

DSP FLEXIPOWER SERIES

SINGLE PHASE IN – SINGLE PHASE OUT
5-10kVA

THREE PHASE IN – SINGLE PHASE OUT
10kVA

USER 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 Systems

EPO: Emergency Power Off

RS232: Serial Communication Protocol

SNMP: Simple Network Management Protocol

CVCF: Constant Voltage Constant Frequency

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 Circuit

Passive (OFF/O): Opening the Circuit

Manufacturer

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INDEX

1. WARRANTY.....	1
1.1. Terms of Warranty	1
1.2. Out of Warranty Terms and Conditions.....	1
2. SAFETY.....	2
2.1. Important Notice for UPS.....	2
2.2. Important Notice for Battery	3
2.3. Description of the Symbols Used on the Labels Applied to the UPS	3
3. REQUIREMENT	4
3.1. Transportation.....	4
3.2. Placement.....	4
3.3. Storage	5
4. UNPACKING AND INSTALLATION OF UPS	6
4.1. Unpacking.....	6
4.2. Installation Procedures	8
4.2. Installation Procedures	8
4.2.1. PE Connection.....	11
4.2.2. Input Connection	12
4.2.3. Battery Connection.....	12
4.2.4. Output Connection	13
4.2.5. Communiation Interface Connection	13
5. MODES OF OPERATION.....	18
5.1. Online Mode (norl).....	19
5.2. Eco Mode (Eco)	20
5.3. Bypass Mode	20
5.4. Battery Mode	21
5.5. Frequency Converter Operation (cF50 – cF60).....	23
5.7. Manual Bypass Mode	23
6. FRONT PANEL & REAR PANEL	24
6.1. Front Panel Segments	24
6.1.1. Keypad	24
6.1.2. Liquid Crystal Display (LCD)	25
6.2. Rear Panel	29
7. OPERATING PROCEDURES	30

7.1. UPS Default Data and Special Function Execution	30
7.2. UPS Default Settings and Their Alternatives	34
7.3. Commissioning	35
7.3.1. Start-Up with the Mains	35
7.3.2. Start-Up with the Battery (Cold Start)	38
7.4. Decommissioning	39
7.6. Manual (Maintenance) Bypass Instructions and Decommissioning	40
7.7. Emergency Power Off (EPO)	41
8. MAINTENANCE	42
8.1. Batteries	42
8.2. Fans	42
8.3. Capacitors	42
9. TROUBLESHOOTING	43
Appendix -1: Error List	45
Appendix -2: Technical Specifications	46
Appendix -3: Description of UPS and Block Diagram	47

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 shipment 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 and batteries. Please read all instructions before operating the equipment and save this manual for future reference.
- For parallel system installation, please refer to parallel installation guide.
- Because of “LITTLE LEAKAGE CURRENTS” generated by EMI Filter of the UPS, it is necessary to double ensure if the earth of the UPS is properly grounded before AC mains is connected with.
- 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.
- Make sure UPS is completely turned off when moving UPS from one place to another. It might cause electrical shock if the output is not cut completely.
- The UPS must always stands in a vertical position. Make sure that the floor can support the weight of the system.
- 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 with the installation.
- UPS requires Ph-N+PE input connection.
- It should be checked between all the terminals included PE to be sure that no hazardous voltages 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 persons.
- 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 personnels.**
- Make sure that the battery qty is proper for the unit and they are same type and capacity. Otherwise danger of explosion and fire is within the bounds of possibility.
- 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 waste disposal centers.
- **A battery can present risk of electric shock and high short circuit currents.**

The following precautions should be observed when working on batteries;

- ❖ Remove rings, watches, neckleaces, 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 and output circuit breakers (F1 and F2) to “0” position.
 - ❖ If UPS has internal batteries; Remove + battery (red) and - battery (black) 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.

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.



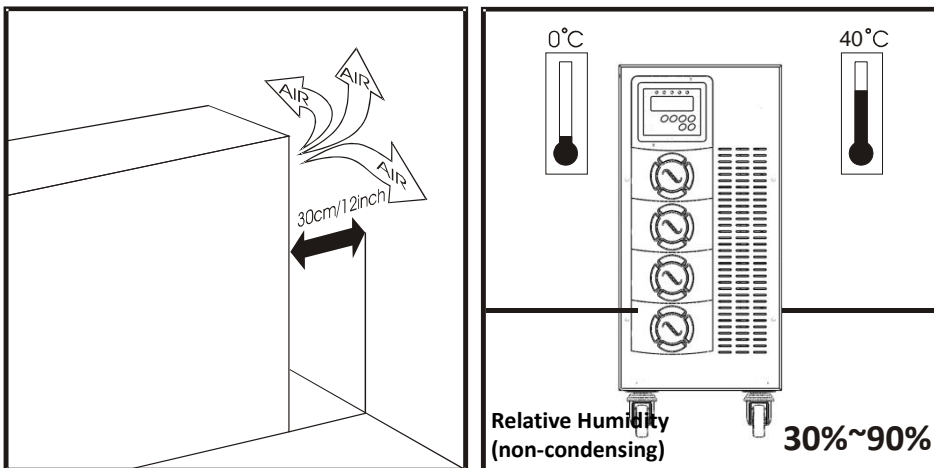
The equipment shall be packed properly during transportation. Therefore it is recommended to keep the original package for future need.



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

3.2. Placement

- 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-2 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 back side of UPS. Leave at least 30 cm at the back side of the UPS for maintenance.
- Air outlets of the UPS are present on the front and back sides. Leave at least 30 cm at the front and back side of the UPS for ventilation.
- To eliminate any overheating of the UPS, keep all ventilation openings free from obstruction, and do not store "things" on top of the UPS.
- 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 30% 90% (non-condensing).



3.3. Storage

Please store the UPS in an environment where the temperature is between -15°C $+40^{\circ}\text{C}$, no receipt of direct sunlight, far from the heating, in a dry place.

Environmental humidity must be between 30% 90% (non-condensing).

Recommended storage temperature, humidity and altitude values are listed on the [Appendix-2 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°C ,
- ❖ Every 6 months if the temperature is between 20°C and 30°C ,
- ❖ Every 3 months if the temperature is between 30°C and 40°C ,
- ❖ Every 2 months if the temperature is over 40°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 12 hours.

4. UNPACKING AND INSTALLATION OF UPS



Equipment and batteries whose packages are damaged during transportation shall be inspected by qualified technical personnel before starting with the installation.



If any equipment has been damaged during shipment, keep the shipping and packing materials 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



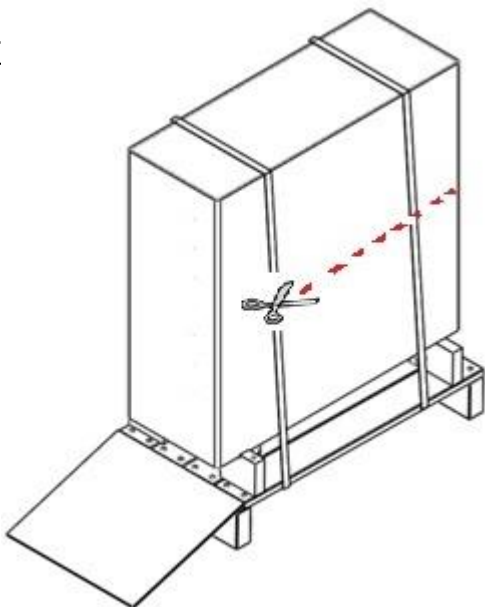
Before the installation, please check if your UPS is customized following your special requirements (if any).



UPS output voltage and frequency is set to 220V/50Hz, as default.

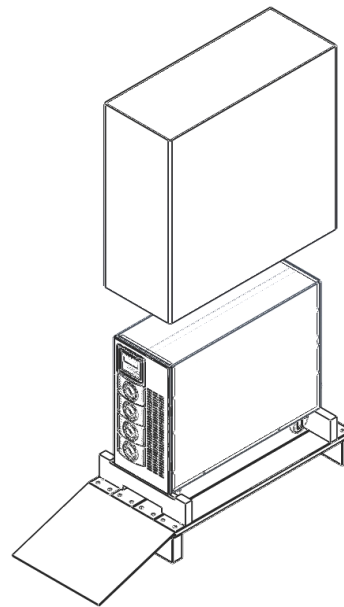
4.1. Unpacking

1



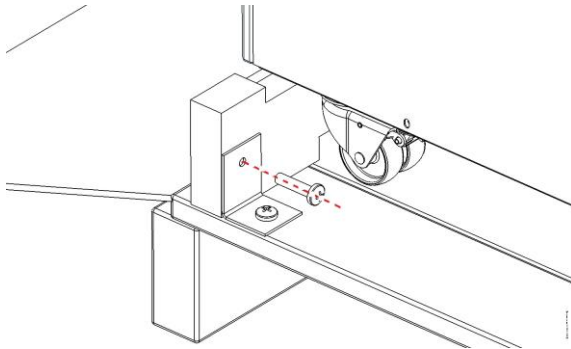
Replace the platform and remove the wrap.

2



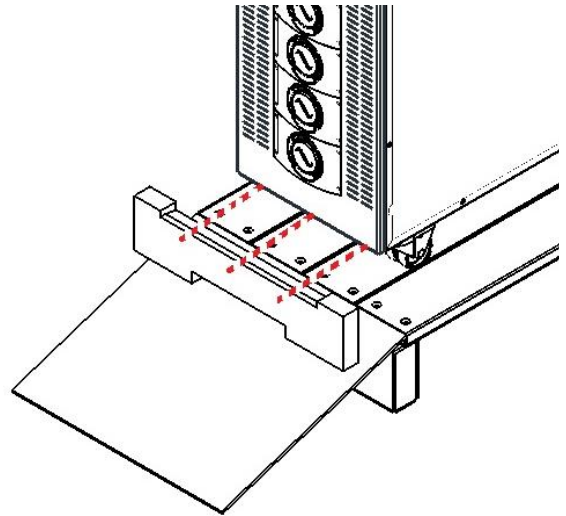
Remove the package.

3

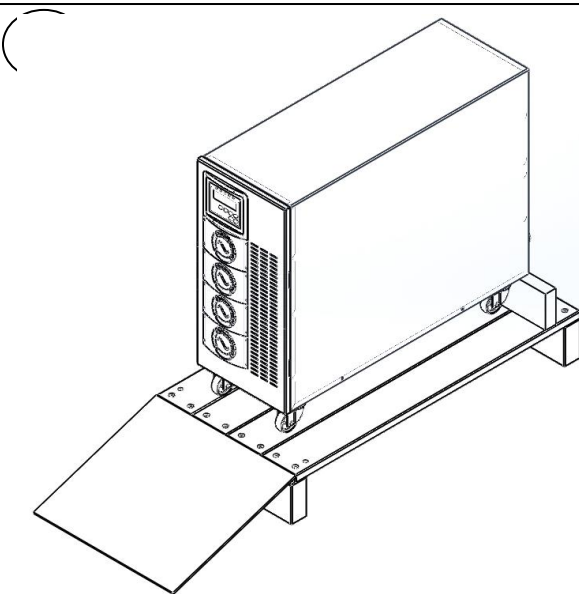


Screw off the stop plates placed at the front of UPS.

