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Introduction

Thank you for choosing our high technology C1 Series™ uninterruptible power supply. Product you purchased was manufactured as per ISO9001 quality assurance system using most advanced technology.

In order to get highest efficiency from your product and to ensure a safe use, we recommend that you strictly read and retain this user's manual for later reference. In addition, do not hesitate to contact your nearest authorized vendor or technical support center for more detailed information and/or assistance.

1. Overview

C1 Series **U**ninterruptible **P**ower **S**upply (UPS) is a high technology product that was manufactured to provide uninterruptible energy to fields including but not limited to industrial facilities, hospital, schools, banks, business centers, and computer and communication systems. You can use your device, which is equipped with static bypass system, all necessary protection systems and an online structure with all loads safely.

Because this device was designed double conversion online system basis, it supplies all connected loads with continuous voltage with stable frequency and stable amplitude. Therefore, no transition period is necessary when electric power is interrupted or recovered.

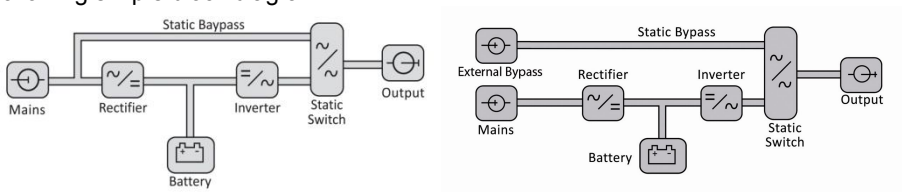
With deployment of a DSP (Digital Signal Processor) based microprocessor in its design, UPS output voltage is accurately controlled, thereby ensuring stable operation of devices that are sensitive to voltage fluctuations.

Static bypass unit of the system ensures that the mains voltage is constantly kept at backup. In case of an overload, this system takes over the load uninterruptedly. Once overload is recovered, load is transferred back to inverter. In addition, static bypass unit acts in similar way in cases of UPS failure and prevents power shortage at the system.

UPS will supply loads from the battery in cases of mains voltage outage. Loads are supplied from the battery for a backup time that varies depending on the capacity of batteries used. If mains voltage is recovered during the backup time, UPS will return to online mode automatically and continue supplying power to loads. Meanwhile, batteries are charged as well.

When UPS is connected to a computer system using any of a several communication options, all functions of the device can be monitored by means of designated software. Connecting to a remote device via modern is possible to transfer information on device related functions and problems.

System used in C1 series uninterruptible power supply is shown in the following simple block diagram.



Single Input **Dual Input**

Figure–1 UPS block structure

2. Safety

This user manual contains all information pertaining to transportation, installation and operation of C1 Series uninterruptible power supplies of 30-120 KVA power range.

2.1 Warnings

- Be sure to read this user manual thoroughly before operating you UPS system.
- Heed all warnings given in this user manual.
- Please apply all instructions in respective order.
- Device must be operated in vertical position in all cases.
- Do not expose device to rain or liquid spillage.
- Device must be installed and commissioned by an authorized service personal.
- Please do not remove device cover. There parts in device that not serviceable by the user. Contact a technical service unit in case of any failure.
- Do not operate the UPS in environments with temperature and/or humidity that exceed the temperature and humidity limits set forth in technical specifications section.
- Contact with batteries of the UPS is highly dangerous. Even all the switches are thrown off; there will be high voltage on battery contacts.
- Do not open the plastic cover of the batteries. Electrolyte liquid inside batteries is highly hazardous to skin and eyes.
- If connection of external batteries necessary, make sure only the batteries that are compatible with device are connected and that connection is made by authorized personnel only.
- Explosion Hazard: Do not litter batteries in fire.

2.2 Explanation of symbols used

DANGER! HIGH VOLTAGE

CAUTION

3. Installation

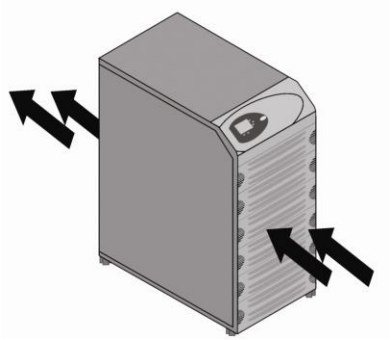
3.1 Choosing the right location

Uninterruptible power supplies are devices that consist of highly delicate circuits. Therefore, the environment to install and run UPS must be carefully analyzed and chosen.

- Uninterruptible power supply operates at temperatures between 0–40 °C. However, environment temperature must be maintained in the range of 20–25 °C so that the inner heat of the UPS can be adequately cooled down.
- Cooling devices that provide ample ventilation to keep environment temperature within the range given above must be utilized in installation environment. Power of the air conditioner required in installation environment is given below.

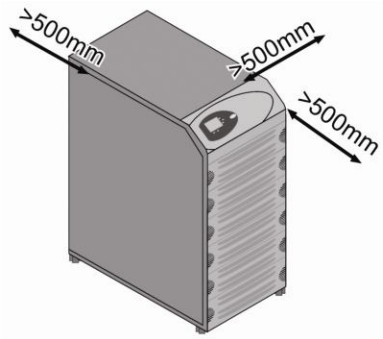
UPS Power (KVA)	30	40	60	80	100	120
Air Conditioner Power (BTUx1000)	9	11	15	19	24	30

Table–1 Air conditioner power for different UPS power



Figure–2 UPS' ventilation inlets and outlets

- UPS must be positioned so that the ventilation inlets/outlets shown on the figure are not blocked.



Figure–3 Distance to be observed around the UPS

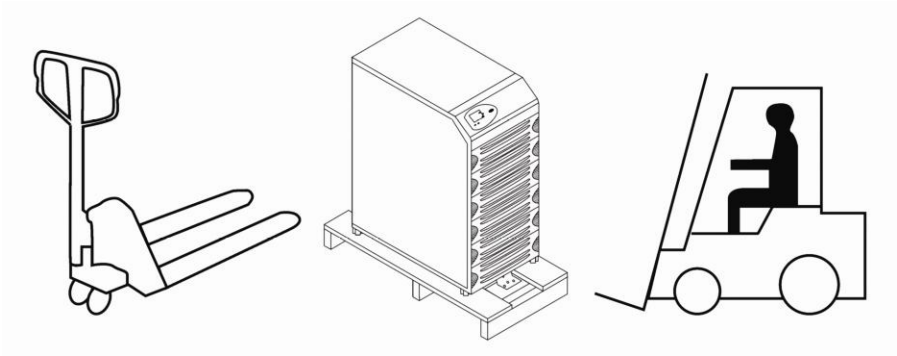
- Distance that must be observed around the UPS should be as indicated in the figure-3.

- Place the UPS so that it will not be exposed to direct sunlight or radiated heat.
- Environment to operate the UPS should be carefully chosen to ensure that it will not be any influence by dust, iron filings, oil, and miscellaneous manufacturing wastes.
- Operating environment should be free of flammable and caustic gasses such as hydrogen sulfur, sulfuric acid, chloride, ammonia, nitric acid, ozone, and hydrochloric acid and alike,.

Surface to set the UPS must be even and of a sound structure that can carry the device and –preferably, plastic coated.

3.2 Device transportation

- Carry the UPS to installation location along with the palette it was shipped on using a forklift or pallet jack.



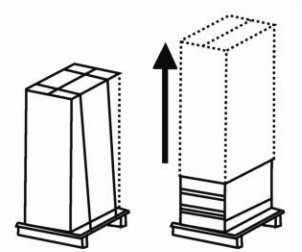
Figure–4 Transporting the UPS

Strictly, do not carry the UPS in horizontal position. UPS must be carried in upright (vertical) position only.

3.3 Unpacking and placing the UPS

If UPS shall be kept at the depot for a prolonged period of time, do not remove packaging until the installation.

- Cut the black protection band shown in figure and remove the nylon protective material inside the card box.

