic and may cause acid projections or injuries.** |

# CHAPTER 5: ELECTRICAL CONNECTIONS

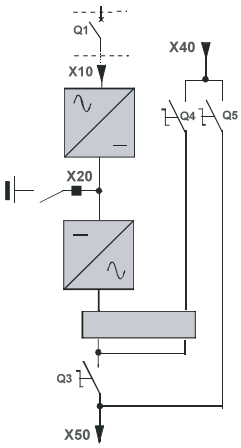
## 5.1 LOCATION AND DIMENSIONS OF TERMINALS

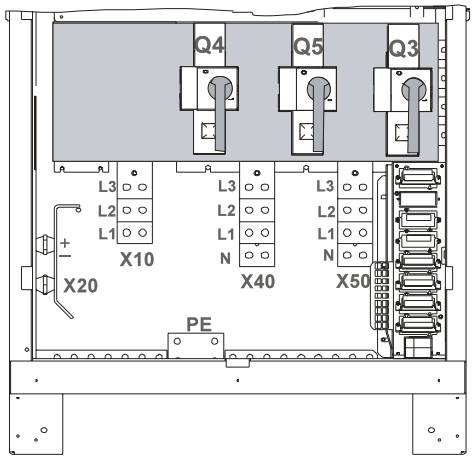
| | |
|---|---|
| ELECTRICAL SAFETY | **To ensure proper tightening of lugs to terminations, use screws supplied by SOCOMEC-SICON (or screws and washers of section adapted to the holes of terminations).** |

### 5.1.1 Separated rectifier and bypass inputs on Delphys MP UPS

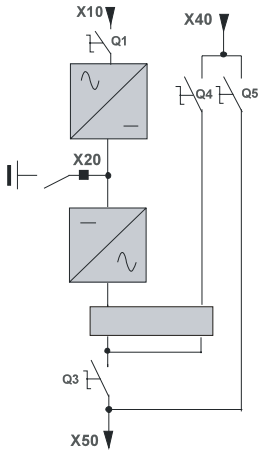
***DELPHYS* MP without switch Q1**

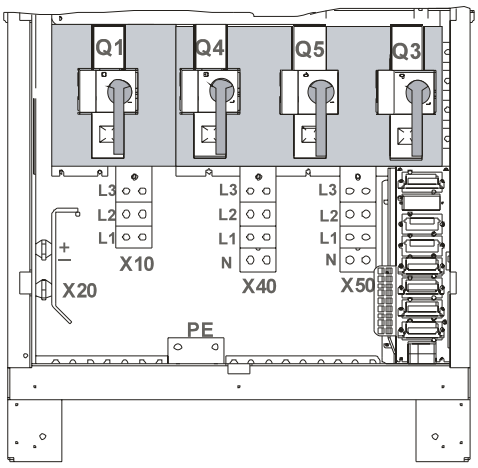
| | |
|---|---|
| **ELECTRICAL SAFETY** | **As switch Q1 is not provided in the UPS, a switching device with quick access must be installed in the cabling system of the building.** |




***DELPHYS* MP with switch Q1 (optional)**



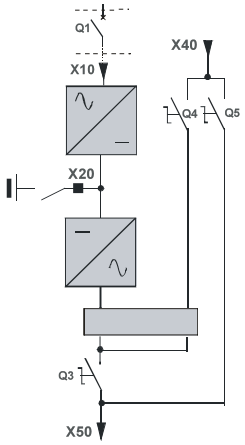



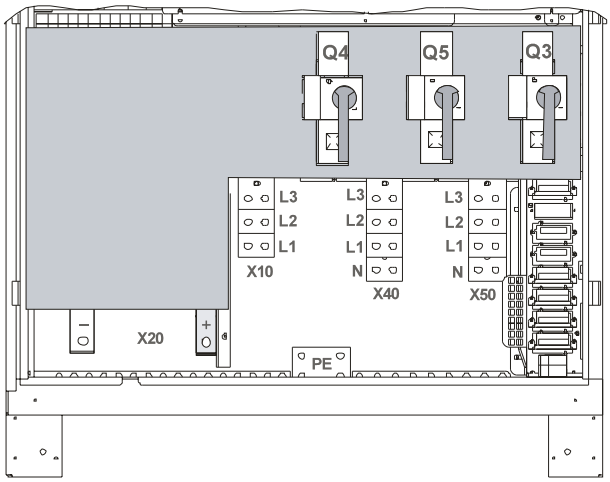

For more details about the connection terminals, please refer to section 5.1.4).

### 5.1.2 Separated rectifier and bypass inputs on Delphys MP elite UPS

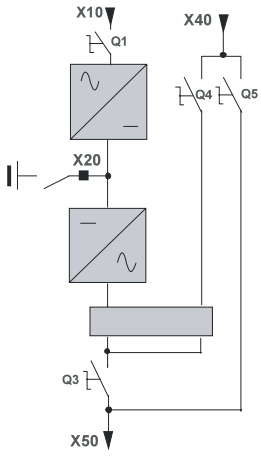
***DELPHYS* MP elite without switch Q1**