4

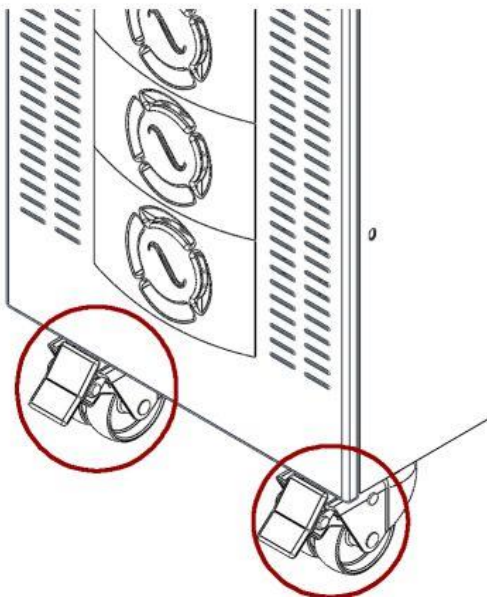


Remove the stop plate.



Reload the UPS via wheels.

6



Lock the wheels where installed.



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

4.2. Installation Procedures



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

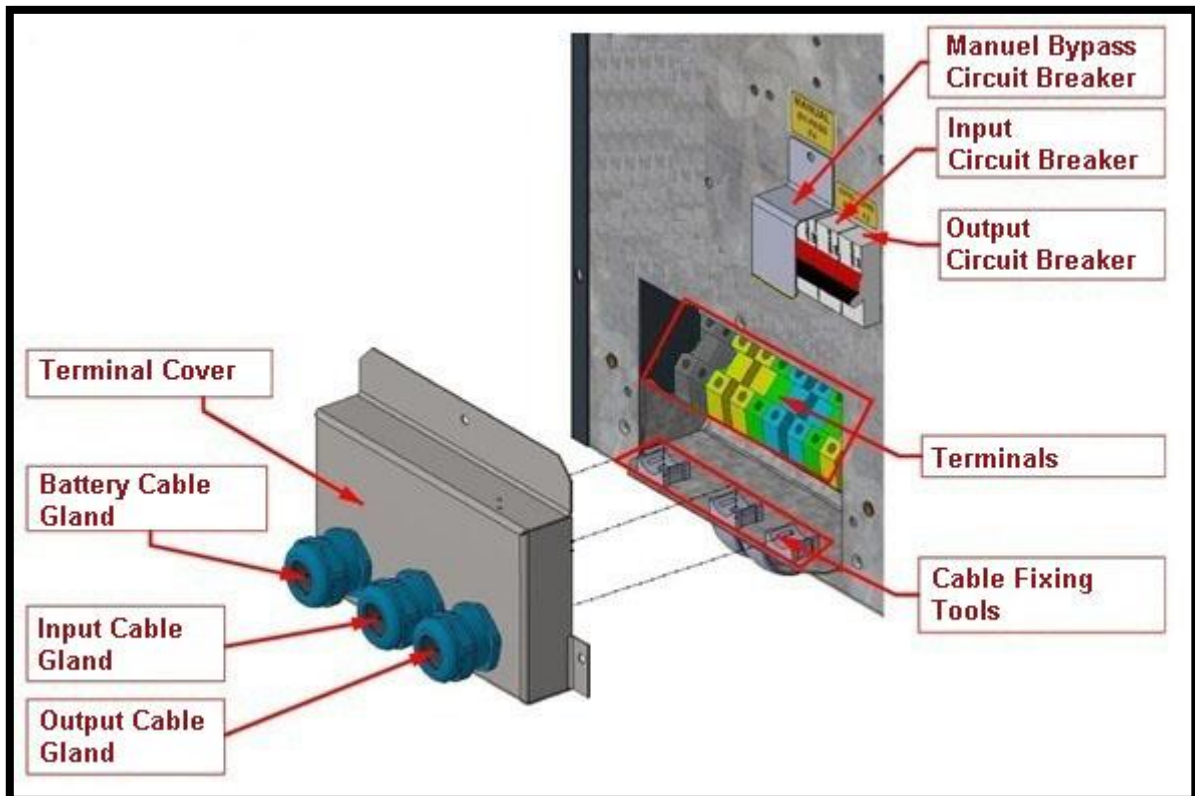


When the UPS is brought from a cold place to a warmer place, humidity of the air may condensate in it. In this case, wait for 2 (two) hours before beginning with the installation.

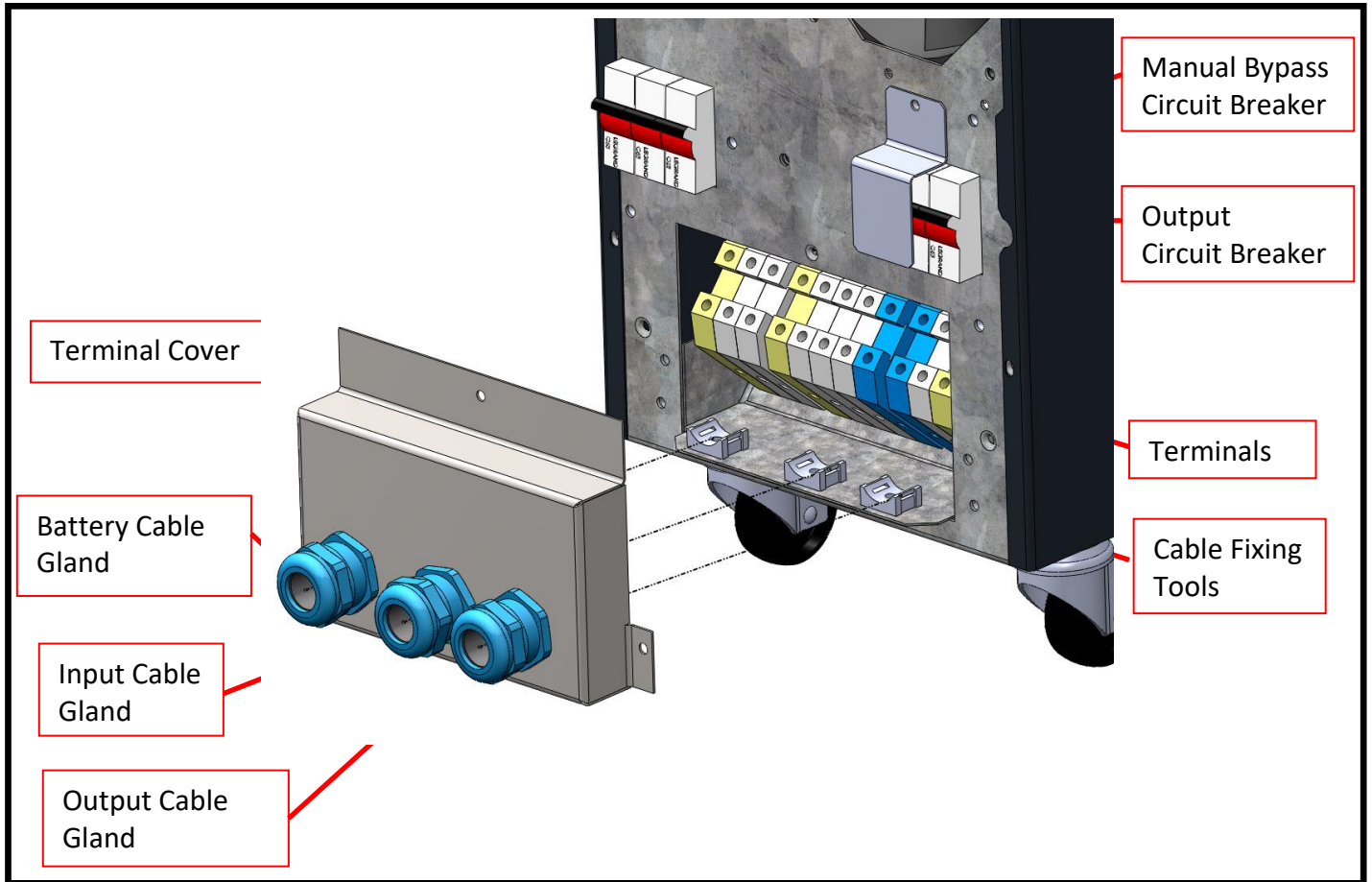
The installation must comply with national installation regulations.

Connection terminals are in the rear side of the UPS. Please take out the terminal cover to make the connections.

Standard UPS circuit breakers and terminal-settlements are shown below;



Terminals and Circuit Breakers for 5-6-8-10kVA 1Phase In/1Phase Out UPS



Terminals and Circuit Breakers for 10kVA 3Phase In/1Phase Out UPS



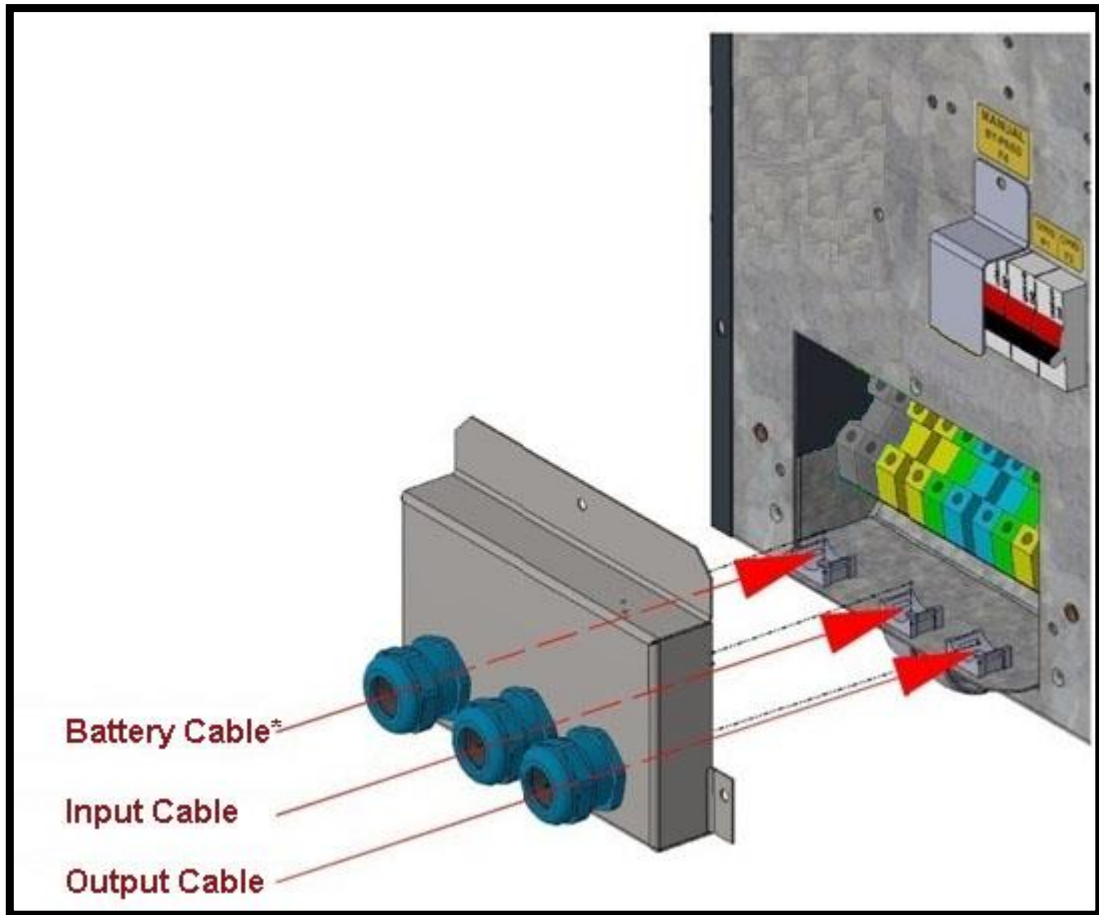
If UPS has internal battery; even no connections have been done, UPS may produce output voltage whenever "ON" key is pressed.

