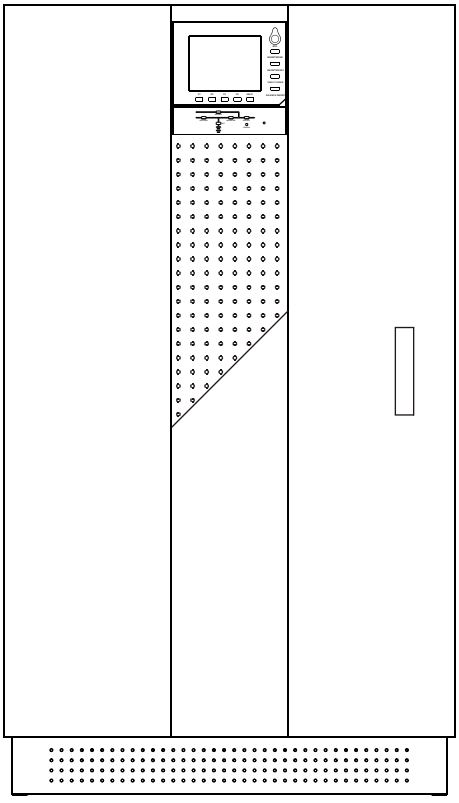
Three phase Input/Three phase Output

Uninterruptible Power Supply

User Manual



PP-EP10~PP-EP80

Foreword

Welcome to use our product, please read this manual thoroughly. It includes instructions of safety installation and operation about three-phase in and three-phase out UPS. Its installation and maintenance must be performed by qualified engineer authorized by manufacturer or agent. The UPS is designed only for commercial or industrial use, not allowed to power life support equipment. It is without warranty of the damage caused by deregulation.

Note: It is subject to make changes to the product described in this manual at any time and without prior notice for reasons of improvement. Please contact us for latest information.

Content

Functions and characteristics

1. Full digital

   Full digital technology based on double DSP, eliminate the zero drift commonly by analog, make it easy to update and maintenance; convenient to use modern control methods; advanced logic management; provide rich interactive interface

2. Reliability

   High reliability Thyristor phase-controlled rectifier, IGBT module based full-bridge inverter; inverter isolation transformer; the battery is directly connected to DC BUS, which achieves zero transfer time from utility to battery; SCR based static switch achieves zero transfer time from inverter to bypass and vice versa

3. Excellent input and output characteristics

   Input power wall-in, benefit the connection of generation and power transfer generator power limit mode, Wide input voltage range, compliant to most voltage standard: 380V/400V/415V 50Hz/60Hz; Output PF 0.9(lag);

4. Professional battery management（PBM）

   Intelligent auto transition between equalizing charge and floating charge;
   Battery backup time prediction, Periodic self-test; lengthen battery life

5. N+X parallel mode

   Only connect the parallel cable and do some setting can achieve the parallel mode, the master can be set at will, when the master fault, one of the slaves will be master automatically . It can be connected in parallel eight units max..

6. Load Bus Synchronization（LBS）

   LBS realizes the synchronization of the two system, it provides high reliability of STS for the dual power supply system

7. Perfect protection

   Over voltage protection, over frequency protection, over-current protection, over bus voltage protection, over-temperature protection, auxiliary power supply failure protection, output overload protection, output short-circuit protection, emergency shutdown

8. Perfect monitoring

   RS232 and RS485, large-screen LCD panel;
   monitor section monitors the status of the UPS, transfers command, records failure events in the history record, and communicates with host computer

Safety instruction

This manual contains installation and operation, please keep it!

There is dangerous voltage and high temperature inside the UPS. During the installation, operation and maintenance, please abide the local safety instructions and relative laws, otherwise it will result in personnel injury or equipment damage. Safety instructions in this manual act as a supplementary for the local safety instructions.

1. There is high leakage current inside, so ground first before connecting to utility.
2. Though the utility isn‘t connected in, there is still AC voltage at output, so please open all the switches within the front panel when cut off the output of the UPS.
3. Please don’t open the cover of the UPS, there is risk of electric shock.
4. Battery replacement must be done by professional. The inside of the battery may contain the toxic ingredients, so the waster batteries should be sent to special department for appropriate treatment. Do not open or damage the battery. The short circuit is prohibited, or it may cause an explosion, fire and corrosion, which may do harm to the person.
5. When replacing the fuse, please use the fuse of the same specification.
6. All the internal maintenance must be done by the professionally trained person.
7. All the communication lines must use shielded cables to protect signals from the interference. In a residential environment, this product may cause radio interference, therefore some appropriate measures must be taken. For example, move the UPS for some distance to reduce the interference.

Storage

The storage place must meet the following requirements:

Temperature: 0℃～40℃(32℉～104℉)

Relative humidity: 95%

Installation environment

When select the installation room, please take note of the following:

1. The place must be dry, clean and well-ventilated.
2. Check whether the floor is strong enough to bear the weight of UPS and battery box.
3. Check whether the room is large enough for installation and maintenance.
4. When UPS is running, check whether the ambient temperature is between 0℃～40℃.
5. The recommended temperature is between 20℃～25℃. The operating life of the battery will decreased due to the increasing temperature. The temperature rises 10℃, the life will be half.
6. Don't place the machine directly in sunlight or near the heat source.

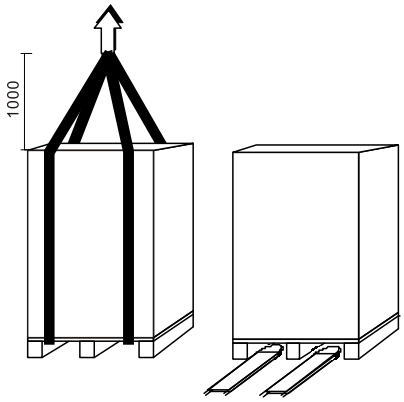
In order to meet the above requirements, it is necessary to eliminate the heat dissipated by UPS, two methods can be used:

Natural ventilation

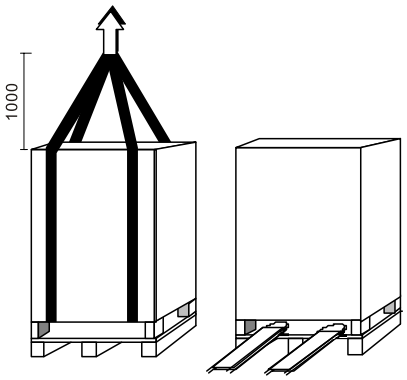
Forced cooling (air conditioner system)

Installation preparation

1. Remove the packaging carefully, don't damage the original packaging, check if the machine is damaged in transit. If it is found damaged, please don’t start the machine and notify the carrier and dealer.
2. Check if the equipment is just the right type you ordered.