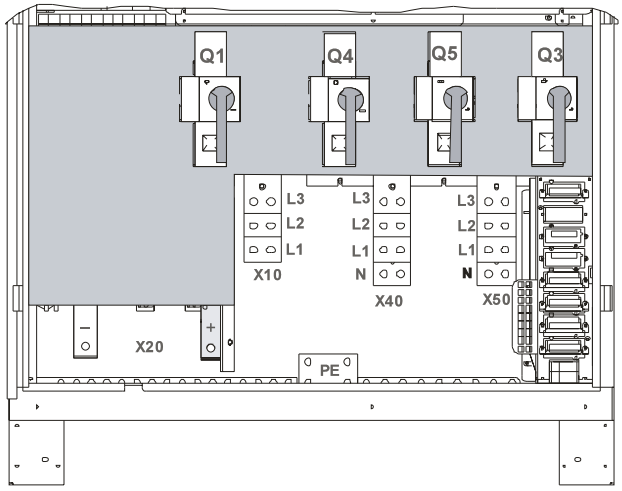
| | |
|---|---|
| **ELECTRICAL SAFETY** | **As switch Q1 is not provided in the UPS, a switching device with quick access must be installed in the cabling system of the building.** |




***DELPHYS* MP elite with switch Q1 (optional)**



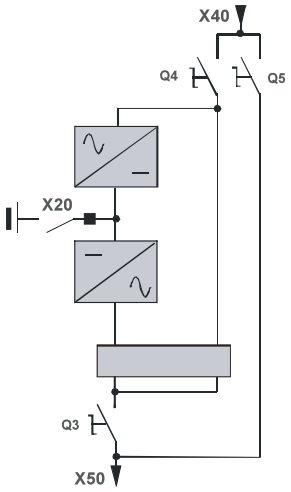




For more details about the connection terminals, please refer to section 5.1.4).

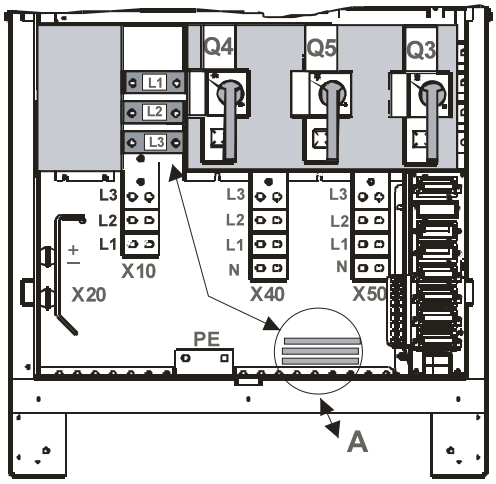
### 5.1.3 Common rectifier and bypass input

With a common rectifier and bypass input, straps marked A are to be used for L1, L2 and L3 in order to ensure rectifier input connection.