The following table shows the recommended size of circuit breakers used in distribution panel and input/output cables for the linear loads.

The maximum current for each terminal is 30Arms for 5-6kVA, 50Arms for 8-10kVA.

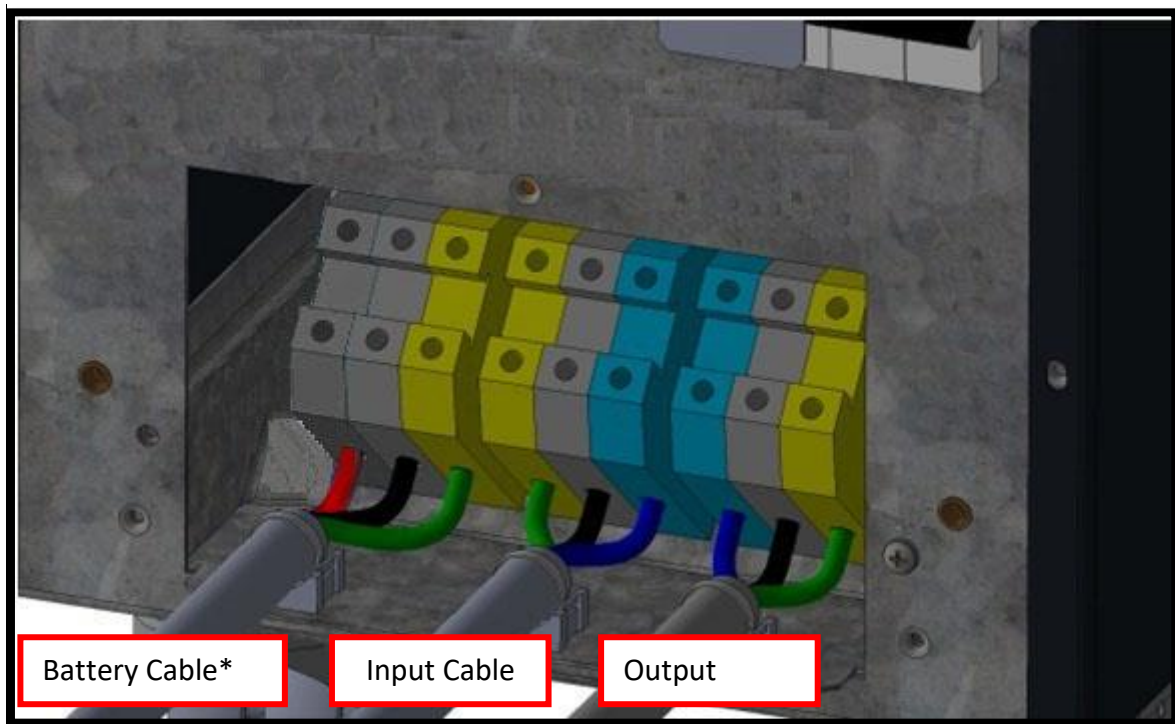
POWER	MAX. CURRENT	INPUT CIRCUIT BREAKER	OUTPUT CIRCUIT BREAKER	BATTERY MAX. CURRENT	CABLE CROSS SECTION				
					INPUT	OUTPUT	BATTERY	NEUTRAL	PE & PB
5-6KVA	33 A	32 A	32 A	25 A	6 mm ²	6 mm ²	6 mm ²	6 mm ²	6 mm ²
8-10KVA	54,3 A	63 A	50 A	41 A	10 mm ²	10 mm ²	6 mm ²	10 mm ²	10 mm ²

After removing the terminal cover; inpt/output and battery cables shall be passed through the assigned glands.



Pass the cables through the glands

Cables shall be connected to the terminals as shown below;



*There should be no external battery terminal when internal batteries are used. Internal and External batteries can not be used at the same time.

Cable connection

Connections shall be made in the following order;

4.2.1. PE Connection



Connect the PE ground connector before connecting any other cable.

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

The load shall be grounded via output protective earth terminal “PB”.

If there is an external battery cabinet present, it shall be grounded via battery protective earth terminal “PB” of the UPS.



PE cable should be min. 10cm longer than the other cables.

4.2.2. Input Connection



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



Switvh the circuit breaker on the distribution panel to “0” position before making the connections.

Please add double-pole miniature circuit breaker (equivalent UPS input breaker) to distribution board 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 the total value of 30 mA (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.

For 1Phase Input/1Phase Output FP; connect the phase cable to input “L” terminal, the neutral to input “N” terminal.

For 3Phase Input/1Phase Output FP; connect the phase cable to input “R-S-T” terminals, the neutral to input “N” terminal.



According to EN 62040-1-2, the user should place a warning label on the input distribution board 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)

4.2.3. Battery Connection

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



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

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

- Connect the “PB” terminal on the external battery cabinet to battery “PB” terminal on the UPS.
- 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.



The batteries must be charged min. 12 hours before first-use.



In the event of an extended period of UPS non-operation, the batteries must be charged periodically in order to prolong battery life. The charge period, which depends on the temperature, is given in the [Section 3.3](#) of the manual.

4.2.4. Output Connection

Please add double-pole miniature circuit breaker (equivalent to UPS output breaker) to distribution board where the loads are to be connected. Connect the phase cable to output “L” terminal and the neutral cable to output “N” terminal.



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.

4.2.5. Communication Interface Connection

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

The Communication port on the UPS provides true RS232 type to communicate with UPS software to remote monitoring the power and UPS status.

With optional interfaces cards, which contains, RSE(RS485 plus EPO), USE(USB plus EPO), DCE(Dry Contact plus EPO), as well as SNMP/ card, you may combine them according to your demand. However, RSE card and USE card are prohibited to be used simultaneously.

The bundled software of the UPS is compatible with many operating systems such as Windows 98, & 2000, ME, NT and XP.

When the optional interface cards are used with onboard RS232 port in communication, the shutdown command at the DCE card & also the EPO signals will get the highest priority in control command, then the SNMP/WEB card, then RSE and USE get the lowest priority.

Optional Interface Boards:

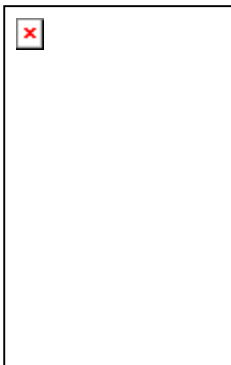
- RSE(RS485 and EPO) Card
- USE(USB and EPO) Card
- DCE(Dry Contact and EPO) Card
- SNMP/WEB Card
- NetAgent II Card



These cards are not suitable to use simultaneously.

4.2.5.1. Serial Communication (RS232)

UPS is equipped with Serial Communication as standard. DSUB-9 female connector with the following pin layout shall be used on the UPS side of the connection cable.



Baud Rate	2400 bps
Data Length	8 bits
Stop Bit	1 bit
Parity	None

Pin 3: RS232 Rx

Pin 2: RS232 Tx

Pin 5: Ground

Hardware Installation

- Connect the male connector of RS232 cable to the UPS communication port.
- Connect the female connector of the RS232 cable to a dedicated RS232 port of the computer. If not exists, you may use USB-RS232 converter.

Software Installation

Please refer to the User's Manual of the software for installation.

4.2.5.2. SNMP/WEB Card

It is installed into **INTERFACE** slot on the rear panel.
For installation, please refer to the User's Manual attached with the card.



In case of internal SNMP use with UPS, serial communication port (RS232) is disabled.

4.2.5.5. NetAgent II Card

It is installed into **INTERFACE** slot on the rear panel.
For installation, please refer to the User's Manual attached with the card.

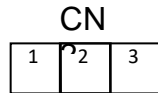
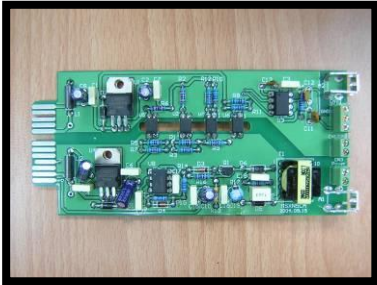


4.2.5.7. RSE (RS485) Card

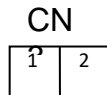
It is installed into **INTERFACE** slot on the rear panel.

CN1 is for the function of the terminal resistor. Short pin1-2 to enable the function and short pin2-3 to disable it.

CN2 for RS485 and CN3 for remote power.



- 1 → Ground
- 2 → A/Data+
- 3 → B/Data-



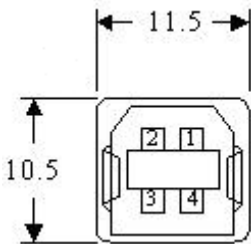
- 1 → AC+
- 2 → AC-

4.2.5.8. USE (USB) Card

It is installed into **INTERFACE** slot on the rear panel.

- CN1 for USB.
- Comply with USB version 1.0,1.5Mbps
- Comply with USB HID Version 1.0.

The Pin Assignments of the USE card:



- 1 → VCC (+5V)
- 2 → D-
- 3 → D+
- 4 → Ground



4.2.5.9. DCE (Dry Contact)-B Card

It is installed into **INTERFACE** slot on the rear panel.

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

The pin assignments of 10-Pin Terminal:

- Pin 1:** UPS on Bypass mode.
- Pin 2:** Utility Normal (Normal close contact)
- Pin 3:** Utility Normal (Normal open contact)
- Pin 4:** Inverter On
- Pin 5:** Battery Low
- Pin 6:** Battery Bad or Abnormal
- Pin 7:** UPS Alarm
- Pin 8:** Common
- Pin 9:** Shutdown UPS positive(+) signal
- Pin 10:** Shutdown UPS positive(-) signal



The shutdown function will be activated, after a +6~+25Vdc is put between pin9 and pin10 for 5 seconds. The capacity of each relay contact is 40Vdc/25mA. Installation Position: slot1 (CHA-CN7) or slot 2(CHB-CN8). Flexible signal output for N.C.(Normal close) or N.O.(Normal open) contact by shorting pin1-2 or pin2-3 from JP1-5. The shutdown function will be enabled in 1 minute after blackout occurs if the pin1-2 of both CN1 and CN6 be shorted by cap. Or, the shutdown function can only be enabled by pin9-10 of CN3 if the pin2-3 of both CN1 and CN6 be shorted by cap.

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.

Flexi Power 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-3 Description of UPS and Block Diagram](#).

5.1. Online Mode (norl)

Energy is drawn from the mains input. Loads are supplied through 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 loads are not affected by the negativities of the mains.