Please carry it in an appropriate way



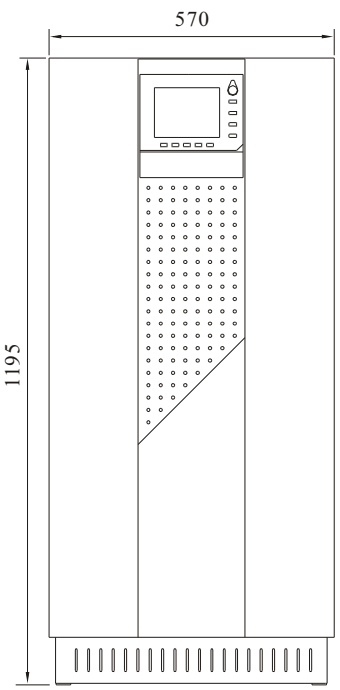
Unloaded from the pallet

Placement

When placing the UPS, keep in mind the following points:

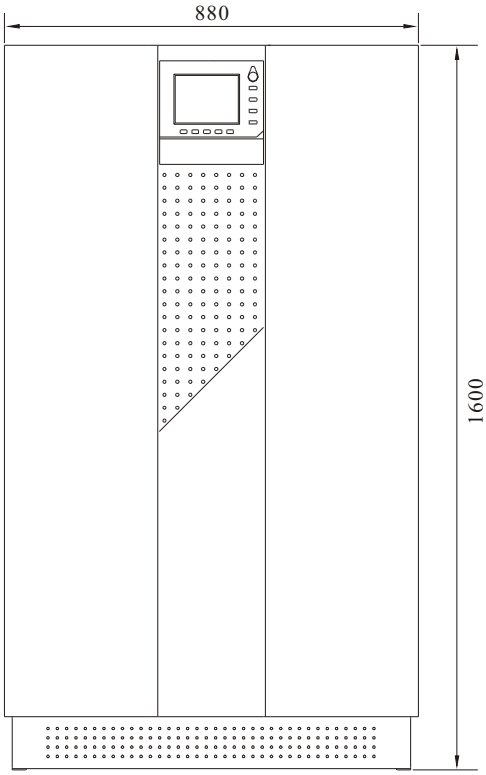
1. Leave at least 1m of unobstructed space in front of the machine for maintenance.
2. Leave at least 50cm of unobstructed space at the back of machine for properly ventilated.
3. Leave at least 20cm of unobstructed space both the two sides of the machine for maintenance.
4. Do not rest any object on top of the UPS.

10-40K

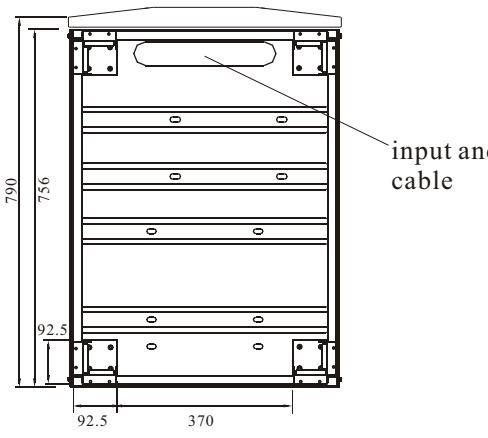


Front view

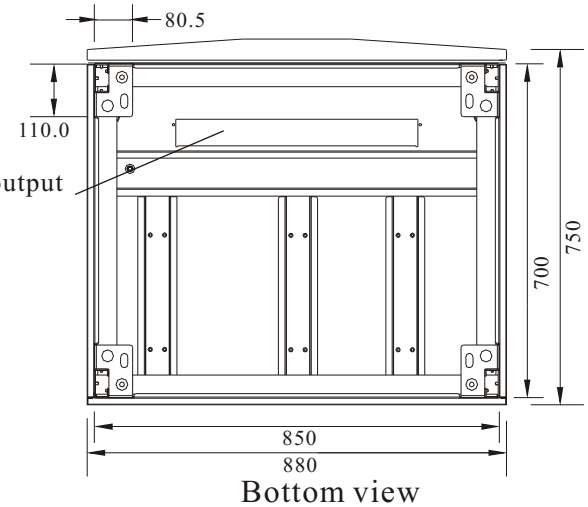
60-80K



Front view



Bottom view



Bottom view

Unit: mm

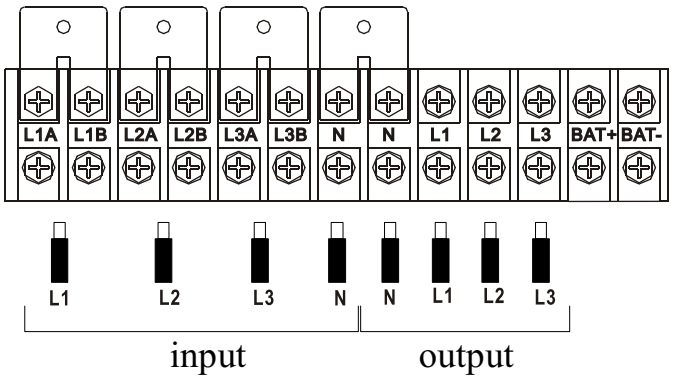
Connection

Only both the UPS is disconnected from the utility and the switch is off, can the connection be performed. Remove the switch panel.

The first step: connect the ground wire to the grounding bar

MAINS and LOAD CONNECTION

10-80KVA(MAINS and BYPASS line TOGETHER)



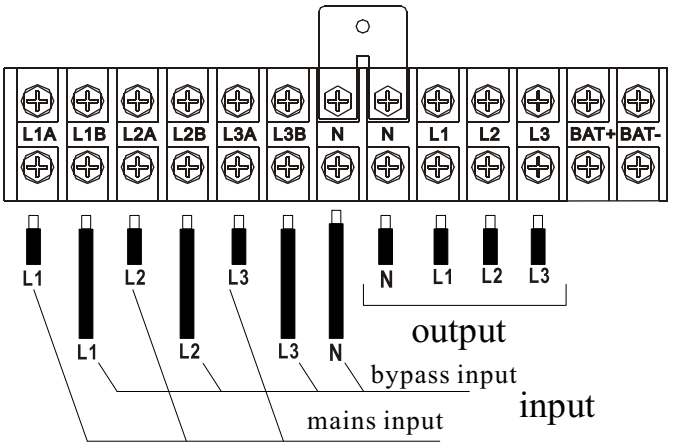
L1A, L2A, L3A, N: mains input
L1B, L2B, L3B, N: bypass input
LxA=LxB, mains input and bypass input have been connected

For input and output wire size, please refer to the table (maximum size in bracket)

	size(mm^2)		
	Input	Ground	Output
kVA	L1/L2/L3/N	PE	L1/L2/L3/N
10	6(10)	6(10)	6(10)
15	6(10)	6(10)	6(10)
20	10(16)	10(16)	10(16)
30	16(25)	16(25)	16(25)
40	25(35)	25(35)	25(35)

	size(mm^2)		
	Input	Ground	Output
kVA	L1/L2/L3/N	PE	L1/L2/L3/N
60	35(50)	25(35)	35(50)
80	35(50)	25(35)	35(50)

10-80KVA (mains and bypass line separate)



L1A, L2A, L3A, N: mains input
L1B, L2B, L3B, N: bypass input
The connection between LxA and LxB has been removed

Startup process

After complete the connection and checking, make sure the input switch of UPS is closed.

Warning:

There may be voltage present at the output during the following operation. Please open the switch connected to the load if necessary.

1. Close the SWBY and SWOUT of the UPS.
   The LCD begins to run. When the UPS starts, it will work in bypass mode at first. Now, the status of led indicators is as following: bypass led (BYPASS) and load led (OUTPUT) light green, battery led (BAT.) lights red, warning led (STATUS) lights yellow.
2. Close the SWIN
   The rectifier starts, its led (RECTIFIER) blinks in green. About 15 seconds later, the rectifier begins to work normally, and the green led lights.
3. Check the DC bus voltage and polarity of the battery, then, close the external battery switch.
4. When the system detects the presence of the battery, the red battery led (BAT.) extinguished.
5. Check and open the internal maintenance bypass switch (SWMB)
6. Press the button INVERTER ON and hold it for at least 2 seconds.
   The inverter begins to start, when inverter synchronizes to bypass, the inverter led (INVERTER) blinks. When the inverter starts, UPS transfer to inverter mode from bypass mode. Now, bypass led (BYPASS) extinguished and the inverter led lights green.
7. Make sure that there is no alarm message displays in LCD screen, and the led status is as follows: RECTIFIER/INVERTER/OUTPUT light green, the others extinguished.

