

# PYRAMID DSP SERIES

**THREE PHASE IN – THREE PHASE OUT**

**10-120kVA**

**THREE PHASE IN – ONE PHASE OUT**

**10-40kVA**

# INSTALLATION and OPERATING MANUAL



**UNINTERRUPTIBLE POWER SYSTEMS**

## **Important Notices!**

Thank you for choosing Inform UPS Systems.

This manual contains important information about technical properties, installation, commissioning of the UPS and contains safety information for users and loads. Learning and applying of the subjects in this manual is necessary to use UPS safely and correctly.



Read the manual completely before working on this equipment!



Keep this manual near UPS for easy consultation!



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Units that are labeled with a CE mark comply with the Standard: EN 62040-1 and EN 62040-2.



## Description of the Symbols Used in the Manual



This symbol points out the instructions which are especially important.



This symbol points out the risk of electric shock if the following instruction is not obeyed.



This symbol points out the instructions, which may be resulted with the injury of the operator or damage of the equipment if not obeyed.



All packing material must be recycled in compliance with the laws in force in the country where the system is installed.

## Description of the Abbreviations Used in the Guide

UPS: Uninterruptible Power System

EPO: Emergency Power Off

RS232: Serial Communication Protocol

SNMP: Simple Network Management Protocol

V: Voltage

A: Ampere

P: Power

For Input, Output and Manual Bypass Circuit Breaker;

“1” (ON): Closing the Circuit

“0” (OFF): Opening the Circuit

For Battery Circuit Breaker;

Active (ON/I): Closing the Fast Fuse Holder

Passive (OFF/O): Opening the Fast Fuse Holder

## Manufacturer

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## 1. WARRANTY

### 1.1. Terms of Warranty

- Warranty period begins from the date of commissioning of the UPS by Inform or authorized Inform distributor technical personnel.
- The UPS including all the internal parts is under the warranty of Inform.
- If the UPS is malfunctioned because of component, manufacturing, or installation (if it's done by authorized personnel) problems during the warranty period, the UPS will be repaired without asking any price for spare parts and labor cost.

Replacements, repairs or modifications of the parts during the warranty period can not extend the duration of the warranty

### 1.2. Out of Warranty Terms and Conditions

This Warranty does not cover any defects or damages caused by;

- If the UPS is not used or installed according to the terms in the manual, then the UPS is out of warranty,
- Neglect, accident, misuse, misapplication or incorrect installation,
- Failure due to fortuitous circumstances or force majeure,
- After delivery of the UPS to the customer, unloading and transportation damage and failures,
- Damage or injuries caused by negligence, lack of inspection or maintenance, or improper use of the products,
- Faulty electrical wiring,
- Defects arising either from designs or parts imposed or supplied by the purchaser,
- Defects and damage by fire and lightning,
- Failures due to modification in the products without Inform approval,
- Improper testing, operation, maintenance, repair, alteration, adjustment, or modification of any kind by unauthorized personnel,

The Manufacturer will repair the device above cases for a fee and is not responsible for the transportation of the equipment.

This Warranty is not valid if the Product's Serial Number have been removed or is illegible.

## 2. SAFETY

### 2.1. Important Notice for UPS



Information related to safety of the UPS, battery, load and the user is summarized below. But the equipment should not be installed before reading the manual completely.

- The equipment may only be installed and commissioned by authorized technical personnel.
- This manual contains important instructions that you should follow during installation and maintenance of the UPS & batteries. Please read all instructions before operating the equipment and save this manual for future reference.
- Not obeying the instructions written on this manual which may be resulted with the injury of the operator or damage of the equipment.
- Even with no connections have been done, hazardous voltages and/or high temperature may exist on connection terminals and inside the UPS. Before beginning with the any installation or maintenance, isolate the input and output of UPS and wait for 5 minutes for DC capacitor discharge. If UPS has internal battery; remove the cover of UPS and disconnect the battery cables.
- The equipment shall be packed properly during transportation and proper equipment should be used for transportation.
- The UPS must always stand in a vertical position. Make sure that the floor can support the weight of the system.
- According to IEC 62040-2; this is a product for commercial and industrial application. In the second environment installation restrictions or additional measures may be needed to prevent disturbances.
- Connect the PE ground connector before connecting any other cable.
- UPS is designed for indoor use. To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% maximum).
- Equipment and batteries whose packages are damaged during transportation shall be inspected by qualified technical personnel before starting the installation.
- UPS requires 3Ph-N+PE input connection.
- It should be checked between all the terminals included PE to be sure that no hazardous voltage exist.
- Do not connect the output neutral to the protective ground or protective bounding.
- The connections shall be made with cables of appropriate cross-section in order to prevent the risk of fire. All cables shall be of insulated type and shall not be laid out on the walking path of the person.
- Contact your local recycling or hazardous waste center for information on proper disposal of the used battery or UPS.
- Make sure that the UPS is not overloaded to provide a higher quality supply to the loads.
- In case of an extraordinary situation (damaged body or cabinet or connections, penetration of foreign materials into the body or cabinet etc.) deenergize the UPS immediately and consult to the Technical Service.

## 2.2. Important Notice for Battery

- **The batteries may only be installed and commissioned by authorized technical personnel.**
- Make sure that the battery qty is proper for the unit and they are same type and capacity. Otherwise there can be danger risk of explosion and fire.
- Do not dispose of batteries in a fire. The batteries may explode.
- Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic.
- In case of electrolyte in contact with skin, immediately wash the contaminated skin with water.
- Replaced batteries must be disposed of at authorized battery waste disposal centers.
- **A battery can present risk of electric shock and high short circuit current.**

The following precautions should be observed when working on batteries;

- ❖ Remove rings, watches, necklaces, bracelets and all metal objects.
  - ❖ Only use tools with insulated handles.
  - ❖ Wear rubbers gloves and a rubber apron when handling batteries.
  - ❖ Do not lay tools or metal parts on top of batteries.
  - ❖ Eye protection should be worn to prevent injury from accidental electrical arcs.
- **Before a maintenance or repair work on the UPS;**
    - ❖ Switch the input, output and battery circuit breakers (F1, F2 and F5) to “0” position.
    - ❖ If UPS has internal batteries; Remove **+** battery (red), **-** battery (black) and **N** battery neutral (blue) cables.
    - ❖ If UPS has external batteries; switch the circuit breakers of the battery cabinet to “0” position.
    - ❖ Determine if the battery is inadvertently grounded. If inadvertently grounded; remove source of ground. Contact with any part of a grounded battery can result in electrical shock.
  - Battery fuses shall only be replaced with the same rating and type which came along with the UPS.

## 2.3. Description of the Symbols Used on the Labels Applied to the UPS



PE: PROTECTIVE EARTH



PB: PROTECTIVE BOUNDING



DANGER! HIGH VOLTAGE (BLACK/YELLOW)



This symbol points out the instructions, which may be resulted with the injury of the operator or damage of the equipment if not obeyed.



## 3. REQUIREMENT

### 3.1. Transportation



The UPS must be placed and stand in a vertical position throughout the transportation.



Use suitable equipment to remove the UPS from the pallet.



The equipment shall be packed properly during transportation. Therefore it is recommended to keep the original package for future need.



All packing material must be recycled in compliance with the laws in force in the country where the system is installed.

### 3.2. Placement

This product meets the safety requirements for devices to be operated in restricted access locations according to EN 62040-1 safety standard, which states that the owner should guarantee the following:

- Access to the equipment can only be gained by service personnel or by users who have been instructed about the reasons for the restrictions applied to the location and about any precautions that shall be taken and,
- Access is through the use of a tool or lock and key, or other means of security and is controlled by the authority responsible for the location.
- UPS is not designed for outdoor application.
- The equipment and the batteries should not be exposed to direct sunlight or placed near to a heat source.
- Recommended operating temperature and humidity values are listed on the [Appendix-1 Technical Specifications](#) section. To provide the required environmental condition.
- Avoid dusty environments or areas where dust of conductive or corrosive materials is present.
- The connection and the circuit breakers are at the front of UPS. Leave at least 75 cm at the front of the UPS for maintenance.
- Leave at least 75 cm from air outlets of the UPS for ventilation.
- Even though the operating temperature of the UPS and batteries are between 0-40 °C, it is suggested to provide an environment temperature between 20-25°C to get maximum performance from the UPS and batteries.
- Advised Environmental humidity condition is between 20% 80% (non-condensing).

### 3.3. Storage

Please store the UPS in an environment where the temperature is between  $-25^{\circ}\text{C}$   $+55^{\circ}\text{C}$ , no receipt of direct sunlight, far from the heating, in a dry place.

Environmental humidity must be between 0% 95% (none condensing).

Recommended storage temperature, humidity and altitude values are listed on the [Appendix-1 Technical Specifications](#) section.

If the batteries will be stored for longer than 6 months, they shall be charged periodically. Charge period depends on the storage temperature. The relationship is as shown below:

- ❖ Every 9 months if the temperature is below  $20^{\circ}\text{C}$ ,
- ❖ Every 6 months if the temperature is between  $20^{\circ}\text{C}$  and  $30^{\circ}\text{C}$ ,
- ❖ Every 3 months if the temperature is between  $30^{\circ}\text{C}$  and  $40^{\circ}\text{C}$ ,
- ❖ Every 2 months if the temperature is over  $40^{\circ}\text{C}$

For long storage duration; please follow up the instructions of installation described in [Section 4](#), start-up UPS described in [Section 7](#) and charge the batteries at least 10 hours.

### 3.4. Electrical Requisites

The installation must comply with national installation regulations.

The electrical distribution panels for the mains and separated bypass mains inputs must have a protection and disconnection system. Disconnection devices used in these panels shall disconnect all line conductors simultaneously. The following table shows the recommended size of the mains and separate bypass mains input protection devices (thermal, magnetic and differential) and the cable cross-sections for the linear loads.

POWER	INPUT CIRCUIT BREAKER	OUTPUT CIRCUIT BREAKER	BATTERY FAST FUSE	INPUT	BYPASS	BATTERY	NEUTRAL	LEAKAGE PROTECTION**
10 kVA (3Ph- 1ph)	20 A	20 A	25 A	6 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	300 mA
10 kVA (3Ph- 3ph)	20 A	20 A	25 A	6 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	300 mA
15 kVA (3Ph- 1ph)	32 A	32 A	32 A	6 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	300 mA
15 kVA (3Ph- 3ph)	32 A	32 A	32 A	6 mm <sup>2</sup>	6 mm <sup>2</sup>	6 mm <sup>2</sup>	10 mm <sup>2</sup>	300 mA
20 kVA (3Ph- 1ph)	32 A	32 A	50 A	10 mm <sup>2</sup>	25 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>	300 mA
20 kVA (3Ph- 3ph)	32 A	32 A	50 A	10 mm <sup>2</sup>	10 mm <sup>2</sup>	10 mm <sup>2</sup>	16 mm <sup>2</sup>	300 mA
30 kVA (3Ph- 1ph)	50 A	50 A	63 A	16 mm <sup>2</sup>	35 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	300 mA
30 kVA (3Ph- 3ph)	50 A	50 A	63 A	16 mm <sup>2</sup>	16 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	300 mA
40 kVA (3Ph- 1ph)	63 A	63 A	80 A	16 mm <sup>2</sup>	50 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	300 mA
40 kVA (3Ph- 3ph)	63 A	63 A	80 A	16 mm <sup>2</sup>	16 mm <sup>2</sup>	16 mm <sup>2</sup>	25 mm <sup>2</sup>	300 mA
60 kVA (3Ph- 3ph)	100 A	100 A	100 A	25 mm <sup>2</sup>	25 mm <sup>2</sup>	25 mm <sup>2</sup>	35 mm <sup>2</sup>	300 mA
80 kVA (3Ph- 3ph)	125 A	125 A	100 A	35 mm <sup>2</sup>	35 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	300 mA
100 kVA (3Ph- 3ph)	175 A	175 A	125 A	35 mm <sup>2</sup>	35 mm <sup>2</sup>	35 mm <sup>2</sup>	50 mm <sup>2</sup>	300 mA
120 kVA (3Ph- 3ph)	200 A	200 A	160 A	70 mm <sup>2</sup>	70 mm <sup>2</sup>	70 mm <sup>2</sup>	95 mm <sup>2</sup>	300 mA

\* Magnetic protection devices are recommended to be used C or D characteristic.

\*\* Minimum 300mA delayed (Type-B). When used, the residual current earth leakage protection system must be common for the two AC inputs (input & split bypass) and installed upstream.

Load leakage currents are added to those generated by the UPS. If loads with high leakage currents are present, adjust this value accordingly. It is recommended to adjust the protective device after measuring the total leakage current with the UPS installed and operational with the intended load. During transitory phases (power failure, return and voltage fluctuations) short leakage current peaks may occur. Make sure that the protection is not activated in such cases.

## 4. UNPACKING AND INSTALLATION OF UPS



Equipment and batteries whose packages are damaged during transportation shall be inspected by qualified Technical Personnel before starting the installation.



If any equipment has been damaged during shipment, keep the shipping and packing material for the carrier or place of purchase and file a claim for shipping damage. If you discover damage after acceptance, file a claim for concealed damage.

Check if the following are provided with the equipment

- UPS
- User Manual
- Test Report
- Key of the cabin door
- Battery fuses (three pieces) ( @ some powers )



Before the installation, please check if your UPS is customized following your special requirements (if any).

### 4.1. Unpacking and Moving



It is recommended to store the original UPS packaging for future needs.

The procedure is as following:

- Remove the bands and the protective packaging from the UPS.
- Use suitable equipment to remove the UPS from the pallet.
- Mount the cabinet parts supplied with the UPS after positioning and connecting the UPS.

## 4.2. Installation Procedures



The equipment may only be installed and commissioned by authorized Technical Personnel.



When the UPS is brought from a cold place to a warmer place, humidity of the air may condensate in it. In this case, wait for 2 (two) hours before beginning with the installation.



Devices with internal batteries may have dangerous voltages on the battery terminals.

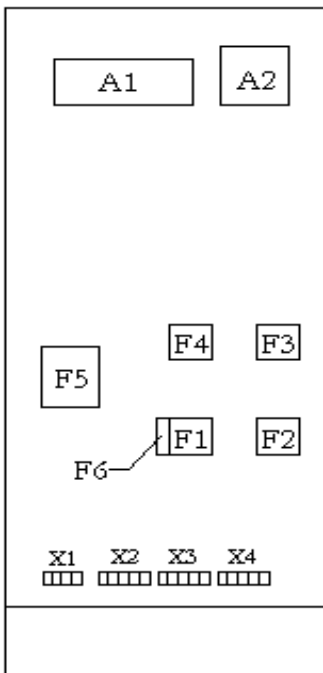
### 4.2.1. Power Connections



Make sure that all circuit breakers are “OFF” before starting with the installation.

