

INV & UPS SERIES

UNINTERRUPTABLE POWER SUPPLY

USER MANUAL



March 2023

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DANGER

Never use this product in locations where flammable gas or ignitable substances are present.

INSTALLATION WARNING

- When installing, ensure that work is done in accordance with the instruction manual. When installation is improper, there is risk of electric shock and fire.
- Installation shall be done by Service personnel with necessary and appropriate technical training and experience. There is a risk of electric shock and fire.
- Do not cover the product with cloth or paper etc. Do not place anything flammable around. This might cause damage, electric shock or fire.

WARNING on USE

- Do not touch this product or its internal components while circuit in operation, or shortly after shutdown. You may receive a burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- There are cases where high voltage charge remains inside the product. Therefore, do not touch even if they are not in operation as you might get injured due to high voltage and high temperature. You might also get electric shock or burn.
- Do not make unauthorized changes to this product nor remove the cover as you might get an electric shock or might damage the product. We will not be held responsible after the product has been modified, changed or dis-assembled.

- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. Please stop using it immediately and shut off the product. It might lead to fire and electric shock. In such cases, please contact us. Do not attempt repair by you, as it is dangerous for the user.

- Do not operate and store these products in environments where condensation occurs due to moisture and humidity. It might lead fire and electric shock.

- Do not drop or apply shock to this product. It might cause failure. Do not operate these products mechanical stress is applied.

CAUTION on MOUNTING

- Confirm connections to input/output terminals are correct as indicated in the instruction manual before switching on.

- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.

- Do not use this product in special environment with strong electromagnetic field, corrosive gas or conductive substances and direct sunlight, or places where product is exposed to water or rain.

- Mount this product properly in accordance with the instruction manual, mounting direction and shall be properly be ventilated.

- Please shut down the input when connecting input and output of the product.

- The power supply may cause damage when it intake conductive material, dust and liquid. When use this product,

please be careful to prevent entry of those materials to inside the product by using filter etc.

- Do not use this product in environments where causes the salt damage.

CAUTION on USE

- Product individual notes are shown in the instruction manual. If there is any difference with common notes individual notes shall have priority.

- Before using this product, be sure to read the catalog and instruction manual. There is risk of electric shock or damage to the product or fire due to improper use.

- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.

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1.INTRODUCTION TO PESS UPS SERIES

1.1.General Information

PESS UPS Series are used to protect critical loads from utility-supplied power problems, including spikes, brownouts, fluctuations and power outages, all using a dedicated battery. There are three basic function that it essentially performs

- avoids damage to hardware caused by over currents and voltage spikes. Many UPS models also continuously regulate the input power.
- avoids data loss and damage. In fact, without a UPS, data stored on devices subject to sudden shutdowns can be corrupted or completely lost. If a power management software is also used, the UPS allows and facilitates the controlled shutdown of the system.
- ensures the availability of networks and other applications while avoiding downtime. When used in conjunction with power generators, ensure that they have enough time to ignite in the event of a power failure.



Figure 1.1. Power Modul Type Three Phase UPS_33

1.2. Basic Structure

The whole system consists of REC module, INV module, static bypass, maintain bypass and battery controller. PESS UPS is completely isolated from the input thanks to usage of input isolation transformer and DC current control by hall-effect DC current module. Thus, the surge voltage at the input and even in systems with high-frequency noise, the charger and load are under safety. The standard LC filters at output allows to charger the battery safely during brownouts, blackouts, and other power interruptions.

The output of the UPS are switched over to either line input or bypass input with two SCRs operated in parallel. The basic structure is shown as figure 1.2:

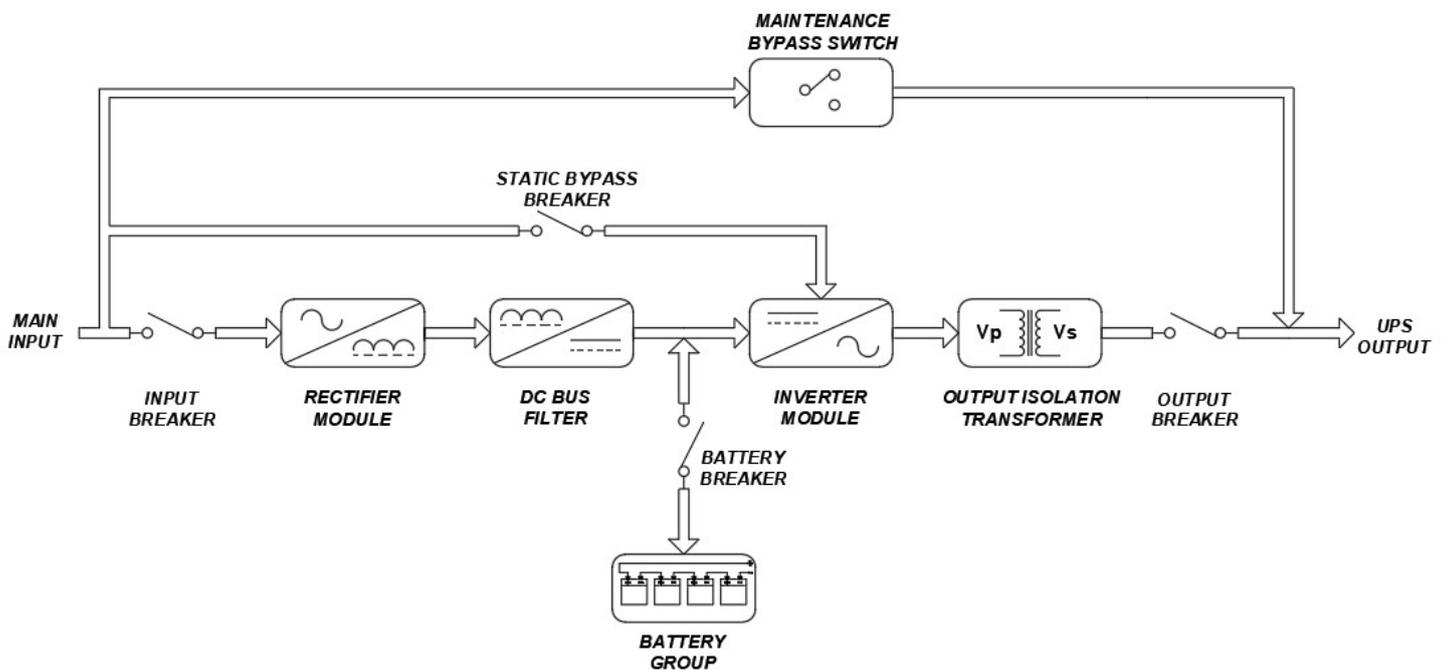


Figure 1.2 Basic Structure of UPS

1.3.WORKING MODES

This part will introduce the working mode of the UPS system.

Line Mode

When the UPS is working in line mode, the AC input will be rectified by REC module, and then be converted to the output via INV module. Meanwhile, the battery is being charged. At this time, static bypass is in standby.

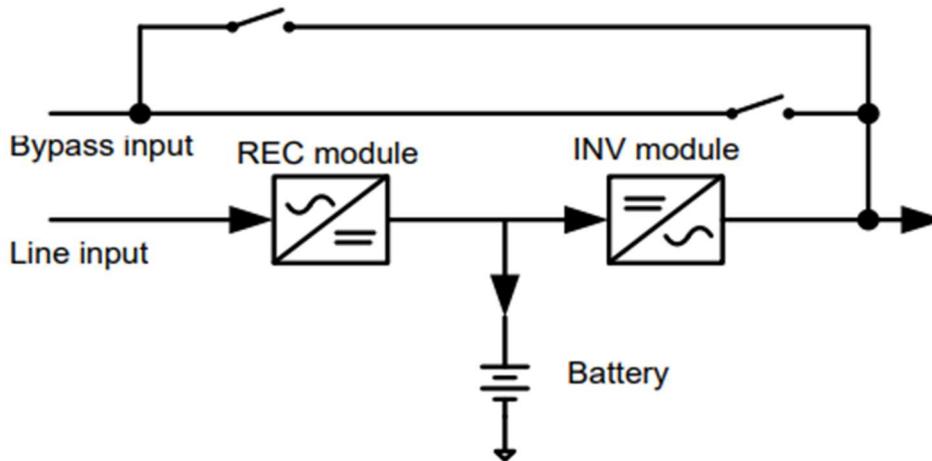


Figure 1.3 Line Mode of UPS

Battery Mode

When the utility fails, the UPS will transfer to battery mode without interruption. The UPS converts the power from battery to output. At this time, static bypass is still in standby. If the utility is recovered, the UPS will transfer back to line mode again.