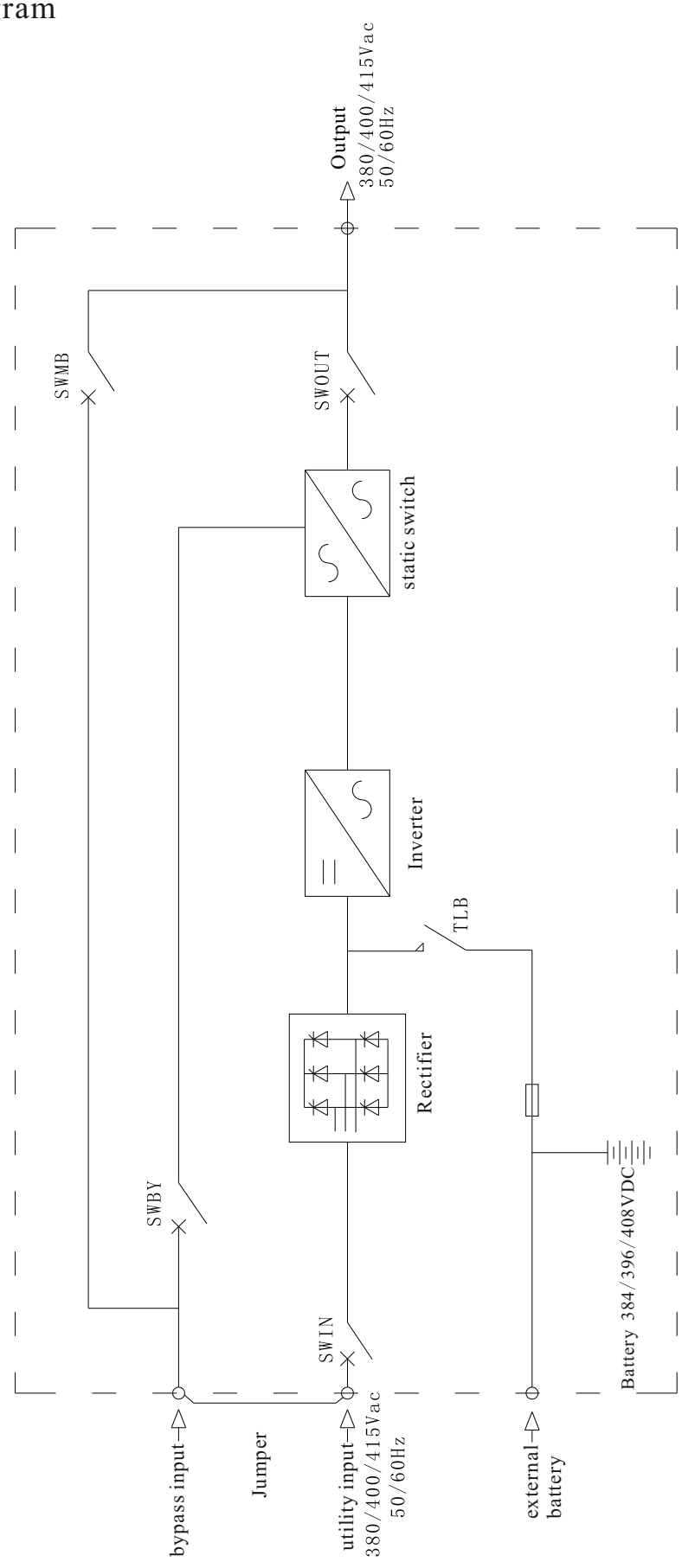
Internal protection

The specifications about the fuses and switches installed in the input and output lines are as follows, a fuse must be replaced of the same type.

	Breaker		Switch	Fuse
[KVA]	SWIN	SWBY	SWOUT	Battery fuse
10	40A（3P）C	40A（3P）C	32A（3P）	63A/660V(aR)
15	40A（3P）C	40A（3P）C	32A（3P）	63A/660V(aR)
20	63A（3P）C	63A（3P）C	32A（3P）	63A/660V(aR)
30	80A（3P）C	80A（3P）C	63A（3P）	120A/660V(aR)
40	80A（3P）C	80A（3P）C	63A（3P）	140A/660V(aR)
60	125A（3P）C	125A（3P）C	100A（3P）	140A/660V(aR)*2
80	125A（3P）C	125A（3P）C	100A（3P）	140A/660V(aR)*2

Modes of operation

Block diagram



Rectifier

Represent the input stage, perform the AC/DC conversion, the functions are as follows:

1. Power the inverter with DC
2. Charge the battery automatically

External battery

When there is no power input, the battery provides power to load.

Inverter

Represent the output stage, convert the DC voltage from RECTIFIER or BATTERY to sine AC voltage.

Static switch

It is an automatic or manual switch. It is used to transfer from the inverter mode to bypass mode or vice versa.

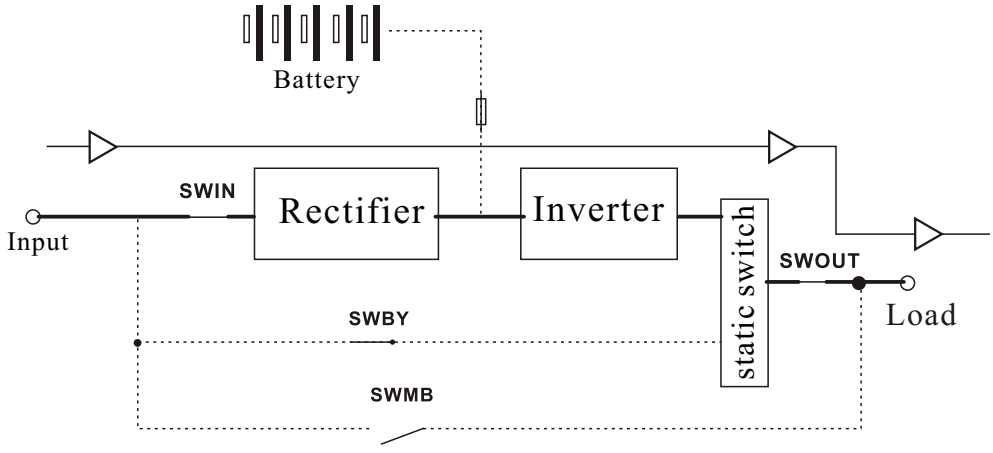
Manual maintenance bypass switch (SWMB)

This switch is only for maintenance, when it closed, the load is directly powered by mains. With the SWMB closed and the other switches open, no voltage inside the equipment (voltages are present only at the input and output terminals and switches area).

Note: the neutral is not interrupted

LINE MODE

The mains power is present, the SWIN, SWBY, SWOUT are closed, the SWMB is open.