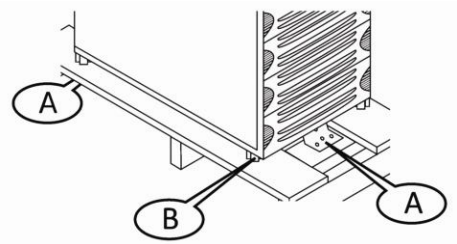


Figure–5 Removing packaging

- Lift the card box upwards to remove.
- Remove Styrofoam protective materials fit on upper corners of the UPS.

Once unpacked, examine the UPS carefully. UPS may have been damaged during the transportation.

- Check to ensure that all standard (user manual, communication cable, parallel cable and warranty certificate) and optional products ordered were shipped with the device without omissions.
- UPS is mounted on the palette from front and back sides using fixation elements.



Figure–6 Unloading UPS from the palette

- Remove front and back fixation elements shown in Figure-6 (A).
- Unload the UPS carefully from the palette.
- Roll the UPS on rollers shown in Figure-6 (B) to the place where UPS will be operated.

3.4 Providing electrical connections

3.4.1 Input feedback protection

This UPS includes no internal circuit for protection against feedback currents. Therefore, it is essential that users or those who installed the UPS put warning labels on all circuit interrupt switches deployed on the line where uninterruptible power supply is used. Warning labels should remind that a UPS device is operating on this line to technical personnel to service these circuits. Warning labels should be as follows.

BE SURE TO ISOLATE THE UPS PRIOR TO SERVICING THIS CIRCUIT

3.4.2 Cross-sections of cables to use

Cross-sections of cables to be used are given in the following table. Be sure to adhere to following cable cross-section specifications for a safe operation.

UPS Power (KVA)	Input (mm^2)	Output (mm^2)	Ground (mm^2)	Battery Cabinet (mm^2)	Battery Cabinet Ground (mm^2)
30	4 x 10	4 x 10	1 x 10	3 x 6	1 x 10
40	4 x 16	4 x 16	1 x 16	3 x 10	1 x 16
60	4 x 25	4 x 25	1 x 25	3 x 16	1 x 25
80	4 x 35	4 x 35	1 x 35	3 x 25	1 x 35
100	4 x 50	4 x 50	1 x 50	3 x 35	1 x 50
120	4 x 70	4 x 70	1 x 70	3 x 50	1 x 70

Table–2 Cable cross-sections

Battery cable cross-sections given in the table above is for cables to be connected between external battery cabin and UPS.

3.4.3 Placing batteries

Six rail-type battery trays are available in 30-40KVA. Batteries can be placed inside these trays. Types and quantities of batteries that may be placed inside these trays are given in the following table.

Battery Type (Ah)	Battery Quantity (Pieces)	Battery Cable Cross-section (mm^2)	Remarks
4.5	64 / 128 / 192	2.5	Use 32 batteries in each tray.
7	64 / 128	2.5	Use 22 and 20 batteries in each tray in order.
9	64 / 128	2.5	Use 22 and 20 batteries in each tray in order.
12	64	4	Use 16 batteries in each tray.

Table–3 Batteries that can be used in battery tray

- Cable cross-sections given in the table above are for connection cables for patching between batteries in the tray.

If type or quantity of your batteries is different than specifications given in table above, you will have to use an external battery cabin. Please contact technical service for details on type and quantity of batteries to be used in an external battery cabin.

- Follow the following steps while placing batteries in trays inside the UPS.

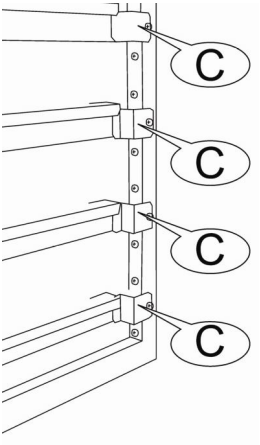
Make sure that all switches are closed (off) before proceeding with the following steps.

- Remove respectively upper and left-side covers of the UPS.
- Begin placing batteries from the lowest tray.

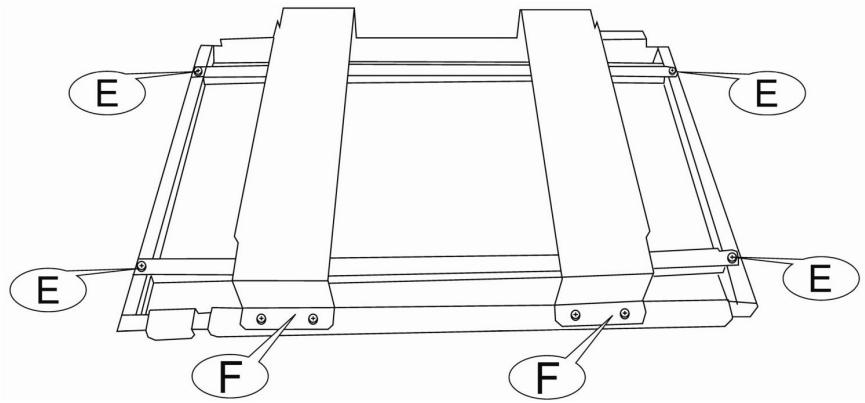
Heed all warnings while working with batteries. Batteries pose substantial electric shock hazard.

- Remove wristwatch, rings, and all other metal accessories.
- Be sure to use tools with isolated handles only. Do not leave tools or other metal objects on batteries.
- Wear isolating gloves and boots.

- Remove fixation elements shown in Figure-7 (C) that anchor battery tray to device chassis.



Figure–7 Battery tray fixation parts



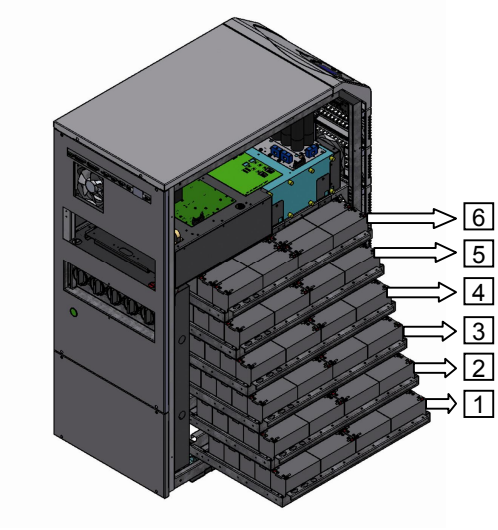
Figure–8 Upper and lateral fixation parts in the tray

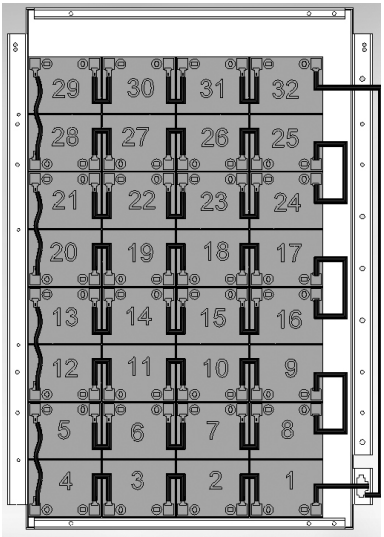
- Remove fixation elements in the tray, shown in Figure-8 (E) and (F).
- Place batteries on tray.

You can make use of following figures when placing batteries or making battery connections inside the tray.

Once you placed batteries inside the battery tray, follow these steps:

- Reinstall battery's lateral fixation part.
- Attach connection cables of batteries inside the tray.
- Push the tray back in place and fix it to device chassis using the fixation part.
- Repeat steps above in respective order for every other tray.



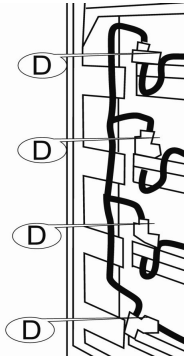


- For 64 batteries of 4.5Ah, 1st and 2nd trays are used.
- For 128 batteries of 4.5Ah, 1st, 2nd, 3rd and 4th trays are used.
- For 192 batteries of 4.5Ah, 1st, 2nd, 3rd, 4th, 5th and 6th trays are used.

Figure–9 Battery trays placement

Figure–10 Configuration of 4.5Ah batteries

Do not connect the socket fixed on device chassis, shown in Figure-11 (D) and the socket fixed to battery tray. This should be done once all connections are provided.