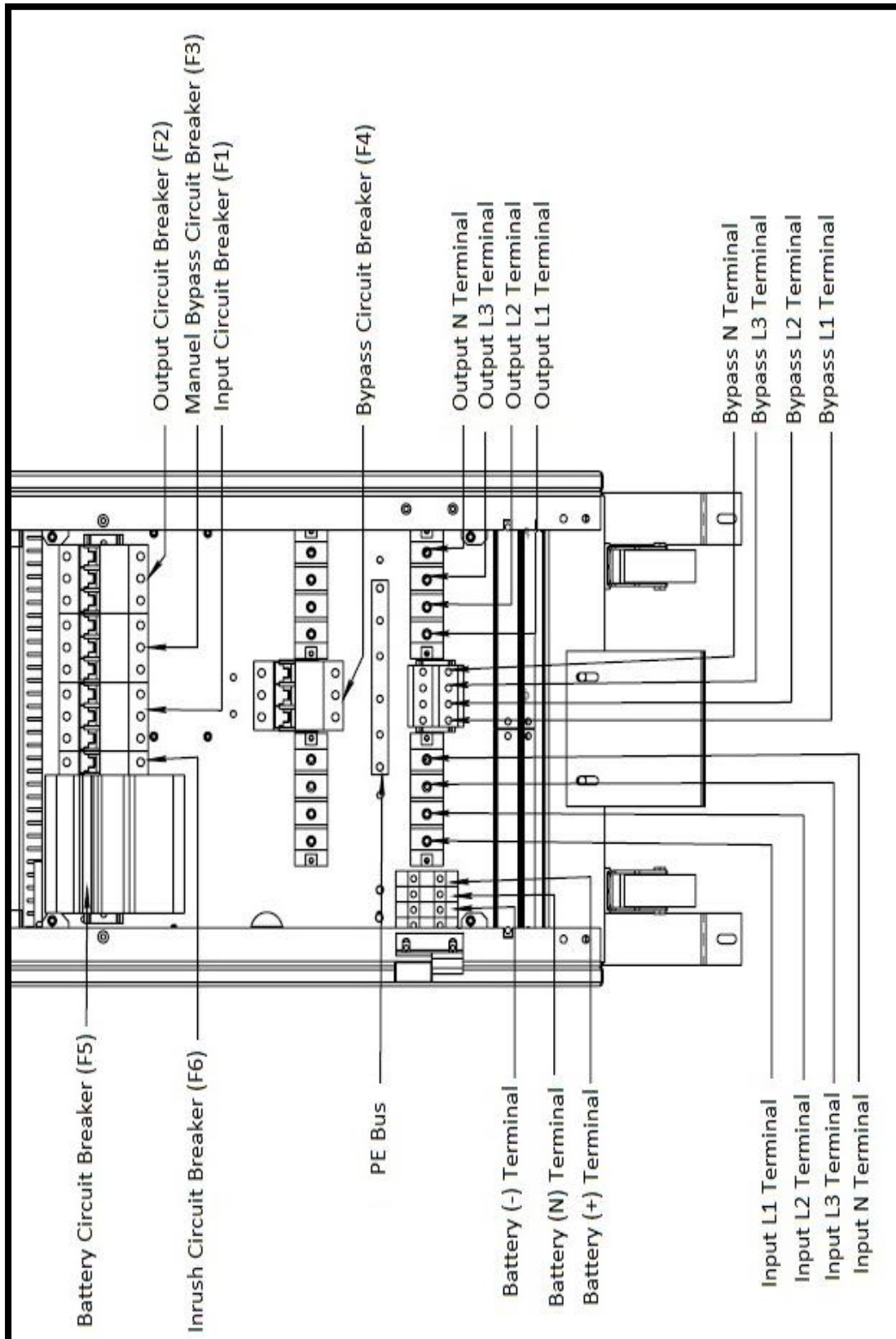
The power screw terminals are located on the lower front side of the UPS. Terminal details are shown separately in the below figures. Refer to the names of each terminal to identify it during connection: After the terminal front cover is removed, the cables shall be passed through the hole under the connection terminals.

Layout of the connection terminals and boards are shown below:



- A1: Communication interface board
- A2: Parallel connection board (optional)
- F1: Input circuit breaker
- F2: Output circuit breaker
- F3: Manual by-pass circuit breaker
- F4: By-pass circuit breaker (optional)
- F5: Battery circuit breaker
- F6: Inrush fuse
- X1: Battery terminals
- X2: Input mains terminals
- X3: Separate by-pass mains terminals (optional)
- X4: Output terminals

## 10-15-20-30kVA Terminal Connections

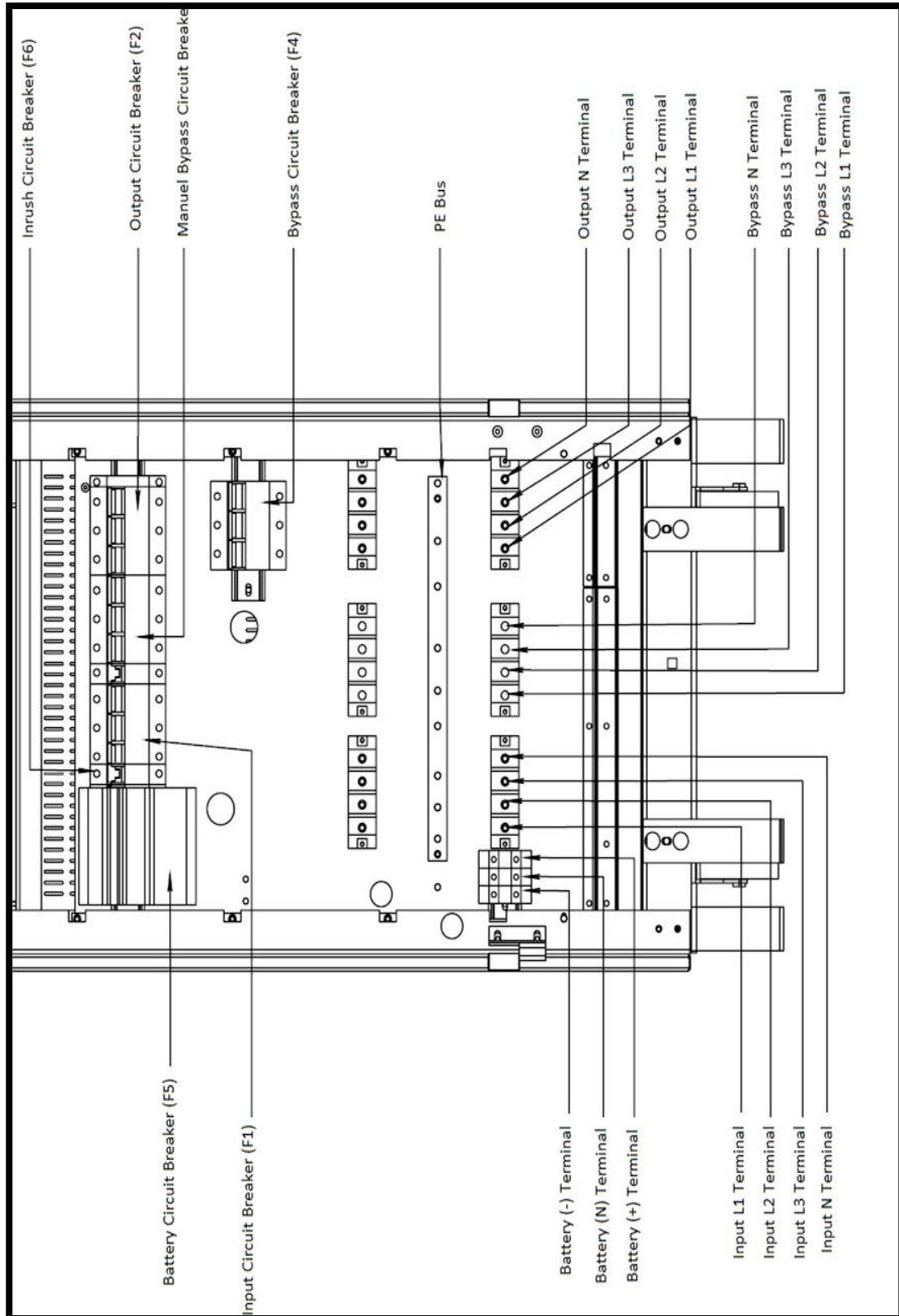


\* Separate Bypass Terminal ( Bypass L1, L2, L3, N ) version is optional.

\*\* For 3Phase Input - 1Phase Output UPS; Output L1-N Terminals are used.



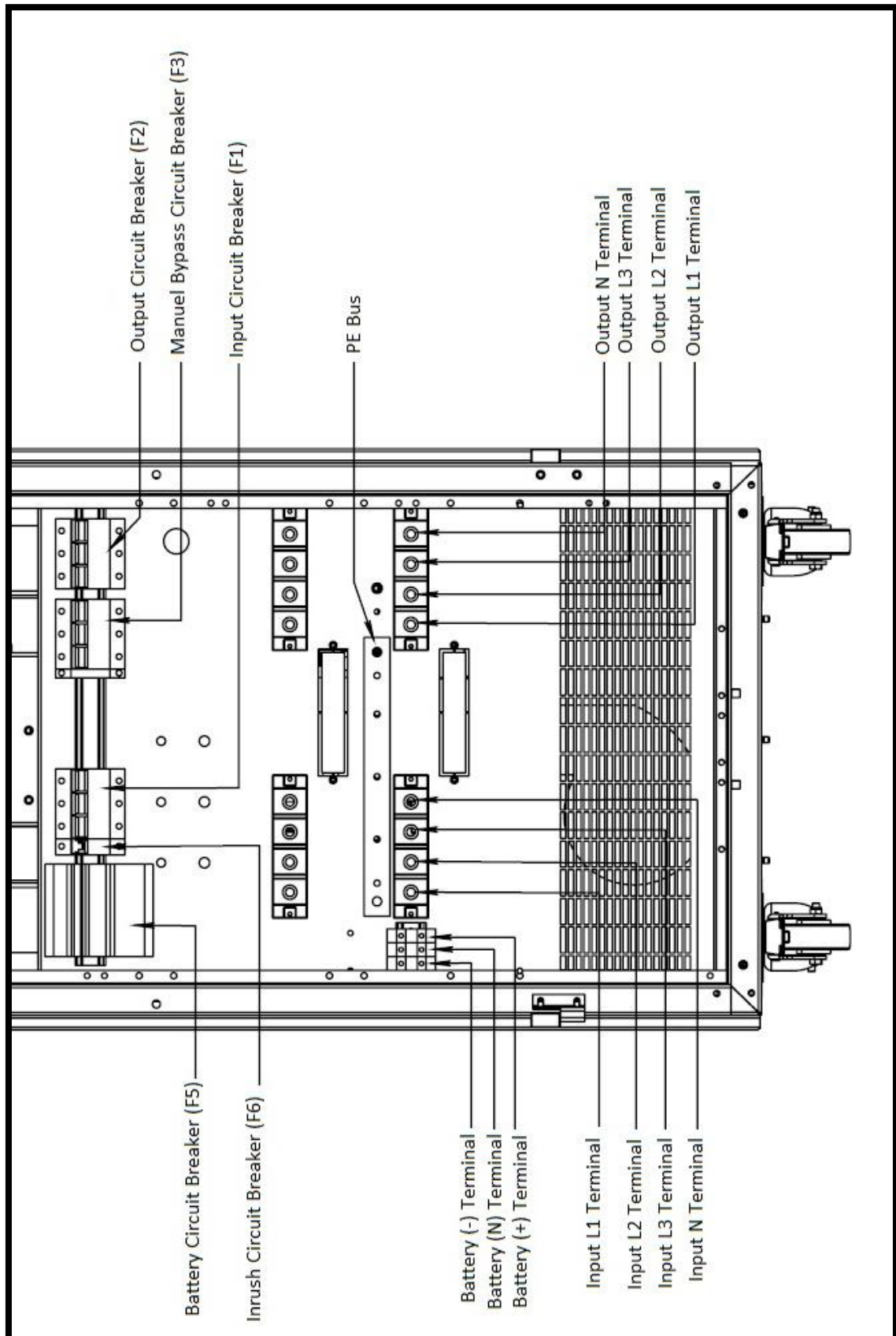
## 40-60kVA Terminal Connections



\* Separate Bypass Terminal ( Bypass L1, L2, L3, N ) version is optional.