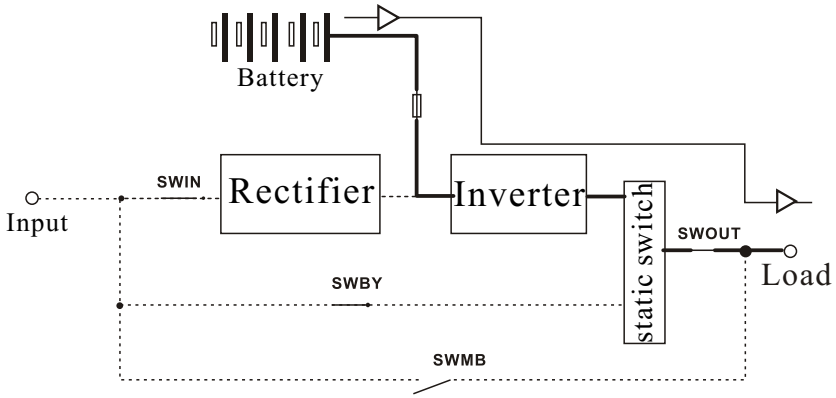


The load is powered by inverter. The rectifier converts the AC voltage to DC voltage to power inverter and charges the battery. The leds of RECTIFIER, INVERTER and OUTPUT are lit green.

Note: when the mains power failure, the load remains to be powered by UPS, using energy from the battery.

BATTERT MODE

Mains power is off, the SWIN, SWBY and SWOUT are closed, the SWMB is open.



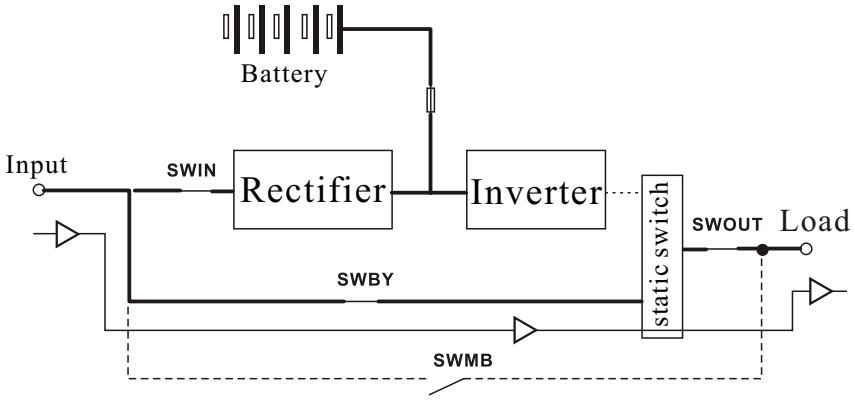
If the mains power is off or out of range, battery discharges to provide power to load. The green led of BAT., INVERTER and OUTPUT on the front panel are on, STATUS is on, and the buzzer alarms.

Note:

When the battery voltage drops below the pre-alarm value, the led BAT. will blink, now, save the data under this condition. The battery will run out and UPS cuts off its power to load if mains power remains off.

BYPASS MODE

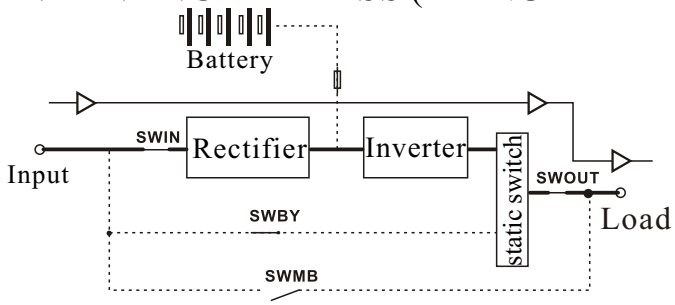
Mains power present, the SWIN, SWBY, SWOUT are closed, the SWMB is open.



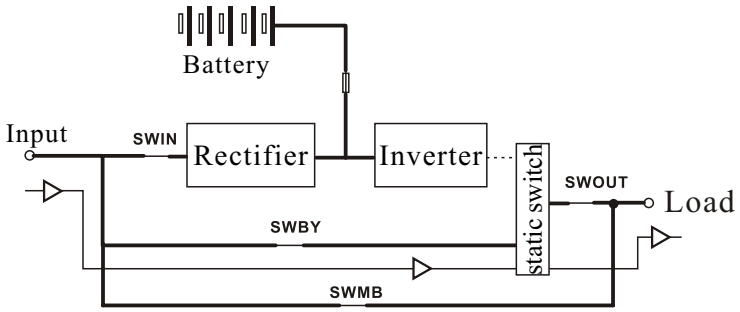
If the inverter fails or over-load, and the inverter is synchronous with the bypass, the static switch will be activated, the inverter mode will be transferred to bypass mode without interruption. If asynchronous, the output will be interrupted when transfer. The led of the BYPASS and OUTPUT are on, STATUS led is on. The buzzer alarms.

Note: In case of over-load, reduce the load to the permitted range, then UPS will be back to inverter mode, otherwise, the load will not be protected by UPS.

MAINTENANCE BYPASS (MANUAL BYPASS)

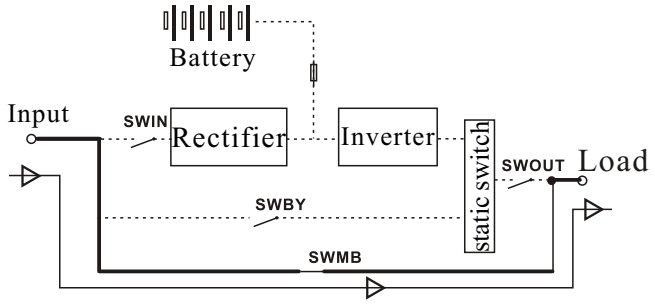


Status a. normal operation



Status b

1. Press the button "INVERTER OFF" on the control panel. The inverter will be off, and the load will be powered by bypass. The inverter LED will be off, alarm LED will be on.
2. Close switch SWMB
   The maintenance bypass is connected to the static bypass in parallel. The operation message will be show on the LCD.
3. Open the output switch (SWOUT), the load is fed directly by maintenance bypass. If it is necessary to turn off rectifier and battery, please go on the following steps:
4. Press the button "EPO" on the front panel for at least 2 seconds.
   It will turn off the rectifier, inverter, static switch and battery contactor.



Status c

Open the input switch (SWIN) and bypass switch (SWBY)

When finishing the maintenance, close the SWIN, SWBY and SWOUT to restart the UPS.