Figure–11 Connection sockets between trays

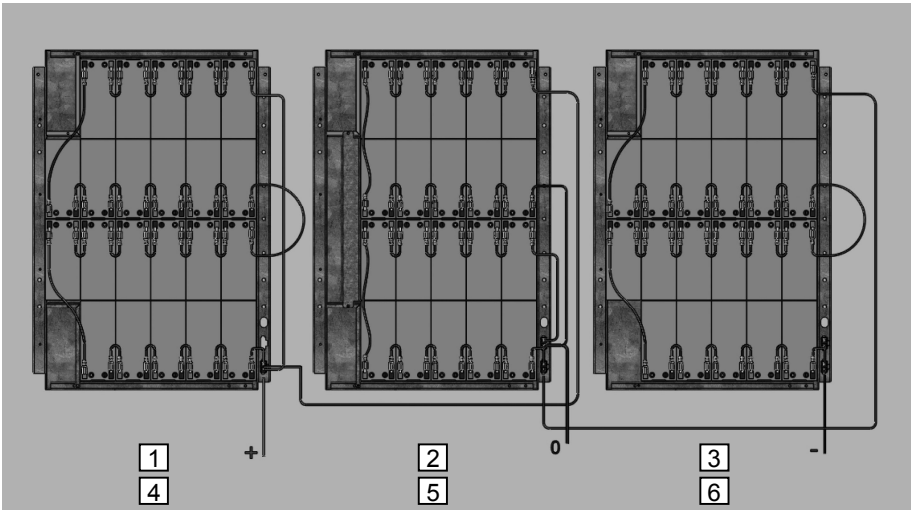


Figure-12 Configuration of 7-9 Ah batteries

- For 64 batteries of 7-9Ah, 1st, 2nd , 3rd and 4th trays are used.
- For 128 batteries of 7-9Ah, 1st, 2nd, 3rd, 4th, 5th and 6th trays are used.

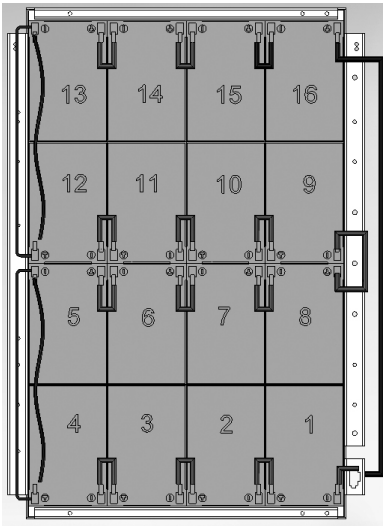


Figure-13 Configuration of 12 Ah batteries

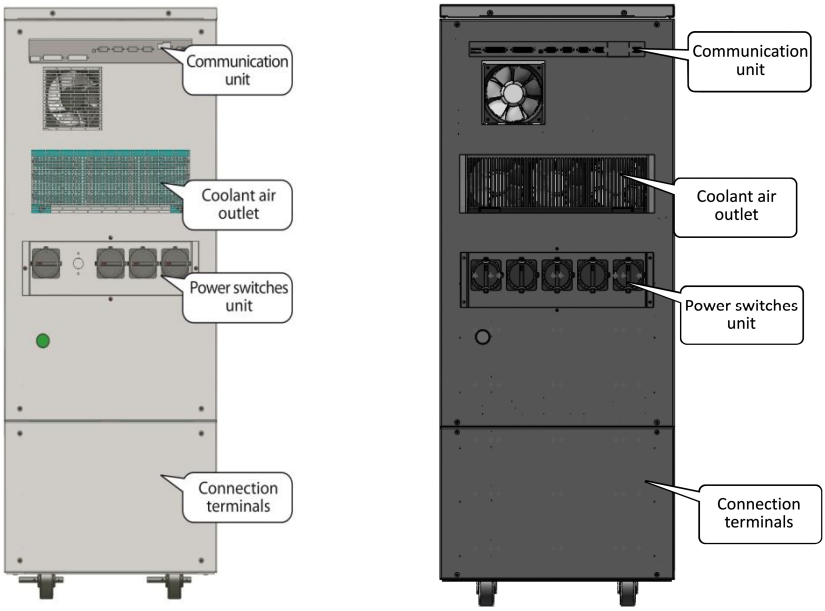
- For 64 batteries of 12Ah, 1st, 2nd, 3rd and 4th trays are used.

3.4.4 Providing cable connections

UPS's backside appearance of 30-40KVA, 60-80KVA and 100-120KVA is as shown following.

Make sure that all switches located on power switches unit, shown on the figure below, are thrown off.

- Remove connection terminal protection cover shown on the figure below



(a) 30-40KVA Single Input **(b) 30-40KVA Dual Input**

Figure–14 Rear view of 30-40KVA

Detail terminal layout of 30-40KVA is shown in the following drawing.

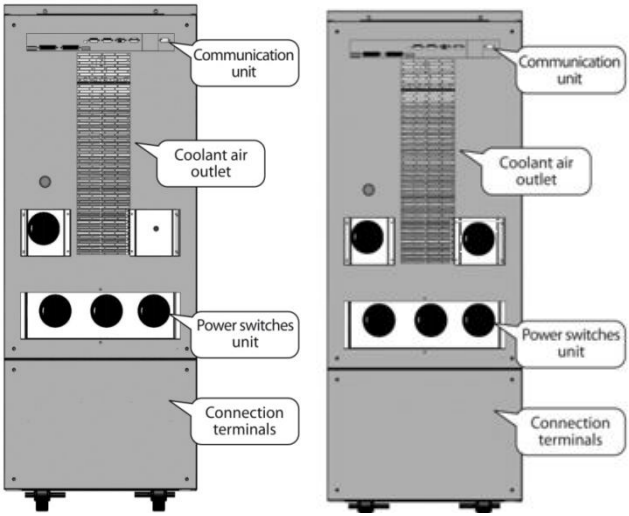
L1	L2	L3	N1	+	0	-	L1	L2	L3	N3	Ξ
INPUT				BATTERY			OUTPUT				E

Single Input

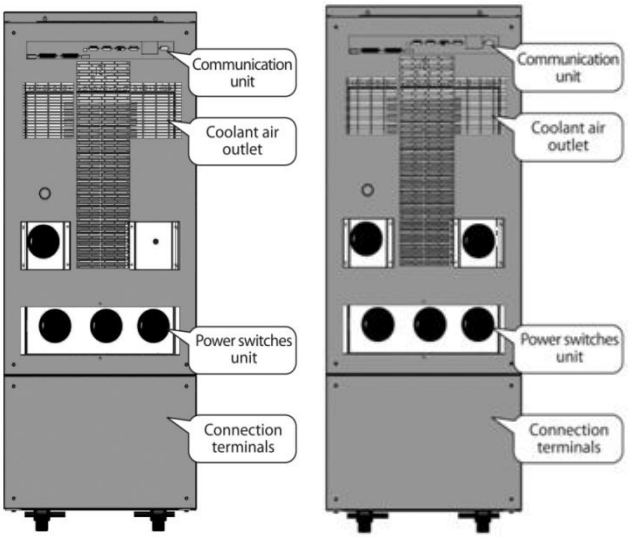
L1	L2	L3	N1	L1	L2	L3	N2	+	0	-	L1	L2	L3	N3	Ξ
INPUT				EXTERNAL BYPASS				BATTERY			OUTPUT				E

Dual Input

Figure–15 Connection terminals layout of 30-40KVA



60-80KVA Single Input **60-80KVA Dual Input**



100-120KVA Single Input **100-120KVA Single Input**

Figure–16 Rear view of 60-120KVA

Detail terminal layout of 60-120KVA is shown in the following drawing.

L1	L2	L3	N1	L1	L2	L3	N3	+	0	-	Ξ
INPUT				OUTPUT				BATTERY			E

Single Input

L1	L2	L3	N2	+	0	-	Ξ
EXTERNAL BYPASS				BATTERY			E
L1	L2	L3	N1	L1	L2	L3	N3
INPUT				OUTPUT			

Dual Input

Figure–17 Connection terminals layout of 60-120KVA

Make sure to connect earth connection before proceeding with all other connections of the UPS.