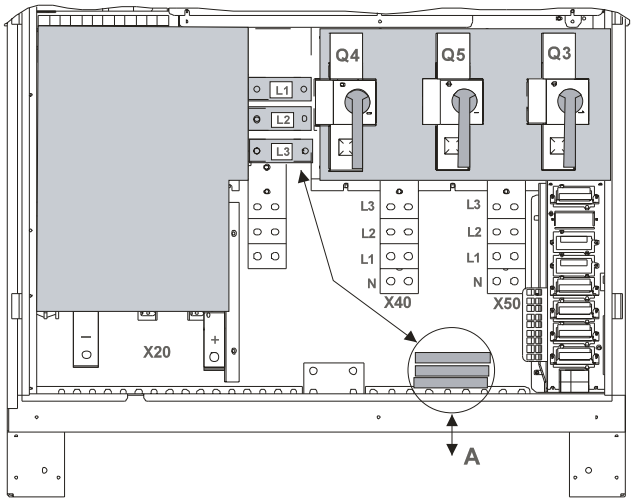
**Common input system**




***DELPHYS* MP**




***DELPHYS* MP elite**

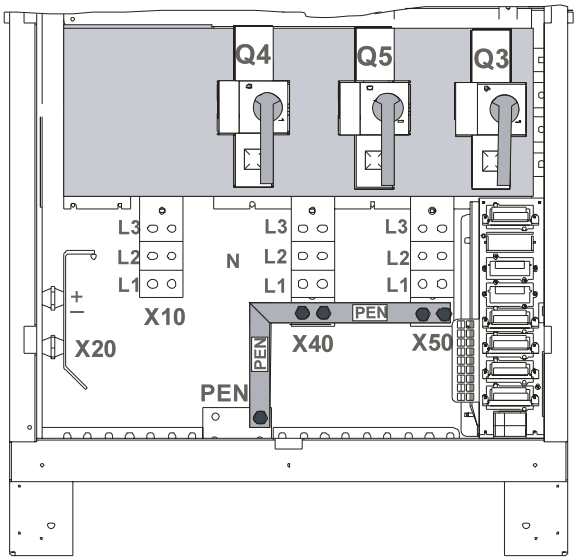



### 5.1.4 Characteristics of connection terminals

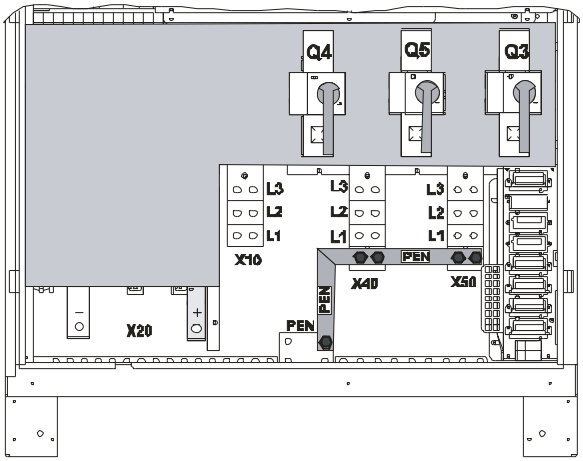
PE : Copper termination 40x5mm, 1 hole ϕ11, screw M10.
X10 : Rectifier supply input
Copper termination 63x4mm, 2 holes ϕ11, screw M10, max cross section 2x120 mm².
X20 : Battery input L+ and L-,
Copper termination 40x5mm, 1 hole ϕ11, screw M10, max cross section 2x240 mm².
X40 : bypass supply input
Copper termination 63x4mm, 2 holes ϕ11, screw M10, max cross section 2x120 mm².
X50 : load output
Copper termination 63x4mm, 2 holes ϕ 11, screw M10, max cross section 2x120 mm².

### 5.1.5 Connection to a neutral system of TNC type

***DELPHYS* MP**




***DELPHYS* MP elite**




### 5.1.6 Characteristics of connection terminals

PE : Copper termination 40x5mm, 1 hole ϕ11, screw M10.
X10 : Rectifier supply input
Copper termination 63x4mm, 2 holes ϕ11, screw M10, max cross section 2x120 mm².
X20 : Battery input L+ and L-,
Copper termination 40x5mm, 1 hole ϕ11, screw M10, max cross section 2x240 mm².
X40 : bypass supply input
Copper termination 63x4mm, 2 holes ϕ11, screw M10, max cross section 2x120 mm².
X50 : load output
Copper termination 63x4mm, 2 holes ϕ 11, screw M10, max cross section 2x120 mm².

### 5.1.7 Terminals for unit inputs on the bypass cabinet

| POWER (kVA) | UNIT INPUTS | Dimensions of terminals |
|---|---|---|
| 500 | X45 | Terminations in Cu 40x6, 8 holes ∅11, screw M10 |
| 600 to 800 3-ph | X45 | Terminations in Cu 100x5, 3 holes ∅13, screw M12 |
| 900 to 1200 3-ph | X45 | Terminations in Cu 100x10, 6 holes ∅13, screw M12 |

### 5.1.8 Terminals for utility input/load output on the bypass cabinet

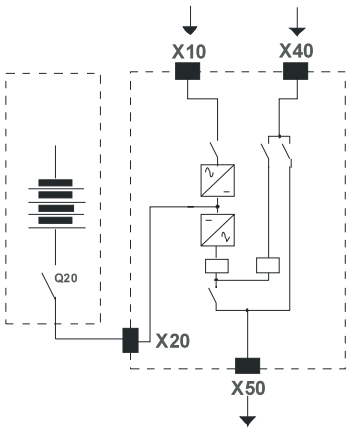
| POWER (kVA) | UNIT INPUTS | Dimensions of terminals |
|---|---|---|
| 500 3-ph | X40 and X50 | Neutral: 50x10 Cu, 1 hole ∅13 screw M12<br>Phase: 40x6 Cu, 1 hole ∅13 screw M12 |
| 800 3-ph | X40 and X50 | Terminations in Cu 100x5, 3 holes ∅13, screw M12 |
| 1200 3-ph | X40 and X50 | Terminations in Cu [4] 100x10, 6 holes ∅13, screw M12 |

[4] Extension terminals (100x10 Cu, 7 holes ∅13) are to be moved from X40 to X50 if cable input is from the top.