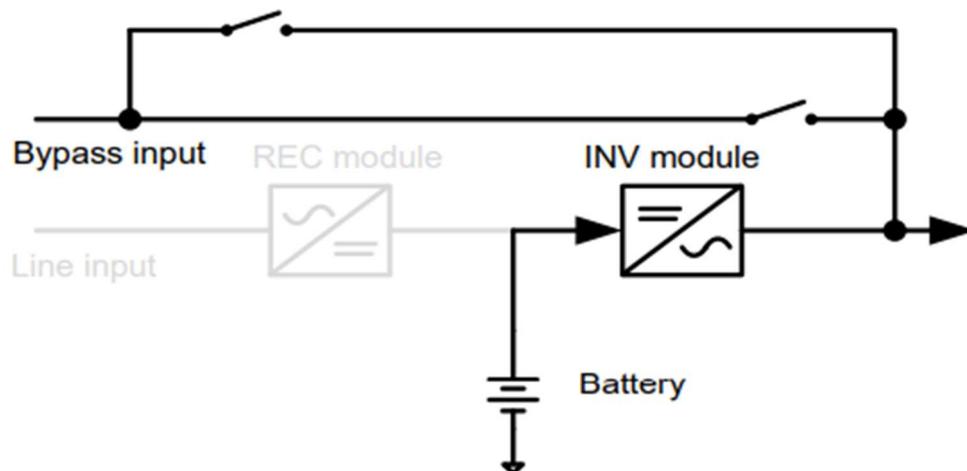


Figure 1.4. Battery Mode of UPS

Static Bypass Mode

Bypass mode can be enabled or disabled by user setting. The default setting is enabled. The UPS system will work in bypass mode when the following conditions occur. The UPS system doesn't turn on. The UPS is overload in line mode. The rectifier or inverter module is abnormal. The utility fails and the battery is discharged to low level. When above mentioned situation is eliminated, the UPS will transfer back to line mode or battery mode

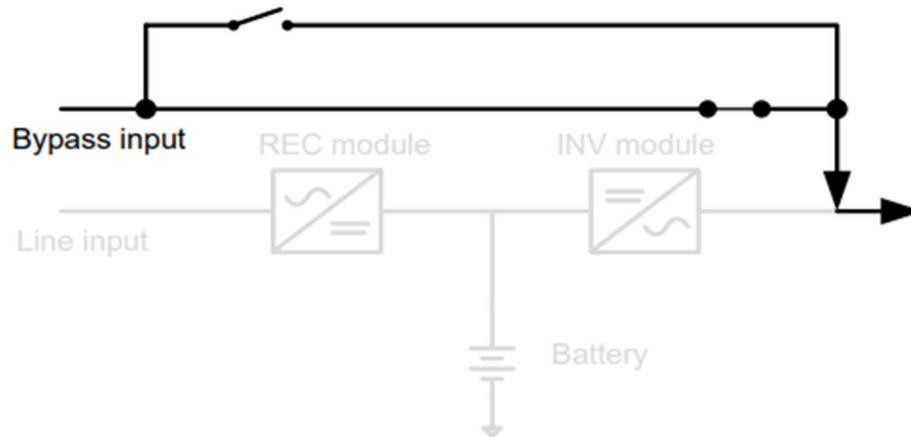


Figure 1.5. Static Bypass Mode of UPS

Maintenance Bypass Mode

When the UPS needs maintenance and load needs uninterruptible power, the users can firstly transfer the inverter to bypass mode, and then switch on maintain bypass breaker. After that, switch off all other breakers and switches. In this condition, the utility can still power the load and users can maintain the UPS.

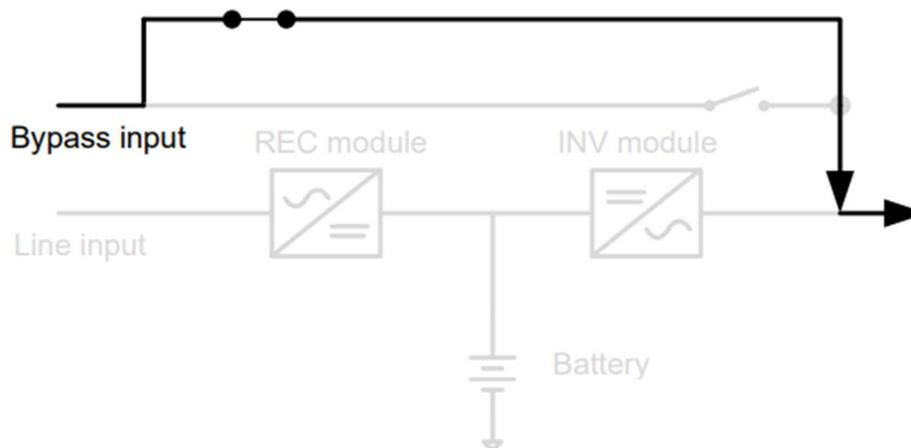
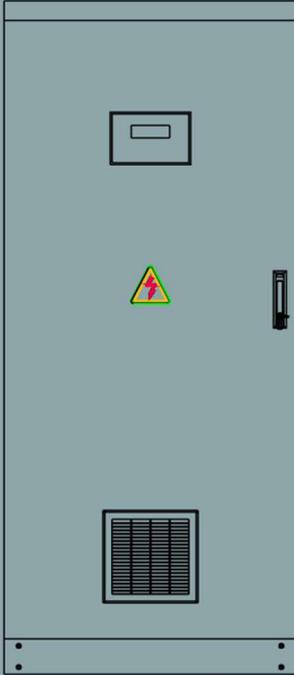


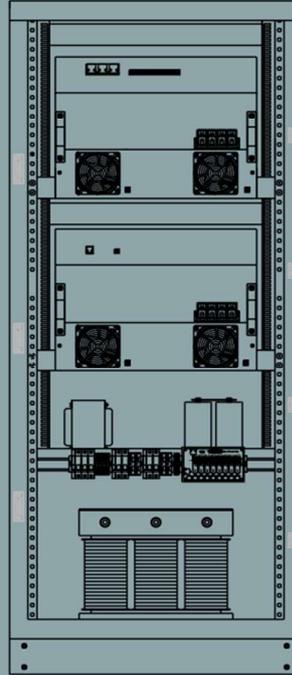
Figure 1.6. Maintenance Mode of UPS

1.4.OVERVIEW

FRONT VIEW



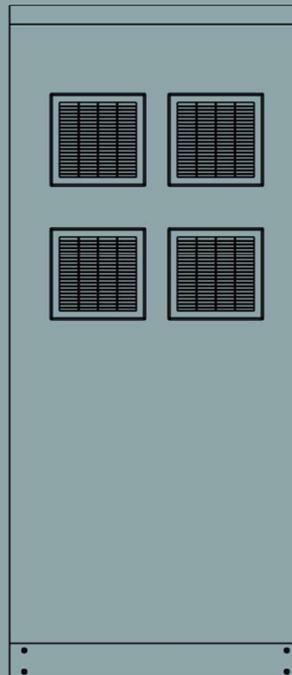
INSIDE VIEW



SIDE VIEW



BACKSIDE VIEW



2.INSTALLATION



All the connections must be done by the technical personnel. Ground line connection must be done before the other connections.

- ✓ Open the UPS package carefully and avoid any impact, scratch, breakage, damage etc. that may occur during transportation. Check for conditions.
- ✓ There is no equipment on the UPS that provides protection against leakage current. For this reason, the technical person or the user should put warning labels on the circuit breakers on the line while working on the UPS. Warning labels will remind the technical person working on the system to intervene on the line.



**MAINTENANCE / EXCAVATION IS
DONE ON THIS LINE.**

Do not interfere.

- ✓ For safe operation; please use suitable cross-sections for connection proper to UPS capacity. Thin wires or loose connections will cause dangerous overheating in the cable connection and terminals.
- ✓ Please use original accessories and insulated service tools while doing UPS connections.

2.1.Battery



Please pay attention to the following warnings when working with batteries. Batteries pose a great risk for electrical shock. Fire or life-threatening may occur due to short circuit, spark etc. during working.

- ✓ Please take off the conductive metal objects such as ring, tag, wristwatch etc. before starting maintenance or replacement processes on the batteries.
- ✓ Please use original accessories and insulated service tools while doing battery connections.
- ✓ Please do not leave the service tools and/or conductive metal objects on the battery.
- ✓ Please do not throw never the batteries in the fire to destroy them. The battery exposed to high temperature may cause serious injury.
- ✓ Please do not pierce the battery casing and do not absolutely open inside the battery. The battery contains toxic gases and electrolytes that are extremely harmful for skin and eyes.
- ✓ Please do not make short circuit the battery negative (-) and positive (+) terminals. Otherwise, the battery may be damaged and there may occur electrical shock or burn in your body due to short circuit.
- ✓ Even the Mains Input MCCB/MCB is “OFF”, the hardware in the UPS is still connected to the battery and there is still battery total voltage on this hardware. Therefore, the Battery MCCB/MCB should be turned OFF and the connection cables between batteries should be removed before doing any maintenance or replacement for the battery.
- ✓ Please make sure that there is not any voltage on the battery connection terminals before making intervention to the battery. Battery circuit has not been isolated from the input voltage circuit. A voltage that may lead to life threatening, can occur between battery terminals and ground (chassis)
- ✓ The direction of the (-) and (+) terminals in battery connections is important. Reverse connection may damage the UPS. Please make connections to the related terminals as per labels on the UPS and wiring diagrams.
- ✓ Please replace the battery with a new with same voltage, capacity and cells number as per the one on the UPS. Please pay attention to the same battery manufacturer and production time of the new battery.
- ✓ There is life-threatening current and voltage on the battery. Therefore, battery maintenance and replacement should be done by trained technical service personnel.
- ✓ To replace a higher capacity battery, please contact technical service. For this, it is necessary to know the technical details of the UPS and connection. Operations done without knowledge may damage the UPS.
- ✓ Please leave space between batteries. There should be a distance of at least 1 cm

between the batteries so that they can dissipate their heat and breathe.



Batteries contain toxic substances such as lead- acid etc. If they are not disposed of properly, they are harmful for the environment and human health. Recycling / reuse or hazardous waste process must be carried out as per prescribed by local laws.

3.COMISSIONING / OPERATION

3.1.Preliminary Checks

- ✓ Please measure the Mains voltage over the Mains Input MCCB/MCB terminal by an AC voltage measurement device (Phase – Phase voltage for 3 phase UPS) and check if the voltage is same with “Input Voltage” as written on the UPS label.
- ✓ Please measure the Mains voltage over the Mains Input Fuse / terminal by a measurement device at Hertz level (Phase – Phase frequency for 3 phase UPS) and check if the frequency is same with “Input Frequency” as written on the UPS label.
- ✓ Please measure the ground voltage over the neutral and ground connection terminal with a measurement device at AC voltage level and check it. The neutral to ground voltage should be less than 3VAC. If it is greater than 3VAC, please strengthen the ground line.