- Connect earth cable to terminal labeled “E” (Earth).
- Connect input cables to terminals labeled “INPUT” (L1, L2, L3, N1) sequentially.

Observe phase sequence while connection input cables. In case of any mistakes in phase sequence, UPS will give ‘Phase Sequence Fault’ warning.

- Connect output cables to terminals labeled “OUTPUT” (L1, L2, L3, N3) sequentially.

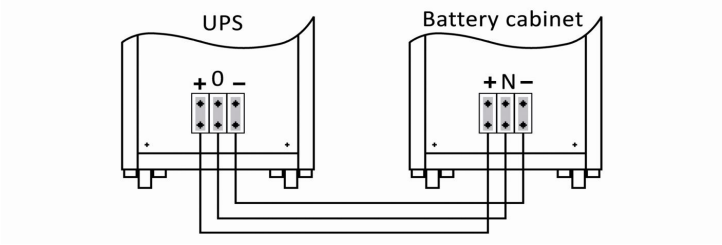
3.4.4.1 Providing external battery cabin connections

When a backup time that is longer than backup time normally provided by the internal battery group is necessary, batteries designated by the manufacturer may be connected externally. In that case, follow the steps below to connect batteries located inside external tray(s) to device.

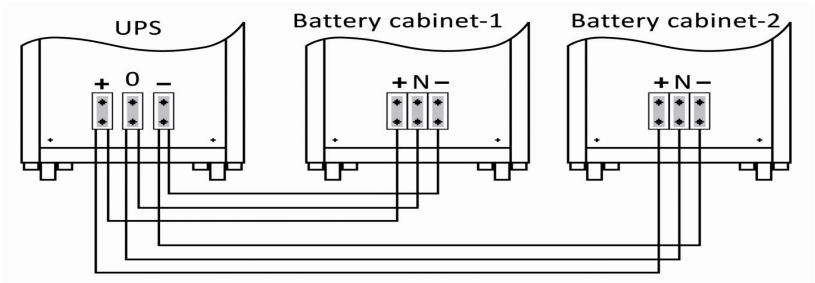
- If the distance between battery cabins and the UPS is longer than three (3) meters, wrap battery cables together.

Battery terminals of UPS with external battery groups have dangerous voltage. Be sure to remove internal battery group from the (red-black) sockets fixed to battery trays of the UPS before proceeding with making external battery connections (Figure–11).

Be sure to adhere to polarity while connecting battery cables as shown in the following drawing. Polarity faults will damage the UPS.



Figure–18 Battery cabin connection (for single battery cabin)



Figure–19 Battery cabin connection (for two battery cabins)

If batteries are located in two separate cabins, make sure that quantities and capacities of batteries on both cabins are identical. Equal quantity of batteries should be used for plus (+) and minus (-) busbars in external battery cabins.

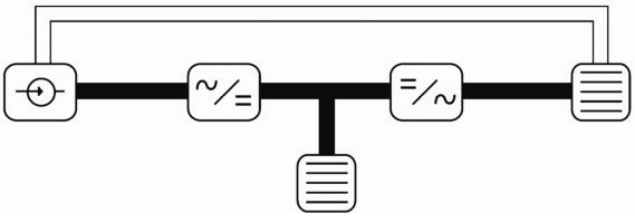
Do not make any connection to battery terminals of UPSs that do not have external cabin. Once all electrical connections were completed, connect the sockets of internal battery trays to sockets fixed to device chassis.

4. Operation modes

4.1 Online (normal) operation mode

C1 Series UPS devices supply all connected loads with continuous voltage with stable frequency and stable amplitude during online operation.

Rectifier and inverter units run continuously. Load is supplied with a stable sinusoidal voltage generated by the inverter. Inverter and bypass voltages are synchronized. Batteries are constantly kept at a buffer charge voltage. Mimic diagram displayed on the LCD screen is as shown below. During this operation mode, LED bar is constantly lit in green.



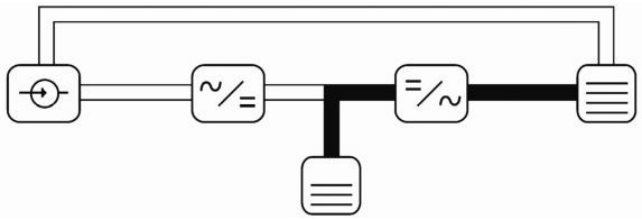
Figure–20 Online (normal) operation mode

UPS will switch back from this operation mode when any of the following occurs:

- Mains voltage or mains frequency is out of limits
- Overheat or overload
- Battery test procedure
- A failure

4.2 Battery operation mode

Rectifier unit does not run, inverter unit runs. Inverter unit is supplied from the battery. Load is supplied a stable sinusoidal voltage generated by the inverter. Batteries are in discharge position. Mimic diagram is as shown in the following drawing. In this operation mode, LED bar flashes green.



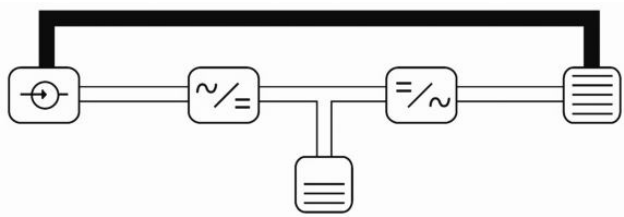
Figure–21 Battery operation mode

When any of the following occurs, UPS will switch to this operation mode.

- Mains voltage or mains frequency is out of limits
- Mains phase sequence fault
- Battery test procedure

4.3 Bypass operation mode

Inverter and rectifier units do not run. Load is supplied by mains over static bypass unit. Mimic diagram is as shown in the following drawing. In this operation mode, LED bar is constantly lit in red.



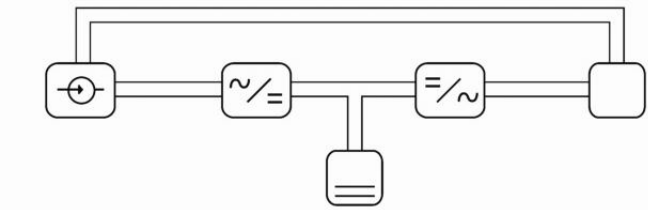
Figure–22 Bypass operation mode

When any of the following occurs, UPS will switch to this operation mode.

- As soon as UPS is turned on
- Cases of overheat shutdown, overload shutdown or overcurrent inverter
- Stopping the UPS by remote bypass switch
- Any failures in rectifier or inverter stages

4.4 System off mode

Rectifier, inverter and static bypass units do not run. In this operation mode, LED bar will be fully off.



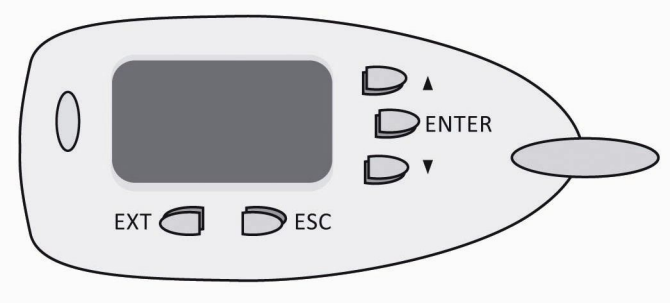
Figure–23 System off mode

UPS will switch to this operation mode if any of the following occurs.

- Stopping the UPS by ‘EPO’ switch
- Stopping the UPS through a computer (shutdown).
- Bypass voltage and frequency is out of limits during bypass operation mode
- Static bypass switch (SCR) malfunction during bypass operation mode
- Shutdown due to overheat or overload during stop mode

5. Front panel and menu structure

5.1 Front panel structure



Figurel–24 Front panel

LED Bar

LED Bar indicates the current operation mode of the UPS in different colors.

Green	Constantly Lit	Normal operation mode
	Flashing	Battery operation mode
Red	Constantly Lit	Bypass operation mode
	Flashing	Economic operation mode (Eco-mod)
Off	System off	

Keypad

Keypad is used to switch on or off the UPS, to browse through menu options, to monitor UPS data and to change as necessary.