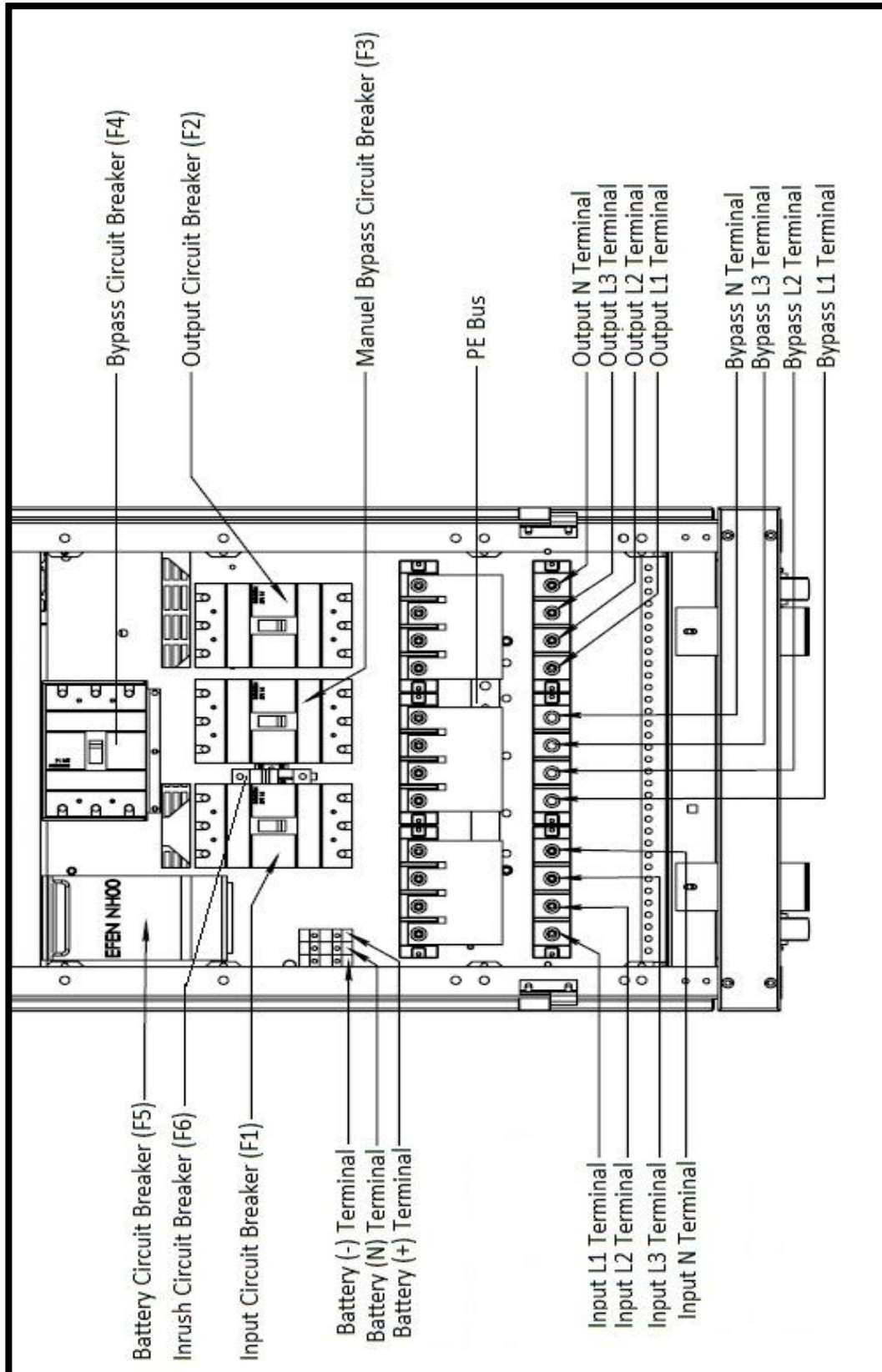
\*\* For 3Phase Input - 1Phase Output UPS; Output L1-N Terminals are used.

## 80kVA Terminal Connections



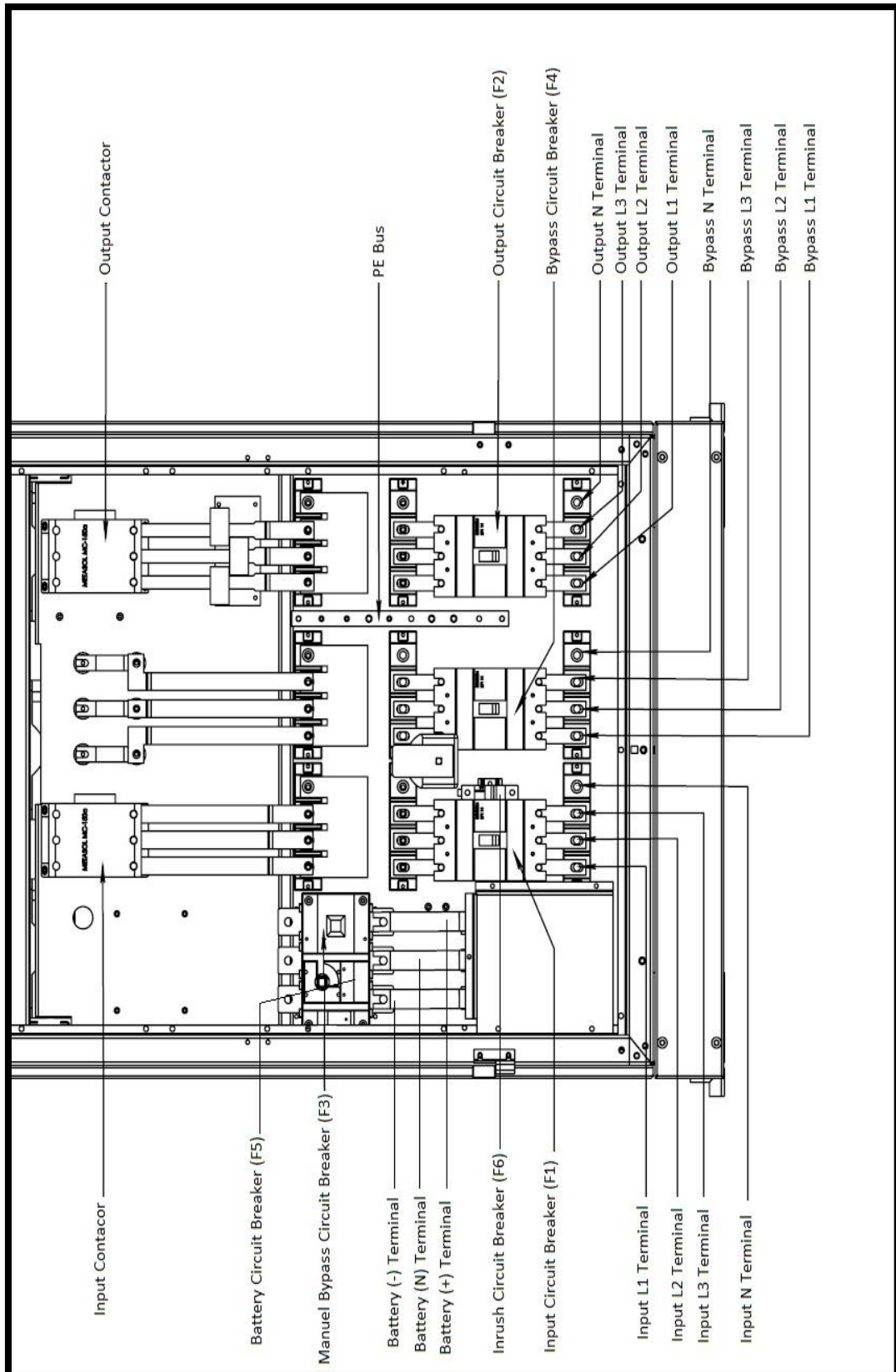
\* Separate Bypass Terminal ( Bypass L1, L2, L3, N ) version is optional.

# 100kVA Terminal Connections



\* Separate Bypass Terminal ( Bypass L1, L2, L3, N ) version is optional.

# 120kVA Terminal Connections





\* Separate Bypass Terminal ( Bypass L1, L2, L3, N ) version is optional.

Connections shall be made in the following order;

#### 4.2.1.1. Protective Earth (PE) Connection



The device shall be earthed for a safe and reliable operation. Connect the PE ground connectors before connecting any other cable.

Input protective earth connection terminal **PE** of the UPS shall be connected to ground with a low impedance connection.

PE terminals of the loads shall be connected to output protective earth terminal of the UPS. If there exists an external battery cabinet, then it shall be grounded via battery protective earth terminal of the UPS.



If PE cables come along with the power cables; PE cable should be min. 10cm longer than the other cables.

#### 4.2.1.2. Input Connection



The installation and adjustment of distribution panel should be done by authorized Technical Personnel.



Switch the circuit breaker on the distribution panel to "0" position before making the connections.

Please add four-pole (4-pole) circuit breaker (equivalent UPS input breaker) to distribution panel where UPS is to be connected. Do not connect any other load to this circuit breaker and please do not forget to add leakage current relay.

Leakage protection relay value must be equal to total value of 300mA (UPS input leakage current relay) and total leakage current value of the load connected to UPS. Relay must be protected type against peak current that can be happened on EMI filter capacitor.

Connect the phase cables to **Input L1-L2-L3** terminals, the neutral to **Input N** terminal. Neutral connection should be done directly from distribution neutral bus to UPS neutral.



According to EN 62040-1, the user should place a warning label on the input distribution panel and the other primary power isolators, in order to prevent the risk of voltage feedback. The label should carry the following indication:



#### **RISK OF VOLTAGE BACKFEED**

- Isolate Uninterruptable Power Supply before working on this circuit.
- Then check for Hazardous Voltage between all terminals including the protective

earth (PE)

#### 4.2.1.3. Bypass Input Connection



Bring the circuit breaker on the distribution panel to “OFF” position before making the connections

Please add four-pole (4-pole) circuit breaker (equivalent UPS Bypass breaker) to distribution panel where UPS is to be connected.

Connect the phase cables to **Bypass L1-L2-L3** terminals, the neutral to **Bypass N** terminal. Neutral connection should be done directly from distribution neutral bus to UPS neutral.

#### 4.2.1.4. Battery Connection



Devices with internal batteries may have dangerous voltages on the battery terminals.



Do not switch the battery circuit breaker (F5) to **ON** position before operating the equipment and seeing “Online Operation” message on the LCD.

If the batteries are already built-in inside the UPS cabinet; remove the cover of UPS and connect the **Positive (red), Negative (black) and Neutral (blue)** cables of the batteries. There is no need any further connection so mount back the cover.

If the batteries shall be put in a separate additional battery cabinet, please follow up the instructions below;

- Connect between battery circuit breaker and battery terminals with using proper cross-section **Positive (red), Negative (black) and Neutral (blue)** cables.
- Switch on to “**0**” position the battery cabinet circuit breaker.
- Connect the “-“on the battery cabinet to “-“on the UPS.
- Connect the “+“on the battery cabinet to “+“on the UPS.
- Connect the “**N**“on the battery cabinet to “**N**“on the UPS.



Read the **PDSP Service Manual** carefully for External Battery connection!



Danger of explosion and fire if the batteries of the wrong type are used.



The batteries must be charged min. 10 hours before first-use.



Battery fast fuses shall only be replaced with fuses of the same type and rating.

#### 4.2.1.5. Output Connection

Please add four-pole (4-pole) circuit breaker (equivalent to UPS output breaker) to distribution panel where the loads are to be connected. Connect the phase cable to **Output L1-L2-L3** terminal and the neutral cable to **Output N** terminal. Neutral connection should be done directly.

**For 3Phase-1Phase UPS;** L1-L2-L3 Terminals are short-circuited.



To enable the short circuit protection feature of the UPS, each load shall be supplied through a separate circuit breaker chosen according to the load current. This may provide quick disconnection of the short circuited load and maintain operation continuity of the other loads. To obtain maximum protection, the rating of each individual load circuit breaker shall have the minimum value, which is enough to carry the full load current continuously.



Make sure that all circuit breakers are at "0" position before starting with the installation.



Each load should be supplied through separate circuit breaker and the cable cross section should be chosen according to the load current value.

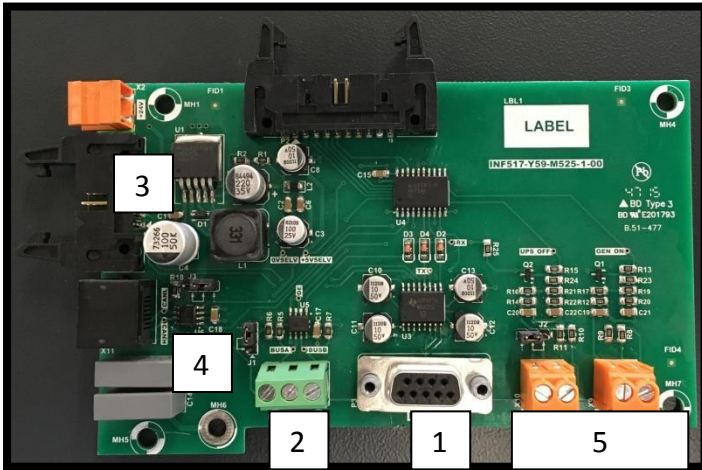


Make sure that the UPS is not overloaded to provide a higher quality supply to the loads.

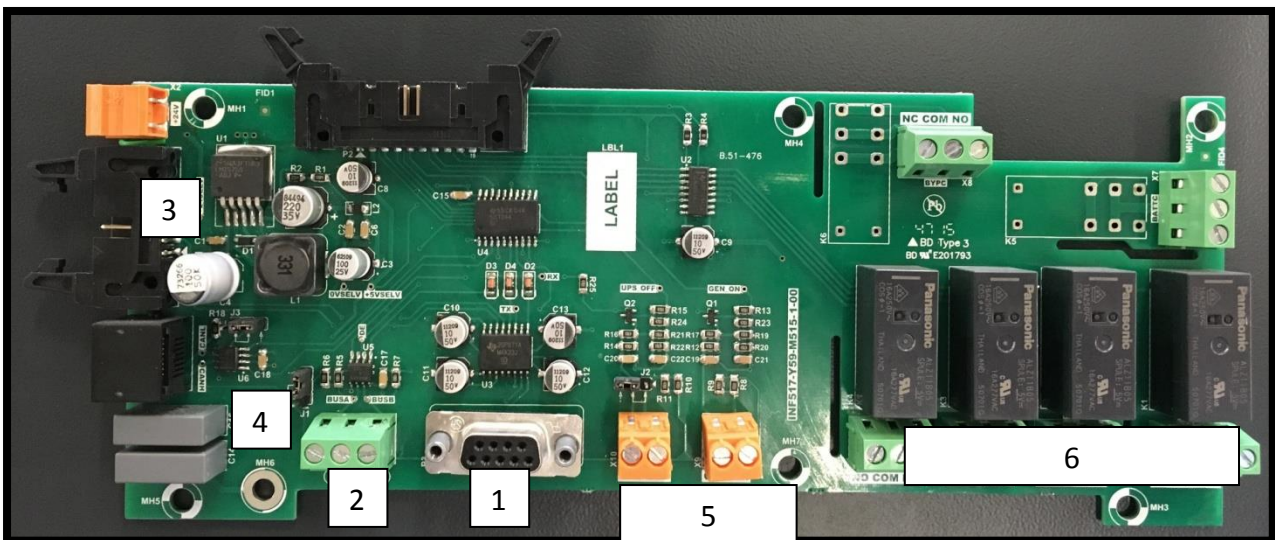
## 4.2.2 Commuination Interface Connection

Connectivity cards allow the UPS to communicate in a variety of networking environment and with different type of devices.

### A. FACTORY DEFAULT: Standard Interface Card on UPS



### B. OPTIONAL : Interface card with Relays



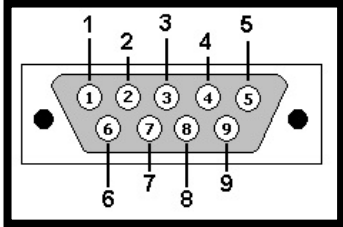
Options are listed below;

1. Serial Communication(Standard Hardware):RS232 Port (can be connected to External SNMP)
2. RS485 Interface (Standard Hardware)
3. Internal SNMP (Optional)
4. SNMP Switch
5. Emergency Power Off and Generator Connections
6. Dry Contacts (On Optional Interface Card)

#### 4.2.2.1. Serial Communication (RS232)

UPS is equipped with Serial Communication as standard.