## 5.2 DESCRIPTION OF POSSIBLE UPS CONFIGURATIONS

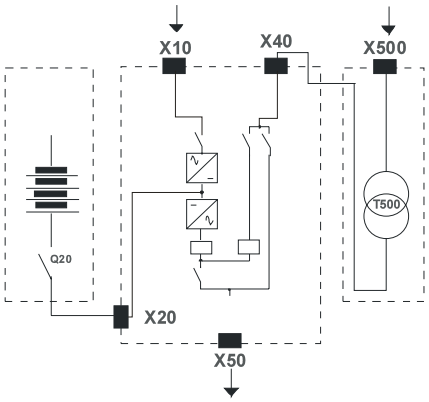
STANDARD UPS
WITH NON ISOLATED RECTIFIER

X10 = RECTIFIER INPUT
X20 = BATTERY CONNECTION
X40 = BYPASS INPUT
X50 = OUTPUT TO THE LOAD



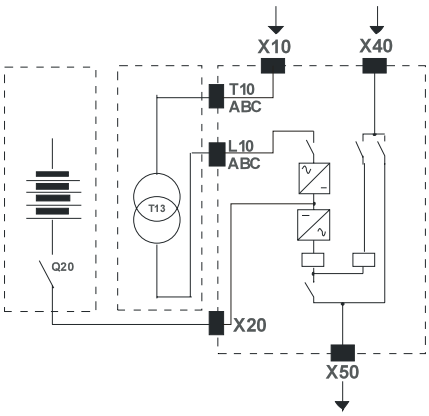

STANDARD UPS
WITH NON ISOLATED RECTIFIER
AND BYPASS TRANSFORMER

X10 = RECTIFIER INPUT
X20 = BATTERY CONNECTION
X500 = BYPASS INPUT
X50 = OUTPUT TO THE LOAD



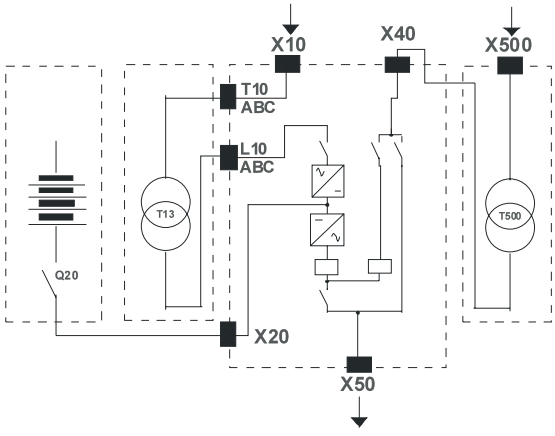

STANDARD UPS
WITH ISOLATED RECTIFIER

X10 = RECTIFIER INPUT
T10 ABC = primary transfo T13
L10 ABC = secondary transfo T13
X20 = BATTERY CONNECTION
X40 = BYPASS INPUT
X50 = OUTPUT TO THE LOAD




STANDARD UPS
WITH ISOLATED RECTIFIER
AND BYPASS TRANSFORMER

X10 = RECTIFIER INPUT
T10 ABC = primary transfo T13
L10 ABC = secondary transfo T13
X20 = BATTERY CONNECTION
X500 = BYPASS INPUT
X50 = OUTPUT TO THE LOAD



## 5.3 EXTERNAL CONNECTIONS

External connections are:
- grounding connection,
- rectifier and bypass connections,
- load output,
- emergency stop and transfer of alarms.

| | |
|---|---|
| STANDARD COMPLIANCE | **To avoid injuries to people or damage to the equipment during functioning, cabling specifications, installation and sizing must comply with the domestic regulations in force.** |

### 5.3.1 Grounding precautions

UPS's manufactured by SOCOMEC SICON UPS are designed for any grounding systems and are compatible with IT, TNS, TT neutral arrangements.
When the neutral arrangement is of TNC type, the equipment must have a PEN conductor.
In cases of different neutral systems between the utility and the load, a transformer must be installed at the bypass input to carry out isolation.

### 5.3.2 Connecting earth cables

**IMPORTANT** : due to EMI filters*, there are "HIGH LEAKAGE CURRENTS".
As a consequence, it is imperative to connect earth cables before mains cables.

* EMI filters = protection against electromagnetic disturbances.

### 5.3.3 Earth cable cross-section

The earth cable cross section must comply with the domestic regulations in force.

### 5.3.4 Leakage current (rating of the differential protection)

The minimum differential current recommended is 300 mA.

### 5.3.5 Neutral cable cross-section

It is necessary to check:

a) the minimum cross-section of the neutral cable must equal one of the phase conductors.

**It is recommended to double the neutral conductor cross-section for supplying non-linear loads as soon as: Icrest per phase / I r.m.s. per phase > 2,2.**

b) the balancing of the loads across the three phases,
c) the values that will trip the protective devices.

## 5.4 VALUES OF CURRENTS FOR CABLE SIZING

NOTE : these values are only indicative for standard systems.

### 5.4.1 Input rectifier currents for Delphys MP and Delphys MP elite

Operating conditions are as follows:
- Input/output power supply voltage 3x400V,
- The UPS is operating at rated power and batteries are recharging.

| POWER on UPS output (kVA) | DELPHYS MP Max. rectifier input current (A) | DELPHYS MP elite Max. rectifier input current (A) |
|---|---|---|
| **60 kVA 3-phase** | 134 | 86 |
| **80 kVA 3-phase** | 169 | 114 |
| **100 kVA 3-phase** | 213 | 142 |
| **120 kVA 3-phase** | 252 | 177 |
| **160 kVA 3-phase** | 339 | 228 |
| **200 kVA 3-phase** | 419 | 282 |

### 5.4.2 Battery currents at the end of the back up time

The UPS is operating at rated power.

| UPS Power | 60kVA | 80kVA | 100kVA | 120kVA | 160kVA | 200kVA |
|---|---|---|---|---|---|---|
| **Currents (A)** | **167** | **225** | **277** | **334** | **445** | **556** |

### 5.4.3 Mean current supplied by the battery when discharging

The mean current value is to be taken into account for sizing connecting cables between the battery and the UPS.

| UPS Power | 60kVA | 80kVA | 100kVA | 120kVA | 160kVA | 200kVA |
|---|---|---|---|---|---|---|
| **Currents (A)** | **154** | **205** | **255** | **307** | **408** | **505** |

### 5.4.4 Bypass current (or output current to the load)

Operating conditions are as follows:
- input/output power supply voltage 3x400V,
- The UPS is operating at rated power.

| UPS Power | 60 kVA | 80kVA | 100kVA | 120kVA | 160kVA | 200kVA |
|---|---|---|---|---|---|---|
| **Currents (A)** | **87** | **116** | **144** | **174** | **232** | **290** |

Note: sizing of cables and protections upstream of the bypass shall take into account:
- overloads caused by non-linear loads,
- possible overloads admitted by the UPS i.e. 1,1In for 1h, 1,25In for 10min or 1,5In for 1min.