LCD screen

This is a screen that is used for monitoring purposes. LCD screen displays input, output and battery data, UPS's current operation mode, warning and failure information, system date and time, and UPS's internal temperature.

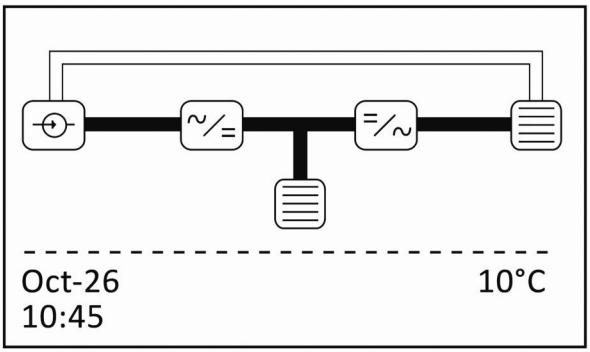
There are two windows in LCD screen.

Mimic Diagram Window

This window consists of a mimic diagram and an alarm information section.

Mimic diagram

This is a graphical diagram. Diagram features symbols denoting input, output, battery, rectifier and inverter units and paths that indicate the current operating mode of the UPS. Moreover, there is a bar that indicates battery charge level in battery indicator and another bar that indicates load percentage. This bar graph is filled or emptied depending on battery and load percentages. This way, user will be able to tell the current condition of the UPS at a glance.



Figure–25 Mimic diagram window

Alarm information section

This is the lower portion of mimic diagram window and consists of two lines. This section shows active alarm and failure information of the UPS. Alarm information is displayed in this section for as long as alarm condition continues. If there are multiple alarms, these are displayed in this section alternately.

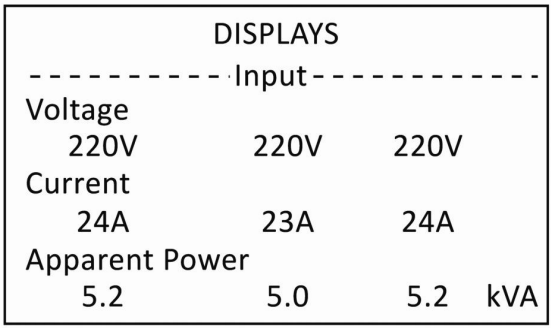
Figure–26 Alarm information window (alarm status)

Whenever there is no alarm or failure, certain important information such as system date and time, device internal temperature etc. is displayed in this section.

Figure–27 Alarm information window (without any alarm condition)

Data Monitoring Window

You can monitor data and status information about the UPS and make changes to parameters and settings using this menu structure.

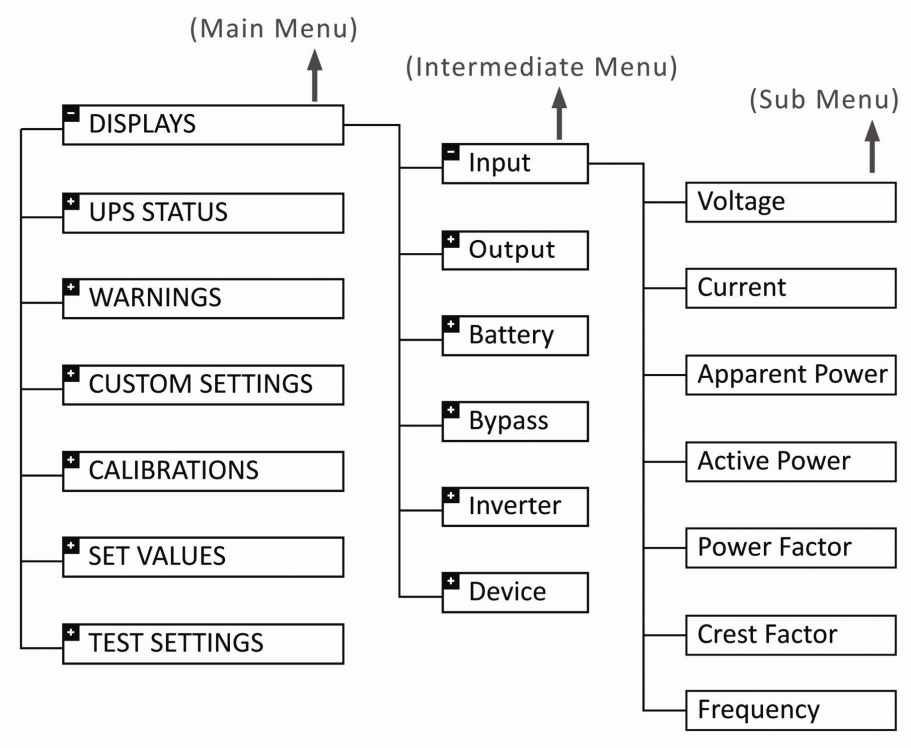


Figure–28 Data monitoring window

5.2 Menu structure

There is a menu structure in data monitoring window to ensure easy access to UPS data and make changes to settings as necessary. Menu structure consists of three levels, namely: Main Menu, Intermediate Menu, and Sub Menu. You can browse through menu options and make changes using the keypad.

Users are allowed to use displays, UPS status, warnings and custom settings main menus only. Calibration, set values and test settings main menus are for use by authorized technical service personnel only.



Figure–29 Menu structure

Follow the steps explained in the table below to browse through different menus.

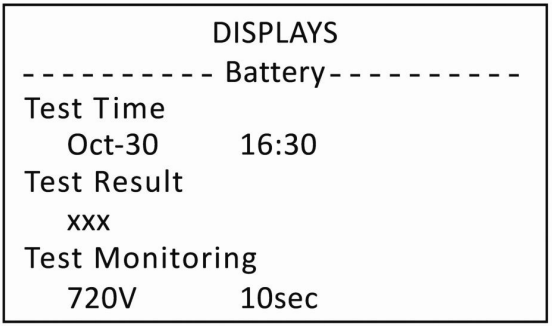
Browsing through main menus	To select main menus, press “ENTER” key while mimic diagram is displayed on LCD screen. Use “Up” or “Down” arrows to select desired main menu. Press “ENTER” key again to enter in to main menu you have chosen.
Browsing through intermediate menus	Once entered in a main menu, use “Up” or “Down” arrows to select desired intermediate menu. Press “ENTER” key to enter in to intermediate menu you have chosen.
Browsing through sub menus	While in sub menu level, you can use “Up” or “Down” arrows to access different sub menus. Note: You cannot change sub menus by pressing “Up” or “Down” arrows in parameter changing mode. In parameter changing mode these arrows will respectively increase or decrease the parameter value.

Table–4 Browsing through menus

5.2.1 Main menus

5.2.1.1 Displays

This is the menu where information pertaining to mains (input), output, battery, bypass, inverter and UPS can be monitored. Use selection keys to browse through menu options. Following information can be monitored using sub menus.



Figure–30 Displays main menu and battery sub menu

Input Mains supply voltages (phase-neutral), mains currents, mains apparent and active powers, power factor, crest factor of load currents and mains frequency information can be monitored.

Output UPS output voltages (phase-neutral), load currents, load percentages, load apparent and active powers, output power factor, crest factor of load currents and output frequency information can be monitored.

Battery Battery voltage, battery current, remaining battery capacity (percentage), elapsed time (resets at every battery operation), remain battery life can be monitored during discharge. At the same time, manual battery test procedures are also initiated from this menu (See: Testing Batteries).

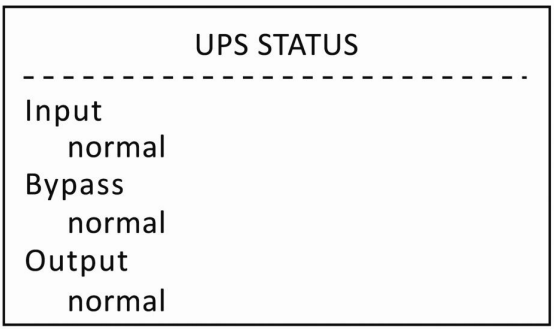
Bypass Mains voltages (phase-neutral) and frequencies can be monitored.