**RS232:** DSUB-9 male connector with the following pin layout shall be used on the UPS side of the connection cable.



RS232 PIN LAYOUT		
PIN#	Signal Name	Signal Description
2	RX	Receive Data
3	TX	Transmit Data
5	GND	Signal Ground

RS232 cable shall be shielded and shorter than 25m.

**The hardware and software listed below can be used with this port;**

- **Monitoring Software - UPSMAN (Optional):** This software is installed on a computer. To establish communication between the UPS and a computer, connect your computer to the UPS communication port using the RS232 communication cable. With the software; many ups parameters such voltage, current, frequency ...etc can be monitored.
- **External SNMP Adapter (Optional):** It gives opportunity to monitor UPS through a Web browser interface without UPSMAN installation. External SNMP adapter is connected via serial communication cable to UPS (If there is no internal SNMP). By IP address assignment SNMP adapter is connected to current network, hence UPS can be monitored on web browser interface.

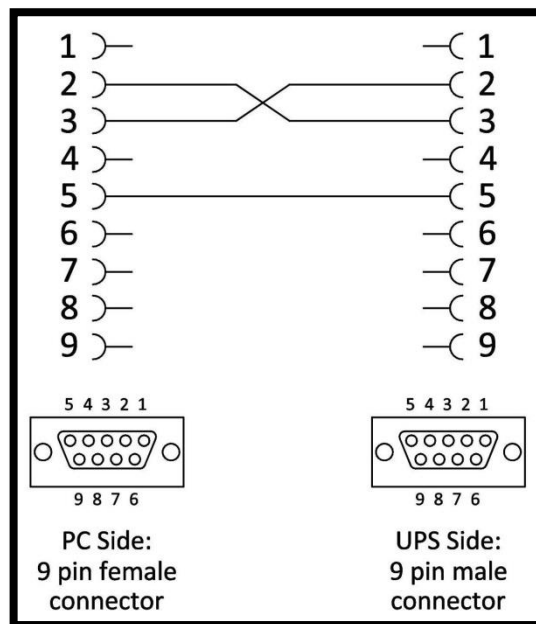
Via SNMP; the information listed below can be monitored;

- ❖ The Latest Battery Test Date
- ❖ UPS Information (example: 220V - 50Hz)
- ❖ Input Data ( $V_{in}$ ,  $F_{in}$ ,  $V_{max}$  vb.)
- ❖ Output Data ( $V_{out}$ , Load Percentge...etc.)
- ❖ Battery Situation ( $V_{batt}$ ...etc)

Over SNMP communication; battery test can be started or existing test can be cancelled. UPS can be shut-down or stand-by (stand-by duration is adjustable). Alarms can be discarded.

- **Service Software:** This software is used only by authorized Technical Service Personnel. Do not let unauthorized people to use this software; otherwise, damage may occur on your equipment and void your warranty.

If Serial Communication cable is needed, it can be produced according to the pin configuration described as below;



Cable Schema of Serial Communication

#### 4.2.2.2. RS485 Interface

3PIN Terminal Connection point is used on the power supply side.

Pin layout is given below:

RS485 PIN LAYOUT		
Pin #	Signal Name	Signal Description
1	A	General Signal
3	B	
2	GND	Ground

RS422 cable shall be shielded and shorter than 100 m.

Only one of the RS232/RS485 communications can be activated at one time.

#### 4.2.2.3. Internal SNMP Communication

Internal SNMP can be installed into SNMP slot placed at the front rear of UPS. As soon as SNMP installed, RS232 port would be disabled.

Internal SNMP has the same logic with External SNMP so please read [Section 4.2.2.1](#) for more information.



In case of internal SNMP use with UPS, serial communication port (RS232) is disabled. In order to activate the RS232 serial port, Internal SNMP should be removed.

#### 4.2.2.5. Emergency Power Off and Generator Connections

Upon request, UPS can be remote shut down and can make softstart to prevent the generator loaded instantly when it is ON. For this purpose, there are two terminals on the Interface card which operate with digital input.

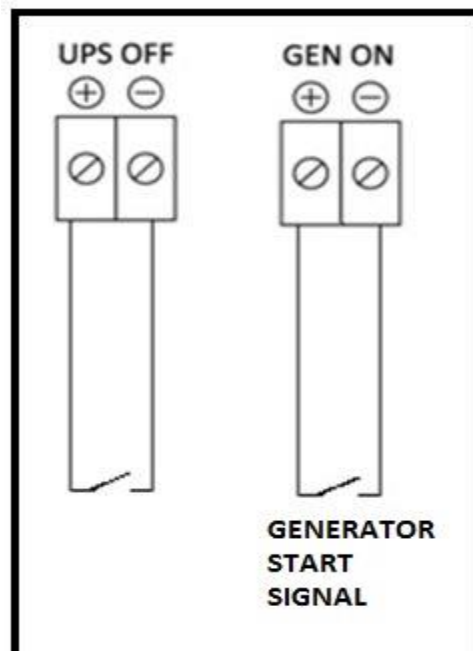


Digital Inputs should be connected like dry contacts. Do not apply any voltage.

Input	Function
<b>UPS OFF (EPO)</b>	If the UPS OFF Input is activated then UPS stops supplying the load. When the energy is removed, UPS returns back to NORMAL operation mode.
<b>GEN ON</b>	If GEN ON input is activated, then UPS reduces the absorbed current from Generator during the transfer from Battery Mode to Normal Mode.

Emergency Power Off  
Connection


GEN ON Connection





#### 4.2.2.6. Dry Contacts (Optional Hardware)

Free contact relay connection cables shall have a cross-section of 1.5 mm<sup>2</sup>.

	<p>Maximum voltage to be applied to the relay contacts is 42V AC rms (sinus) or 60 Vdc. Maximum contact current depends on the applied voltage and the load characteristic. Both maximum voltage and maximum contact current corresponding to the applied voltage shall not be exceeded.</p>
---	--

Maximum allowed resistive contact currents for several voltages are given on the table below:

Applied voltage	Maximum contact current for resistive load
Up to 42 VAC	16 A
Up to 20 VDC	16 A
30 VDC	6 A
40 VDC	2 A
50 VDC	1 A
60 VDC	0.8 A

Each relay has both a normally open (NO) and a normally closed (NC) contact. One end of these contacts is common. Normal states of the relay contacts are shown on the figure at the beginning of the “communications” section.

Relay functions are described below:

Relay	Function
ACFR (AC failure relay)	Contacts change position if the rms value or frequency of the mains voltage is beyond their limits.
BYPR (Bypass relay)	Contacts change position if the UPS is working in the bypass mode
BUVR (Battery under voltage relay)	Contacts change position if the battery voltages are critically low to feed the load and the load power is about to be interrupted
SBFR (secure bus failure relay)	Contacts change position, if the output voltage disappears

## 5. MODES OF OPERATION

Uninterruptible Power Supplies (UPS) have an important function in the protection of the critical and sensitive loads from the irregular mains electricity conditions and they are used to supply uninterruptible energy to these loads. In such irregular mains electricity conditions, the user can provide an artificial energy supply to the equipment present in the office or at home by using an UPS.

UPS during Inverter operation provides stable pure sine wave. This pure sine wave is not affected from the input voltage fluctuations. This helps to extend the life time of your sensible loads. Power factor of the current consumed from the mains is nearly one. You do not have any problem on generator or isolation transformer applications. The reactive energy consumption decreases.

During the mains failure, the energy needed for the load is provided by the battery in UPS (or in external battery cabinet/s). These batteries are charged by an intelligent battery charging circuit during the mains within the limits. Batteries are lead acid battery (VRLA) and do not require any maintenance until the end of their life time.

In case of longer overload or inverter failure situation, UPS transfers the load to Bypass line, and load is supplied from the mains. When the condition turns back to normal, UPS shall continue to supply the load through inverter.

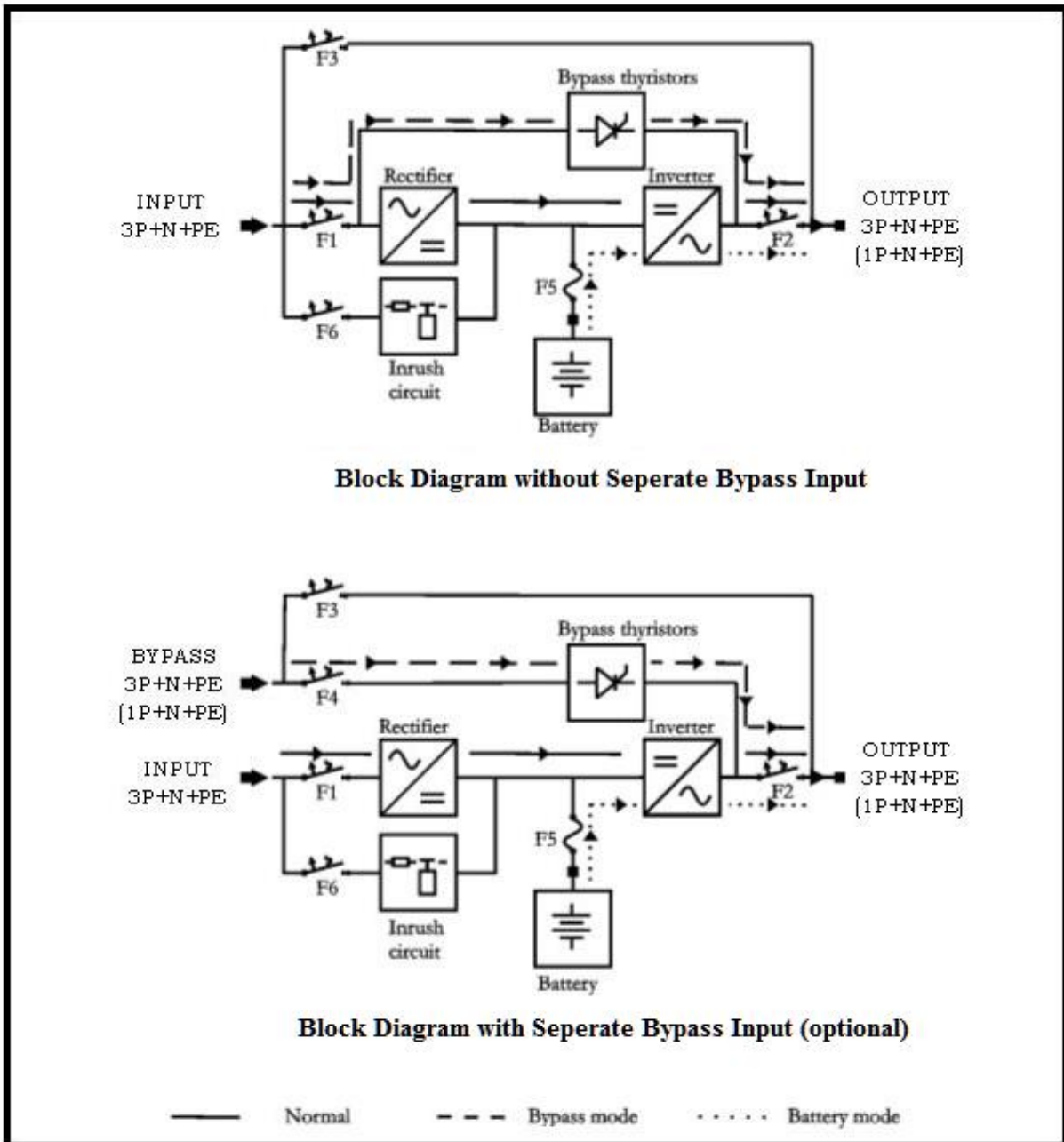
UPS control and management is done by Digital Signal Processor (DSP) which is 200 times faster than standard microprocessors. This helps to make your UPS smarter. DSP uses all the sources on optimum conditions, observes the failure conditions, and communicates with your computer system.

UPS can be operated in one of the following operational modes depending on the condition of mains, battery, bypass, UPS and/or user preference.

You may see the block diagram of UPS in [Appendix-2 Description of UPS and Block Diagram](#).

There are three operation modes, which differ in the path of the energy flow.

UPS block diagrams and the energy flow path in each operation mode is shown below:



When UPS has no separate bypass mains input, bypass line is also fed from the mains input. Thus, if such a device is in question, mains input shall be comprehended when the bypass mains input is referred in the following sections of the manual.

UPS behavior at the start-up is different from the usual operation. The UPS can only operate in bypass mode during start-up. So, in order for the UPS to start-up, frequency/waveform/rms value of the bypass mains voltage shall be in acceptable limits and bypass shall be enabled.

After start-up, the following applies:

Operation mode depends on the priority, inverter, rectifier and bypass preferences made by the user and mains, separate by-pass mains and battery voltages.

Priority and inverter, rectifier and bypass preferences can be set by using the COMMANDS and extra commands (EXTCMNDS) menus.

If operation in any of these modes is impossible, output voltage will not be present. In this case, loads will not be fed, and “VSECFLR” message is shown on the LCD instead of operation mode.

### 5.1. Bypass Operation

Devices without separate bypass mains input, absorb energy from the mains. In devices with separate bypass mains input, energy is drawn from the separate bypass mains.

Loads are fed via static bypass line.

Output voltage has the same amplitude, frequency and waveform as the input voltage.

Current drawn by the loads are only limited by the thermal/magnetic switches over the energy flow path.

Voltage, frequency and waveform of the bypass supply shall be in their tolerance limits, and bypass shall be enabled for the UPS to operate in this mode.

When the upper provisions are met, the UPS works in bypass mode in the following conditions:

- During the start-up
- If the bypass priority is selected
- If the inverter is disabled or blocked
- In case of a prolonged overload

You can save energy by selecting the bypass priority. Efficiency in bypass mode is higher than the efficiency in normal mode. If the bypass priority is selected, the UPS will operate in bypass mode whenever the frequency/waveform/rms value of bypass mains voltage is in their tolerance limits. If the bypass voltage goes beyond these limits, the UPS switches into normal operation.



Bypass Operation mode does not provide perfect stability in frequency/waveform/rms value of the output voltage like in Online Operation. Thus, the use of this mode should be carefully executed according to the level of protection required by the application.



Bypass Operation mode does not provide electronic short circuit protection as provides in Online Operation. If a short circuit occurs on the output during this operation, the thermal/magnetic protection will act and all loads will be deenergized.



Prolonged overloads in Bypass Operation may cause the thermal/magnetic protection act. In this case, all loads will be deenergized.