* It shows the UPS is operated in “normal mode”.



* It shows inverter output voltage.

If the mains voltage and frequency are in certain range, Online Operation is possible. For the mains limits for Online Operation, please see [Appendix-2 Technical Specifications](#).

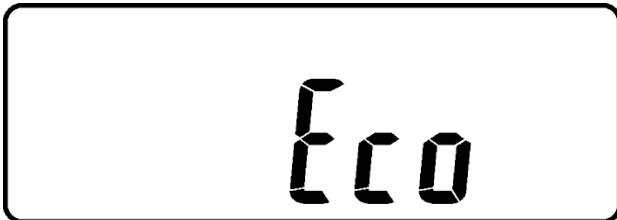
The upper limit of mains voltage is independent from the load percentage and it is 270V. UPS switches to Battery Operation mode when the mains is over 280V. The mains is required to decrease below 260V for UPS to return Online Operation.

Online Operation Conditions;

- In case Online Operation (norl) is set as operation mode of UPS, the mains is within the limits and/or if there is no abnormal condition (overheat, overload, failure...etc.) UPS operates in Online Operation. Except for failures, as soon as the abnormal conditions are eliminated, UPS switches to Online Operation automatically.
- In case Eco Operation is set as operation mode of UPS and the voltage and frequency is out of the bypass limits but within the rectifier limits, UPS swithes to Online Operation.

5.2. Eco Mode (Eco)

In this mode, as long as the mains voltage and frequency within the limits, the load is supplied by the mains in a controlled manner (the inverter is in standby state). The purpose of using this mode is to increase the efficiency up to 98% and to provide energy saving; since the loads are supplied by the mains directly, the loads are unprotected against any possible future risks. (e.g. surge voltage, etc.).





* It shows the UPS is operated in "Eco mode".


To operate the UPS in Eco Mode, it must be chosen through the settings menu. UPS does not switch to Eco Operation automatically. "Eco" is chosen as the operating mode hence UPS operates continuously in this mode.

UPS switches from Eco Operation to another mode under the following conditions:

- In case of the mains voltage or frequency out of the limits of the bypass (UPS returns to Eco Operation when the mains voltage or frequency turn back to within the limits of bypass).
- In case Online Operation (norl) is set as Operation mode through settings menu.

 Eco 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.

 Eco Operation mode does not provide electronic short circuit protection like 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 Eco Operation may cause the thermal/magnetic protection act. In this case, all loads will be deenergized.

5.3. Bypass Mode

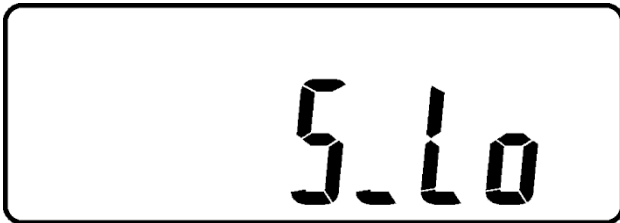
If UPS is commissioned through the mains it starts-up on Bypass Mode. This mode can be chosen by the user by pressing OFF key while UPS operates on **norl** mode. In this case **OFF** written on the front panel but the loads are supported by the mains. Bypass mode can be understood from the flow diagram placed on the left side of the front panel.

While UPS operates in Online Operation, UPS switches to bypass automatically (in case the mains voltage and frequency is within the limits of bypass) in the following conditions;

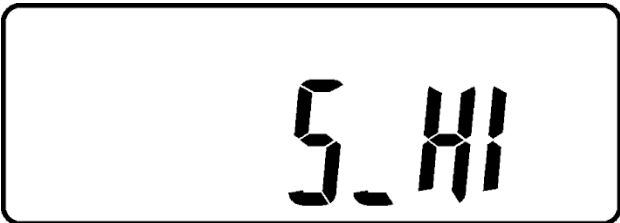
- Inverter Fault (Er10...)
- Prolonged Overload (Er12)
- High Temperature (Er11)

After these conditions are eliminated, the UPS automatically returns to inverter.

Bypass voltage range can be adjusted to wider and narrow one.



* It shows Bypass Voltage is adjusted to narrow one.



* It shows bypass voltage is adjusted to wider one.

Eco and Bypass Operation Voltage Range

The mains voltage is required to be in certain range for Eco and Bypass Operation. Bypass range is 187 V – 259 V. In case the input voltage decreases below 187V or increases above 259V; if UPS runs in Eco Operation UPS switches to Online Operation (norl); if UPS runs in Online Operation (norl) it can not switch to Bypass/Eco Operation even if a fault occurs. If the batteries and the inverter are suitable to supply the loads, UPS switches to Battery Operation.

To return to Eco Operation; the mains voltage should return to under 242V or over 200V.

5.4. Battery Mode

In this operation, energy is drawn from the batteries. The loads are supplied via inverter. Output voltage is sinusoidal and has a regulated amplitude and frequency. It is independent from the battery voltage. Battery voltage should be in acceptable limits and the inverter should be enabled for the UPS to operate in this mode.

UPS operates in Battery Operation in the following cases:

- While UPS is operating in Online Operation or Eco Operation, if the rectifier is disabled or frequency/waveform/rms value of mains voltage is not in acceptable limits.
- If the batteries are connected and UPS is started-up as COLDSTART, UPS runs in Battery Operation and supplies the energy needed for the loads from the batteries.

Battery Management and Battery Back-Up Time

UPS charges the batteries when the mains voltage is between 160V - 280V. Charging voltage is independent from the load.

Autonomy time depends on battery type, quantity, capacity, situation and load level. UPS stops supplying the loads if the battery voltage decreases under a specific value.



In order to obtain longer autonomy time, you may add batteries in an external battery cabinet. Depending on battery capacity, additional charger cards may be needed to add to achieve ideal recharge time, please consult & contact to your authorized service.

Battery life depends on some parameters such as battery type, charge-discharge cycle, and depth of discharge, ambient temperature, conditions. Please look at [Appendix-2: Technical Specifications](#) for the ideal environmental conditions for the batteries. Using the batteries outside this temperature range will decrease battery operation time and battery life.

5.5. Frequency Converter Operation (cF50 – cF60)

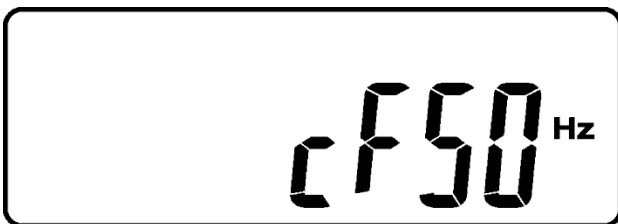
This mode is used when the load is different operating frequency of the mains frequency. For example; this mode must be chosen to supply the load which requires 60Hz where the mains frequency is 50Hz.



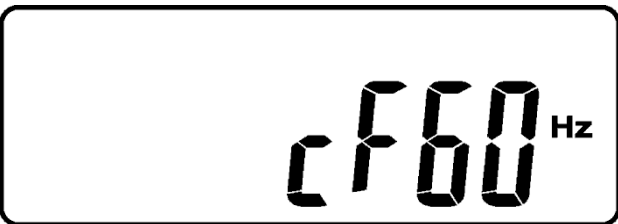
When the UPS is operated under CF50 or CF60 mode, the recommended load connected shall be 75% of rated capacity if the input voltage is 176~280Vac and 50% of the rated capacity if the input voltage is 160~280Vac



During Frequency Converter Operation, You must not switch Maintenance Bypass Circuit Breaker (F4) to “I” position!



* It shows the UPS is operated in “CVCF 50Hz mode”.



* It shows the UPS is operated in “CVCF 60Hz mode”.



The adjustment of frequency converter settings should be done by authorized Technical Personnel.

5.7. Manual Bypass Mode



This feature is useful while performing maintenance or service and shall only be executed by authorized Technical Service Personnel.

Manual by-pass 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.



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.

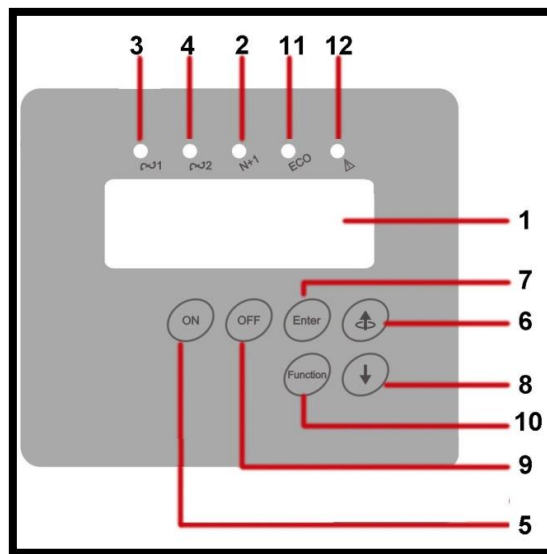
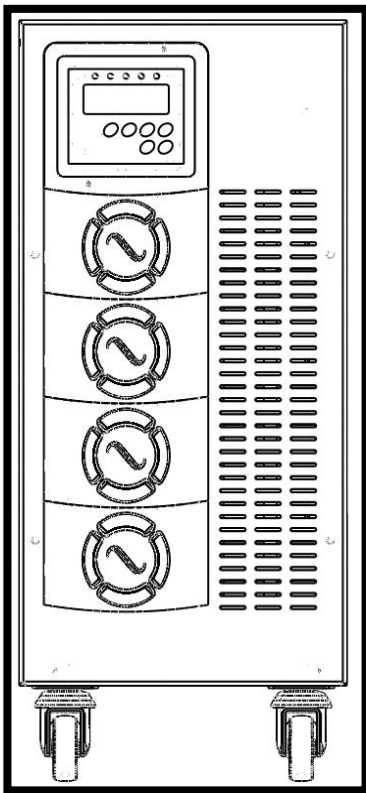
6. FRONT PANEL & REAR PANEL

The front panel located at the front side of the UPS, informs the user about operating status, alarm conditions and measurements. It also provides access to control and configuration parameters. The cable connections, the circuit breakers and the communication slots are located at the Rear Panel.

6.1. Front Panel Segments

Front panel shown below consists of two segments. **LCD** (Liquid Crystal Display) offers detailed information about UPS and **KEYPAD** enables the user to access the UPS.