## 5.5 SIZING OF CIRCUIT BREAKERS

### 5.5.1 Rectifier input circuit breaker

Values are only indicative as per the following conditions:
the rectifier and bypass input voltage is 3x400V with a cos phi = 0,8,
the length of cabling between the circuit breaker and the UPS is <10 metres.

**Delphys MP**

| ***DELPHYS* MP** | **60 kVA** | **80kVA** | **100kVA** | **120kVA** | **160kVA** | **200kVA** |
|---|---|---|---|---|---|---|
| **Sizing of circuit breaker** | **200A** | **200A** | **250A** | **400A** | **400A** | **630A** |

**Delphys MP elite**

| ***DELPHYS* MP elite** | **60 kVA** | **80kVA** | **100kVA** | **120kVA** | **160kVA** | **200kVA** |
|---|---|---|---|---|---|---|
| **Sizing of circuit breaker** | **100A** | **125A** | **160A** | **200A** | **250A** | **400A** |

### 5.5.2 Circuit breaker on bypass input

Values are only indicative as per the following conditions:
- the rectifier and bypass input voltage is 3x400V with a cos phi = 0,8 on linear loads,
- the length of cabling between the circuit breaker and the UPS is <10 metres.

| **UPS power** | **60 kVA** | **80kVA** | **100kVA** | **120kVA** | **160kVA** | **200kVA** |
|---|---|---|---|---|---|---|
| **Sizing of circuit breaker** | **125A** | **160A** | **200A** | **250A** | **400A** | **400A** |

Note 1: the admissible input voltage tolerance is +/-10% - the sizing of circuit breakers has therefore to be adjusted accordingly.

Note 2: the protection on the bypass input is intended for cable protection and does not take into account the $I^2T$ of thyristors.

Note 3 : the sizing of circuit breakers takes into account a possible overload rate of 125%.

### 5.5.3 Circuit breaker on a common rectifier and bypass input

Values are only indicative as per the following conditions:
- the rectifier and bypass input voltage is 3x400V with a cos phi = 0,8,
- the length of cabling between the circuit breaker and the UPS is <10 metres.

**Delphys MP**

| ***DELPHYS* MP** | **60 kVA** | **80kVA** | **100kVA** | **120kVA** | **160kVA** | **200kVA** |
|---|---|---|---|---|---|---|
| **Sizing of circuit breaker** | **200A** | **200A** | **250A** | **400A** | **400A** | **630A** |

**Delphys MP elite**

| ***DELPHYS* MP elite** | **60 kVA** | **80kVA** | **100kVA** | **120kVA** | **160kVA** | **200kVA** |
|---|---|---|---|---|---|---|
| **Sizing of circuit breaker** | **125A** | **160A** | **200A** | **250A** | **400A** | **400A** |

Note: the admissible input voltage tolerance is +/-10% - the sizing of circuit breakers has therefore to be adjusted accordingly.

### 5.5.4 Protection and cross-section of battery cables

Values are provided for a distance of 20 meters **between the UPS and the battery.** (Battery mean current while discharging – Please see section 5.4.3).
**Use double insulated cables BN4-F.**

**BACK UP TIME lower than 30 minutes**

| **UPS power (kVA)** | **60 kVA** | **80 kVA** | **100 kVA** | **120 kVA** | **160 kVA** | **200 kVA** |
|---|---|---|---|---|---|---|
| Protection FUSERBLOC DIN 43620 | Size 2 | Size 2 | Size 2 | Size 2 | Size 2 | Size 2 |
| Sizing of fuses gG | 160A T2 | 160A T2 | 200A T2 | 250A T2 | 400A T2 | 400A T2 |
| | | | | | | |
| Protection FUSOMAT DIN 43620 | Size 1 | Size 1 | Size 1 | Size 1 | Size 2 | Size 2 |
| Sizing of fuses gG | 160A T1 | 160A T1 | 200A T1 | 250A T1 | 400A T2 | 400A T2 |
| | | | | | | |
| Min. cross-section of cabling for a 20 meter distance | 35mm² | 70mm² | 95mm² | 95mm² | 150mm² | 185mm² |

**BACK UP TIME between 30 to 60 minutes**

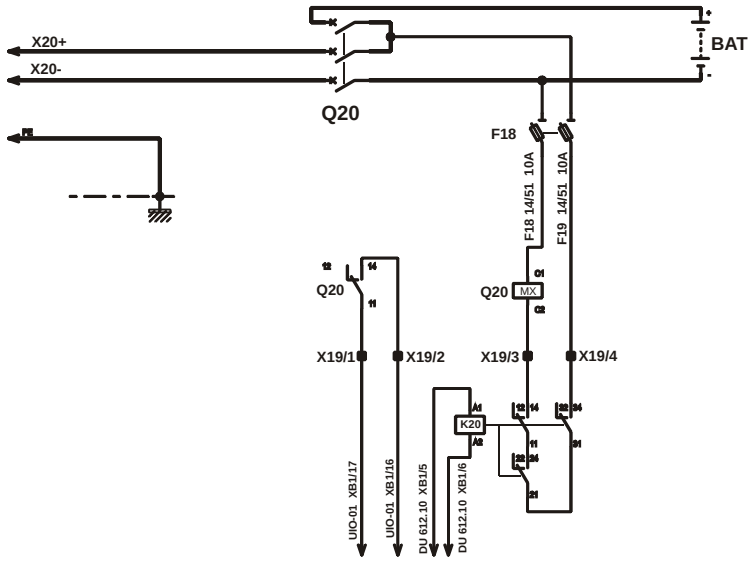
| UPS power (kVA) | 60 kVA | 80 kVA | 100 kVA | 120 kVA | 160 kVA | 200 kVA |
|---|---|---|---|---|---|---|
| Protection FUSERBLOC DIN 43620 | Size 2 | Size 2 | Size 2 | Size 2 | Size 3 | Size 3 |
| Sizing of fuses gG | 160A T2 | 200A T2 | 250A T2 | 400A T2 | 500A T3 | 500A T3 |
| | | | | | | |
| Protection FUSOMAT DIN 43620 | Size 1 | Size 1 | Size 1 | Size 2 | Size 3 | Size 3 |
| Sizing of fuses gG | 160A T1 | 200A T1 | 250A T1 | 400A T2 | 500A T3 | 500A T3 |
| | | | | | | |
| Min. cross-section of cabling for a 20 meter distance | 35mm² | 70mm² | 95mm² | 95mm² | 150mm² | 185mm² |