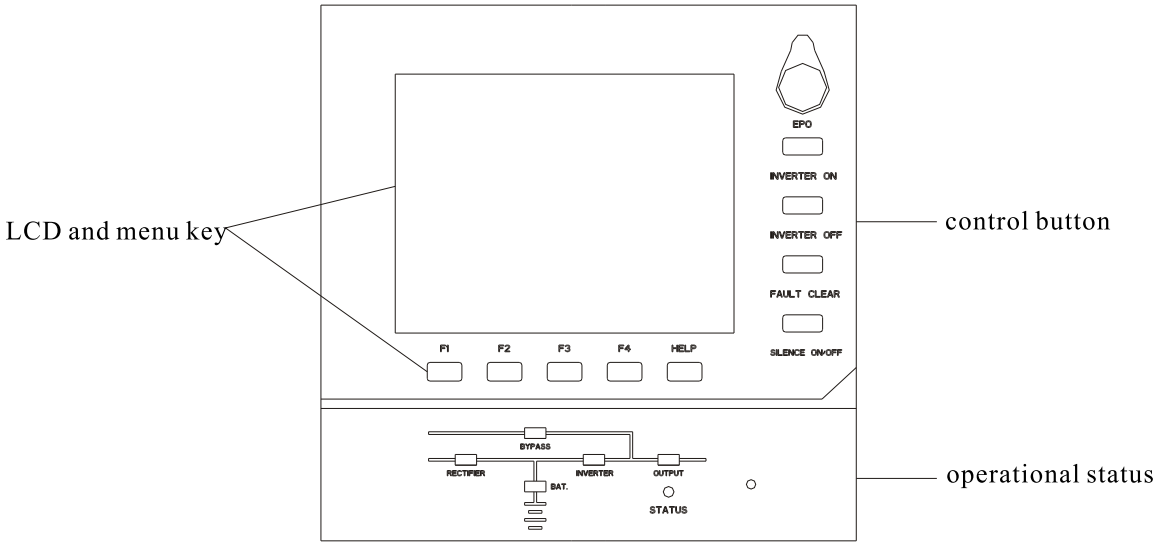
Press the button "FAULT CLEAR" to exit EPO command. Turn off SWMB, press the "INVERTER ON" button on the control panel for more than 2 seconds to get the UPS back to normal operation.

Technical Specification

Three-phase input three-phase output							
Rated capacity(VA)	10KVA	15KVA	20KVA	30KVA	40KAVA	60KVA	80KVA
Active power(W)	9KW	13.5KW	18KW	27KW	36KW	54KW	72KW
INPUT							
Voltage Range	380/400/415Vac (-25%～+20%) three phase						
Frequency Range	50/60Hz±5Hz auto identification						
Power Factor	＞0.8(no filter) ＞0.9(with filter)						
OUTPUT							
Voltage Range	380/400/415Vac ±1%						
Rated output current	15A	23A	30A	45A	60A	90A	120A
Frequency	Auto learning						
Frequency stability(battery mode)	50/60Hz±0.05%						
Wave form	Sine wave						
Power Factor	0.9(lag)						
Total harmonic distortion	＜3% (linear load) / ＜5%(nonlinear load)						
Overload capacity	105%≤60min <110% / 110%≤10min<125%						
Crest Factor	3：1 (max)						
Efficiency	88%	89%	89%	90%	90%	91%	91%
Transfer time							
Line mode? Battery mode	0ms						
Bypass							
Rated voltage	380/400/415Vac (three phase four wire)						
Voltage protection range	-40%～+20%						
Rated frequency	50/60Hz						
Frequency protection range	±20%						
Transfer time	0ms/1ms						
Overload capacity(In)	15In, 10ms 5In, 5s						
Battery							
Voltage (VDC)	384VDC						
Panel							
LED	input, inverter, bypass, battery and output						
LCD	input and output voltage, frequency, power factor, battery voltage, battery current and status, load percentage, UPS status, history record, setting						
Communication							
interface	Dry contact, RS232, RS485, SNMP card slot						
Working environment							
Running Temperature	0～40℃						
Relative humidity	0～95% (without condensing)						
Storage temperature	-25℃～55℃						
Noise at 1	＜63dB					＜67dB	
Optional Harmonic Filter, SNMP adapter, Bypass current-sharing inductor							

Control Panel

The control panel is located on the front door. It is possible to obtain operation status parameters, history records, warning information and enter commands.



The operation panel can be divided into three areas: running state area, LCD and menu key, control buttons.

The LED shows the operational status and warning information of UPS.

LED	STATUS	DESCRIPTION
RECTIFIER	Green on	rectifier works
	Green blinks	Mains is normal, rectifier doesn't work
	Red on	Rectifier fault
	off	Mains is abnormal, rectifier doesn't work
INVERTER	Green on	Inverter output
	Green blinks	Startup, synchronization, or standby status (ECO mode)
	Red on	Inverter fault
	off	Inverter doesn’t work
LOAD	Green on	UPS output
	Red on	Output over load
	off	No output
BYPASS	Green on	Bypass output
	Red on	Bypass power abnormal or out of range, or bypass switch fault
	off	Bypass normal, no bypass output
BAT. (Battery)	Green on	Battery supply power to load
	Green blinks	Battery discharge to end
	Red on	Battery abnormal (battery fault or no battery)
	off	Battery normal, in charging
STATUS (Warning)	Green on	UPS normal
	Yellow on	UPS warning
	Red on	UPS fault

Buzzer alarm

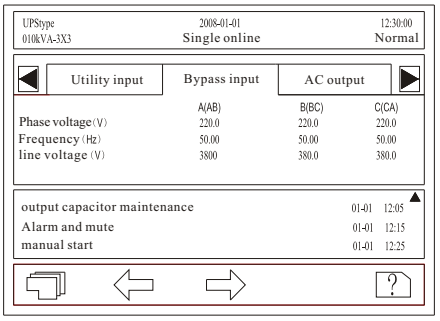
Short single-beep	Press any function key
Beep once per second	UPS alarming
Continued beeping	UPS fault

Control button

EPO	Cut off the output, the rectifier, inverter, static switch and battery stop working
INVERTER ON	Inverter is activated
INVERTER OFF	Inverter is off
FAULT CLEAR	UPS reset
SILENCE ON/OFF	Turn on/off the buzzer

Note: EPO will cut off the output, no power to load.

LCD and menu



system information

Menu

Data

current record

explanation on menu

menu key

F1: switching window or exit

F2: to the left or up

F3: to the right or down

F4: Confirm

HELP : Help

Detailed LCD menu

① System information: the basic information about UPS, including time, date, UPS model and its configuration and status. For example:

NO.	CONTENT	DESCRIPTION
1	UPS type	the name and the model of the UPS
2	2008-01-01	date
3	12:30:00	time
4	010kVA-3X3	010KVA: the capacity of the UPS is 10KVA 3x3: three phase input three phase output
5	Single on-line	Configuration: single on-line, parallel system, single ECO
6	Normal status	Status: normal, warning, fault

②Menu bar ③UPS data

Menu bar displays the menu name in the UPS data area, UPS data area shows the related contents about the selected the menu.

NO.	MENU	ITEM	DESCRIPTION
1	Mains	L－L voltage (V)	Mains input line voltage
		L－N current (A)	Mains input phase current
		Frequency (Hz)	Mains input frequency
2	Bypass	L－N voltage(V)	Bypass input phase voltage
		Frequency(Hz)	Bypass input frequency
		L－L voltage(V)	Bypass input line voltage
3	Output	L－N voltage(V)	UPS output phase voltage
		L－N current(A)	UPS output phase current
		Frequency(Hz)	UPS output frequency
		L－L voltage(V)	UPS output line voltage
		Power factor	UPS output power factor
4	Load	Sout (KVA)	Apparent power at output
		Pout(kW)	Active power at output
		Qout(KVAR)	Reactive power at output
		Load level（%）	Load percentage at output
		Crest factor	Crest factor of load current
5	System	Sout (KVA)	Apparent power at output (parallel)
		Pout(kW)	Active power at output (parallel)
		Qout(KVAR)	Reactive power at output (parallel)
		Single system, no parallel data	When single, no parallel data
6	Battery	Battery voltage(V)	Battery voltage
		Battery current(A)	Battery current
		Battery temperature(℃)	Battery temperature(℃) (optional)
		Remain time (Min.)	Estimation of remaining time
		Battery float charging	Battery status
7	Records	No battery 2008-08-01 11:30:00 2008-08-01 11:30:15 Bypass mode 2008-08-02 11:45:00 2008-08-02 11:50:00	At most, 512 history warning records can be displayed. They can be scroll-displayed in LCD.