6.1.1. Keypad



- ① LCD Display
- ② Green LED lights up to indicate the UPS has the capability to run under redundancy mode.
- ③ Green LED steadily lights up to indicate that the utility input voltage is within the window; the LED flashes flickeringly to indicate

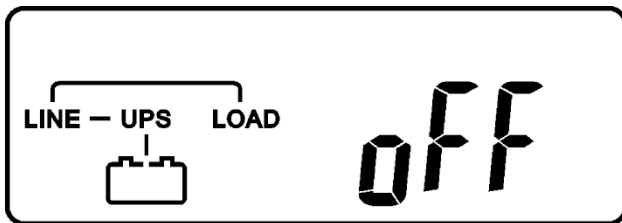
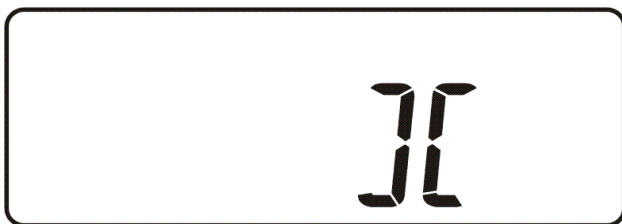
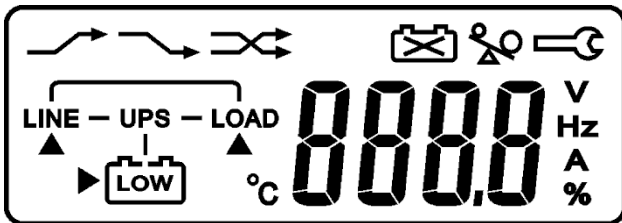
that the utility input voltage is within the acceptable window

- ④ Green LED lights up to indicate Bypass Input is normal.
- ⑤ UPS ON/Alarm Silence
- ⑥ Go to Previous page or change the setting of the UPS
- ⑦ To reconfirm the change of UPS Setting
- ⑧ Go to next page
- ⑨ UPS OFF Switch
- ⑩ Special Functions log in/out
- ⑪ UPS is working under ECO (Economic) Mode
- ⑫ UPS fault or Abnormal

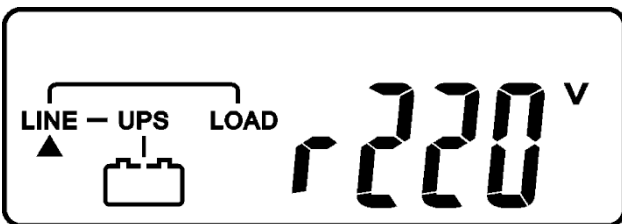
6.1.2. Liquid Crystal Display (LCD)

ENERGY FLOW DIAGRAM is located at the left side and the measurements/informations are located at the right of LCD.

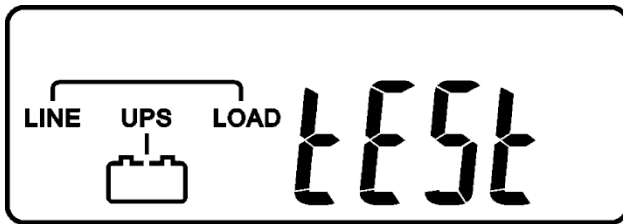
You may find the information of some Symbols on the LCD Display Panel as below;



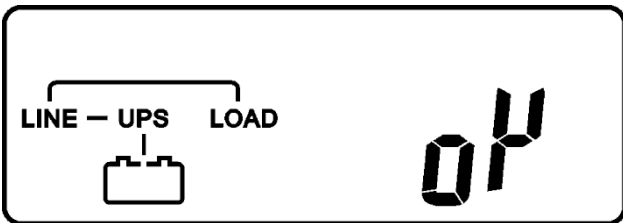
Bypass Mode:



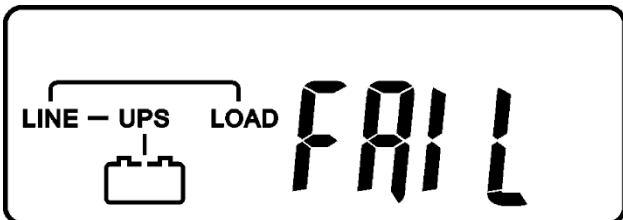
Self Test:



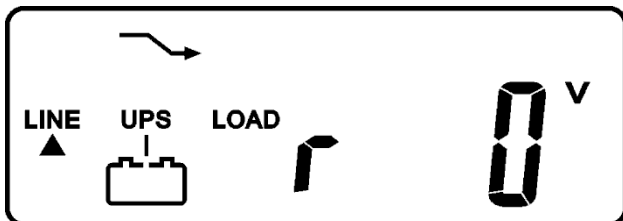
Self Test OK:



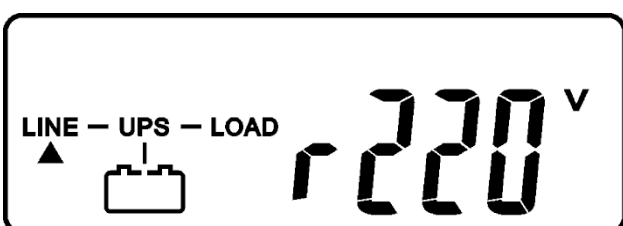
Self Test FAIL:



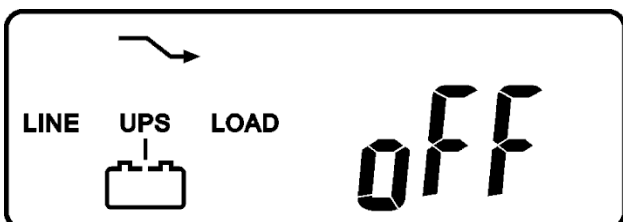
Battery Mode:










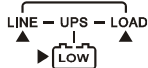









Online (norl) Mode:







OFF Mode:



* It shows "OFF", which means UPS pre-start is unsuccessful.

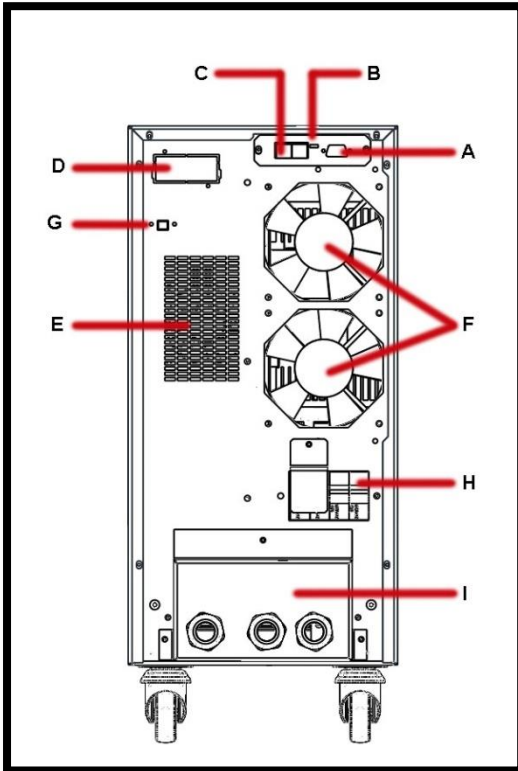
Item	Symbol	Description
1	LINE	Utility or Bypass Source
2		Battery Low
3		Battery Abnormal
4		UPS Overloading
5		UPS Working in specified mode*
6		A Blackout Transfer occurred in UPS Output
7		Bypass Input Abnormal, UPS fails to transfer to bypass, Bypass Abnormal at ECO mode
8		Utility Input Abnormal
9	OFF	UPS Shutoff
10	LINE OFF	UPS Abnormal Lock
11		UPS Flow Chart
12		4 Digits Measurement Display
13		Indicate the item desired to be measured
14		UPS ON Switch or Alarm Silence
15		UPS OFF Switch
16		Previous Page or Setting Change
17		Next Page
18		Special Function Log in /out
19		Enter or Reconfirmed
20		Utility Input Normal LED

21		Bypass Input Normal LED
22		UPS under Redundancy Mode
23		UPS under ECO Mode
24		UPS Fault or Abnormal Warning LED
25	EPO	Emergency Power Off
26	Er05	Battery Weak or Dead
27	Er06	Output Short Circuit
28	Er10	Inverter Over-current
29	Er11	UPS Overheat
30	Er12	UPS Output Overloading
31	Er15	Fan Error
32	Er16	Wrong Procedure to Enter Maintenance Mode
33	Er17	Output Parameters Set Error in Parallel System
34	Er21	ID Numbers are in conflict in Parallel System or ID number Error in single unit
35	Er24	Parallel communication error (communication wire disconnected or failure to find ID1 UPS) in parallel system
36	Er27	CVCF mode with Bypass input
37	Er28	The UPS must be operated in normal mode in parallel system
38	Er31	Bypass Overload Time out and cut off output.
39	Er**	The settings of both control board and driver board are not matched each other.

*The specified modes include Normal mode, ECO mode, CVCF mode, etc..

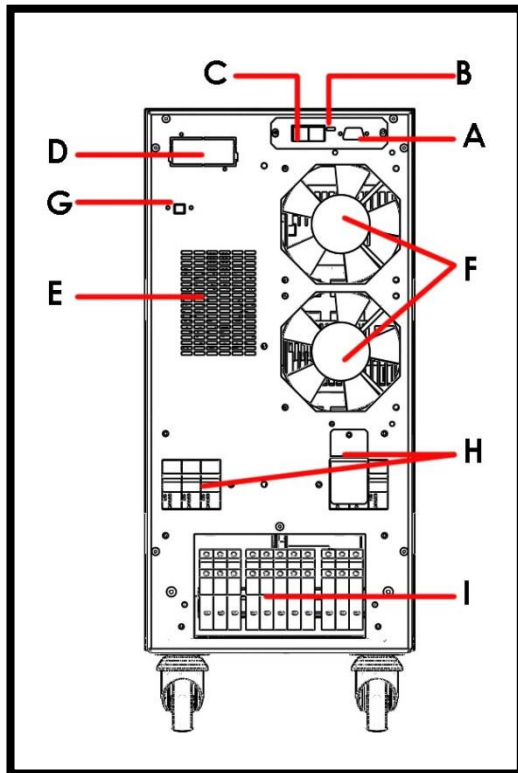
6.2. Rear Panel

1Phase Input / 1Phase Output DSP Flexi Power



- A:** RS-232 Port (CN1)
- B:** Terminal Resistor for Parallel function
- C:** CAN Bus Connection Port for Parallel System (PAR1/CN2.1 – PAR2/CN2.2)
- D:** Communication Slot
- E:** Air Ventilation Hole
- F:** Cooling Fan
- G:** EPO
- H:** Input-Output-Manual Bypass Circuit Breakers
- I:** Terminal Cover & Terminals

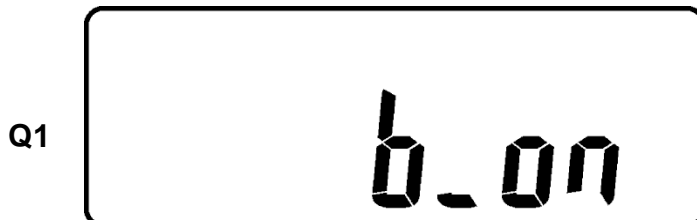
3Phase Input / 1Phase Output DSP Flexi Power



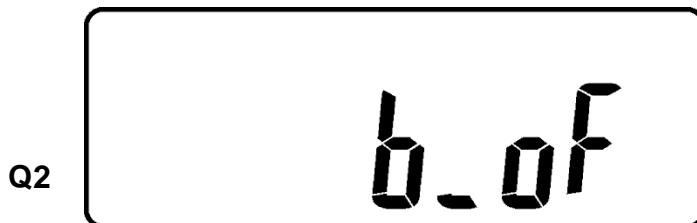
7. OPERATING PROCEDURES

7.1. UPS Default Data and Special Function Execution


After UPS completely starts up, press FUNCTION (10) key pad to change the LCD display screen to drawing Q1.