Please check the neutral to ground voltage of the installation place for the 3 Phase UPS without neutral

3.2.Startup with Main Input / Input Voltage

- ✓ Please turn ON Input MCB.
- ✓ After applying the Mains voltage to the UPS, the UPS will generate DC bus voltage with help of soft start feature and LCD front panel will be energized.
- ✓ Please turn ON Battery MCCB.



Please check battery charge voltage and current from the LCD front panel

- ✓ Please turn ON Load MCCB.



Please check output voltage from the LCD front panel.

- ✓ Please check load current from the LCD front panel.

4.LCD CONTROL PANEL

The control panel contains:

- LED-backlight LCD with 4 lines x 20 columns.
- 6 Buttons to navigate LCD menus.
- 24 Indication LED to get any status, critical or failure information of system.

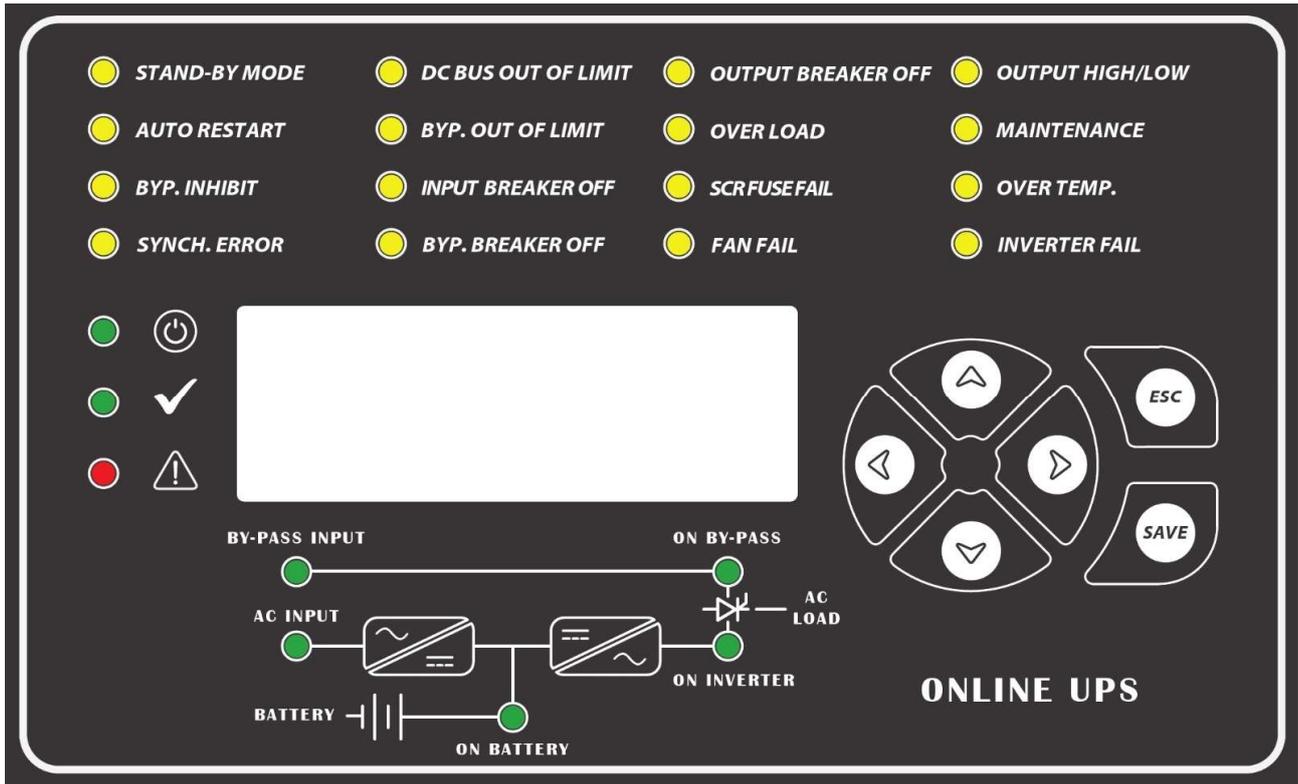


Figure 4.1. The Control Panel of UPS

4.1. Indication LEDs

LED	NORMAL STATE	INDICATION
	ON	Power on status indicator led.
	OFF	Everything working properly and there is no any alarm or fail status.
	ON	There is critical fault and device should be check.
	ON	In stand-by mode, the internal inverter in the device is waiting in stand-by. The load is supplied from bypass power supply. In case of insufficient line, inverter will feed load.
	ON	This led indicates the automatic restart function status. If it's enabled UPS will try to restart itself in certain time interval after any type fault is solved.
	OFF	It is used to prevent the device from switching to boost mode in cases where it is not desired to transfer the boost voltage to the battery or DC BUS.
	OFF	This led indicates synchronization problem between device bypass input and output.
	OFF	When DC BUS voltage is out of the acceptable levels, this led indicates this situation.
	OFF	When bypass voltage is out of the acceptable levels, this led indicates this situation.
	OFF	The input mcb of the device is tripped or off. This situation requires intervention.
	OFF	The bypass mcb of the device is tripped or off. This situation requires intervention.
	OFF	The output mcb of the device is tripped or off. This situation requires intervention.
	OFF	When this led is active inverter will be shut down. It indicates the IGBT is overloaded. The device output is redirected to be fed from the bypass.
	OFF	It indicates the SCR fast fuse is blown. This situation requires replace blown fuse new one.
	OFF	If the heatsink of the semiconductor reach to 70 C fan fail indicator led will be turn on. If this issue can not be solved in 1,5 min over temperature situation will be triggered and the internal inverter will be shut down.
	OFF	If the output voltage out of the $\pm 10\%$ range for any reason the internal inverter will be shut down and this led will be activated.
	OFF	This led indicates the the maintenance switch is on. In this the loads supplied from the input of the device directly.
	OFF	This led is indicated the over temperature situation. Device operation will be suspended until this issue is solved.
	OFF	There is critical fault for UPS system, System is going to shut down.

Figure 4.2. The Control Panel of UPS

4.2.LCD Menus

Lettering	
Text in white font	Fixed text
Text in yellow font	Dynamic text
Text in red font	Values that can be modified by navigation keys

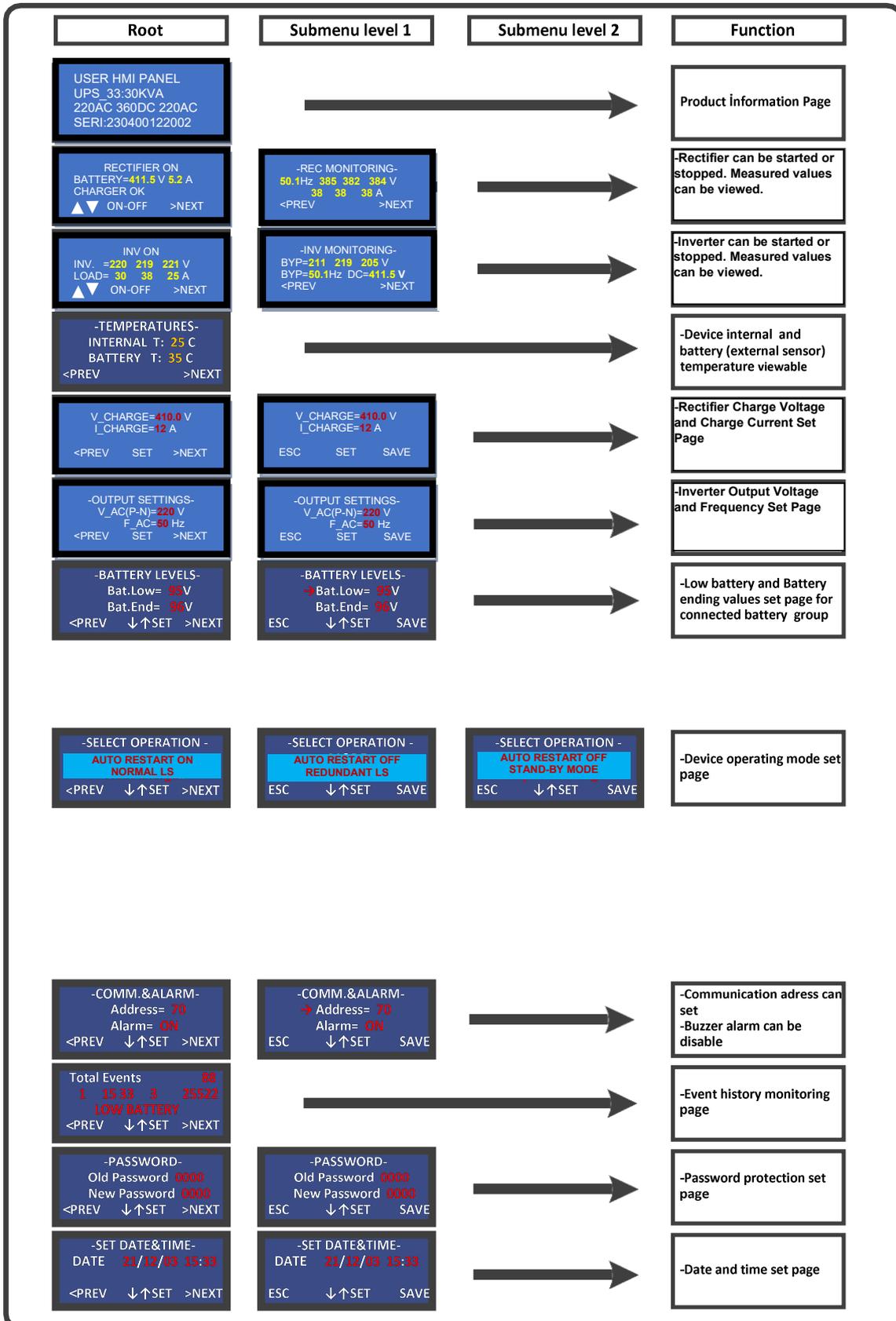


Figure 4.3. LCD Menus of UPS Panel

4.3.Event Logger & Event Codes

Events recorded in the memory can be monitored from “Event History Monitoring Page of LCD” up to 1000 events are recorded. There is total 91 event codes. All events can be viewed by using UP-DOWN buttons. Event code format is shown as:

“Event no : Event code : Event Value : Day : Month : Hour : Minute : Second”

The all-recorded event can be deleted by pressing ESC & SAVE buttons in the same time, and the UPS will reset to factory settings. Description of event codes is given in the following table.