Inverter Voltages generated by UPS inverter unit (phase-neutral) can be monitored.

Device Information on device model, serial number, power, program name, program date, total uptime (in days, hours, minutes and seconds respectively) and warranty status of the device can be monitored using this menu. One of the following three is displayed in 'Warranty Status' line: "not entered" if device warranty term was not set; or warranty expiry date if warranty term was set; or "warranty expired" if warranty term is expired.

5.2.1.2 UPS status

This is used to acquire information about important components of the UPS. There are intermediate menus under this main menu.



Figure–31 UPS status main menu

Input This shows mains status. This will display “normal” if mains voltage is within the designated limits; or “low” if mains voltage is under the designated limit; or “high” if mains voltage is over the designated limit. If mains frequency is out of designated frequency range, “Frequency Out of Limits” warning will be displayed while mains phase sequence faults will be shown as “Phase Sequence Fault” warning.

Bypass This indicates bypass status. This will display “normal” if bypass voltage is within the designated limits; or “low” if bypass voltage is under the designated limit; or “high” if bypass voltage is over the designated limit. If bypass frequency is out of designated frequency range, “Frequency Out of Limits” warning will be displayed while mains phase sequence faults will be shown as “Phase Sequence Fault” warning. Static bypass switch unit will not activate if bypass phase sequence fault occurred.

Output This indicated the source used to supply the load. This will display “service” is manual bypass is active, or “bypass” if static bypass unit is active, or “normal” if UPS is operating in online mode, or “battery” if the UPS is running on battery mode. If there is no power at the output, “low” warning will be displayed here.

Fan This shows the failures of fans connected to cooling units and rotation rpm of cooling fans. Rotation speed of fans connected to cooling unit will be dynamically adjusted by the microprocessor depending on the output load and temperature of cooling unit. If any of the fans connected to cooling unit malfunctions or stop, ‘’fault‘’ warning will be displayed here instead of rotation rpm.

Fuse This indicates the status of fast fuses located on the power stage. When any of the fuses malfunctions, unit location of the fuse is provided to pinpoint malfunctioned fuse. These units are ‘input’, ‘bypass’, ‘rectifier’ or ‘battery’. This displays “normal” if all of the fuses are intact.

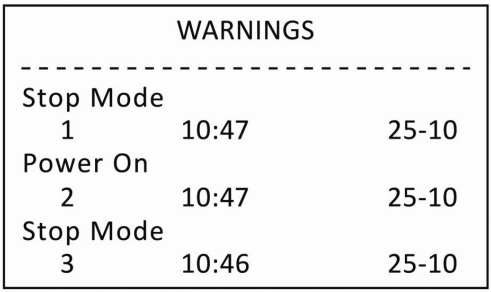
Heatsink This indicates the temperature of cooling block where power semiconductors are mounted for cooling purposes. If the temperature of cooling block exceeds preliminary alarm level of 60 °C an ‘overheat’ warning will be displayed here. In this case, UPS will continue to operate in online mode. If the temperature exceeds auto shutdown level of 80°C, ‘overheat shutdown’ warning will be displayed. In this case, UPS will no longer operate in online mode, and transfer the load to static bypass unit.

SCR This indicates the status of thyristors placed on power stage to function as static switch (SCR). This will display “fault” if any of the thyristors is malfunctioned or “normal” if all thyristors are intact.

IGBT This indicates the status of IGBTs placed on power stage for switching purposes. This will display the location of the malfunctioned IGBT (rectifier or inverter) if any of IGBTs malfunction. If all IGBTs are intact, “normal” will be displayed here.

5.2.1.3 Warnings

Previous warning, failure and information messages are monitored in this menu. 512 different warnings may be displayed along with date and time when warning condition occurred. You can browse through warning messages using selection keys and obtain information about past failures of the UPS. Warnings are displayed in a page structure. Most recent warning is displayed in number 1. Warning date section consists of day and month. “Down” arrow will take to you next page while “Up” arrow will take you to previous page.



Figure–32 Warnings menu

List of possible warnings and failures that may be displayed in warnings menu is given in the table below.

Warnings	Description
Power On	This indicates that UPS is switched on by turning on the input circuit breaker.
Stop Mode	This indicates that UPS stopped/is stopped.
Rectifier Start	This indicates that rectifier unit started.
Inverter Start	This indicates that inverter unit started.
Normal Mode	This indicates that UPS is running in online mode.
Battery On	This indicates that UPS is running on battery power.
Battery Low	While in battery mode, this indicates that batteries are about to run out.
Battery Depleted	This indicates that battery voltage has depleted.
Battery Test	The manual or periodical battery test mode of the UPS.

Synchron Control	This indicates an ongoing synchronization procedure between inverter and bypass voltages.
Eco Mode	This indicates that UPS is in economic operation mode.
Awaiting Shutdown	This indicates that UPS is being shut down via a control program running on computer.
Awaiting Restore	This indicates that UPS is being restarted via a control program running on computer.
Mains Low	This indicates that mains voltage is below the designated limit and that UPS has begun operating on battery power.
Mains High	This indicates that mains voltage is above the designated limit and that UPS has begun operating on battery power.
Bypass Low	This indicates that bypass voltage is below the designated limit. Static bypass unit will not supply bypass voltage to output.
Bypass High	This indicates that bypass voltage is above the designated limit. Static bypass unit will not supply bypass voltage to output.
DC Low	This indicates that busbar voltage at the output of rectifier unit is below the designated limit.
DC High	This indicates that busbar voltage at the output of rectifier unit is above the designated limit.
Battery High	This indicates that the voltage at battery group contacts is above the designated limit.
Battery Fault	Battery faulty detected during a periodic or manual battery testing procedure.
Rectifier Fault	During the operation of rectifier unit, this indicates that the designated voltage cannot be ensured at the output of this unit and that rectifier unit may be a problem in rectifier.
Inverter Fault	This indicates that the voltage at the output of inverter unit is out of designated limits. Load is transferred to static bypass unit.
Output Fault	This indicates that UPS output voltage is out of designated limits. Load is transferred to static bypass unit.

Synchron Fault	This indicates that synchronization between inverter and bypass voltages has failed. There is a synchronization problem.
Fan Failure	This indicates that any of the fans connected to cooling unit is malfunctioned.
Emergency Stop	This indicates that UPS is being switched off via emergency stop switch (EPO).
Generator Active	In generator applications, this indicates that generator is online and that UPS is supplied by the generator.
Maintenance Breaker ON	This indicates that UPS was switched to manual bypass mode.
Maintenance Breaker OFF	This indicates that UPS was switched back from manual bypass mode.
Overheat Shutdown	This indicates that cooler temperature has exceeded auto shutdown level (80°C). Load is transferred to static bypass unit.
Overload	Load supplied by UPS has exceeded designated limits. UPS will continue operating in online operation mode. We recommend that load is reduced to prevent device from overheat.
Overload Shutdown	Limit time for operation under overload has exceeded. Load is transferred to static bypass unit. We recommend that load is reduced.
Overcurrent Rectifier	There is a problem at rectifier unit. UPS will switch to battery operation mode. In this case, UPS will attempt to start rectifier unit a few times.
Overcurrent Inverter	Either there is short-circuit on UPS output, or excessive current is drawn from the output momentarily, or there is a malfunction at inverter unit. Load is transferred to static bypass unit temporarily. In this case, device will attempt to start inverter unit a few times.
Overcurrent Fault	UPS is switched to failure mode due to repetitive overcurrent problems that occurred at rectifier or inverter units. Load is transferred to static bypass unit permanently.

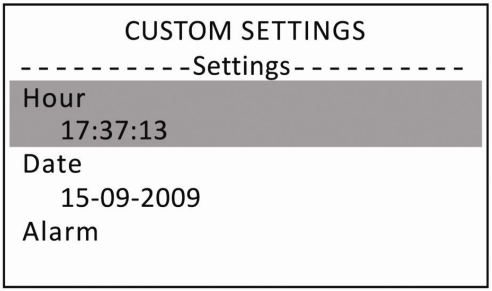
Bypass SCR Fault	Bypass thyristors are malfunctioned.
Inverter IGBT Fault	IGBT at inverter unit is malfunctioned.
Inverter CPU Fault	There is a problem between inverter CPU and panel CPU.
Rectifier CPU Fault	There is a problem between rectifier CPU and panel CPU.
Shortcircuit shutdown	There is a shortcircuit on any of output loads.