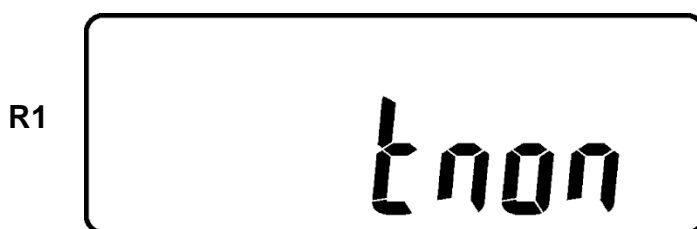


* It shows buzzer is "On".

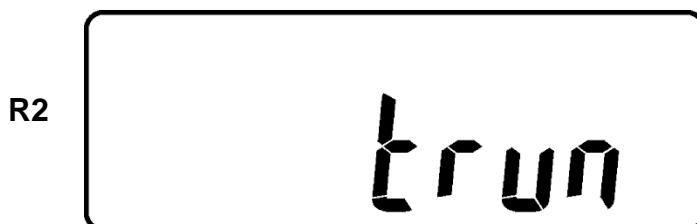


* It shows buzzer is "Off".

Press  key pad to scroll down the screen and check the UPS settings. The LCD display will show in consequence between Drawing Q1(buzzer) → Drawing R1(Self-test) → Drawing S1(Bypass Voltage Windows) → Drawing T(Output Frequency Synchronization Window) → Drawing U(Inverter Output Voltage) → Drawing V1(UPS Operation Mode) → Drawing W(Output Voltage Micro Tune Value) → Drawing X(UPS Id) → Drawing Y(Parallel function status).

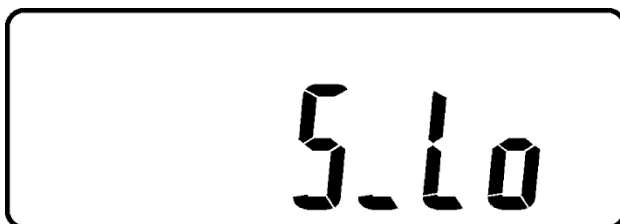


* It shows self-test is NOT "on".



* It shows self-test is "on".

S1



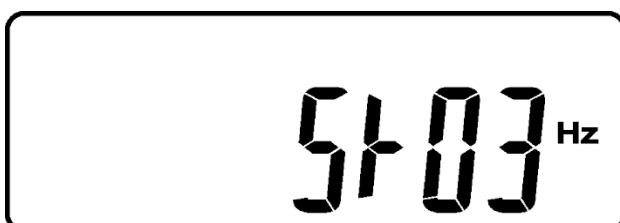
* It shows Bypass Voltage is adjusted to narrow one.

S2



* It shows bypass voltage is adjusted to wider one.

T



* It shows Frequency Window is +/-3Hz.

U



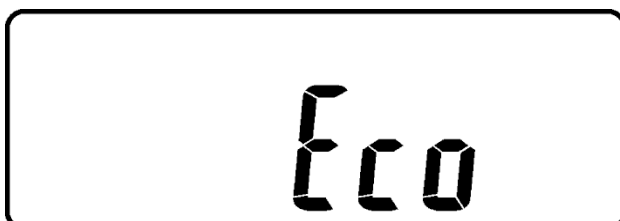
* It shows inverter output voltage.

V1



* It shows the UPS is operated in "normal mode".

V2



* It shows the UPS is operated in "Eco mode".



* It shows the UPS is operated in "CVCF 50Hz mode".



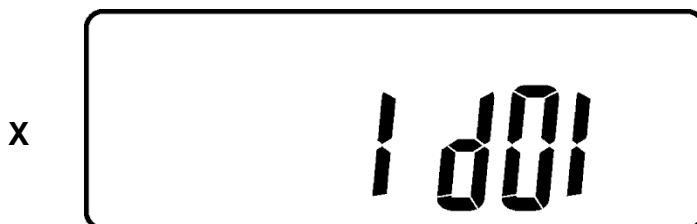
* It shows the UPS is operated in "CVCF 60Hz mode".



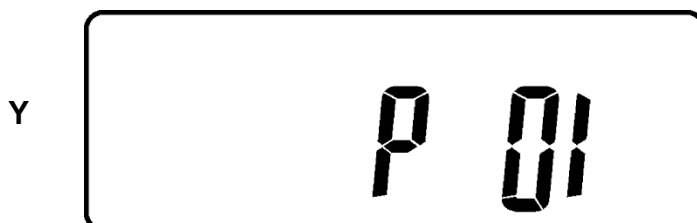
The adjustment of frequency converter settings should be done by authorized Technical Personnel.




* It shows Output Voltage Adjustment % from 0% to 3% or -0% to -3%.




* It shows UPS Identification Number.




* It shows the UPS is in the No. 1st of parallel systems.

Press scroll up  (6) key pad, you may execute special functions. The Functions includes buzzer ON (as drawing Q1), or buzzer OFF (as drawing Q2, Alarm silence for UPS Warning) and self-test OFF (As drawing R1) or self-test ON. (as drawing R2. UPS will execute battery test for 10 seconds. If the self-test is successful, it will show as Drawing E1; otherwise, it will show as drawing E2 & error message in the same time.)


7.2. UPS Default Settings and Their Alternatives

Make sure the UPS is not “On” yet. Press scroll down  (8) key pads simultaneously for approx. 3 seconds, the buzzer will sound twice, the LCD display screen shows as drawing Q1, then the UPS is under setting mode now.



Except Buzzer(as drawing Q1 & Q2) and Self-test (as drawings R1 & R2), all the rest default settings may be changed by pressing scroll up  (6) key pad.

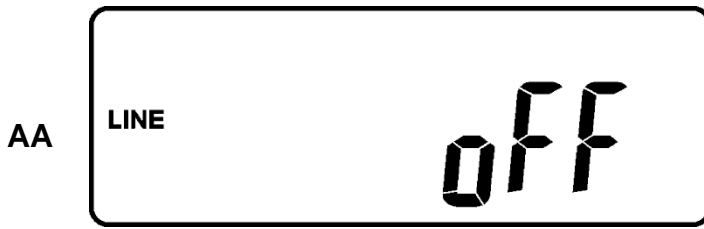
- Drawings S1 and S2 mean the bypass input acceptable window, it can be 184Vac~260Vac or 195Vac~260Vac.
- Drawing T means the bypass frequency window of the Inverter Output, the acceptable setting values are $\pm 3\text{Hz}$ and $\pm 1\text{Hz}$.
- Drawing U means the acceptable Inverter Output Voltage, of which voltage is 200Vac, 208Vac, 220Vac, 230Vac, or 240Vac.
- Drawing V1, V2, V3 and V4 mean the operation modes of the UPS, of which alternative is Online, Eco(Economic) mode, fixed 50Hz Output or fixed 60Hz Output.
- Drawing W means the adjustments of the Inverter Output, which may be calibrated as 0%, +1%, 1%, +2%, -2%, +3%, or -3%.
- Drawing X means a specified address & position of the UPS when the UPS is in Parallel mode. The settable numbers are from 1st to 4th. The number must be 1st if the UPS is not in parallel.
- Drawing Y means the parallel function status. The “P 01” means parallel function disabled and the “P02” means parallel function enabled.

When all the setting changes are done, you have to press ENTER (7) key Pad to save all the changes when the LCD screen shows as drawing Z, then, the LCD screen will show as drawing AA to complete the setting changes. If you don't want to change those settings, you may press “OFF”  (9) key pads for 5 seconds, then the LCD screen turns to Drawing AA directly, which means your Setting changes are invalid.

Z



* Please press Enter key to save data.



* It shows the UPS is locked.

Turn Off the breaker of Input. Your Setting changes are completed.

7.3. Commissioning

After all connections and settings have been done, UPS can be started-up in two ways. If the mains is in normal condition, you may start-up with the mains. If it is not, you may start-up the UPS from the battery.



Even with no connections have been done, hazardous voltages may exist on connection terminals and inside the UPS. Do not touch these parts.

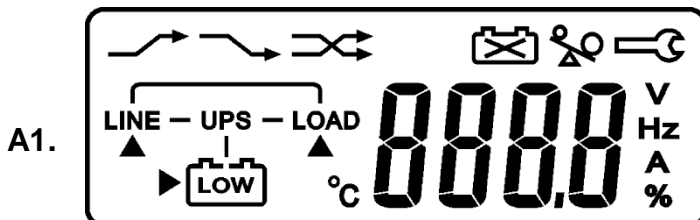


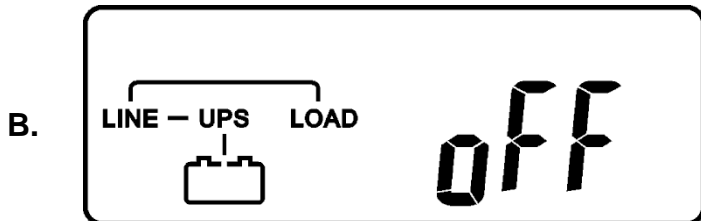
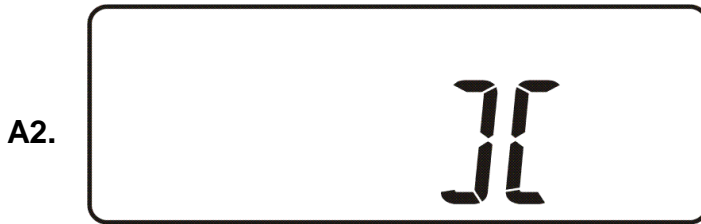
If you work on terminals; all circuit breakers in the input/bypass distribution panel, and the battery circuit breakers in the external battery cabinet should be brought to "0" position.

7.3.1. Start-Up with the Mains

1. Switch the input circuit breaker on the distribution panel to "ON" position.
2. Switch the circuit breakers on external battery cabinet –if exists- to "ON" position.
3. Switch the input circuit breaker (F1) to "ON" position.

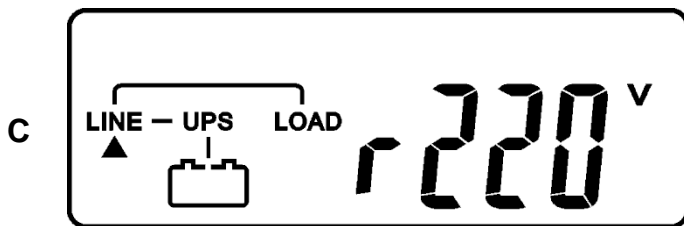
Green LEDs ω_1 & ω_2 light up to show the Utility and Bypass Inputs are normal and the LCD display with parallel function will illustrate from drawing A1, drawing A2 to drawing B. Otherwise the LCD display will illustrate from drawing A2 to drawing B.



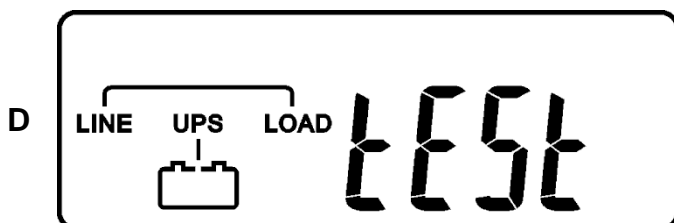


Then, the UPS is on Bypass Mode now and it will proceed self-test automatically. If there is no abnormal message occurred, it means the pre-startup of the UPS is successful and the charger starts to charge the batteries.