Table 4.1. LCD Menus of UPS Panel

Level	Code	Event Description	Event Value
Critical	5	Line Breaker OFF	1
Normal	4	Line Breaker ON	0
Normal	40	Rectifier ON	0
Normal	41	Rectifier OFF	1
Critical	42	Battery Fuse OFF	1
Normal	43	Battery Fuse ON	0
Normal	52	Overload removed	0
Critical	53	Overload occurred	1
Normal	54	IGBT Failure removed	0
Critical	55	IGBT Failure occurred	1
Critical	56	Bypass Breaker ON	0
Normal	57	Bypass Breaker OFF	1
Critical	58	DC input Failure	Vbat/2
Normal	59	DC input OK	Vbat/2
Normal	60	Battery is discharging	1
Normal	61	Battery is charging	0
Critical	64	Bypass is out of limit	Vbat/2
Normal	65	Bypass Accepted	Vbat/2
Normal	66	Load on Bypass	0
Normal	67	Load is not on the Bypass	1
Normal	68	Load on Inverter	0
Normal	69	Load is not on the inverter	1
Critical	70	Inverter Output Failure	Vbat/2
Normal	71	Inverter Output OK	Vbat/2
Critical	72	Maintenance Switch ON	Vbat/2
Normal	73	Maintenance Switch OFF	Vbat/2
Critical	74	Inverter Temperature Fail	1
Normal	75	Inverter Temperature OK	0
Critical	76	Output Breaker OFF	1
Normal	77	Output Breaker ON	0
Critical	78	Inverter Fan Failed	1
Normal	79	Inverter Fan OK	0
Critical	80	Inverter Failed	1
Normal	81	Inverter OK	0
Normal	90	Inverter Run	0
Normal	91	Inverter Stop	1

5.USER PROGRAMMABLE RELAY PCB & FREE CONTACTS

Product has a relay-PCB that is including 8 relays output terminals and RS485 communication output terminal. There are 8 units free alarm contacts with automation type products. The warning LEDs' situations, that are on the communication PCB, LCD panel and communication interface, can be monitored via these free contacts. Each free contact has two outputs; one is normally open, other is normally closed. Each free contact can be programmed to any LED indication on front LCD panel or common of any three LEDs through communication interface via Modbus-RS485. Technical data's, default relay alarms and relay PCB layout are shown below.



Figure 4.4. Programmable Free Alarm Relay Board

Table 4.2. Technical Features of Free Alarm Relays

TECHNICAL FEATURES OF FREE ALARM CONTACT

Nominal Switching Capacity (Resistive Load) 10A / 250VAC, 10A / 30VDC

Max. Switching Power (Resistive Load) 2.500VA, 300W

Max. Switching Voltage 250VAC, 30VDC

Max. Switching Current 10A

Relay1	Circuit breakers open. (AC input, battery or load)
Relay2	Bypass input failure or out of acceptable limits.
Relay3	Low battery
Relay4	Overload
Relay5	Output High/Low
Relay6	Ventilation fault (Fan failure), overtemperature
Relay7	UPS failure, DC over voltage
Relay8	Thick LED off (there is a critical alarm)

These are default definition and can be change via PC HMI software of the UPS Device

5.1. Relay Programming Through Communication

Each of Relay contacts (0x70 – 0x85) can be programmed as to give alarm any LED (0x26, 0x27) indication or any common of three LEDs indication.

For example; if Relay1 programmed as binary “0000 0000 0000 0000 0000 0000 0001 0011”, it means that LEDs binary “0000 0000 0000 0000 0000 0000 0001 0011” bit0, bit1 and bit4 of LEDs will be attached to give alarm in Relay1 commonly. So that, “bit0=Load is feeding from battery, bit1=Load on inverter and bit4=Bypass circuit breaker OFF” will be attached to give alarm in Relay1 commonly.

For example; if Relay2 programmed as binary “1000 0000 0000 0000 0000 0000 0000 0000”, it means that LEDs binary “1000 0000 0000 0000 0000 0000 0000 0000” bit31 of LEDs will be attached to give alarm in Relay2 commonly. So that, “bit31=Battery Circuit Breaker OFF” will be attached to give alarm in Relay2.

6.REMOTE COMMUNICATION & PC HMI INTERFACE

Users can access to all information related to the product via serial communication. All measurements, indications, alarms and the status of the product at that moment can be monitored. Since the communication system is interactive, the user can turn OFF / ON the product and make adjustments.

The product can communicate with computers or SCADA systems over RS-485 through Modbus protocol. Using PESS protocol converter; product can communicate over TCP/IP through Modbus- TCP, SNMP, DNP3 or IEC61850 protocol.

RS-485 cable length and quality will affect the communication quality. Please consider the following notes regarding the wiring to ensure quality communication.

- ✓ Cross-Section: Min. 2 x 0.22 mm² or Min. 2 x AWG 2
- ✓ CAT 5 (shielded)
- ✓ Twisted-Pair
- ✓ UV Resistant (only for outdoor use)

To perform the communication between the computer and the product, you need to make the connection as noted above. The user can use RS-485/USB converter for devices without RS-485 port such as laptops.

To Communicate product over RS485, TCP, SNMP or DNP3 with user defined program, users should reference the Modbus list that shown below.

6.1.Modbus Data List of Device

Table 6.1. Modbus Data List of Device

DEC. ADDRESS	HEX ADDRESS	READABLE / WRITABLE	DATA	COEFF.	DEFINITION	INV_11	INV_33	UPS_11	UPS_31	UPS_33
0	0x00	R / WR	set_V_FLOAT	10x	battery float charge voltage	NO	NO	YES	YES	YES
1	0x01	R / WR								
2	0x02	R / WR	set_V_LOWBAT	10x	low battery voltage level	YES	YES	YES	YES	YES
3	0x03	R / WR	set_DC_START	10x	DC voltage low level where INV to RUN again after DC FAIL	YES	YES	YES	YES	YES
4	0x04	R / WR	set_INV_out	10x	inverter output AC voltage	YES	YES	YES	YES	YES
5	0x05	R / WR	set_F_out	10x	inverter output frequency (50 or 60 Hz)	YES	YES	YES	YES	YES
6	0x06	R / WR								
7	0x07	R / WR	set_I_aku	10x	battery charge current limit	NO	NO	YES	YES	YES
8	0x08	R / WR								
9	0x09	R / WR	set_B_inv	1x	1=Normal LS, 2=Stand-BY, 3=BYPASS-Inhibited, 4=Redundant LS	YES	YES	YES	YES	YES
10	0x0a	R / WR								
11	0x0b	R / WR	set_A_inv	1x	Automatic RUN condition after fail remove 1=Active, 0=Passive	YES	YES	YES	YES	YES
12	0x0c	R / WR								
13	0x0d	R / WR								
14	0x0e	R / WR	set_C_inv	1x	inverter on/off switch "0=OFF, 1=ON"	YES	YES	YES	YES	YES
15	0x0f	R / WR	set_C_rec	1x	Rectifier on/off switch decimal "19=OFF, 3=ON"	NO	NO	YES	YES	YES
16	0x10	R / WR	set_HT_NM_BUS	1x	currently displayed event number from event history	YES	YES	YES	YES	YES
17	0x11	R / WR								
18	0x12	R / WR								
19	0x13	R / WR								
20	0x14	R / WR	set_DAY	1x	day of DATE	YES	YES	YES	YES	YES
21	0x15	R / WR	set_MONTH	1x	month of DATE	YES	YES	YES	YES	YES
22	0x16	R / WR	set_YEAR	1x	year of DATE	YES	YES	YES	YES	YES
23	0x17	R / WR	set_HOUR	1x	hour of TIME	YES	YES	YES	YES	YES
24	0x18	R / WR	set_MINUTE	1x	minute of TIME	YES	YES	YES	YES	YES
25	0x19	R	F_byp	10x	Bypass frequency	YES	YES	YES	YES	YES
26	0x1a	R	V_bat	10x	Battery_voltage	YES	YES	YES	YES	YES
27	0x1b	R	T_internal	10x	Cabinet Temperature in celcius degree	YES	YES	YES	YES	YES
28	0x1c	R	V_byp_L1	10x	Bypass Voltage on L1 Phase	YES	YES	YES	YES	YES
29	0x1d	R	V_line12	10x	GRID Line Voltage between L12 Phase	NO	NO	YES	YES	YES
30	0x1e	R	V_inv_L1	10x	Inverter Voltage on L1 Phase	YES	YES	YES	YES	YES
31	0x1f	R	I_out_L1	10x	Output Current on L1 Phase (Bypass or INV)	YES	YES	YES	YES	YES
32	0x20	R	I_rec_L1	10x	Rectifier Input Current on L1 Phase	NO	NO	YES	YES	YES
33	0x21	R	V_dcbus	10x	Inverter DC bus Voltage	YES	YES	YES	YES	YES
34	0x22	R	I_battery	10x	battery current (signed int16)	NO	NO	YES	YES	YES
35	0x23	R	Fail_code_inv	1x	INVERTER FAIL CODE (Decimal)	YES	YES	YES	YES	YES
					1= IGBT FUSE FAIL					
					2=MAINTANANCE SW ON, Maintanance Switch activated					
					3=EPO/RPO ON, Emengent-Remote POWER OFF signal detected					