### Mains Limits for Bypass Operation

Frequency, rms value and total harmonic distortion of the bypass mains input voltage has to be between acceptable limits for the UPS to operate in bypass mode.

Different rms voltage upper and lower limits are present for the return from another operation mode to bypass mode. This provides hysteresis and ensures that the device does not change operation mode very often when the bypass mains rms voltage is close to one of the limits.

Bypass mains limits are software parameters. They can be changed upon request.

## 5.2. Normal Operation

Energy is drawn from the mains input.

Loads are fed via the rectifier and the inverter. The AC voltage at the input is converted to a DC voltage by the rectifier. The inverter converts this DC voltage to an AC voltage with a stable sinusoidal waveform, amplitude and frequency.

Output voltage is sinusoidal and has a regulated amplitude and frequency. It is independent from the input voltage.

The inverter is synchronized in frequency with the bypass mains input to enable load transfer to the bypass supply without any interruption, in case of an overload or inverter failure.

Voltage and frequency of the mains input shall be in their tolerance limits, and both the rectifier and the inverter shall be enabled for the UPS to operate in this mode.

When the upper provisions are met, the UPS works in normal mode in the following conditions:

- If the inverter priority is selected.
- If the bypass priority is selected but bypass is disabled or frequency/waveform/rms value of bypass mains voltage is not in acceptable limits.

### Mains Limits for Normal Operation

Frequency and rms value of the mains input voltage has to be between acceptable limits for the UPS to operate in normal mode.

Lower limit of the voltage depends on how much the UPS is loaded and it decreases as the load decreases until it reaches 80 V phase-neutral.

Frequency lower and upper limits and voltage upper limit are fixed.

Voltage and frequency ranges for normal operation are given in the “technical specifications” section of the manual.

This feature lessens the need to use the batteries. Thus, it increases the battery life and continuity of the load power.

### Electronic Short Circuit Protection

The UPS attempts to force the thermal/magnetic protection devices between the output terminals and the short circuited load to open, by supplying current to the short circuited load for a limited duration. The UPS shall be working in battery or normal mode, for this feature to work.



To enable the short circuit protection feature of the UPS, each load shall be fed over a separate circuit breaker chosen according to the load current. This may provide quick disconnection of the short circuited load and operation continuity of the other loads. To obtain maximum protection, the rating of each individual load circuit breaker shall have the minimum value, which is enough to carry the full load current continuously.

If the protection device fails to open the circuit in a limited time, the UPS stops feeding current to the output. “VSECFLR” message is shown on the upper left of the LCD.

### Overload Behaviour

While operating in normal or battery mode, the UPS can feed overloads for a limited duration which is given in the “technical specifications” section. After that duration, UPS automatically switches into bypass mode, if the bypass is enabled and frequency/waveform/rms value of the bypass mains voltage is acceptable. If the overload situation continues in the bypass operation, thermal/magnetic protection devices may activate and protect the circuit. In this case, all loads on the output will be deenergized.



Make sure that the UPS is not overloaded to provide a higher quality supply to the loads.

### 5.3. Battery Operation

Energy is drawn from the batteries. Loads are fed via the inverter.

Output voltage is sinusoidal and has a regulated amplitude and frequency. It is independent from the battery voltage.

Battery voltage shall be in acceptable limits and the inverter shall be enabled for the UPS to operate in this mode.

When the upper provisions are met, the UPS works in battery mode in the following conditions:

- If rectifier is disabled.
- If the rectifier is disabled or frequency/waveform/rms value of mains voltage is not in acceptable limits.

#### Battery Test

This feature enables the user to obtain information about the battery condition. If the batteries have approached end of their lives, batteries fail.

Battery life depends on several parameters like the number of charge-discharge cycles, discharge depth and ambient temperature. Battery life greatly decreases as the ambient temperature increases. Therefore it is recommended to keep the ambient temperature about 20 °C.

To perform a battery test, enter “START B. TEST” in the COMMANDS menu and wait. The UPS will switch into battery mode, when the test has started. After about ten seconds, UPS will return to the operation mode before the test. If the batteries pass the test, no alarm will be shown.

If the batteries fail, you’ll receive BATT FAILED message under the ALR submenu. In this case, make sure that the battery circuit breaker is “ON”/”I”, charge the batteries for minimum 10 hours and repeat the test. If the alarm persists, consult technical service for replacement.



Make sure that the batteries are fully charged and battery circuit breaker is “ON”/”I” before starting battery test. Otherwise, the batteries will fail even if they are in good condition.

BATT FAILED message will not disappear until another successful test is performed.

#### 5.4. Manual Bypass Operation



This procedure may only be executed by authorized Technical Service personnel.



Some parts inside the UPS (terminals, EMC filters and measurement circuits) are still energized during Maintenance Bypass Operation. In order to deenergize all UPS parts, circuit breakers on mains and bypass mains distribution panels feeding the UPS and circuit breakers on external battery cabinet shall be brought to "OFF" position. Internal batteries should also be isolated from the system.

Manual Bypass enables the user to isolate the electronic circuitry of the UPS from the mains and the load without interrupting the load operation by connecting the loads directly to the bypass utility supply. This feature is useful while performing maintenance or service and should only be executed by authorized technical service personnel.



During Manual Bypass operation; in case of any mains interruption occurs, all loads on the output will be deenergized. Manual Bypass Operation should not be preferred for long time use.

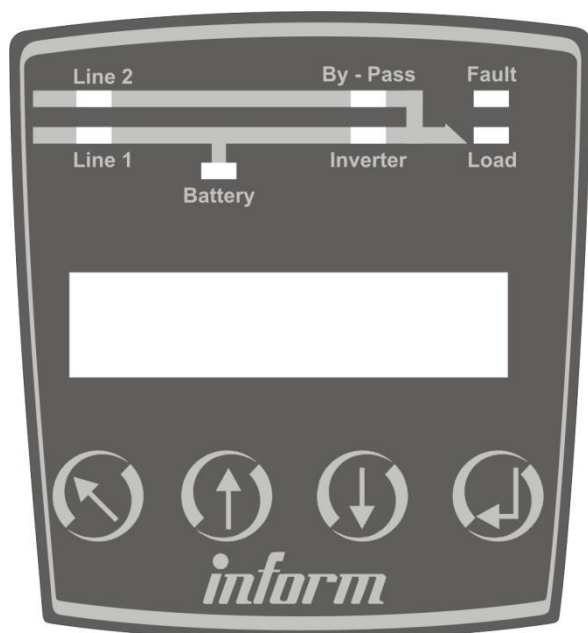


**When installing external maintenance bypass breaker please make sure that auxiliary contact information carrier cable is connected in parallel to internal maintenance bypass auxiliary contacts. And please use twisted and shielded cable for this transmission.**

## 6. FRONT PANEL





### 6.1. Front Panel

The front panel located on the upper part of the UPS informs the user about operating status, alarm conditions and measurements. It also provides access to controls and configuration parameters. Front panel shown below consists of three parts. As mimic panel provides basic information about the energy flow path and existing alarms, LCD (liquid crystal display) offers detailed information and provides access to controls. Keypad enables the user to move in the menu and to make selections.



#### 6.1.1. Keypad

Functions of the buttons are given below:

BUTTON	SYMBOL	DEFINITION
ESC		Exit from the current menu
UP		Scrolls the available menus/values upwards. It increases the value each time it is pushed when changing a parameter.
DOWN		Scrolls the available menus/values downwards. It decreases the value each time it is pushed when changing a parameter.
ENTER		Enters the menu displayed on the screen. It makes selections or confirms the choice/changes made.



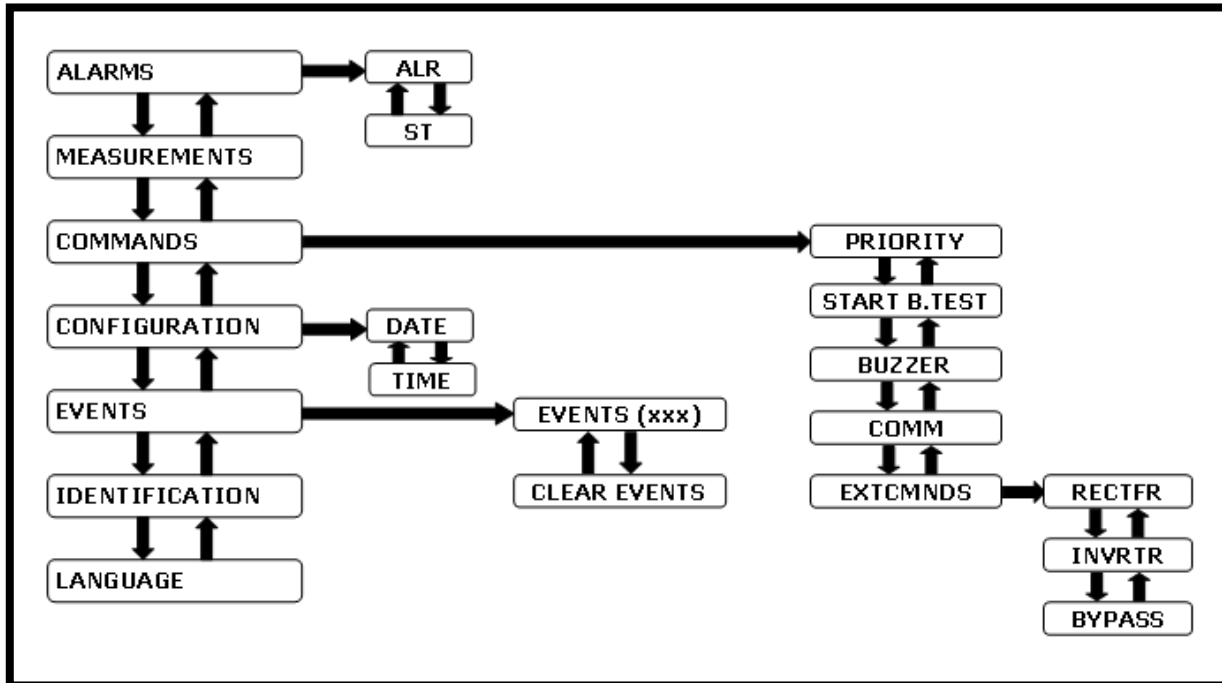
### 6.1.2. Mimic Panel

Mimic panel is a diagram, which shows the path of energy flow in the UPS by means of several LED's. Definitions of LED states are shown below:

LED's			
ID	COLOR	DEFINITION	STATE
Line 1	Green	Input mains voltage is OK and rectifier is active	Steady
		Input mains voltage is OK and rectifier is inactive	Flashing
		Input mains voltage is very close to its upper/lower limit and rectifier is active	
		Input mains voltage is not OK	Off
Line 2	Green	Bypass voltage is OK	Steady
		Bypass mains voltage is not OK and output voltage is not synchronized to the bypass voltage	Flashing
		Bypass mains voltage is not OK	Off
Battery	Red	Battery mode is active and battery voltage is OK	Steady
		UPS is performing battery test and battery voltage is OK	
		Battery mode is active and battery voltage is close to its lower limit (energy available in the battery is about to be depleted)	Flashing
		Battery test is active and battery voltage is close to its lower limit (energy available in the battery is about to be depleted)	
		Rectifier is active and able to supply whole power required by the inverter	Off
Inverter	Green	Load is fed via inverter	Steady
		Inverter is not active	Off
Load	Green	Load is powered	Steady
		Load is powered but UPS is overloaded	Flashing
		Output voltage is not OK	Off
Bypass	Yellow	Load is fed via static bypass line	Steady
		Bypass is not active	Off
Fault	Red	No alarms	Off
		A minor alarm is present	Flashing
		A major alarm is present	Steady

### 6.1.3. Liquid Crystal Display (LCD) and User Menu

LCD provides detailed information about device status, alarms and measurements. It also enables the operator to manage the UPS. All information, commands and configuration parameters are given in a menu, which has the following structure:



LCD consists of two lines and has the following structure:

“OPERATING MODE” or “VSECFLR”
“MENU or PARAMETER NAME”

If there is no voltage on the output, VSECFLR message is displayed on the upper line. Operation mode parameter is one of the notations below:

OPERATING MODE NOTATIONS	
NORMAL	Normal mode
BYPASS	Bypass mode
BATT	Battery mode

Menu and parameter descriptions are given below:

ALARMS MENU	
ALR = “XXXXXXXXXXXX”	12 digit service codes.
ST = “XXXX-XXXXXXXX”	Note these numbers before referring technical service.

Alarm codes and names can be seen by entering the ALR submenu.

CODE	NAME	DEFINITION
A01	BYP BADSHAPE	Bypass mains voltage is different than the inverter reference signal (e.g. its frequency is beyond synchronization limits or it has a total harmonic distortion > %10)
A02	BYP VOL HIGH	Bypass mains voltage is higher than its upper limit
A03	BYP VOL LOW	Bypass mains voltage is lower higher than its lower limit
A06	BYP SYN FAIL	Frequency of bypass mains voltage is beyond the frequency range for bypass operation or bypass mains voltage is very low
A07	BYP SEQ FAIL	Phase sequence of bypass mains voltages is not OK
A08	MNBYP SW ON	Manual bypass switch is "ON"
A09	INV TMP HIGH	Inverter block temperature is very high
A10	OUT OVERLOAD	RMS current drawn from any of the output lines exceeds its nominal value
A11	BYP ACT	Bypass is activated.
A12	INV NOT ACT	Inverter is not started due to a fault
A13	INV BLCK	Inverter operation is automatically stopped due to a fault
A14	VSEC NOT OK	Output voltage is beyond its limits
A15	MASTER T-OUT	This alarm is observed when information flow from master ups is interrupted
A16	CABLE UNPLUG	Parallel Communication cable is unplugged or damaged
A17	INP VOL HIGH	Input line/neutral voltage is higher than its upper limit
A18	INP VOL LOW	Input line/neutral voltage is lower than its lower limit
A21	INP SYN FAIL	Frequency of mains voltage is beyond the frequency range for normal operation or mains voltage is very low
A22	INP SEQ FAIL	Phase sequence of input mains voltages is not OK
A23	REC TMP HIGH	Rectifier block temperature is very high
A24	REC OVERLOAD	RMS current drawn from any of the input lines exceeds its nominal value
A25	VDC HIGH	DC bus voltages is higher than its upper limit
A26	VDC LOW	DC bus voltages is lower than its lower limit may mean that the battery is empty during battery operation
A27	REC NOT ACT	Rectifier is not started due to a fault
A28	REC BLCK	Rectifier operation is automatically stopped due to a fault
A30	TESTING BATT	Battery test is performed
A31	REDUND. LOST	It appears in case Load % x (N+1) / N > 100, for more information refer to page:28
A32	N FAULT	Depending on N description ( n+1, n+2...), this alarm is observed when the qty of ups in the systems decreases below N value
A33	REC OFF	Rectifier is inactive
A34	INV OFF	Inverter is inactive
A35	BYP OFF	Bypass is inactive
A36	BYP PRI HIGH	Priority is Bypass
A37	BATT DISCHAR	Batteries are discharging after a mains failure

<b>A38</b>	<b>VDC NOT OK</b>	DC bus voltage is out of its normal range
<b>A39</b>	<b>T-AMP HIGH</b>	Ambient temperature exceeds its upper limit
<b>A40</b>	<b>GENSET ON</b>	Generator friendly operation is activated
<b>A41</b>	<b>EMG STOP ON</b>	Emergency stop is activated
<b>A42</b>	<b>MINOR ALR</b>	Minor Alarm
<b>A43</b>	<b>MAJOR ALR</b>	Major Alarm
<b>A44</b>	<b>BATT TS FAIL</b>	Batteries failed in the battery test
<b>A45</b>	<b>BATT CR OPEN</b>	Battery Circuit Breaker is open
<b>A47</b>	<b>INV RX T-OUT</b>	Communication between the inverter and the front panel is lost
<b>A48</b>	<b>REC RX T-OUT</b>	Communication between the rectifier and the front panel is lost

All alarms except VSEC NOT OK are minor.