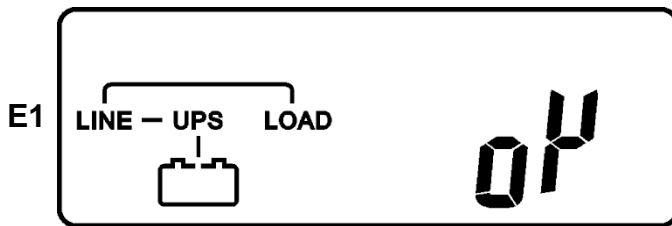
4. Press the UPS On Switch (5) for approx. 3 seconds, then the Buzzer sounds twice and the LCD display changes from drawing B to drawing C.



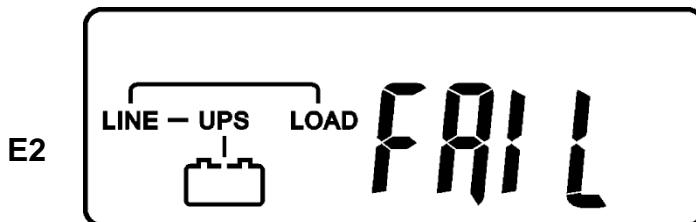
Then, the UPS is under self-test mode again, the LCD display will illustrate from drawing C to drawing D and remain approx. 4 seconds under battery mode, then illustrate from drawing E1 to drawing F if the self-test is successful.



* It shows "test".

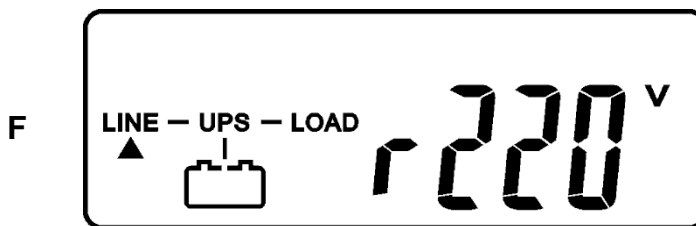


* It shows "OK" in self-test



* It shows "Fail" in self-test

In case of failure in self-test, the LCD display will illustrate from Drawing D to drawing E2, then an error code or error status will be shown on the screen.



* It shows "220Vac" in Utility Input.

Your start-up operation of the UPS is completely now. Make sure the UPS is plugged onto the wall receptacle for charging at least 8 hours and the batteries of the UPS are fully charged.


5. Switch the output circuit breaker (F2) to "ON" position.

6. Switch the output circuit breaker on the distribution panel to "ON" position.

Afterwards UPS starts to supply the loads.

7.3.2. Start-Up with the Battery (Cold Start)

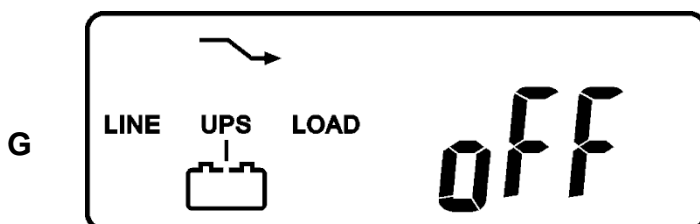
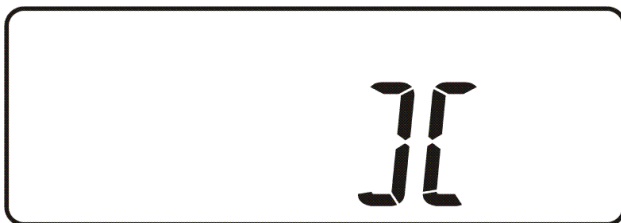
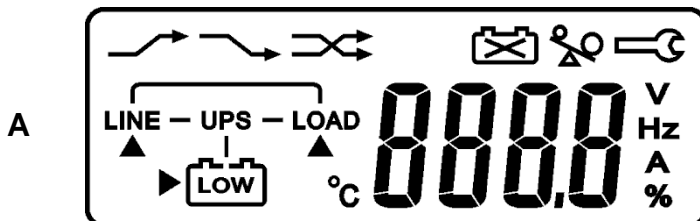
Where the mains is out of the limits, you may start-up UPS from battery. The start-up order is explained below. This process is called “ColdStart” and operation time depends on battery capacity, battery condition and load capacity.



In order to obtain longer autonomy time, It is recommended to start-up UPS with the mains as far as possible.

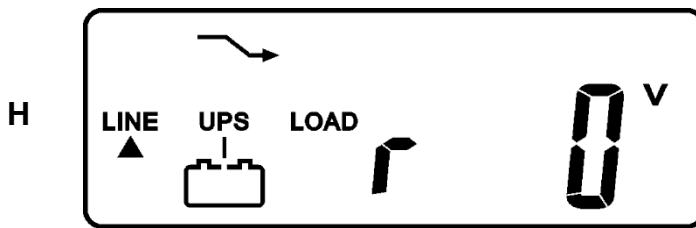
Please follow up the below procedure to make cold start :

1. Make sure the internal batteries are connected. - If exists; switch the circuit breakers on external battery cabinet to “ON” position.
2. Push the UPS On Switch (5) once for approx. 5 seconds to awake the UPS, and then the buzzer sounds twice. The LCD display will illustrate from drawing A to drawing G, and keep awake for approx. 15 seconds.

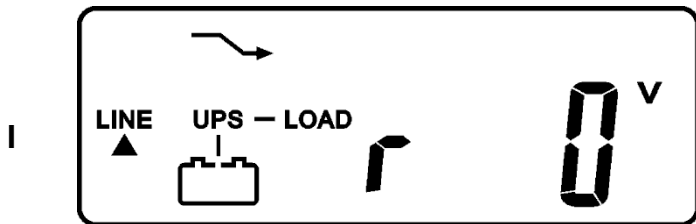


* It shows “Off”, which means the UPS pre-start is unsuccessful.

3. Press the UPS On Switch (5) of the UPS again for about 3 seconds till the LCD display illustrates from drawing G to drawing H, then the UPS will be in self-test Mode. The UPS may offer energy to the output in a minute, and the LCD display illustrates as drawing I. In case of failure in pushing the UPS On Switch in 15 seconds, the UPS will automatically turn off.



* It shows Utility input is "0" and Utility Abnormal.




4. Switch the output circuit breaker (F2) to "ON" position.
5. Switch the output circuit breaker on the distribution panel to "ON" position.

Afterwards UPS starts to supply the loads.

7.4. 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. If exists, switch external battery cabinet circuit breakers to "OFF" position.
4. Press Off  (9) key pad for about 5 seconds, the Inverter output will be turned off, then the output load is supplied by Bypass loop and "OFF" would be written on LCD screen (as drawing B).
5. Switch the input circuit breaker on the distribution panel to "OFF" position.
6. Switch the input circuit breaker (F1) to "OFF" position.



7.6. Manual (Maintenance) Bypass Instructions and Decommissioning

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;


- Press Off  key pad for about 5 seconds, the Inverter output will be turned off, then the output load is supplied by Bypass loop and “OFF” would be written on LCD screen (as drawing B).
- Remove the cover of Manual Bypass circuit breaker.
- Switch the manual bypass circuit breaker (F4) to “ON” position.
- See  drawing on LCD. It means UPS operates on Manual Bypass Mode.
- Switch the output circuit breaker (F2), the input circuit breaker (F1) and the breakers on external battery cabinets if any- to “0” position.

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



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

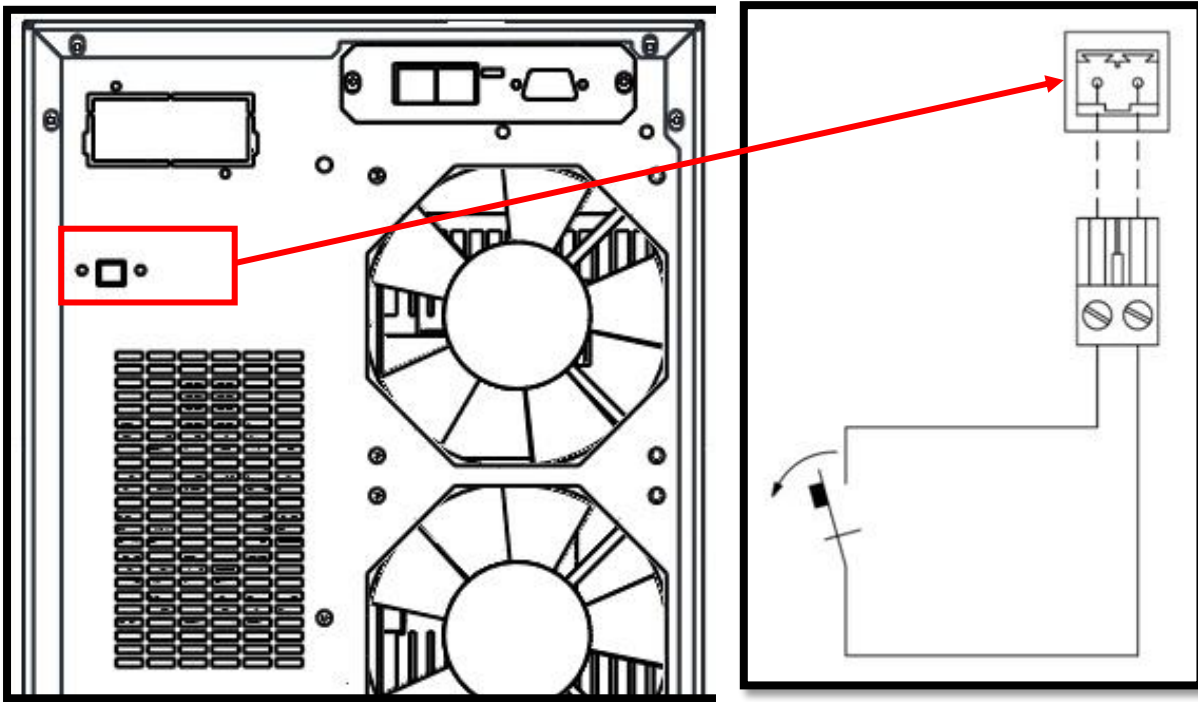
In order to transfer the loads from Manual Bypass to UPS without interruption, do the following instruction respectively;

- Switch the output circuit breaker (F2), the input circuit breaker (F1) and the breakers on external battery cabinets if any- to “I” position.
- Switch the manual bypass circuit breaker (F4) to “OFF” position.
- Make sure UPS operates on Bypass Mode (as drawing B).
- Press the UPS On Switch  for approx. 5 seconds. If there is no problem after the self-test UPS starts to operate on Online Operation (**norl**).
- Replace the cover of Manual Bypass circuit breaker.

7.7. Emergency Power Off (EPO)

UPS output can be cut off immediately by EPO connection if desired. EPO connection is normally open (NO), i.e. when the EPO connection is closed circuit UPS output cuts off.