					4=DC BUS FAIL, DC Bus has long deviation					
					5=OUTPUT HIGH/LOW, Inverter Output Voltage has long deviation					
					6=INTERNAL HIGH TEMP., Termistor detected > 50C inside temp.					
					7=HEATSINK HIGH TEMP., 70C thermostat is activated					
					8=OVERLOAD, Overload detected from Current Sensor					
					9=IGBT OVERLOAD, Overload detected from IGBT Saturation					
					10=INV. DISCONNECTED, Communication Fail					
36	0x24	R								
37	0x25	R								
38	0x26	R	LEDs_H	1x	LED INFORMATIONS UPPER 16 BIT (Polls)					
					BIT_0= Common Signal in any Failure caused to INV OFF	YES	YES	YES	YES	YES
					BIT_1= There is no critical alarm (if it is 0, yellow alarm level)	YES	YES	YES	YES	YES
					BIT_2= Power supply is ok	YES	YES	YES	YES	YES
					BIT_3= Synchronization To Bypass Lost	YES	YES	YES	YES	YES
					BIT_4= No data					
					BIT_5= No data					
					BIT_6= No data					
					BIT_7= No data					
					BIT_8= AC Rectifier Input OK	NO	NO	YES	YES	YES
					BIT_9= No data					
					BIT_10= No data					
					BIT_11= No data					
					BIT_12= No data					
					BIT_13= No data					
					BIT_14= No data					
					BIT_15= Battery circuit breaker OFF	NO	NO	YES	YES	YES
39	0x27	R	LEDs_L	1x	LED INFORMATIONS LOWER 16 BIT (Polls)					
					BIT_0= Load is feeding from Battery, Rectifier has no operation	NO	NO	YES	YES	YES
					BIT_1= Load on Inverter	YES	YES	YES	YES	YES
					BIT_2= Bypass Input is OK	YES	YES	YES	YES	YES
					BIT_3= Load on Bypass	YES	YES	YES	YES	YES
					BIT_4= Bypass circuit breaker OFF	YES	YES	YES	YES	YES
					BIT_5= AC Input circuit breaker OFF	NO	NO	YES	YES	YES
					BIT_6= Bypass is Out of Acceptable Limit	YES	YES	YES	YES	YES
					BIT_7= DC Bus Out of limit for inverter operation	YES	YES	YES	YES	YES
					BIT_8= Fan failure detected before 1.5 minute Overtemp Fail	YES	YES	YES	YES	YES
					BIT_9= IGBT saturation or Failure detected	YES	YES	YES	YES	YES
					BIT_10= Overload Occured on Output	YES	YES	YES	YES	YES
					BIT_11= Output Breaker OFF	YES	YES	YES	YES	YES
					BIT_12= Common Signal in any Failure caused to INV OFF	YES	YES	YES	YES	YES
					BIT_13= Over temperature (70C thermostat activated)	YES	YES	YES	YES	YES
BIT_14= Maintenance switch is activated	YES	YES	YES	YES	YES					

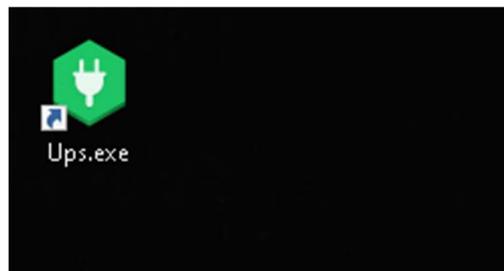
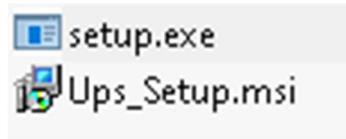
					BIT_15= Inverter output has long deviation	YES	YES	YES	YES	YES
40	0x28	R	V_inv_L2	10x	Inverter Voltage on L2 Phase	YES	YES	YES	YES	YES
41	0x29	R	V_inv_L3	10x	Inverter Voltage on L3 Phase	YES	YES	YES	YES	YES
42	0x2a	R	V_line13	10x	GRID Line Voltage between L13 Phase	NO	NO	YES	YES	YES
43	0x2b	R	V_line23	10x	GRID Line Voltage between L23 Phase	NO	NO	YES	YES	YES
44	0x2c	R	I_out_L2	10x	Output Current on L2 Phase (Bypass or INV)	YES	YES	YES	YES	YES
45	0x2d	R	I_out_L3	10x	Output Current on L3 Phase (Bypass or INV)	YES	YES	YES	YES	YES
46	0x2e	R	I_rec_L2	10x	Rectifier Input Current on L2 Phase	NO	NO	YES	YES	YES
47	0x2f	R	I_rec_L3	10x	Rectifier Input Current on L3 Phase	NO	NO	YES	YES	YES
48	0x30	R	F_line	10x	GRID Line Voltage Frequency	NO	NO	YES	YES	YES
49	0x31	R	F_inv	10x	Inverter Output Frequency	YES	YES	YES	YES	YES
50	0x32	R	set_T_HT_NM	1x	event history total event number	YES	YES	YES	YES	YES
51	0x33	R	set_HT_NM_BUS	1x	Currently displayed event number from event history	YES	YES	YES	YES	YES
52	0x34	R	htadres	1x	currently displayed event code, check from event code table	YES	YES	YES	YES	YES
53	0x35	R	htadres+1	1x	currently displayed event value, check from event code table	YES	YES	YES	YES	YES
54	0x36	R	htadres+2	1x	reading currently displayed event's DAY	YES	YES	YES	YES	YES
55	0x37	R	htadres+3	1x	reading currently displayed event's MONTH	YES	YES	YES	YES	YES
56	0x38	R	htadres+4	1x	reading currently displayed event's HOUR	YES	YES	YES	YES	YES
57	0x39	R	htadres+5	1x	reading currently displayed event's MINUTE	YES	YES	YES	YES	YES
58	0x3a	R	htadres+6	1x	reading currently displayed event's SECOND	YES	YES	YES	YES	YES
59	0x3b	R	RELAY8	1x	readi 8 dry contac RELAYS current position	YES	YES	YES	YES	YES
60	0x3c	R / WR	set_vline12_par	10x	Line voltage calibration parameter for L12	NO	NO	YES	YES	YES
61	0x3d	R / WR	set_lline1_par	10x	Line current calibration parameter for L1	NO	NO	YES	YES	YES
62	0x3e	R / WR	set_vrec_par	10x	BATTERY DC voltage calibration parameter	NO	NO	YES	YES	YES
63	0x3f	R / WR	set_Tint_par	10x	Internal temperature calibration parameter for rectifier	NO	NO	YES	YES	YES
64	0x40									
65	0x41	R / WR	set_lbat_par	10x	Battery current calibration parameter	NO	NO	YES	YES	YES
66	0x42	R / WR								
67	0x43	R / WR								
68	0x44	R / WR	set_lline2_par	10x	Rectifier Line current calibration parameter for L2	NO	NO	YES	YES	YES
69	0x45	R / WR	set_lline2_par	10x	Rectifier Line current calibration parameter for L3	NO	NO	YES	YES	YES
70	0x46	R / WR	set_RELAY1_LED	10x	dry contact 1 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
71	0x47	R / WR		10x	dry contact 1 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
72	0x48	R / WR	set_RELAY2_LED	10x	dry contact 2 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
73	0x49	R / WR		10x	dry contact 2 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
74	0x4a	R / WR	set_RELAY3_LED	10x	dry contact 3 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
75	0x4b	R / WR		10x	dry contact 3 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
76	0x4c	R / WR	set_RELAY4_LED	10x	dry contact 4 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
77	0x4d	R / WR		10x	dry contact 4 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
78	0x4e	R / WR	set_RELAY5_LED	10x	dry contact 5 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
79	0x4f	R / WR		10x	dry contact 5 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
80	0x50	R / WR	set_RELAY6_LED	10x	dry contact 6 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES

81	0x51	R / WR		10x	dry contact 6 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
82	0x52	R / WR	set_RELAY7_LED	10x	dry contact 7 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
83	0x53	R / WR		10x	dry contact 7 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
84	0x54	R / WR	set_RELAY8_LED	10x	dry contact 8 LED, selection code upper word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
85	0x55	R / WR		10x	dry contact 8 LED, selection code lower word (Look LEDs 32 bit)	YES	YES	YES	YES	YES
86	0x56	R / WR								
87	0x57	R / WR								
88	0x58	R / WR								
89	0x59	R / WR								
90	0x5a	R / WR								
91	0x5b	R / WR								
92	0x5c	R / WR								
93	0x5d	R / WR								
94	0x5e	R / WR								
95	0x5f	R / WR	set_Vline13_par	10x	Line voltage calibration parameter for L13	NO	NO	YES	YES	YES
96	0x60	R / WR	set_Vline23_par	10x	Line voltage calibration parameter for L23	NO	NO	YES	YES	YES
97	0x61	R / WR								
98	0x62	R / WR								
99	0x63	R / WR								
100	0x64	R / WR								
101	0x65	R / WR	set_BYP_par	10x	Bypass voltage calibration parameter for L1	YES	YES	YES	YES	YES
102	0x66	R / WR	set_BYP_par2	10x	Bypass voltage calibration parameter for L2	YES	YES	YES	YES	YES
103	0x67	R / WR	set_BYP_par3	10x	Bypass voltage calibration parameter for L3	YES	YES	YES	YES	YES
104	0x68	R / WR	set_INV_par	10x	Inverter voltage calibration parameter for L1	YES	YES	YES	YES	YES
105	0x69	R / WR	set_INV_par2	10x	Inverter voltage calibration parameter for L2	YES	YES	YES	YES	YES
106	0x6a	R / WR	set_INV_par3	10x	Inverter voltage calibration parameter for L3	YES	YES	YES	YES	YES
107	0x6b	R / WR								
108	0x6c	R / WR								
109	0x6d	R / WR								
110	0x6e	R / WR	set_lout_par	10x	Output Current on L1 Phase calibration parameter	YES	YES	YES	YES	YES
111	0x6f	R / WR	set_lout_par2	10x	Output Current on L2 Phase calibration parameter	YES	YES	YES	YES	YES
112	0x70	R / WR	set_lout_par3	10x	Output Current on L3 Phase calibration parameter	YES	YES	YES	YES	YES
113	0x71	R / WR	set_Vbus_par	10x	INV DC bus voltage calibration parameter	YES	YES	YES	YES	YES