<b>MEASUREMENTS MENU</b>		
MEASUREMENT		DEFINITION
LD = XXX,XXX,XXX	%	Ratio of the actual inverter active power of each line to its nominal value* <sup>1</sup>
Vsc = XXX,XXX,XXX	V	Output line/neutral voltages* <sup>1</sup>
Isc = XXX,XXX,XXX	A	Output line currents* <sup>1</sup>
Fo = XX.X	Hz	Frequency of output line/neutral voltages
Vby = XXX,XXX,XXX	V	Bypass line/neutral voltages* <sup>1</sup>
Vin = XXX,XXX,XXX	V	Input line/neutral voltages
Iin = XXX,XXX,XXX	A	Rectifier Output Current
Fin = XX.X	Hz	Frequency of input line/neutral voltages
Vdc = XXX,XXX	V	Positive and negative DC bus voltages
Vbat = XXX,XXX	V	Positive and negative battery branch voltages
Ibat = ±XXX,±XXX	A	Positive and negative battery branch currents Positive during charge, negative during discharge
Tbat = XXX	°C	Ambient temperature

<b>COMMANDS MENU</b>		
PRIORITY = INVRTR/BYPASS		Selects the priority of normal and bypass operation modes Push ENTER to switch between INVRTR and BYPASS
START B. TEST		Push ENTER to start battery test
BUZZER = ENBLD/DSBLD		Enable or disable the buzzer Push ENTER to switch between ENBLD and DSBLD
COMM = RS232/RS422		Push ENTER to switch between RS232/RS422 communication
EXTCMNDS		Push ENTER 3 times to enter this submenu

<b>EXTRA COMMANDS SUBMENU</b>		
RECTFR	= ENBLD/DSBLD	Enable or disable operation of the rectifier block Push ENTER to switch between ENBLD and DSBLD
	= BLCKD* <sup>2</sup>	Can be seen only when the rectifier is blocked Push ENTER to remove the blockage and enable the rectifier
INVRTR	= ENBLD/DSBLD	Enable or disable the operation of the inverter block Push ENTER to switch between ENBLD and DSBLD
	= BLCKD* <sup>2</sup>	Can be seen only when the inverter is blocked Push ENTER to remove the blockage and enable the inverter
BYPASS	= ENBLD/DSBLD	Enable or disable the operation of the bypass thyristors Push ENTER to switch between ENBLD and DSBLD

\*<sup>1</sup> There is only one measurement value at 1ph output models

\*<sup>2</sup> The UPS hinders the operation of the rectifier and inverter blocks in case of a failure.

<b>CONFIGURATION MENU</b>	
DATE = "XX-XX-XXXX"	Shows system date in dd-mm-yyyy format Push ENTER to switch between day, month, year, hour, minute and second. Then, use arrows to configure
TIME = "XX-XX-XX"	Shows system time in hh-mm-ss format Use date submenu to set time

<b>EVENTS MENU</b>	
EVENTS (xxx)	Shows last 380 events (alarms) of system. (xxx) shows events count. To look event details, you must press ENTER key in current position and use UP/DOWN keys.
CLEAR EVENTS	Clears all events stored in eeprom after verification of clear process.

EVENTS (xxx) SUB MENU	
YYY : AAAAAAAAAAAAA	“YYY” Shows order number of event and “AAAAA-A” shows event description. (For events descriptions see ALARM DEFINITIONS on page 17). Events stored in eeprom using FIFO method. Order number of last occurred event is 001. To look event details, you must press ENTER key in current position and use UP/DOWN keys.
DATE = XX/XX/XXXX	Displays date of event occurring.
TIME = XX:XX:XX	Displays time of event occurring.
A:XXXX-XXXX-XXXX	Displays alarm status when event is occurred.
ST=XXXX-XXXXXXXX	Displays status string when event is occurred.

IDENTIFICATION MENU	
"X/X XXX kVA"	Shows number of input/output phases and output nominal apparent power
FW = "XX"	Shows firmware version

## 6.2. Buzzer

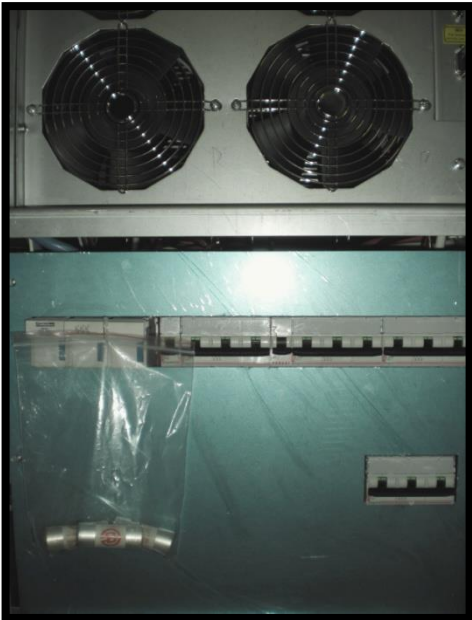
Buzzer warns the user about the present alarms. It can be disabled by using the commands menu

BUZZER	
STATE	DEFINITION
Off	No alarms
Discontinuous	A minor alarm is present
Steady	A major alarm is present

## 7. OPERATING PROCEDURES

### 7.1. Preparations

At some powers of PDSP UPS, fuse breaker is present on the UPS. On these powers, UPS is shipped with 3pcs battery fast fuses in a plastic package attached to the UPS. Separate the package from UPS and take out the fuses.



After all connections are completed as described in [Section 4](#), the battery fuses must be placed as shown below.



Do not leave the battery fuse package at the front of UPS. Otherwise the fans would be blocked and UPS may overheat.

## 7.2. Commissioning

After all connections and settings have been done, UPS can be started-up.



Even all the fuses and breakers of the UPS are at “0” (OFF) position, still hazardous voltage exist on connection terminals of the UPS. Therefore Do not touch the terminals.



If you work on terminals; all circuit breakers in the input/bypass distribution panel, and if any the battery circuit breakers in the external battery cabinet, should be brought to “0” position.



Units with internal batteries have hazardous voltage on the battery connectors even if the battery circuit breaker is at “0” position. **Do not touch the battery connectors!**

### 7.2.1. Start-Up UPS with Internal Battery

1. Put the battery fast fuses into the battery circuit breaker (F5). (on the fuse breaker models)  
Do not close the circuit breaker / fuse breaker yet!
2. Switch the input circuit breaker on the distribution panel to “ON” position.
3. Switch the input circuit breaker (F1) to “ON” position.
4. If exists, switch Bypass circuit breaker (F4) to “ON” position.
5. Switch the inrush circuit breaker (F6) to “ON” position.
6. Wait till ‘NORMAL’ shown on LCD.
7. Switch the battery circuit breaker (F5) to “ON” position.
8. Switch the output circuit breaker (F2) to “ON” position.
9. Switch the output circuit breaker on the distribution panel to “ON” position.

Afterwards UPS starts to supply the loads.



### 7.2.2. Start-Up UPS with External Battery

1. Put the battery fast fuses into the battery circuit breaker (F5). (on the fuse breaker models)  
Do not close the circuit breaker yet!
2. Switch the input circuit breaker on the distribution panel to “ON” position.
3. Switch the input circuit breaker (F1) to “ON” position.
4. If exists, switch Bypass circuit breaker (F4) to “ON” position.
5. Switch the inrush circuit breaker (F6) to “ON” position.
6. Wait till ‘NORMAL’ shown on LCD.
7. Switch the circuit breakers on external battery cabinet to “ON” position.
8. Switch the battery circuit breaker on UPS (F5) to “ON” position.
9. Switch the output circuit breaker (F2) to “ON” position.
10. Switch the output circuit breaker on the distribution panel to “ON” position.

Afterwards UPS starts to supply the loads.

### 7.3. Decommissioning

Follow the order written below to decommission the UPS:

1. Switch the output circuit breaker on the distribution panel to “OFF” position.
2. Switch the output circuit breaker (F2) to “OFF” position.
3. Switch battery circuit breaker (F5) to “OFF” position.
4. If exists, external battery cabinet circuit breakers to “OFF” position.
5. Switch the input circuit breaker on the distribution panel to “OFF” position.
6. Switch the inrush circuit breaker (F6) to “OFF” position.
7. Switch the input circuit breaker (F1) to “OFF” position.
8. If exists, switch Bypass circuit breaker (F4) to “OFF” position.
9. Wait a few minutes till UPS completely turn off.

### 7.4. Manual (Maintenance) Bypass Commissioning Instructions



This procedure may only be executed by authorized Technical Service Personnel.

Manual Bypass enables the user to isolate the electronic circuitry of the UPS from the mains and the load without interrupting the load operation by connecting the loads directly to the bypass supply. This feature is useful while performing maintenance or service and shall only be executed by authorized technical service personnel.

In order to transfer to Manual Bypass without interruption, do the following instruction respectively;

- Open the front cover.
- Switch the Manual Bypass circuit breaker (F3) to “ON” position.
- See “Bypass” written on LCD.
- Switch the output circuit breaker (F2), the battery circuit breakers (F5) –the breakers on external battery cabinets if any-, the input circuit breaker (F1) and inrush circuit breakers (F6) to “0” position.
- If UPS with bypass, switch the bypass (F4) circuit breaker to “0” position.
- LCD would be off and the alarms would be silenced.

The loads will be continued to be supplied directly from the mains.



Some parts inside the UPS (terminals, EMC filters and measurement circuits) are still energized during maintenance bypass operation. In order to deenergize all UPS parts, circuit breakers on mains and bypass mains distribution panels feeding the UPS and circuit breakers on external battery cabinet shall be brought to “OFF” position. Internal batteries shall also be isolated from the system.



During Manual Bypass operation; in case of any mains interruption occurs, all loads on the output will be deenergized. Manual Bypass Operation should not be preferred for long time use.

### 7.5. Manual (Maintenance) Bypass Decommissioning Instructions

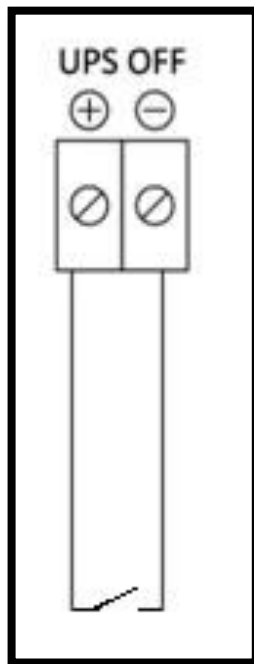
In order to transfer the loads from Manual Bypass to UPS without interruption, do the following instruction respectively;

- Switch the input circuit breaker (F1) to “I” position.
- If exists, switch Bypass circuit breaker (F4) to “I” position.
- Switch the inrush circuit breaker (F6) to “I” position.
- LCD will be ON. Go to **Measurements** menu and wait till DC busbar voltages be min. 372VDC.
- Switch the battery circuit breakers (F5) –the breakers on external battery cabinets if any-.
- Switch the output circuit breaker (F2) to “I” position.
- See “Bypass” written on LCD.
- Wait 2 minutes till the UPS completes the test.
- Switch the Manual Bypass circuit breaker (F3) to “0” position.
- See “NORMAL” written on LCD.
- Close the front cover of UPS.

## 7.6. Emergency Power Off (EPO)

If Remote Control is needed to be done for EPO then a button / locked button can be used like shown in the below figure.

Emergency Power Off ( EPO ) Connection



EPO switch should be placed where unauthorized people can not reach it. Unauthorized use may cause the load be deenergized.

## 7.7. Connection to a Generator

If the input power is supplied by a generator, set the digital input “GEN ON” high. This ensures generator friendly operation by smoothing the increment of the current drawn from the generator, during transition from battery mode to normal mode.

When this is done, “GEN ON” alarm will be shown. Connection details are given in the “communication” section.

The power of the generator must be selected compatible with the power of the UPS.