Table–5 Warnings table

5.2.1.4 Custom settings

This is a menu where users can make parameter changes as per their desire and purpose. You can make changes using selection keys. Follow these steps to make changes.

- In this menu, there is a horizontal graphical bar that covers the first two lines. This bar will assist you in selecting the parameter that you are willing to change. Using “Up” or “Down” arrow keys, bring the graphical bar over the parameter that you’re willing to change.



Figure–33 Selecting the parameter to change

- Once “ENTER” key is pressed, two-line graphical bar will change to a single line and select the value of the parameter that you are willing to change.
- You change the parameter value to your desire using “Up” and “Down selection keys.
- When you press “ENTER” key again, new value is set and graphical bar shifts to next parameter.

Parameters included in Custom Settings main menu and their respective functions are given in the following table.

Main Menu	Sub Menu	Function
Passwords	Password–1	These are the passwords required to access "CALIBRATION", "SET VALUES" and "TEST SETTINGS" main menus. Entering all three passwords correctly is necessary to enter these menus. Otherwise these menus will not be visible. Passwords are changed on weekly basis.
	Password–2	
	Password–3	
Battery	Test Time	These are the parameters used for test procedure (See: Testing Batteries)
	Test Period	
	Automatic Start	On: Following full depletion of batteries, UPS restarted when mains voltage is recovered. Off: Following full depletion of batteries, UPS is not restarted when mains voltage is recovered. UPS waits for a manual start up.
Display	Language	This determines the language used on LCD screen. There are nine languages, namely Turkish, English, French, German, Polish, Hungarian, Italian, Spanish, and Russian.
	Start-up Picture	'xxx': Company logo is displayed while UPS starts up. Off: No logo is displayed.
	Illumination	If front panel is not used for a prolonged period of time, LCD screen is dimmed to save energy and to prolong the life of LCD screen. Off: Screen will not switch to standby mode and will stay bright all the time. '1–30 min': LCD screen will be dimmed if keypad is not used for a period determined here. LCD screen will be automatically lit as soon as keypad is used again.

Relays	RL1	There are three user relays (See: Programmable Relay Unit).
	RL2	
	RL3	
Settings	Hour	System time can be changed here. This features hour and minute in respective order (this is activated once password is entered in correctly).
	Date	System date can be changed here. This features day, month, year, and day of the week in respective order (this is activated once password is entered in correctly).
	Alarm	This is used to set the alarm. This features day, hour, and minute information in respective order. This will be activated only while the status information is On (this is activated once password is entered in correctly).
	Guarantee	UPS' warranty term is entered, changed or cancelled here (this can be changed by authorized personnel only).
	Serial Number	UPS' serial number is entered here. This can be entered by authorized personnel only and only during the testing stage (this is activated once password is entered in correctly).

Table–6 Custom settings menu

6. Operating procedures

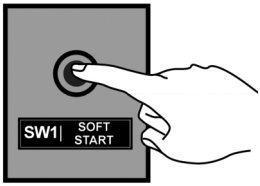
6.1 Switching the UPS on

All switches must be in OFF position before switching UPS on.

Check to make sure that all electrical connections are correct.

Perform following steps in given order to switch on the UPS.

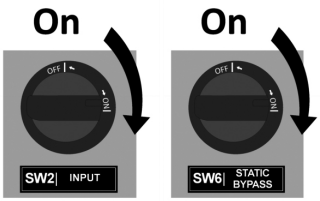
Soft start is necessary to start up a device of this power range. For this purpose, press and hold the soft start (SW1) button for at least 5 seconds as shown in the figure below.



Figure–34 Pushing soft start button

At this stage, strictly do not throw input (SW2) and battery (SW3) switch to ON position. If the device is dual input also don't turn on static bypass switch(SW6).

- Once soft start procedure is completed, turn input (SW2) switch(in dual input devices turn input (SW2) and static bypass switch(SW6)) in the directions shown below to bring them to on position as shown in the figure below.



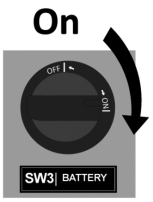
Figure–35 Turning on input (SW2) and static bypass (SW6) switch

- If the mains voltage is within the designated limits the UPS will switch to bypass mode, otherwise UPS will switch to system off mode.

At this stage, strictly do not throw battery breaker to ON position.

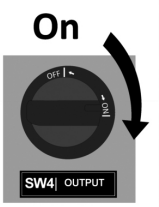
6.2 Starting the UPS

- Briefly press “EXT” key located on front panel.
- Mimic diagram window will be displayed on LCD screen and rectifier unit will begin to run.
- Once rectifier unit has begun running, inverter unit will begin to run automatically.
- Once inverter unit is ready, the UPS will switch to online mode.
- Once UPS switched to online mode, throw the battery (SW3) switch to ON position as shown in the figure below.



Figure–36 Turning on battery (SW3) switch

- Bring output (SW4) switch to ON position as shown in the figure below.



Figure–37 Turning on output (SW4) switch

- Now you can turn on the loads connected to the UPS.

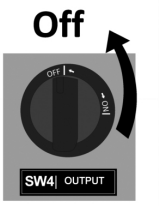
If you encounter anything unexpected during the startup, please contact authorized technical service.

6.3 Stopping the UPS

Press and briefly hold “EXT” key located in front panel. If mains voltage is within the designated limits, UPS will switch to bypass mode, otherwise the UPS will switch to system off mode. Mimic diagram window will show the information of this mode.

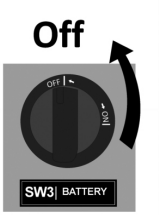
6.4 Switching the UPS off

- Stop the UPS as explained in “Stopping the UPS” section.
- Turn off all loads connected to the UPS.
- Throw output (SW4) switch to OFF position.



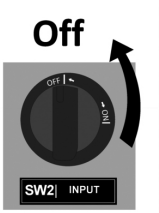
Figure–38 Turning off output (SW4) switch

- Throw battery (SW3) switch to OFF position.



Figure–39 Turning off battery (SW3) switch

- Throw input (SW2) switch to OFF position.



Figure–40 Turning off input (SW2) switch

The only difference in Dual Input devices is that after turning off input switch (SW2) ,turn off static bypass switch(SW6)

There is dangerous voltage in UPS even after the UPS is switched off. Never service or intervene inner parts of the UPS.

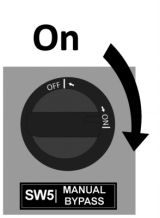
6.5 Manual bypass operation

6.5.1 Switching the UPS to manual bypass mode

Follow the steps below for a safe manual bypass procedure that will not cause any energy interruption at the UPS output.

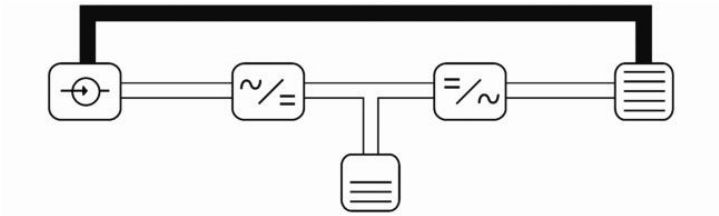
- Press and briefly hold “EXT” button on the front panel. Load is transferred to static bypass unit uninterruptedly and device switches to bypass operation mode.

- Throw the manual bypass (SW5) switch to ON position.



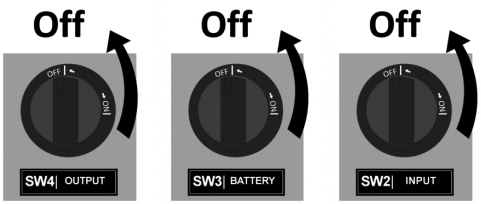
Figure–41 Turning on manual bypass (SW5) switch

- Along with a periodical siren, “Service Switch On” warning is displayed on alarm information window and “WARNINGS” main menu. “Service” warning is displayed on the output option of “UPS STATUS” main menu. Bypass mode is indicated as follows on mimic diagram.