6.2.HMI SETUP INSTALLATION STEPS

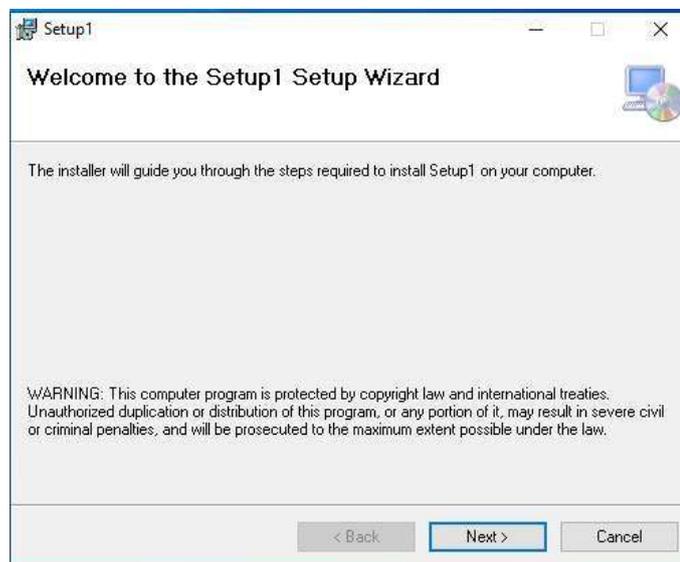
STEP 1 : Download suitable software from this web page to the computer.

<https://www.pess-energy.com/downloads>

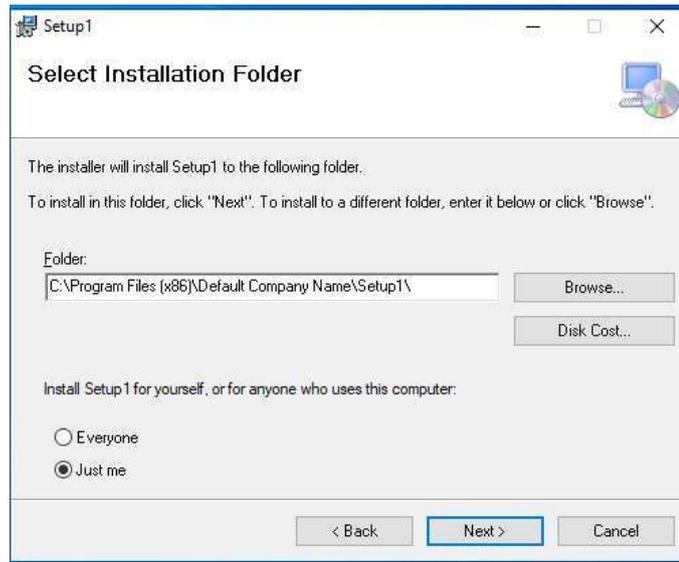


Thus, our UPS Gui program will be installed on the desktop

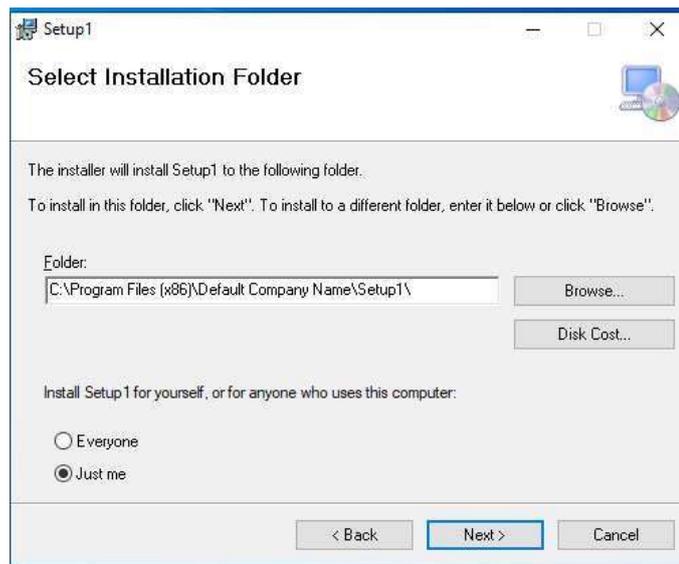
STEP 2: After the installation menu is opened, you will see the menu shown in the figure below.



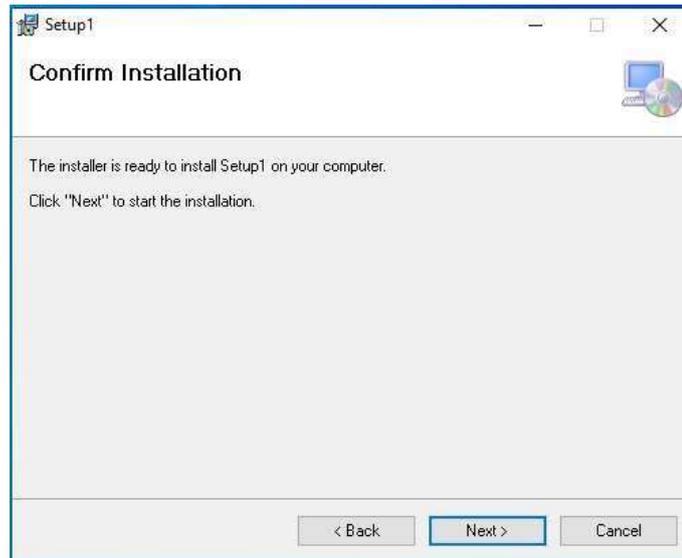
STEP 3: Click forward to proceed



STEP 4 : Click forward to proceed

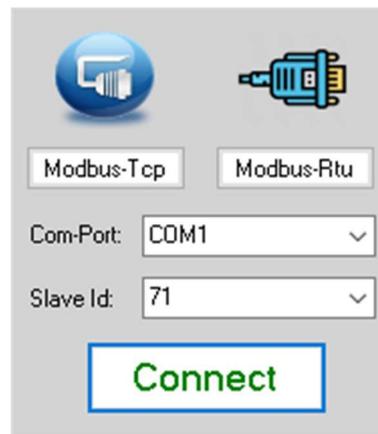


STEP 5: Clicking next to this screen will start the installation. Also say yes to the warning on the screen



6.3.PC HMI Software

The following figure shows the initial protocol selection screen of the interface. One of the Modbus TCP or Modbus RTU options is selected from this menu. Then the communication slave number is entered by selecting the IP address or com-port. (81 for UPSs or Inverters as standart) For the Com Port value; please check Device Manager \ Connection Ports (COM & LPT) on your computer.



The UPS/INV interface consists of 6 main parts. Although LED information bar, date-time screen bar, communication bar is constant on the screen, different 6 parts could be selected to screen. "main" shows the device mimic diagram. "Measurements" shows all measurement values. "Settings" to read and set all adjustable values of device. "Events", this section contains the error states of the device. "Relay" menu is for programming each dry contact relay as common of any three selected LED information. In the "Calibration" to calibrate all measured values of device.

Main Menu:

Mimic diagram UPS or INV is detected as automatic from the communication data. MCB status, flowing energy directions can be seen in this menu.

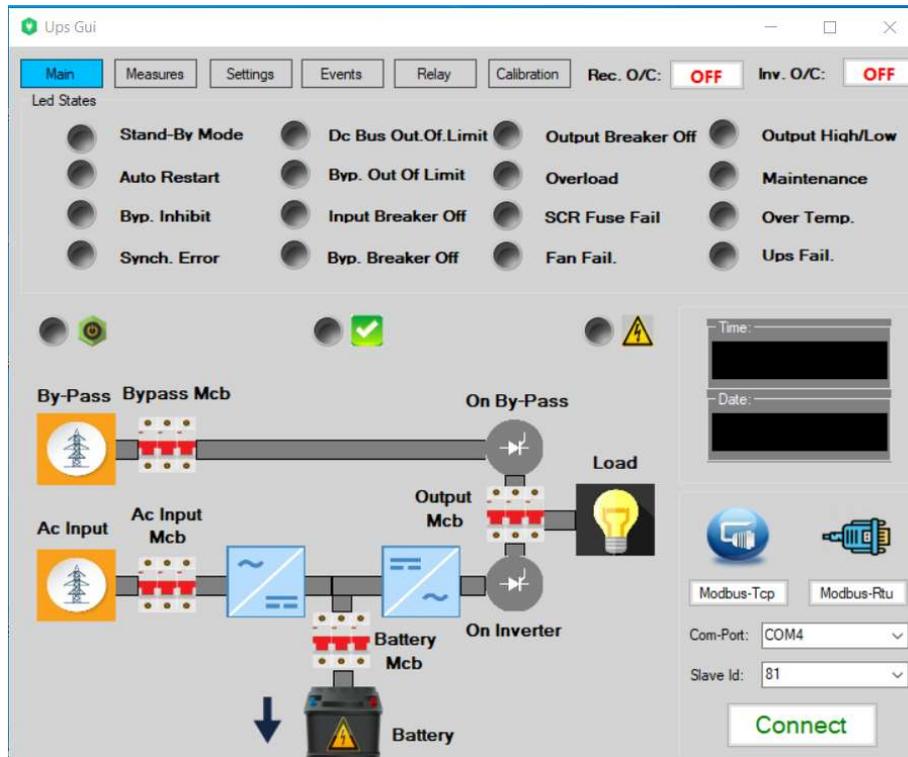


Figure 6.1. Main menu and mimic diagram of UPS device



Figure 6.2. Main menu and mimic diagram of INV device

Measurements Menu:

This menu shows all measured values about device like as voltages, currents, frequencies.