## 8. OPERATING PROCEDURES FOR PARALLEL SYSTEMS

### 8.1. Introduction

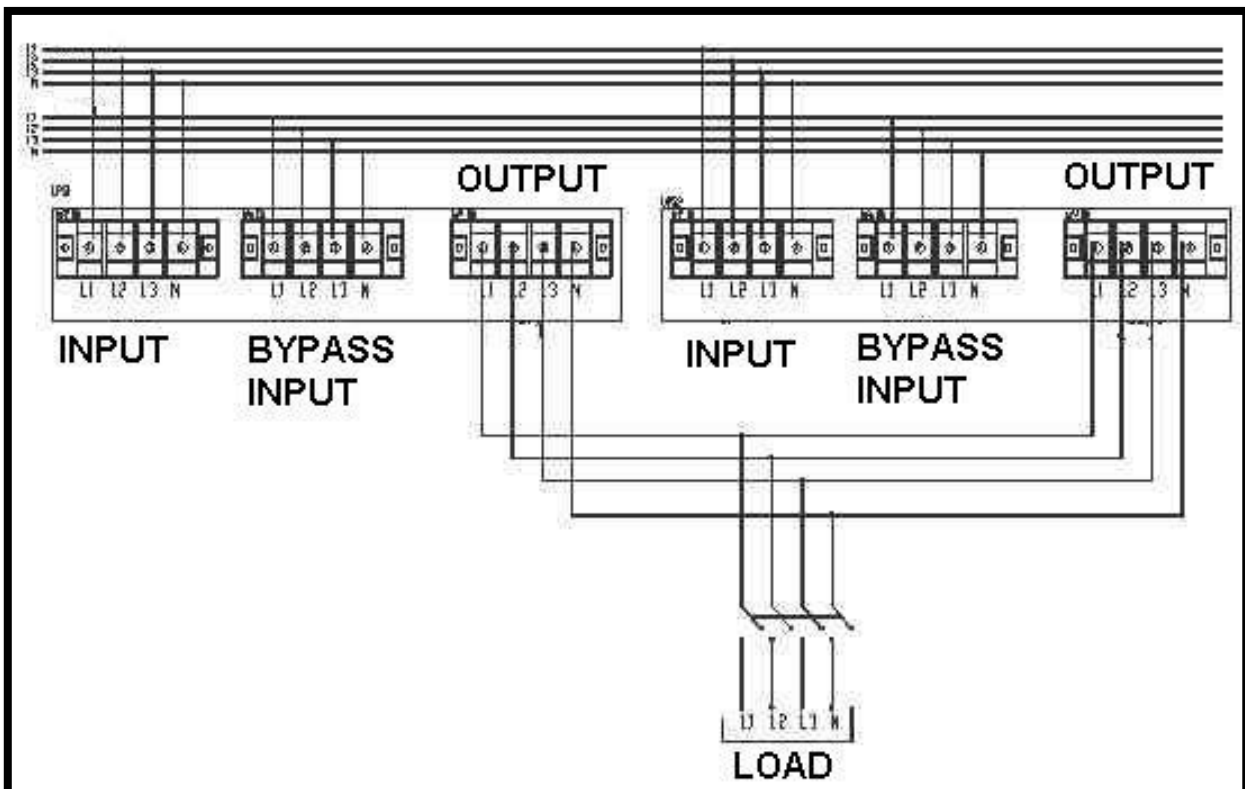
Pyramid DSP UPS Systems are designed according to high MTBF figures with increased reliability but in case of necessity, a second ( or more ) Pyramid DSP UPS's can be connected in parallel redundant configuration for supplying the very critical load to increase the reliability. Maximum 4pcs identical power and specification Pyramid DSP can be connected in parallel.

If power demand increases in a certain UPS application exceeding the power rating of an already installed stand-alone UPS, then a second (or more) UPS of the same model and power rating can be added in parallel to the existing UPS to increase the output power capacity.

The AC inputs of all UPS's in the parallel system are connected to the same mains, and all the AC outputs are connected to each other. Each UPS has its own battery group. The critical load is connected to the common output of the parallel system. There are also some signal cable connections between the UPS units necessary for parallel operation, and will be described later.

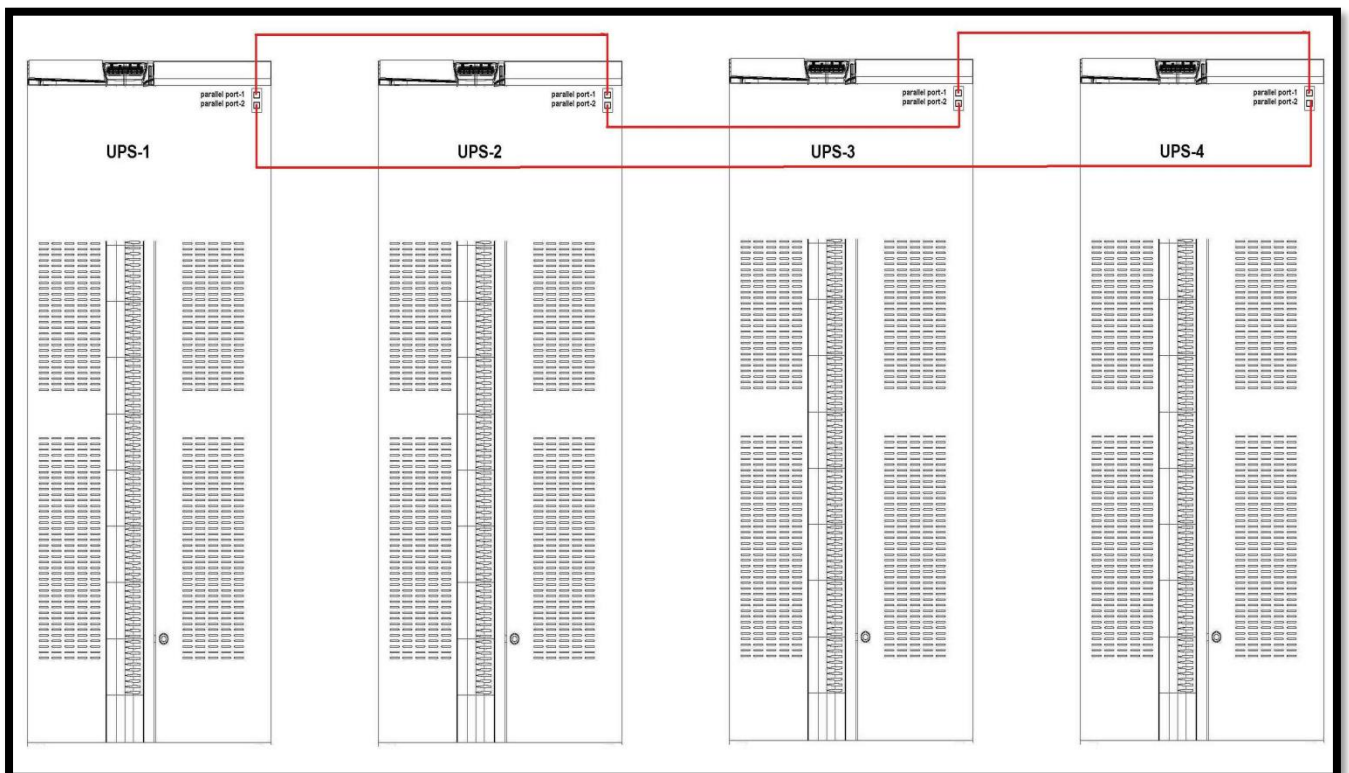
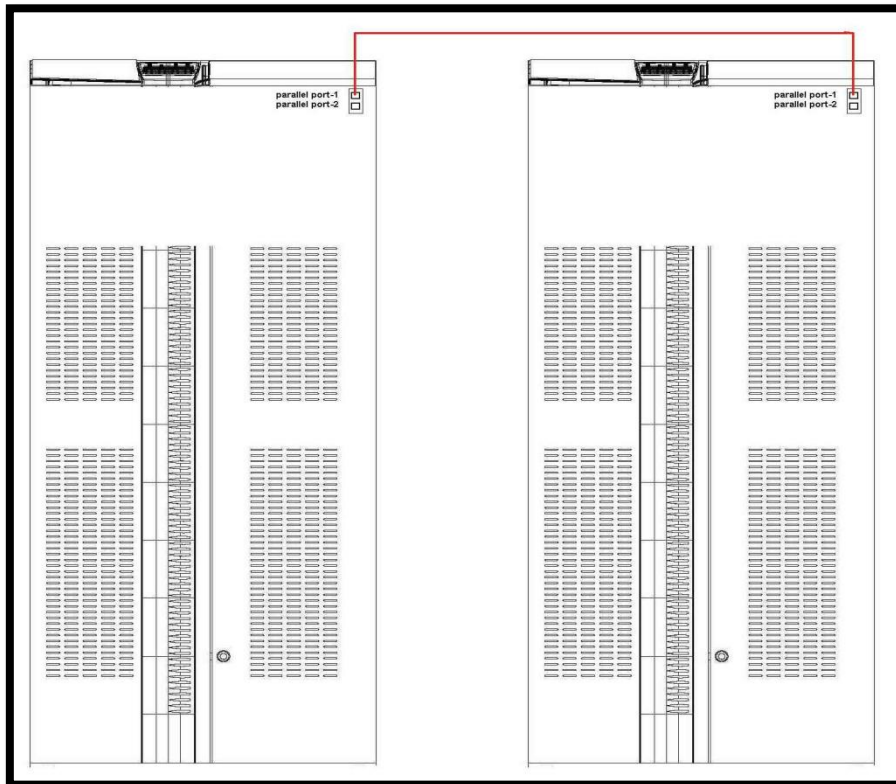
### 8.2. Procedure for Commissioning and Start-Up (First Installation)

- I. If the UPS's will be converted to parallel systems on site, after installing the parallel kit to each ups, calibration of them should be made perfectly at single mode initially.
- II. Before switching on the ups's, make sure that electrical connections have been made as shown in below diagram:



(OUTPUT CONNECTION OF PARALLEL UPS SYSTEMS)

III. The Communication of parallel systems is made through CANBUS. Before starting up the UPS's, make the connection of communication cables between UPS's as per below diagram:



(COMMUNICATION CABLE CONNECTION BETWEEN PARALLEL UPS's)



**CAUTION:** Do not remove the communication cables between the UPS's during parallel operation.

In case this communication cable is removed or damaged during parallel operation and the communication is lost then the slave ups which can not communicate with the master ups shall disenergize its output and maintain the OFF position. The other ups's shall continue their normal operation. At such a case, this UPS should be turned off completely in order to insert its communication again and then switched on again. Do not try to insert its communication cable while it is operating.

**IV.** All switches (F1, F2, F3, F4 (optional), F5 and F6) should be in "OFF" ("0") position.

**V.** Switch on the input Fuse (F1) of the first UPS ("Master" or "Number 1" labeled UPS), Inrush Fuse ( F6 ) should be in "OFF" position. ( Note: if the ups's are not factory parallel configured, then any of the ups can be switched on but followingly should be configured as master and the remaining UPS's as slave which will be explained in detail in the following section )

**VI.** Go to the "CONFIGURATION" section from the front panel menu, enter to "MODE" part and change it from SINGLE to PARALLEL-1 position. This adjustment is made already at factory set UPS's. Then please check and control this during commissioning.

**VII.** By using down button on the same Menu, "N" number should be defined. Parallel Pyramid DSP series UPS's operate according to redundancy principle. At the N+1 configurations, the "N" number in this part is usually - 1 quantity of the parallel operating ups qty.

On each UPS, this value should be same and correctly entered. Consequently the amount of load that is allowed to be connected to total system should not be more than (UPS qty – N).

"N" can be defined different than "1". For example it can be defined as 2 at a 4pcs parallel system. In this case the system will operate as 2+2 redundancy mode and the total load that is going to be connected to the system can not be more than (2x One UPS Power).

N Value here can be accepted as minimum UPS qty that is required to supply the load where each ups operates in full load condition. Then (UPS Qty) – (N) becomes the redundant ups qty in the system.



The system expect to have at least one more ups than N value. Otherwise it shall provide "REDUNDANCY LOST" alarm. The same alarm shall also appear in case  $\text{Load \%} \times (N+1) / N > 100$  situation.



"Redundancy Lost" alarm is just a warning alarm stating that the load amount shared on the remaining ups's is more now, after the failure of one ups or after a power increase on the load side. This alarm shall not affect the normal operation of the total system. It indicates that there is not anymore redundant UPS in the total system. In case of a failure on one of the remaining ups's, the system will either go to overload, bypass condition or will shut down totally depending on the ups quantity in the parallel system.

**VIII.** After defining the UPS number and N value from the Configuration Menu, switch off the UPS and similarly configure the other parallel UPS's in the system. Followingly switch off each ups again. Each ups number should be different. Under this menu; Parallel-1, Parallel-2, Parallel-3 and Parallel-4 options are available. Maximum 4pcs of UPS can be connected in parallel and at the systems where 4 UPS's operate in parallel, each ups's numbers should be different, defined from 1 to 4. (note: if the ups's are factory parallel configured then each ups's number has been already defined, please check and control this )



**CAUTION:** Configuring the parallel ups's with same numbers may cause serious damage during operation. Make sure that each parallel ups is configured with different numbers.

**IX.** After completing the configuration the Numbers of each ups and N values, switch on the F1 input fuse then F4 Bypass Fuse (if the UPS is splitt bypass version) and F6 Inrush Fuse respectively on each parallel UPS's.

After seeing "Normal" message on the LCD panel, F5 Battery fuse can be switched on.

Then the output fuses can be switched on followingly.

The system (all ups's in parallel configuration) will start operating from static bypass initially, then they will start supplying the load from inverter.

**X.** The initially started up UPS will operate as master and the remaining UPS's will operate as slave. According the numbers defined for each ups, on the LCD panel, MAS (master) and SLAVE (1,2,3,4) messages should be observed. On the master unit, candidate master UPS is also shown as CX.

C represents the best available master candidate ups among the slave ups's and X represents the number of the slave UPS. In case the master ups fails, then this candidate assigned UPS becomes master.

### **8.3. Procedure for Transferring to Static Bypass**

In case it is required to transfer the system to Static Bypass, then this process can be made from the LCD panel of any ups in the parallel system. In case static Bypass is activated on any UPS, all the UPS's will pass to Static Bypass mode at the same time.

In order to pass to static bypass mode, From the LCD panel menu, go to Commands Menu – Extcmd. Select the SYS. TO BYP: ENBLD from the menu. In order to do this selection, pressing ENTER button will be enough. If Enter button is pressed again from any ups in system (not need to be done from the ups where it was enabled at the first time), then the selection will be changed to DSBLD (static bypass disabled, again inverter operation starts).

### **8.4. Procedure for Transferring to Manual (Maintenance) Bypass**

In case it is required to transfer the system to Manual Bypass, then this process can be made from any ups in the system. In case Manual Bypass is activated on one of the any UPS, other UPS's will enter to Static Bypass mode also.

In order to activate the Bypass Mode, it is enough to switch on the Maintenance Bypass switch (F3) on any UPS.

To go back to Inverter operation again, it is necessary to switch off the manual bypass switch of the ups which is brought to on position at the first place.

### **8.5 Procedure for Decommissioning**

To switch off the System or one of the ups, follow up the below procedures;

1. Switch battery circuit breaker (F5) to "OFF" position.
2. Switch the output circuit breaker (F2) to "OFF" position.
3. Switch the input circuit breaker (F1) to "OFF" position.
4. If exists, switch Bypass circuit breaker (F4) to "OFF" position.

Now the ups or ups's can be separated from the system.



## 9. MAINTENANCE



All the maintenance operations should be done by authorized Technical Service Personnel.



Hazardous voltage and high temperature metal parts exist inside the UPS even if the UPS is disconnected. Contact may cause electric shock and burns. All operations except replacing battery fuses shall be carried out by the authorized Technical Personnel only.