NO.	MENU	ITEM	DESCRIPTION
8	Language	中文 English	中文（Chinese） or English can be chosen. Keys F2, F3，F4 to select the menu, key F4 to confirm.
9	Settings	Display contrast	Adjust the LCD display contrast. Use the F1, F2, F3 to select this menu, press F4 to confirm. Use the F2 and F3 to select the needed value, then, press the F4 to confirm.
		Date format set	Select the date format: Y/M/D, D/M/Y, M/D/Y. Use the F1, F2, F3 to select this menu, press F4 to confirm. Use the F2 and F3 to the format, then, press the F4 to confirm.
		Date & time	Set the date(in accordance with the date set above) and time.(24 hours). Use the F1, F2, F3 to select this menu, press F4 to confirm. Use the F2 and F3 to input the needed value, then, press the F4 to confirm.
		Comm1 baud rate Comm2 baud rate Comm3 baud rate	Set the baud rate of the three communication port: 9600 (default) 4800 2400 Use the F1, F2 and F3 to select the port and set the baud rate, then, press the F4 to confirm.
		Communication address	RS485 setting, parallel mode only
		Communication mode	Set the communication mode, the default is RS232(Modem is optional)
		callback times	Set the failure call-back times
		Phone No. 1 Phone No. 2 Phone No. 3	phone No. setting for modem only
		Command password	Command password setting. Keys F1 ,F4 to enter the setting, Keys F2 and F3 to input code, key F4 to confirm. It should enter the old code first, then set a new one.

NO.	MENU	ITEM	DESCRIPTION
10	Command (*)	Battery maintenance test	Start the battery maintenance testing manually. The battery will be partly discharged to assess the battery capacity. Testing can be done only under 20%-80% load, and battery must have be kept float charging for more than 5 hours. Use the F1, F2, F3 to select the required testing, press the F4 to confirm. Use the F2 and F3 to input the code, then, press F4 to start.
		Battery capacity test	Start the battery capacity testing manually. The battery will be fully discharged to assess the battery capacity. Testing can be done only under 20%-80% load, and battery must have be kept float charging for more than 5 hours. Use the F1, F2, F3 to select the required testing, press the F4 to confirm. Use the F2 and F3 to enter password, then, press F4 to start.
		System test	Start the system testing (self-test). 5 seconds later, LCD will display the testing result: system normal, fault or warning
		Stop testing	Stop the battery maintenance testing, capacity testing and system testing manually
		Freshening charge	Start battery freshening charge. Use the F1, F2, F3 to select the function, press the F4 to confirm. Use the F2 and F3 to enter code, then, press F4 to start.
		Stop freshening charge	Stop freshening charge of battery manually
11	Version	UPS model	UPS model, e.g. 380-50Hz
		Monitor version Rectifier version Inverter version	The software version of monitoring, rectifier, inverter
NOTE: It is required to enter password when operation. The initial is 12345. Please enter the "settings**"→"command code" to change the password. If the code is lost, please contact customer service center.**			

④Record

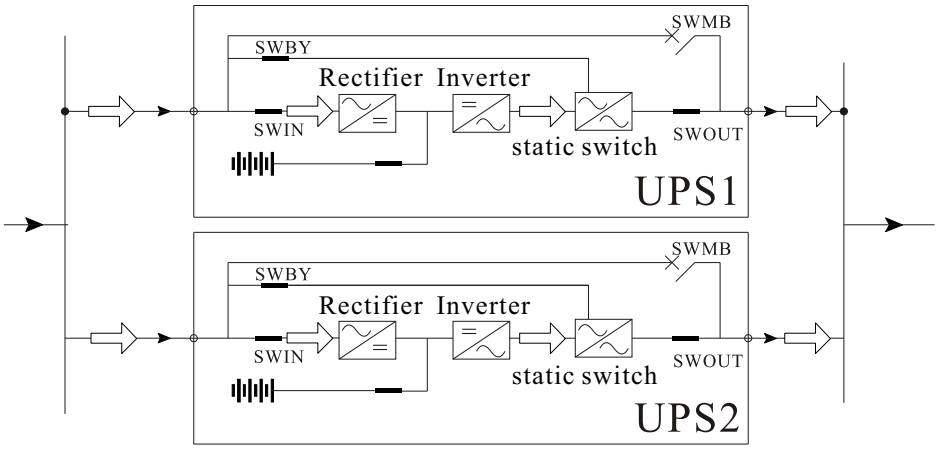
The record displays the latest the warning data. Use the F1, F2 and F3 to get the complete history record, please refer to history record in the above table.

⑤ Menu key explanation

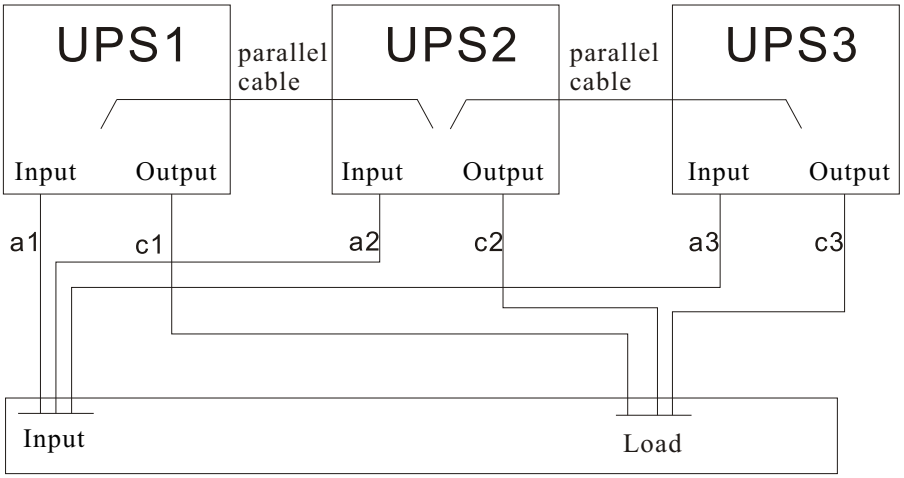
Explain the menu key function in the current specific window in the form of symbol.

Appendix

Parallel operation



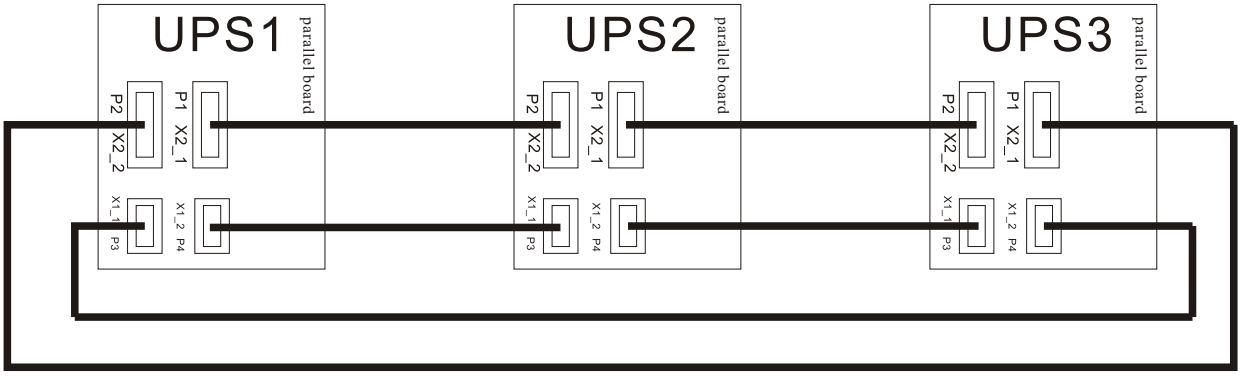
parallel connection diagram



input and output cable connection diagram

the length of the input and output wire is nearly the same，for example:

A1=a2=a3, c1=c2=c3 or a1+c1=a2+c2=a3+c3

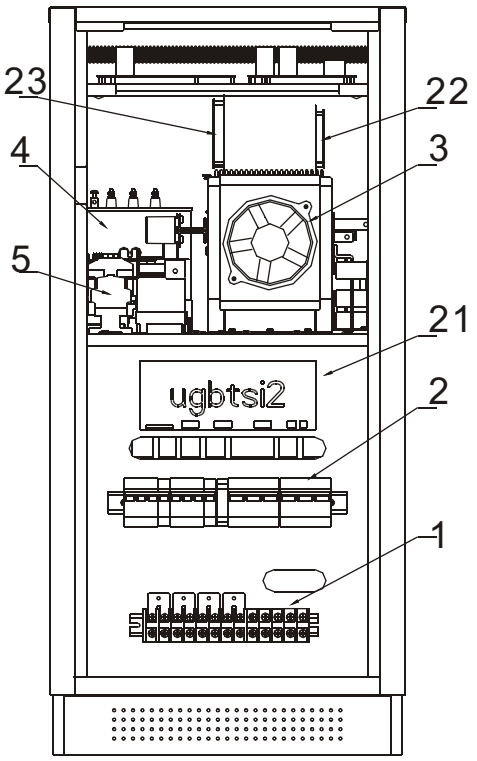


parallel connection diagram

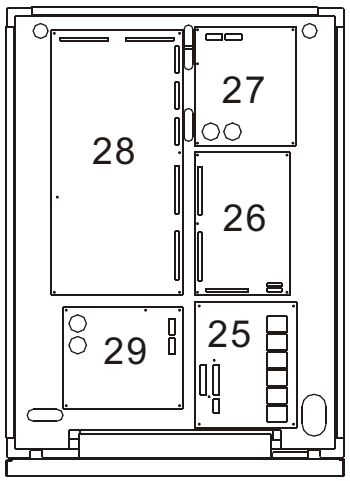
The two parallel cables from the parallel boards X1-1and X2-2 of one UPS are respectively connected to the parallel boards X1-2and X2-1 of the next UPS.

Appendix

Structure



front view

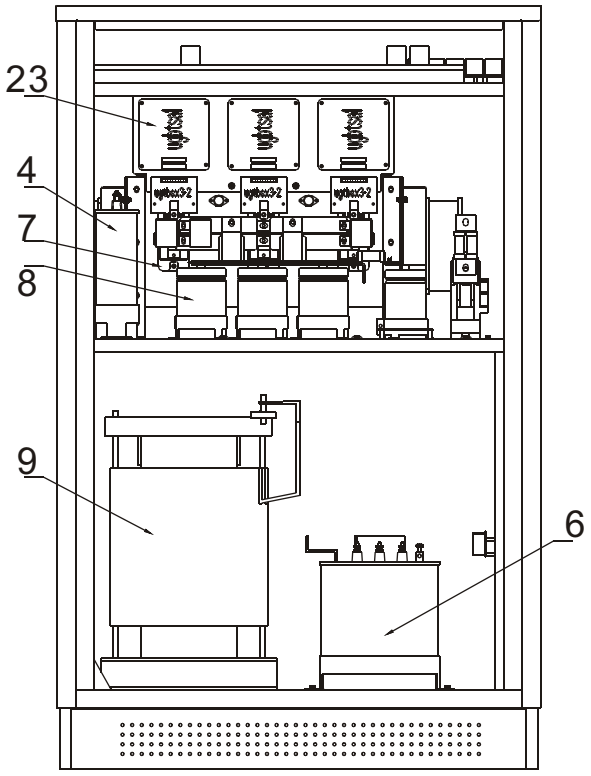


top view

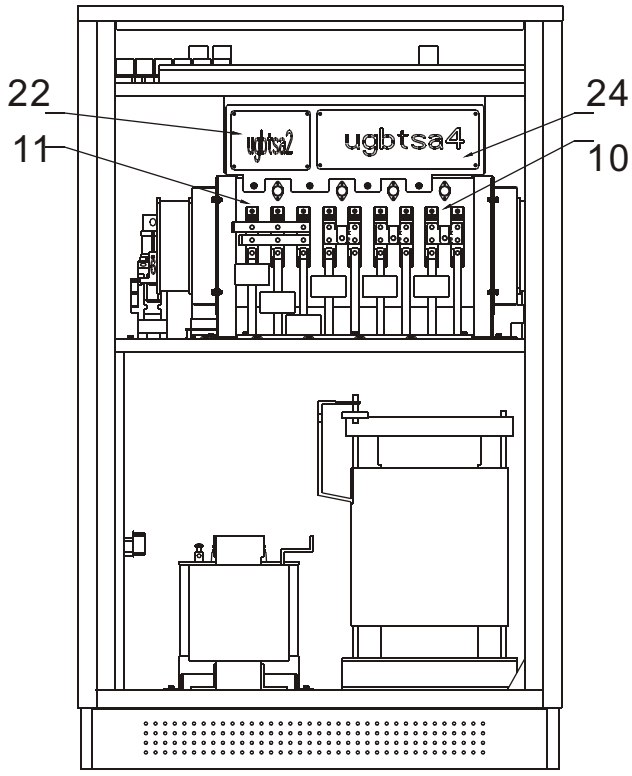
10-40KVA

1. termimal
2. switch
   (SWIN,SWBY,
   SWOUT,SWMB)
3. fan
4. AC cap.
5. battery contactor
6. inductor
7. INV.(IGBT)
8. DC bus
9. transformer
10. STS
11. rectifier

21. singnal protection board
22. REC. driver board
23. INV. driver board
24. STS driver board
25. parallel board
26. DSP boad
27. power supply board
28. signal detection board
29. power supply board(reserved)