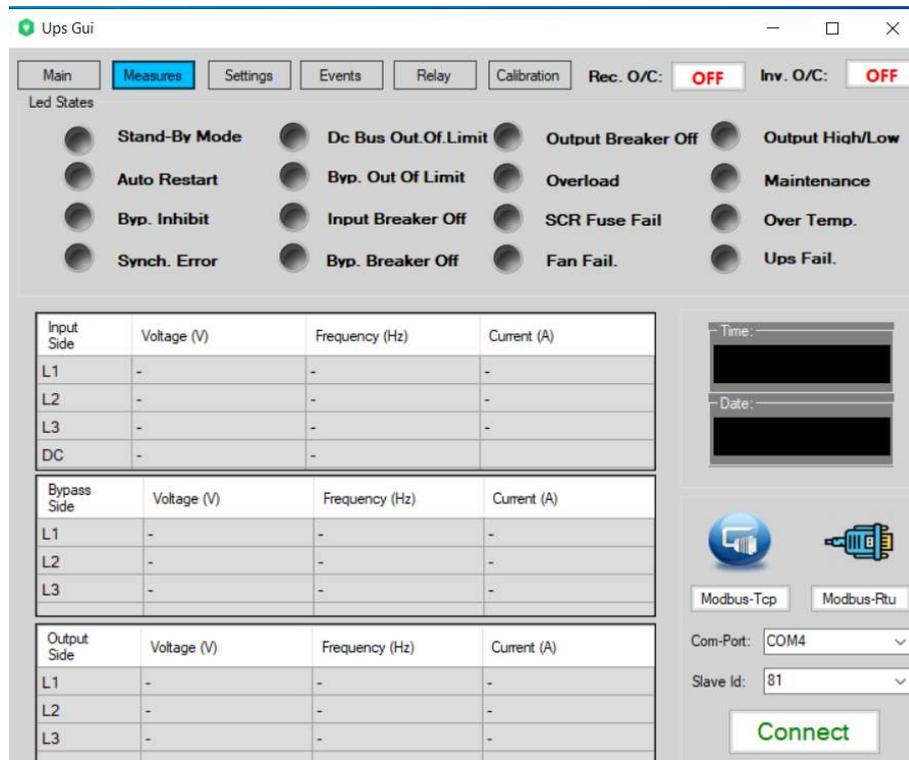


Figure 6.3. Measurement menu of device

Settings Menu:

In this menu, many settings such as voltage, current, low battery, mode functions, time and date settings are made. At the same time, the ALARM information of the 8 relay card is displayed. User can understand which RELAY is activated and which RELAY is assigned to which LED indications in this menu.

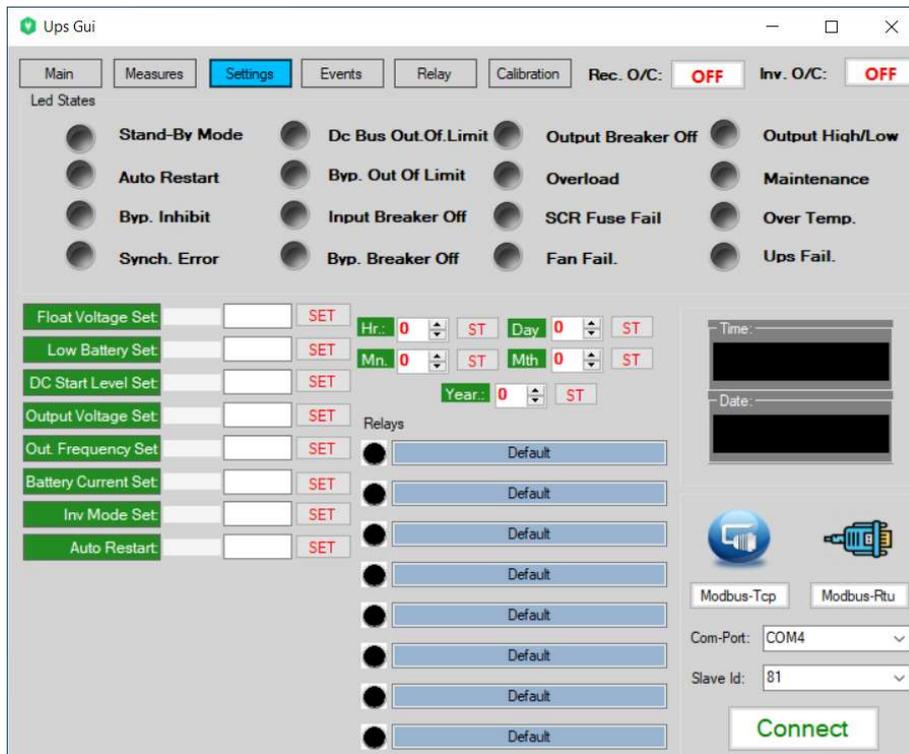


Figure 6.4. Settings menu of device

Events Menu:

In this menu, last 1000 event information of the device can be obtained. At the same time, these informations can be saved to the computer as a text file or to a desired disk.

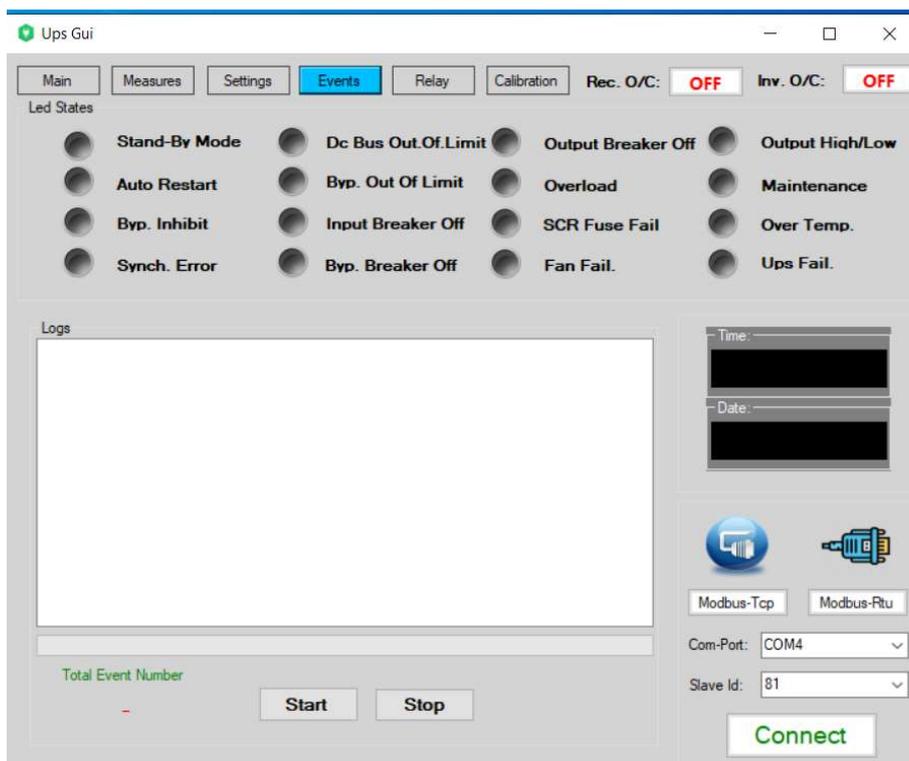


Figure 6.5. Events menu of device

RELAY Programming Menu:

Using this menu; Operator can prefer to select a special relay configuration. Every selection bar includes all led information of device. User can select any led of device and assign it to any relay which he prefers. Each relay can be assigned to three LED information. It will give alarm when any of these selected three LED information occurs. Operator can see the programmed situation of each relays in settings menu.