Some parts inside the UPS (terminals, EMC filters and measurement circuits) are still energized during maintenance bypass operation. In order to deenergize all UPS parts, circuit breakers on mains and bypass mains distribution panels feeding the UPS and circuit breakers on external battery cabinet shall be brought to "OFF/O" position. Internal batteries shall also be isolated from the system.

Maintenance includes fully control of all the electronic and mechanical components in UPS. And they needed to be replaced after their lifetime is over. Systematic maintenance ensures to improve UPS's efficiency and to extend life-time. INFORM recommends every 3 to 6 months of period for systematic maintenance after warranty by authorized service.

### 9.1. Batteries

The life of batteries strongly depends on the usage and environmental conditions. (ambient temperature, frequency of electricity cuts, etc.). There are also other factors like the number of charge-discharge cycles and discharge depth. Performing battery test can provide you information about battery condition. But not to come across any unrequired condition during electricity cut, the batteries should be maintained periodically by authorized Technical Personnel.



Danger of explosion and fire if the batteries of the wrong type are used.



Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes.  
It may be toxic.



When replacing batteries; use the same quantity and type that were originally fitted.



Batteries must always be disposed of according to local environmental laws.

## 9.2. Battery Fuses

Switch the battery circuit breaker to “I” position before seeing “Online Mode” message on the LCD may cause battery fuses to blow out.



Battery fuses should only be replaced with the same rating or equivalent.

## 9.3. Fans

The life of fans used to cool the power circuits depends on the usage and environmental conditions. Please look at [Appendix-1: Technical Specifications](#) for detailed environment conditions. Preventive maintenance shall be done by authorized Technical Personnel periodically.

## 9.4. Capacitors

The life of the electrolytic capacitors on the DC BUS and the capacitors used for output and input filtering purposes depends on the usage and environmental conditions. Preventive maintenance should be done by authorized Technical Personnel periodically.

## 10. TROUBLESHOOTING

This section gives information about the procedures which shall be performed in case of abnormal operation. If you fail to fix the problem consult authorized technical service with the following information:

- Model and serial number of the UPS, which can be found on the nameplate on the rear of the UPS. This information is also available in the test report provided with the UPS.
- ALR and ST codes in the ALARMS menu



Hazardous voltage and high temperature metal parts inside even if the UPS is disconnected. Contact may cause electric shock and burns. All operations except replacing battery fuses shall be carried out by the authorized technical personnel only.

Alarms and problems you may encounter during operating the UPS are given in the table below.

If you have noticed an abnormality in operation; check the protective earth connections, examine the circuit breaker positions, read alarms from the ALARMS menu and refer to the table. Apply all suggestions corresponding to each alarm. If your issue is excluded or the suggested actions do not solve your problem, consult the technical service.

Alarm	Possible Cause	Action
BYP BADSHAPE alarm is present	Bypass mains voltage is different than the inverter reference signal	Make sure that the bypass circuit breaker is "I"/"ON"(if the UPS has no separate bypass mains input, make sure that the input circuit breaker is "I"/"ON".
	(e.g. its beyond its limits or it has a total harmonic distortion > %10)	
VBYP HIGH alarm is present	Bypass mains voltage is higher than its upper limit	Check if the bypass mains voltage is in specified limits
VBYP LOW alarm is present	Bypass mains voltage is lower higher than its lower limit	
BYP SYN FL alarm is present	Frequency of bypass mains voltage is beyond the frequency range for bypass operation or bypass mains voltage is very low	
BYP SEQ FL alarm is present	Phase sequence of bypass mains voltages is not OK	Phase sequence of the separate bypass mains input shall be changed. Consult technical service
MAN BYP alarm is present	Manual bypass switch is "ON"	Check the position of the manual bypass switch.
INV OVTE alarm is present	Inverter block temperature is very high	Check if there is an overload and remove the excessive load. Measure the ambient temperature near UPS. Make sure that the temperature is in specified limits. Check if the fans are running.

Alarm	Possible Cause	Action
OUT OVLD alarm is present	Rms current drawn from any of the output lines exceeds its nominal value	Check if there is an overload and remove the excessive load. If the total power drawn by the load is less than the nominal power, make sure that it is distributed evenly between phases.
INV BLKD alarm is present	Inverter operation is automatically stopped due to a fault	Consult the technical service
VSEC NOK alarm is present (Output voltage is beyond its limits)	The UPS may not started up yet. This alarm is permanent if the UPS is intended to be started with the bypass blocked or when the bypass mains is not in specified limits	Check if there are any other alarms and apply the related suggestions Examine the preferences, check the mains voltages and read the "modes of operation" section of the manual. If input voltage is between the limits check the battery is OK.
	The UPS may have stopped to feed the load because the combination of the mains conditions and the user preferences made from the COMMANDS menu does not allow the UPS to work in any of the operation modes.(e.g. if inverter is disabled and both input and bypass mains voltages are not acceptable or if the rectifier is disabled when the bypass voltage is not in specified limits or batteries may be discharged during a prolonged outage)	
VIN HIGH alarm is present	Input line/neutral voltage is higher than its upper limit	Check if the bypass mains voltage is in specified limits
VIN LOW alarm is present	Input line/neutral voltage is lower than its lower limit	
IN SYN FLR alarm is present	Frequency of mains voltage is beyond the frequency range for normal operation or mains voltage is very low	Check if the mains voltage is in specified limits
IN SEQ FLR alarm is present	Phase sequence of input mains voltages is not OK	Phase sequence of the mains input shall be changed. Consult technical service
RECT OVTE alarm is present	Rectifier block temperature is very high	Measure the ambient temperature near UPS. Make sure that the temperature is in specified limits. Check if the fans are running.
RECT OVLD alarm is present	RMS current drawn from any of the input lines exceeds its nominal value	Check if there is an overload and remove the excessive load.
VDC HIGH alarm is present	Any of the DC bus voltages is higher than its upper limit	Consult the technical service
VDC LOW alarm is present	Any of the DC bus voltages is lower than its lower limit Means that the batteries had discharged. It is removed when the rectifier resets.	If you encounter this alarm during start-up, check if the inrush circuit breaker is "ON"/"I".
		Charge the batteries, perform battery test and check if the alarm has removed.
RECT BLKD alarm is present	Rectifier operation is automatically stopped due to a fault	Consult the technical service

Alarm	Possible Cause	Action
VDC NOK alarm is present	Any of the DC bus voltages approaches its lower or upper limits May mean that the batteries have approached to their lower voltage limit and are almost empty.	Charge the batteries, and check if the alarm has removed.
AMB OVTE alarm is present	Ambient temperature exceeds its upper limit	Measure the ambient temperature near UPS. Make sure that the temperature is in specified limits.
GEN ON alarm is present	Generator friendly operation is activated (digital input "GEN ON" is set high)	Check the "GEN ON" input
UPS OFF alarm is present	Emergency stop is activated (digital input "UPS OFF" is set high)	Check the "UPS OFF" input
BATT FAILED alarm is present	Batteries failed in the battery test	Perform the test again when the batteries have been charged for a long time and the battery circuit breaker is "I"/"ON" Check if the alarm continues
BATT C. OPEN alarm is present (A difference between battery & DC bus voltage is present )	Battery circuit breaker (F5) is probably open ("0"/"OFF")	Make sure that the battery circuit breaker is "I"/"ON". If not do the following: -Check the rectifier preference and enable the rectifier. -Make sure that the input mains voltage is in specified limits. -Make sure that the UPS has switched to normal mode and close the battery circuit breaker.
	The battery circuit breaker of the external battery cabinet is open ("0"/"OFF")	Make sure that the battery circuit breaker of the external battery cabinet is "I"/"ON". If not do the following: -Check the rectifier preference and enable the rectifier. -Make sure that the input mains voltage is in specified limits. -Make sure that the UPS has switched to normal mode and close the battery circuit breaker.
	Battery fuses of the battery circuit breaker (F5) or the external battery cabinet may have blown	Check if the battery fuses are blown. Replace if necessary (see maintenance section)
	There is no battery in the system	Batteries shall be supplemented. Consult technical service

Any other alarm occurs except the alarms explained above, contact to an authorized Technical Service instantly.

Please have the following information ready before you contact to service:

- Ensure you read the troubleshooting section carefully and apply the procedure.
- Model Number
- Serial Number
- Firmware version
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

## Appendix-1: Technical Specifications

Apparent power [kVA]	10	15	20	30	40	60	80	100	120	
<b>MODELS</b>										
Apparent Power [kVA]	10	15	20	30	40	60	80	100	120	
<b>ENVIRONMENTAL</b>										
Storage Temperature Range [°C]	-25 to +55 (15 - 40 recommended for longer battery life)									
Operating Temperature Range [°C]	0 to +40 (20 - 25 recommended for longer battery life)									
Relative Humidity Range	% 0 - % 95 (non condensing)									
Max. Altitude without Derating [m]	1000									
Protection Level	IP 20									
Maximum Power Dissipation	[W]	800	960	1280	1920	2560	3840	5120	6400	7680
	[Btu]	2730	3277	4369	6553	8737	13106	17475	21843	26212
	[kcal/h]	688	825	1100	1650	2200	3302	4403	5503	6604
<b>ELECTRICAL</b>										
<b>Mains Input</b>										
Number of Phases	3P+N+PE									
Nominal Voltage [V]	380 / 400 / 415 (line-line)									
Voltage range for normal operation (line to neutral) [V]	Lower limit (depends on the load level)	187 @ %100 load ( line- neutral )								
		120 @ %64 load ( line- neutral )								
		80V@ %42 load ( line- neutral )								-
	Upper Limit	280								
Nominal Frequency [Hz]	50 / 60									
Frequency Range [Hz]	+/-10%									
Nominal Current [A]	wave Form	sinusoidal								
	rms Value *(2)	13	20	26	40	54	80	106	132	158
Maximum Current [A]	wave form	sinusoidal								
	rms Value	18	25	33	49	69	101	133	167	199
<b>OUTPUT @ 3PH OUTPUT UPS'S</b>										
Performance Classification	VFI-SS-111									
Number of Phases	3P+N+PE									
Nominal Voltage [V]	380 / 400 / 415 (line-line)									
Static Voltage Regulation	Normal	<%1								
@ %100 Linear Load	Battery									
Nominal Frequency [Hz]	50 / 60									
Free Running Frequency [Hz]	± % 0.01									

Voltage THD @ Rated Linear Load	<%3								
Nominal Apparent Power [kVA]	10	15	20	30	40	60	80	100	120
Maximum Load P. F.	0.8								
Nominal active power [kW]	8	12	16	24	32	48	64	80	96
Nominal current [A] at 380V	15	23	30	45	61	91	121	151	182
Load Crest Factor @ Rated Power	3:1								
Overload Duration	>1min @ %150 load								
Efficiency (normal operation) @rated linear load with 0.8 PF	Up to 94% *								

### OUTPUT @ 1PH OUTPUT UPS'S

Performance Classification	VFI-SS-111					-				
Number of Phases	1PH+N+PE					-				
Nominal Voltage [V]	220 / 230/ 240 (LINE-NEUTRAL)					-				
Static Voltage Regulation	Normal	<%1					-			
@ %100 Linear Load	Battery									
Nominal Frequency [Hz]	50 / 60					-				
Free Running Frequency [Hz]	± % 0.01					-				
Voltage THD @ Rated Linear Load	<%3					-				
Nominal Apparent Power [kVA]	10	15	20	30	40	-				
Maximum Load Power Factor	0.8					-				
Nominal Active Power [kW]	8	12	16	24	32	-				
Nominal current [A] at 380V	45	68	91	136	182	-				
Load Crest Factor @ Rated Power	3:1					-				
Overload Duration	>30sec @ %150 load					-				
Efficiency (normal operation) @rated linear load with 0.8 PF	Up to 94%*					-				

### STATIC BY-PASS LINE @ 3PH OUTPUT UPS'S

Number of Phases	3P+N+PE									
Voltage Range (Line-Neutral) [V]*(1)	220 V /230V /240V ±%10									
Frequency Range [Hz] *(1)	47-53									
Nominal Apparent Power [kVA]	10	15	20	30	40	60	80	100	120	
Nominal Current [A]	15	23	30	45	61	91	121	151	182	
Transfer Duration [ms]	0									
<b>STATIC BY-PASS LINE @ 1PH OUTPUT UPS'S</b>										
Number of Phases	1P+N+PE									
Voltage Range (Line-Neutral) [V]*(1)	220 V /230V /240V ±%10									
Frequency Range [Hz] *(1)	47-53									
Nominal Apparent Power [kVA]	10	15	20	30	40					
Nominal Current [A]	45	68	91	136	182					
Transfer Duration [ms]	0									
<b>BATTERIES</b>										
Battery Type	Sealed lead acid, 12 V									
Number of Batteries	2x31									
Nominal Battery Voltage [V]	2x372									
Stored energy time @ nominal load with standard internal batteries*(2)	7Ah	14m	6m	4,5m	-					
	9 Ah	25m	10m	7m	2,5m					
<b>PHYSICAL</b>										
Dimensions (WxDxH) (cm)	40 x 77 x 110				52 x 90 x 130		67 x 73 x 160	63 x 100 x 140	85 x 77 x 182	
Weight (kg)	102	110			240	242	260	295	330	
<b>STANDARDS</b>										
Safety	IEC / EN / TSE 62040-1									
Performance	IEC / EN / TSE 62040-3									
EMC	IEC / EN / TSE 62040-2									
Product Certification	CE									



<b>COMMUNICATIONS</b>	
OPTINAL Free contact communication (AC failure, battery under voltage, bypass and output failure)	
Serial communications (RS232, RS 485)	
Two digital inputs for remote shut down of the UPS and generator operation feedback	
<b>OTHERS</b>	
Manual by-pass with 0 transfer time	
Electronic short circuit protection	
Over temperature and over current protection	
Liquid crystal display (LCD)	
Mimic front panel	
<b>OPTIONS</b>	
Parallel Kit, Internal or External SNMP Kit, Split Bypass	
Remote Control Panel, Isolation Transformer, Battery Cabinet, IP21	

\*(1) These are software parameters. They can be changed upon request

\*(2) Batteries shall be fully charged in order to provide these values

\*The manufacturer reserves the rights to change the technical specifications and design without notice.

## Appendix-2: Description of UPS and Block Diagram

There are three operation modes, which differ in the path of the energy flow.

UPS block diagrams and the energy flow path in each operation mode is shown below:

Separate Bypass version is optional.

For 3Phase Input - 1Phase Output UPS; Output L1-L2-L3 Terminals are short-circuited.