left view

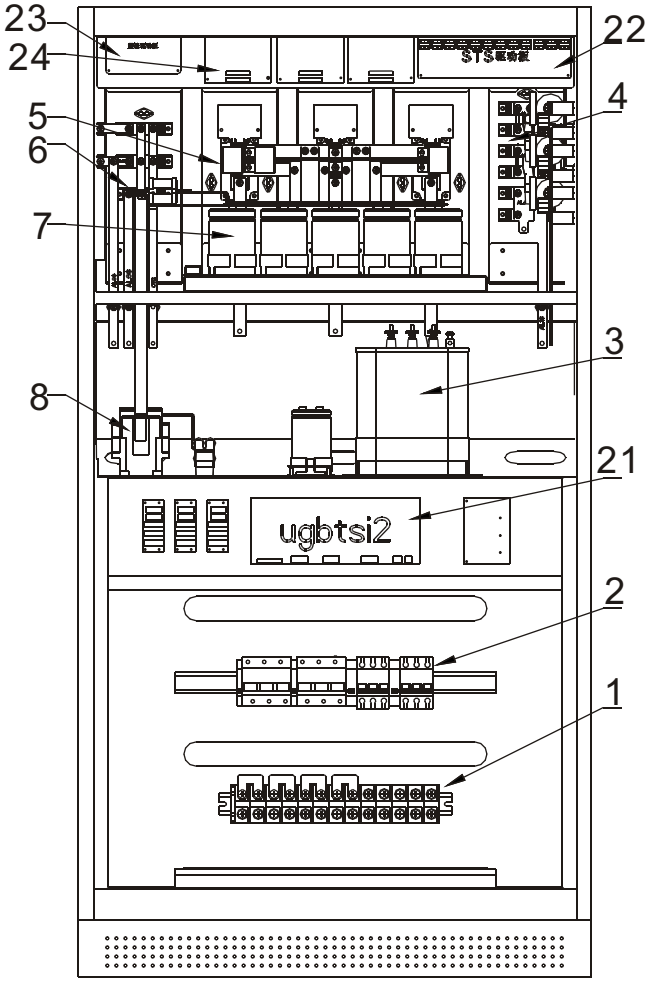


right view

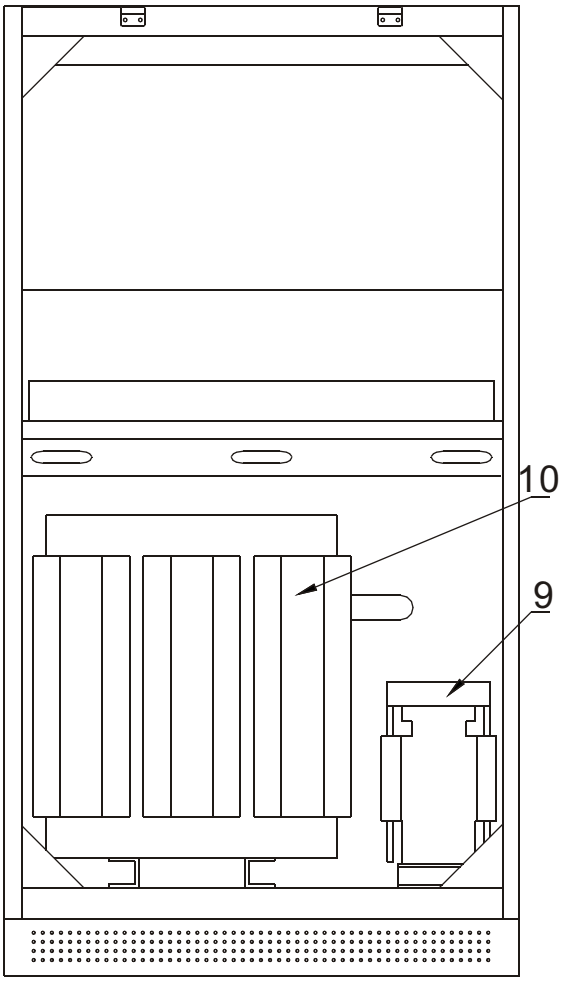
Appendix

Structure

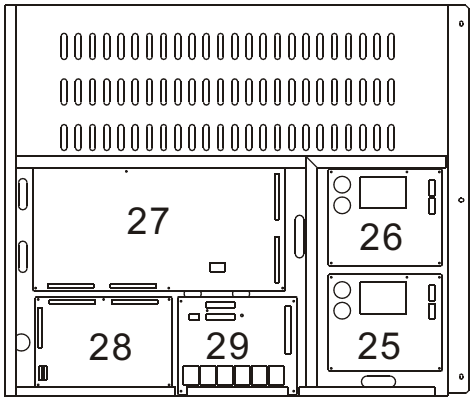
60-80KVA



front view



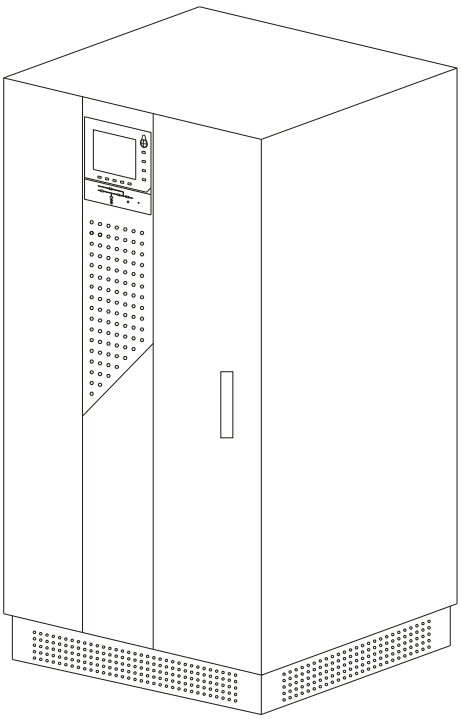
back view

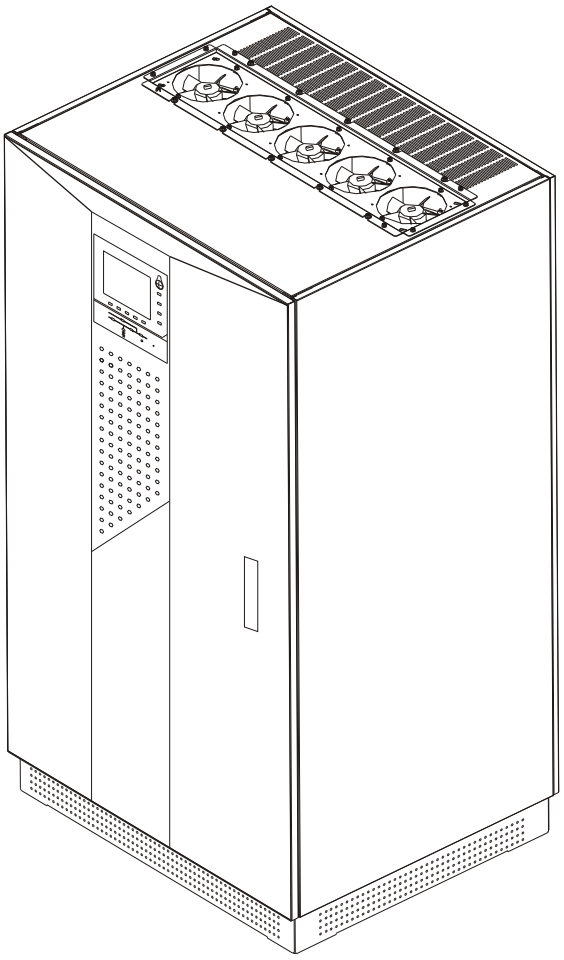


internal panel

1. termimal
2. switch (SWIN,SWBY, SWOUT,SWMB)
3. AC cap.
4. STS
5. INV.（IGBT）
6. Rectifier
7. DC bus
8. battery contactor
9. Inductor
10. transformer
21. singnal protection board
22. STS driver board
23. REC. driver board
24. INV. driver board
25. power supply board
26. power supply board (reserved)
27. signal detection board
28. DSP board
29. parallel board

dimension





three phase output

P	Phase		Dimension [mm]		
KVA	Input	Output	L/W	P/D	H
10	3+N	3+N	570mm	800mm	1195mm
15	3+N	3+N	570mm	800mm	1195mm
20	3+N	3+N	570mm	800mm	1195mm
30	3+N	3+N	570mm	800mm	1195mm
40	3+N	3+N	570mm	800mm	1195mm
60	3+N	3+N	880mm	760mm	1600mm
80	3+N	3+N	880mm	760mm	1600mm