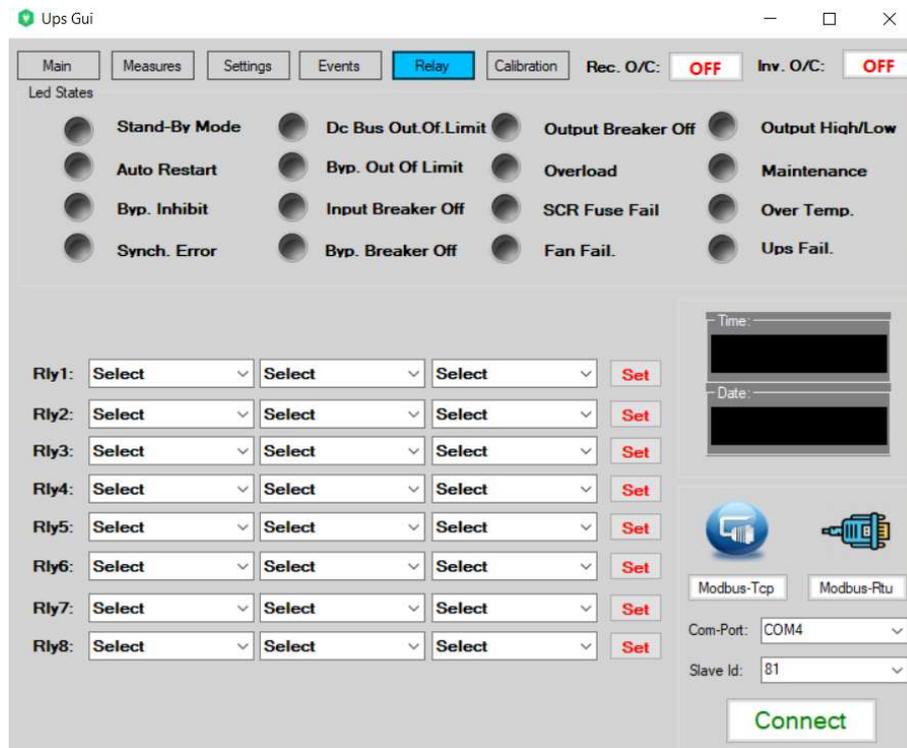


Figure 6.6. Relay programming menu of device

Calibration Menu:

This menu is the menu where calibration adjustments are made. Voltage, current and temperature calibrations are made in this menu. The program is compatible with Windows 10, 7 and XP. The PC connection is done via USB port through RS485 protocols or via ETHERNET-TCP port through TCP/IP protocols.

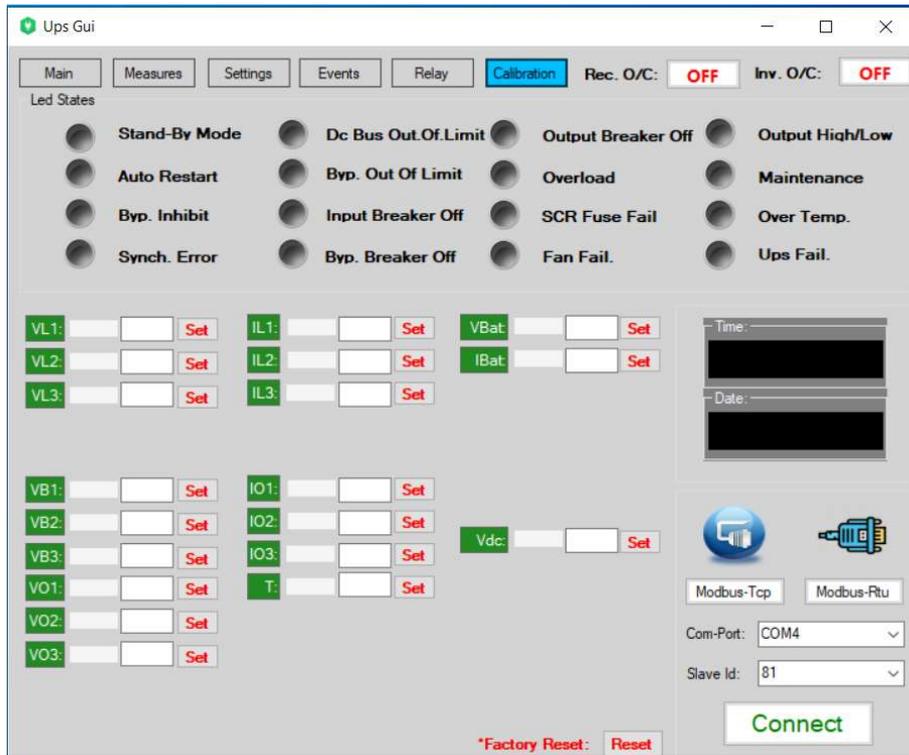


Figure 6.7. Calibration menu of device

7.MAINTENANCE

Please read the instruction to ensure maintain a longer product lifetime and your safety.

7.1.Precautions

- Make sure the power is disconnected before installation. (Otherwise, electric shock may cause serious injury or death)
- Always work with the equipment disconnected from the power supply. (Otherwise, electric shocks or short circuits may occur)
- When performing any tests, maintenance or repairs, first disconnect the power supply and then disassemble the equipment.
- Do not install the product, unless you hold a national certification and have received relevant information on the product. (Otherwise, electric shocks or short circuits may occur).
- When in operation, electric energy systems such as transformers, converters, motors and cables generate electromagnetic fields (EMF). Therefore, there is risk for people with pacemakers or implants that stay in close proximity to those systems. Thus, such people must stay at least 2 meters away from those devices.

7.2.Safety Instructions



There is still possible high voltage inside of the UPS even disconnect all connection.

Please start the UPS by checking the safety and usage instructions in the manual. Please follow all safety and warnings for electrical connections as described below. Installation, commissioning, service and maintenance must be done by technical service personnel or authorized personnel.

- Please carefully review the quantity and material integrity specified in the shipping document. Any defect, damage etc. cases, contact our technical service or your supplier. In case of any defects, damage etc., please contact our technical service or your supplier.
- Do not open the product door without technical service assistant.
- The AC/DC electrolytic capacitors in the UPS have high voltages that will cause serious injury. This voltage will be discharged after a while (2-3 minutes) after the circuit breakers are turned to the “OFF” position.

- The circuit contains a high voltage battery pack that causes serious injury. Even the circuit breaker must be set to "OFF"; Potentially dangerous voltage is still present at the input terminal of the battery.

7.3. Transporting & Shifting



Please check capacity of sufficient floor and elevator / crane to avoid causing serious injury in case falling tipping etc.

- Please ship the UPS in original packing against shock, damage etc. during transportation.
- Please do not forget to take the necessary precautions to prevent damage to the UPS cabinet during lifting.
- Please move the UPS in an upright position with respect to the center of gravity. Sideways movement may damage the UPS due to heavy materials inside.
- Excessive vibration and splash may damage the UPS during transportation.
- Please do not move the UPS by pulling or pushing it from its packaging. Always use forklift, crane or pallet truck to transport.
- If the UPS is to be lifted by crane, use the appropriate distribution bar or lifting strap.
- Never expose the UPS directly to water, even if it is packaged during shipping.
- Do not bend the UPS more than +/-10° during transportation, otherwise it may fall and cause injury.
- Do not put other packages on the UPS package during transportation. Otherwise, the UPS may be damaged.

7.4. Storage

- Store the UPS in a dry place. The environment temperature should be in ideal storage temperature range (-25°C/+55°C).
- Optimum storage temperature range for battery is -20°C/+25°C and the battery will be damaged beyond -20°C/+40°C range.
- If the UPS will be stored for a period more than 3 months, then the batteries (over time depending on storage temperature) must be recharged periodically.

7.5. Installation Location

- There may be condensation in the UPS due to the humidity caused by the temperature difference. In this case, wait 2 hours before installation to adapt the UPS to the environment.

- Do not keep explosives and materials that may be affected by heat in the same area as the UPS.
- Objects that may be affected by the magnetic field should be kept at least 1m away from the UPS.
- The area that UPS placed should be open and have free space (min 100mm). Do not install the UPS to the places that receive direct sunlight, next to the radiators, humid/damp areas and close with conductive materials.
- Do not block the ventilation fans and other openings.
- Foreign objects should never be inserted into the UPS.
- The UPS must be protected against ingress of water or other liquids.

8.TROUBLE SHOOTING

PROBLEM	DESCRIPTION	SOLUTION
No measurement, No LED light, no warning tone even though system is connected to mains power supply	-No input voltage connection, -Power Supply PCB fail	-Check building wiring socket outlet and input cable. -Check power supply pcb output dc values.
SYNCH. ERROR	Synchronization problem between device bypass input and output	-Check building wiring socket outlet and input cable. -Check bypass monitoring cable sequence (Ph-N) is true.
DC BUS OUT OF LIMIT	DC BUS voltage is out of the acceptable levels	-Check Rectifier is operating or not. -If rectifier operates, check your battery level is suitable range or not.
BYP. OUT OF LIMIT	Bypass voltage is out of the acceptable levels	-Check your bypass voltage with a voltmeter if it is in true range. -Check bypass monitor cable connection is in true way or not.
INPUT BREAKER OFF	Input mcb of the device is tripped or off	-Check input MCB is OFF. If not, you may have wrong MCB aux connection.
BYP. BREAKER OFF	Bypass mcb of the device is tripped or off	-Check bypass MCB is OFF. If not, you may have wrong MCB aux connection.
OUTPUT BREAKER OFF	Output mcb of the device is tripped or off	-Check output MCB is OFF. If not, you may have wrong MCB aux connection.
OVER LOAD	It indicates the IGBT is overloaded	-Check you output if it has any short circuit or huge load which is out of the rated range of device.
IGBT FUSE FAIL	It indicates the IGBT fast fuse is blown	-Try to make ON inverter via LCD menu, if it indicates again, it means you have an IGBT or IGBT fuse failure, you need to repair shutdown and repair UPS.
FAN FAIL	Fan abnormal	-Check the FAN is working or not. Fan may failed and then overtemperature was occurred. Replace FAN with new one, if it is not working.
OUTPUT HIGH/LOW	Inverter output voltage has long deviation.	-Check the output voltage of inverter. Short circuit or wrong connection may cause to this indication. OR one of

		output loads has oscillating characteristic, find the oscillating load and remove it from the system.
MAINTENANCE	-It indicates when the maintenance switch is activated.	-Check maintenance switch position. If it is ok, you may have a failed AUX connection.
OVER TEMP.	-it indicates if 70C thermostat activated.	-Check the real heatsink temperature. Run the ups again, if it appears again in a short time, it means 70C thermostat is failed. In Maintenance mode, you can replace 70C thermostat.
INVERTER FAIL	-it indicates as commonly if inverter shutdown with any fail.	-Check other leds to understand what caused to shutdown of inverter.