### 5.5.5 Protection of battery cables by means of circuit breakers

| UPS power (kVA) | Type of circuit breaker | Ref. Socomec | Ref Jeumont Schneider | Setting of circuit breaker |
|---|---|---|---|---|
| **60 and 80** | NS250 N FPAV 3P TM200D | A035808 | 31631 | At least thermal and magnetic |
| **100 and 120** | NS400 H FPAV 3P MP1 | A035788 | 32742 | 800A |
| **160 and 200** | NS630 H FPAV 3P MP1 | A035798 | 32942 | |

Note : be careful about the way of connecting the circuit breakers – See § 5.5.6.

### 5.5.6 Circuit breaker for battery protection on UPS's between 60 and 200kVA

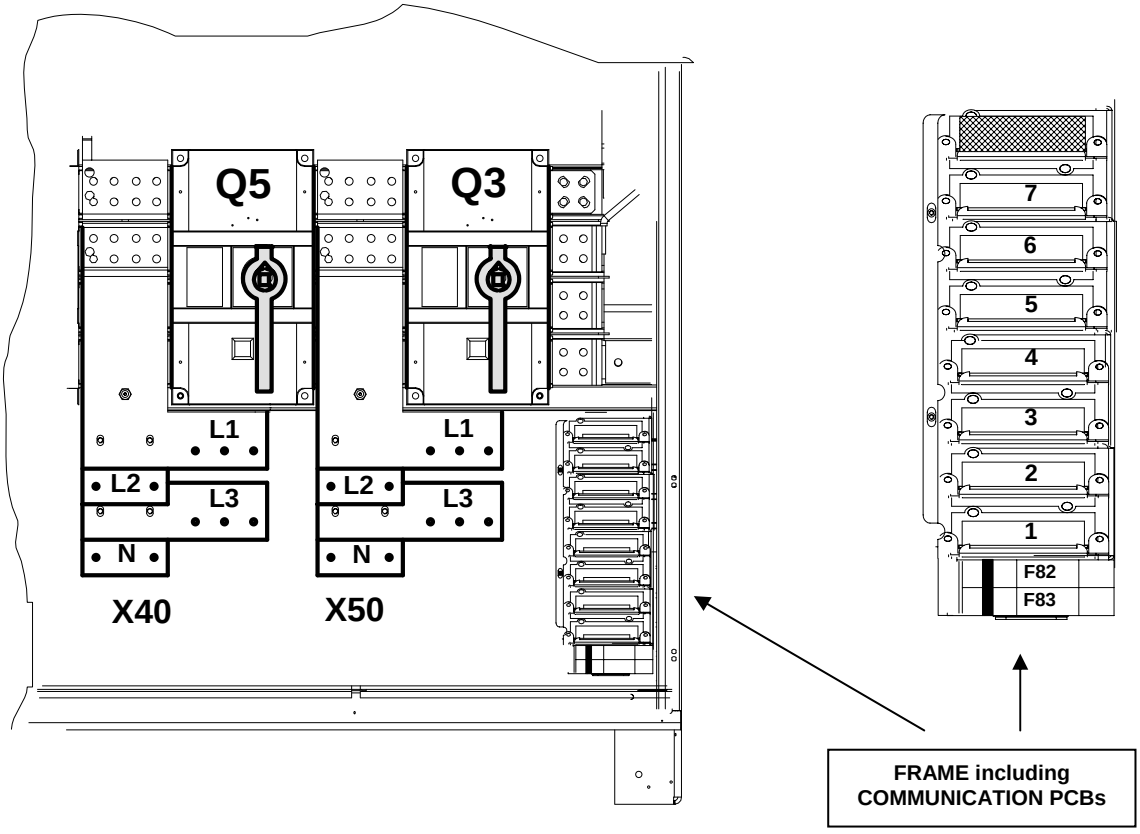


## 5.6 COM - SLOT FRAME FOR EXTERNAL COMMUNICATION

### 5.6.1 Layout of the COM-SLOT frame

PCB's are gathered on a specific frame located in the bottom right corner of the UPS (See below).

**View of the communication frame** **Detailed view**




Seven slots identified from 1 to 7 can be used.

**Slot 1**:
Standard interface PCB is provided as a standard with 3 inputs and 4 outputs with defined data (See section 5.6.2.1).