In case EPO connection is used in distance; a latched switch can be used as described in below figure. When UPS operates in Online Operation; the latch switch shall be normally open (NO). Whenever any emergency occurs you have to make the switch closed to turn the UPS off. Line OFF will be seen on the front panel. In case you start-up UPS again you have to turn off UPS first.



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

8. MAINTENANCE

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.



All the maintenance operations should be done by authorized technical service personnel.

8.1. 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. Not to come across any unrequired condition during electricity cut, the batteries should be maintained periodically by authorized Technical Personnel.



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.

8.2. Fans

The life of fans used to cool the power circuits depends on the usage and environmental conditions. Please look at [Appendix-2 Technical Specifications](#) for detailed environment conditions. Preventive maintenance shall be done by authorized Technical Personnel periodically.

8.3. 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.

9. TROUBLESHOOTING

When the UPS malfunctions during operation, you may check the followings:

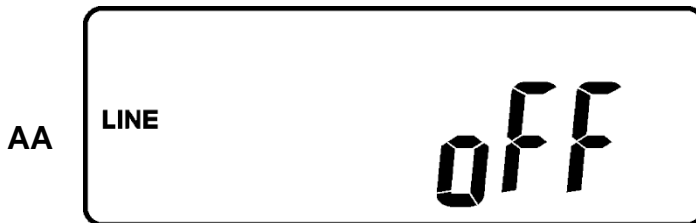
- Are the wirings of input and output correct?
- If the input voltage of the Utility is within the input window of the UPS?

In case problems or symptoms still exist, please proceed the followings for proper adjustment. Should the problem persists, please contact your local distributor for help.





Situation	Check Items	Solution
UPS Red Fault LED lights up	Check the error code shown on the LCD screen	
	1. Er05,  	Check to see if the battery connection is properly done, then re-charge the batteries for 8 hours to see whether the UPS may backup normally; otherwise, consult your local distributor right away.
	2. Er06, Er10, Er12, Er28 	Remove the overload. Check AC power cables; if any damages occurred change it.
	3. EPO	Remove the short circuit occurred at the EPO terminal.
	4. Er11, Er33	Remove the objects blocked onto the ventilation holes.
	5. Er14	Check the cooling FANs on rear panel are working normally.
	6. Er15	Make sure the UPS is operated normally. If it is on CVCF mode, you have to turn off and turn on the UPS again.
	7. Er16, Er27	All of parameters except ID Number in the parallel UPS must be same. 0
	8. Er21	Reconnect the RJ-45 wire or set a UPS with ID=1.0
	9. Er24	When the UPS is on CVCF mode, it is prohibited to have bypass input. You have to turn off the UPS and bypass input and re-start the UPS.
	10. Other error code.	Consult your local distributor for help.
UPS fails to offer battery backup or its back up time is shorter than its calculation.	If the backup time is still too short after 8 hours of charge, please contact your local distributor for battery replacement.	
UPS locks itself and it can not be turned off.	Please check the further chapter to trouble shoot the problem; otherwise, consult your local distributor for help. 0	

UPS Is Off Due to Unknown Reason and Its Trouble Shooting


If there is a serious abnormal condition occurred, the UPS will lock it itself in “OFF” position as shown in drawing AA and a abnormal message will show on the LCD screen.



* It shows the UPS is locked.

After 3 seconds, all messages will be locked except Bypass messages(LED  & LCD ). In case the Utility is abnormal after the UPS is locked, the LED  will be extinguished and the LCD  will be shown on the LCD screen.

To release the UPS lock, please proceed the followings:

- Check those error messages recorded.
- Check [Section 9](#) to solve the problem. Otherwise, consult your local distributor for service.
- Press Off  key pad for 5 seconds and buzzer will sound twice.
- Switch the input circuit breaker (F1) to “OFF” position.
- The UPS lock problem is solved now, but you shall contact with your Local distributor to make sure the error message shown is solved.

Appendix -1: Error List

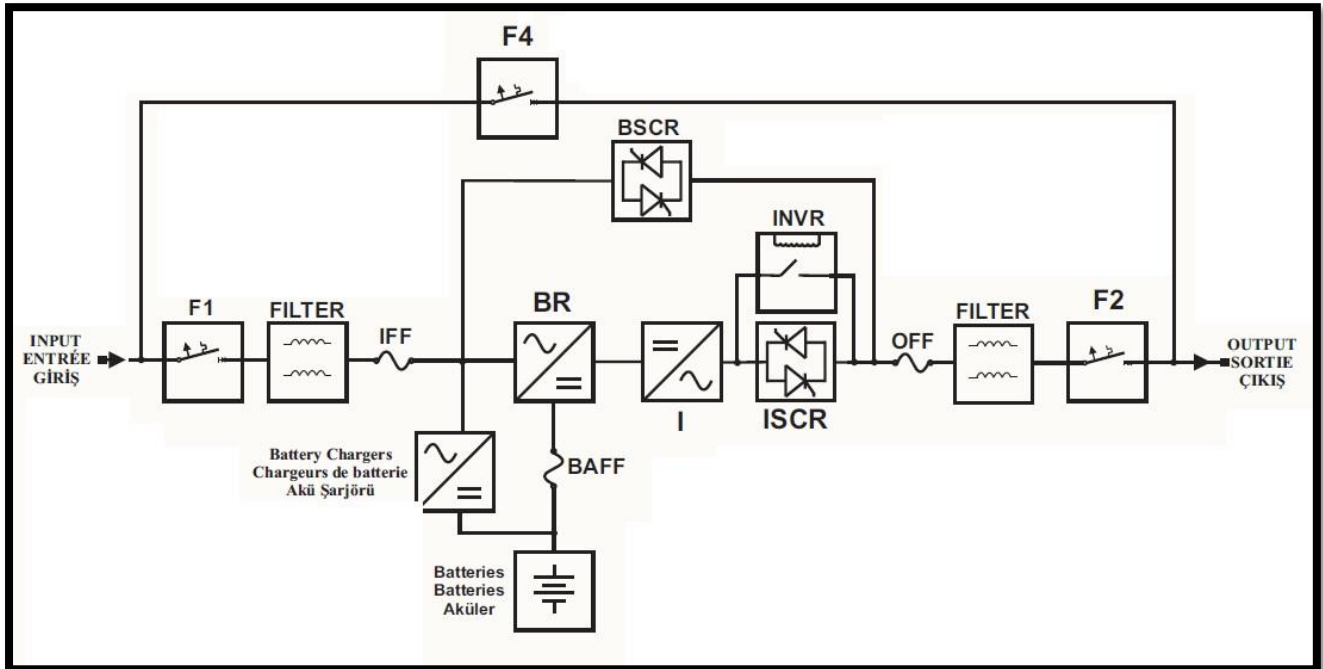
1	Er05	Battery Weak or Dead
2	Er06	Output Short Circuit
3	Er10	Inverter Over-current
4	Er11	UPS Overheat
5	Er12	UPS Output Overloading
6	Er14	Fan Error
7	Er15	Wrong Procedure to Enter Maintenance Mode
8	Er16	Output Parameters Set Error in Parallel System
9	Er17	ID Numbers are in conflict in Parallel System or ID number Error in single unit
10	Er21	Parallel communication error (communication wire disconnected or failure to find ID1 UPS) in parallel system
11	Er24	CVCF mode with Bypass input
12	Er27	The UPS must be operated in normal mode in parallel system
13	Er28	Bypass Overload Time out and cut off output.
14	Er31	The settings of both control board and driver board are not matched each other.
15	Er33	Isolated Transformer Overheat
16	Er**	Other Error code

Appendix -2: Technical Specifications

Tower Model	FP1105	FP1106	FP1108	FP1110	FP3110
Power (kVA)	5	6	8	10	10
Power (kW)	4,5	5,4	7,2	9	9
INPUT					
Voltage Tolerance (@ full load)	180~280VAC				320~485VAC
Frequency	45 ~ 65 Hz				
Phase/Wire	Single Line + Neutral + Ground				Three Line + Neutral + Ground
Power Factor	Up to 0.99 at 100% Linear Load				
OUTPUT					
Voltage Window	220/230/240VAC (Selectable)				
Voltage Adjustment	0%; ±1%; ±2%; ±3%				
Voltage Regulation	±1%				
Power Factor	0.9				
Wave Form	Sine Wave				
THD _v	THD<3% (at Full Linear Load)				
Frequency Stability	±0.2% (Free Running)				
Frequency Regulation	±1%; ±3%				
Transfer Time	0ms				
Efficiency (Norl)	Up to 92%				
Efficiency (ECO)	Up to 97%				
ColdStart	Exists				
BATTERY					
Quantity	20pcs				
Voltage	240VDC				
Recharge Time	4 hours to 90%				
FRONT PANEL					
Status On LED + LCD	Line Mode, Backup Mode, ECO Mode, Bypass Supply, Battery Low, Battery Bad/Disconnect, Overload, interrupting during transfer & UPS Fault				
Information on LCD	Input Voltage, Input Frequency, Output Voltage, Output Frequency, Load Percentage, Battery Voltage & Inner Temperature.				
Self-Diagnostics	Upon Power-on, Front Panel Setting & Software Control, 24-hour routine checking				
PHYSICAL					
Input / Output Connection	hardwire				
External Battery Connection	hardwire				
Dimensions (HxWxD)mm	710x254x585				
Net Weight (Kgs) (with battery)	30		38		45
Leakage Current	< 3mA at Full Load				
ENVIRONMENT					
Operating Temperature Range	0°C - 40°C				
	20 - 25°C (Recommended For Longer Battery Life)				
Maximum Altitude without Derating (m)	1000m				
Relative Humidity Range	90% RH Maximum (non-condensing humidity)				
Acoustic Noise	<50dB (at 1m)				
COMMUNICATION					
Interface Type	Standard RS232 Interface				
Communication Slot	USB & EPO***, RS485 & EPO***, Relay Contacts & EPO, SNMP/WEB				
STANDARDS					
Safety	IEC/EN 60950,62040-1				
EMC	IEC/EN 62040-2				
Performance	IEC/EN 62040-3				
Protection Class	IP20				

***These cards are not suitable to use simultaneously.

Appendix -3: Description of UPS and Block Diagram



Input & Output EMI Filter: These filters (EMI – Electro Magnetic Interference) prevent electromagnetic interference between the mains and the load. Additionally, protect UPS and loads from any surge.

Bypass Thyristor: In case any inverter fault occurs; Bypass thyristor transfers the energy electronically from input to output without any cut at the output.

Battery Charger: The charger charges the batteries

Booster Rectifier: On mains operation, the boost rectifier adjusts the mains voltage to the necessary DC voltage level required for the inverter and helps to provide sinus current with a power factor near to 1 from the mains.

On battery mode it increases the battery voltage level, required for the inverter and uses current from the battery with a low ripple ratio thus extending the battery life.

Inverter: The inverter helps to obtain a very constant AC voltage level at the output by using DC voltage at the rectifier's output.

Inverter Thyristor: This helps to separate inverter from the output electronically in case of by pass mode operation or UPS output off conditions.

Battery: The necessary energy is supplied from the batteries when the mains is not available.

Manual Bypass Breaker: This is an automatic breaker which connects the output of the UPS to the Bypass input. It is used mainly for maintenance purposes on the UPS without deenergizing the load and supplying by the mains.