**Slot 2, 3 and 4**:
These ADC PCBs are optional with 3 input and 4 output data that can be set as per customer's requirements. Using 3 ADC PCBs in the respective slots allows to have up to 9 settable inputs and up to 12 settable outputs.

**Slots 5 and 6** : the following communication PCBs can be selected:
- a series communication interface via an isolated RS232/RS485 connection using MODBUS/JBUS protocol
- a NET VISION interface for connection to the Ethernet,

**Slot 7** : option intended for connecting:
- a MODEM to the phone network
- a remote signalling/control panel (In such a case, a specific COM slot frame has to be installed by the factory).

### 5.6.2 STANDARD and ADC PCBs (UIO – 0x)

#### 5.6.2.1 Layout

#### 5.6.2.2 Description of input and output data

**Input data :**

| | |
|---|---|
| - Emergency stop | loop closing on terminations IN1- and IN1+*, |
| - Opening of battery connection | loop closing on terminations IN2- and IN2+, |
| - Emergency generator | loop closing on terminations IN3- and IN3+. |

* dual input to allow the transfer of alarms.

**Output data :**

| | | | |
|---|---|---|---|
| - General Alarm | dry contacts, terminations C1 | NO1 | NC1* |
| - Servicing alarm | dry contacts, terminations C2 | NO2 | NC2* |
| - Battery operation | dry contacts, terminations C3 | NO3 | NC3* |
| - LOAD ON MAINS | dry contacts, terminations C4 | NO4 | NC4* |

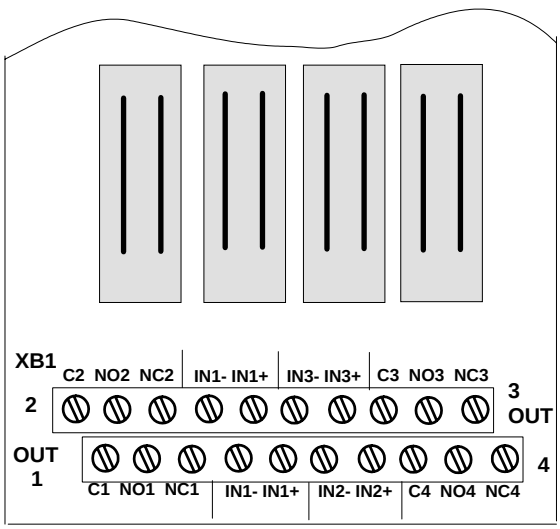
* C = Common ; NO = make contact ; NC = break contact.

#### 5.6.2.3 Description of terminals

**The wire size capacity of screw terminals is between 0,5 and 1,5 mm$^2$**

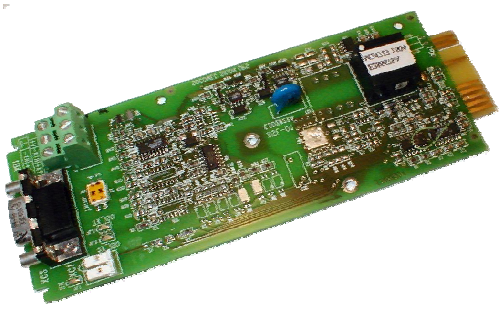
**The emergency stop has a dual input for the transfer of alarms.**

**Breaking capacity : 8A/230Vac.**



### 5.6.3 Serial connection PCB (USL – 0x)

#### 5.6.3.1 Layout



#### 5.6.3.2 Description of connections

**RS232** XC2 : female DB9 standard connector of PC type.

**RS485 isolated** XB1 : RTX+ and RTX-

**RS422 isolated** XB1 : RTX+ for 'Transmit +'
RTX- for 'Transmit –'
RX+
RX-

LEDs VL1 and VL3 provide information about the reception and transmission steps.
LED VL2 indicates whether there is voltage or not.

## 5.7 EMERGENCY STOP (ESD)

The UPS emergency stop causes:
- the load to be shutdown
- the rectifier and inverter to be shutdown while the battery remains connected. However, the battery connection can be made open on request, through the addition of a Mx coil, directly controlled by the emergency stop (Please, see following sections).

**Single UPS (Standard PCB)**
The emergency stop is carried out through the closing of the loop on terminations IN- and IN+.
Dual input is provided to ensure the transfer of alarms.
Opening of the loop can be set at commissioning.

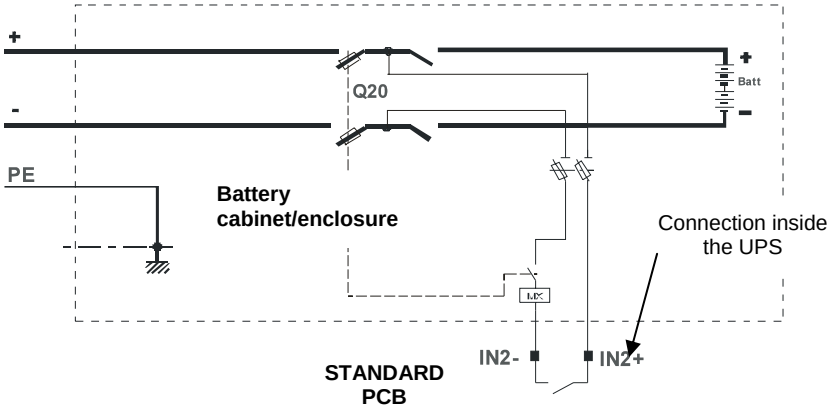
**Modular systems**
Each unit is fitted with a COM SLOT frame including a standard PCB. The emergency stop can either control each unit separately or the whole system, provided that each loop is galvanically separated.

**Central bypass systems**
The central bypass cabinet incorporates a COM-SLOT frame including a standard PCB.
The emergency stop can control :
- only the central bypass cabinet (standard PCB – terminations IN1- and IN1+),
- the whole system, provided that galvanic isolation is carried out between each loop.

## 5.8 AUTOMATIC OPENING OF BATTERY PROTECTION Q20

Opening of Q20 is controlled through loop closing on terminations IN2- and IN2+ of the standard PCB.

**This option enables Q20 to be opened following an emergency shutdown or a slow discharge.**




## 5.9 GENERATOR SET OPERATION

A so-called GENERATOR SET information allows the UPS to operate according to gen set conditions. The manufacturer can set three conditions for generator set operation, that is:

a) output voltage of charger(s) adjusted to the off-load voltage of the batteries. In such a case, the corresponding input is on terminations IN3- and IN3+ of the standard PCB,

b) desynchronisation of the inverter from the bypass input and bypass locked, thus no transfer to the bypass mains is possible,
**Case of a modular system** : each unit has to be connected to terminations IN3- and IN3+ of the standard PCB,
**Case of a central bypass system** : the input is in the central bypass cabinet and has to be connected to terminations IN3- and IN3+ of the standard PCB. This data is transmitted via the internal bus to each module, that can individually be adjusted to a different off-load voltage.

c) function a) and function b) through contact combination.

| | |
|---|---|
| **NOTE** | **Without a specific request, the factory standard setting implies there is no action on the UPS when the generator set is operating. Configurations mentioned above can be set at commissioning** |

## 5.10 BACKFEED PROTECTION

Standard:
The Backfeed protection is compliant with standard IEC 62040-1-2.

Purpose:
The Backfeed protection is for ensuring personnel safety against any risks of accidental energy return to the input circuit. The Backfeed protection imposes the automatic opening of an switching device in case of a malfunctioning of the static switch.

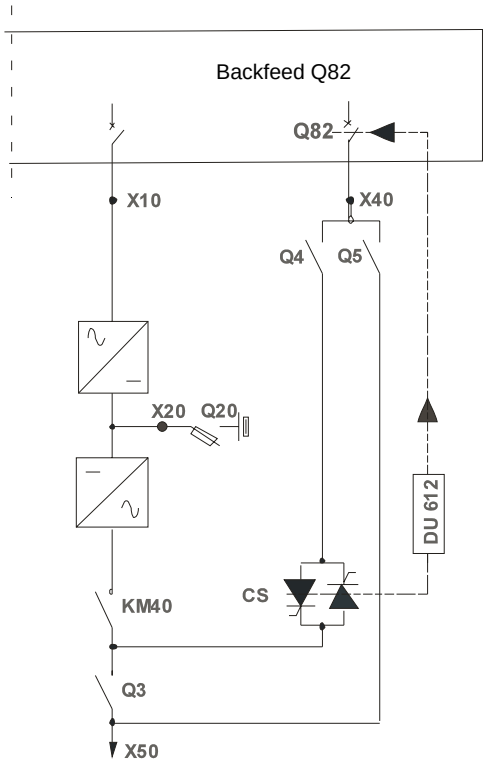
Principe :
The Backfeed protection consists of an electronic detection PCB internal to the UPS and an external electromechanical device for isolation from the power circuit. Optionally, the back-feed protection device may be built into the system. For further details about the size of the protective device, please see sections 5.5.1 or 5.5.2.

Label:
A safety label bearing the following advice is available in this manual:

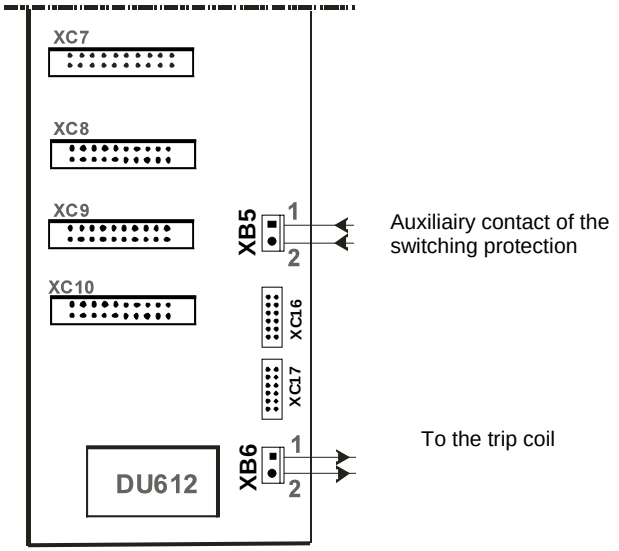
**«ISOLATE THE UPS BEFORE WORKING ON THIS CIRCUIT»**

The operator shall stick the label on the electromechanical device for isolation from the power circuit.

**Basic scheme**




**PCB DU612**




On PCB DU612:

XB6 terminals 1-2 : connection of the trip coil 220V-240V of the power isolating device.

XB5 terminals 1-2: connection of the auxiliary contact indicating the status of the power isolating device.