Figure–42 Manual bypass mode

- Throw output (SW4), battery (SW3) and input (SW2) switch to OFF position. Shortly after the UPS will switch off.



Figure–43 Turning off output (SW4), battery (SW3), input (SW2) switch

The only difference in Dual Input devices is that after turning off input switch (SW2) ,turn off static bypass switch(SW6).

There are dangerous voltages on input, battery and output contacts while the UPS is in manual bypass mode. Do not remove terminal protective cover.

6.5.2 Switching the UPS back from manual bypass mode

While UPS is in manual bypass mode and switched off, do not bring manual bypass switch to "OFF" position. Follow the steps below in order for a safe manual bypass procedure that will not cause energy interruption at UPS output.

- Push soft start (SW1) button until hearing warning-beep.
- Bring input (SW2) switch to ON position.(If the device is dual input bring static bypass switch to ON position).
- UPS will switch to static bypass mode.
- Bring output (SW4) switch to ON position.
- Bring manual bypass (SW5) switch to OFF position.
- Start the UPS by pressing and briefly holding "EXT" button located on the front panel of the device.
- Once the UPS is switched to online mode, bring battery (SW3) switch to ON position.

6.6 Economic operation mode (ECO-MOD)

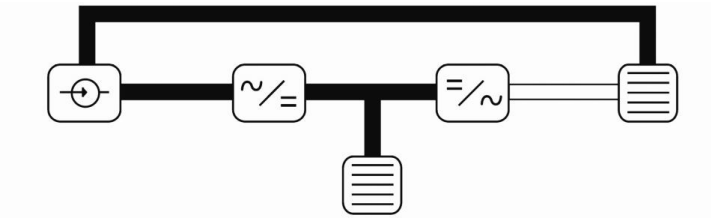
This is an operation mode during which the load is supplied by mains instead of the power generated by uninterruptible power supply. Contrary to bypass operation mode, in this mode rectifier and inverter units keep running. Voltage, frequency and waveform of the mains are continuously observed. Inverter voltage is kept ready and synchronized with mains. As soon as voltage and/or frequency of the mains go out of designated limits, load is transferred to inverter unit that is kept readily at backup. When mains return to normal limits, load is automatically transferred to static bypass unit again.

Batteries are kept charged continuously in this operation mode. When mains voltage is interrupted, rectifier unit is switched off, inverter unit is supplied on battery power, and batteries begin discharging. When the mains voltage is recovered,

rectifier activates again and batteries begin recharging. LED bar flashes in red during this operation mode

6.6.1 Activating economic operation mode

- Stop the UPS and switch to bypass operation mode.
- Select the “Eco Mod” under “TEST SETTINGS\General\Operating Mode” menu.
- Switch on the UPS by pressing and briefly holding “EXT” button on front panel.
- Wait until rectifier and inverter units begin running.
- Once “Eco Mod” warning is visible in “WARNINGS” menu, displayed mimic diagram will be as following drawing.



Figure–44 Economic operation mode

If the UPS is stopped during Eco-Mode, Eco-Mode will be temporarily deactivated. If bypass voltage is interrupted in this state, your loads will not be supplied power. Perform steps given above to reactivate Eco-Mode feature.

6.6.2 Deactivating economic operation mode

- Press and briefly hold “EXT” button on front panel to switch the UPS to bypass operation mode.
- Select “Normal” option under “TEST SETTINGS\General\Operating Mode” menu.
- Press and briefly hold “EXT” button on front panel.
- Once rectifier and inverter units begin running, the UPS will switch to online (normal) operation mode.

6.7 Emergency stop procedure (EPO)

The UPS may be halted using emergency stop switch in extraordinary cases including but not limited to fire, earthquake, flood or alike. When emergency stop switch is used, rectifier and inverter units switch off, static bypass unit will not activate, and the UPS will switch to system off mode. When emergency stop switch is used “Emergency off” will be visible in “WARNINGS” main menu.

There are dangerous voltages on input and battery terminals even after emergency stop procedure is completed. Do not remove protective covers of switch and terminal sections.

Emergency stop is performed by means of an external switch. Contacts of external emergency stop switch are taken from “CUSTOM CONTACTS” socket located on the UPS communication unit (See: Custom contacts). If external emergency stop switch is brought to ON position while the UPS is running, emergency stop procedure will be initiated. To activate emergency stop feature, set “TEST SETTINGS\Hardware Info\Emergency off” menu option to “ON”. If you do not wish to use emergency stop feature, set this menu option to “OFF”.

You will have to turn off the UPS and turn back on again if you want to start the UPS after an emergency stop.

6.8 Operation during mains fail

In case of a power outage, load is uninterruptedly supplied battery power and UPS goes under the following changes.

- UPS will switch to battery operation mode and mimic diagram will indicate battery operation mode accordingly.
- Alarm information window will display “Mains Out of Limit” and WARNINGS menu will display “Mains Fault” warnings.
- Data monitoring window will display “DISPLAYS\Battery” menu.
- Periodical siren will activate.
- LED bar will flash in green. Flashing interval of LED bar will shorten as battery level diminishes.

Battery capacity, and accordingly battery voltage, diminishes throughout the mains voltage outage. Capacity increase rate is dependent on battery voltage and amount of load connected to output. Battery voltage is constantly compared with

reference voltage set using “SET VALUES\Battery” menu option. Periodical siren will emit more frequently depending on the result of this comparison.

- If mains voltage is recovered before batteries are fully depleted, UPS will switch to online (normal) operation mode uninterruptedly.
- The UPS will give “Batteries Depleted” warning once batteries are fully depleted and will switch off inverter units. In this case, load will no longer be supplied with power.
- Once batteries were fully depleted, the UPS continues to observe mains voltage for approximately 4 minutes. If mains voltage is recovered during this period of time, UPS will start up automatically and switch to online (normal) operation mode. If mains voltage is not recovered during this period of time, UPS will be switched off completely to prevent damage to batteries.

Once UPS is fully switched off, do not bring the switch to OFF position to ensure that device can automatically startup as soon as mains voltage becomes available again. Otherwise you will have to startup the device manually.

6.9 Remote start and stop of the UPS

Starting and stopping Uninterruptible Power Supply remotely using an external switch is possible. Contacts of external switch will be taken from the “CUSTOM CONTACTS” socket located on the communication unit of the UPS (See: Custom Contacts Socket). If this switch is brought to OFF position while the device is running, device will switch to bypass operation mode. Rectifier and inverter units will be switched off and load will be supplied via static bypass. Once the switch is brought back to ON position, the UPS will switch to online mode again. To enable remote start/stop feature, set “TEST SETTINGS\Hardware Info\UPS Shutdown” menu option to ON.

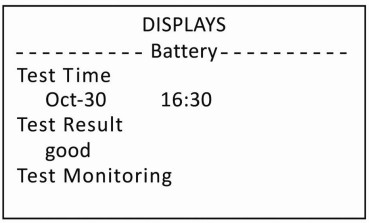
6.10 Testing batteries

Batteries are tested in two different ways, namely manual and periodical battery testing. Battery testing can only be performed while the UPS is in online operation mode.

Manual test

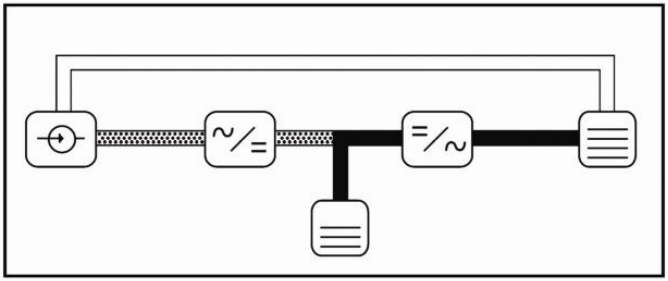
To initiate manual battery testing, follow the steps below.

- Go to “CUSTOM SETTINGS\Battery\Test Time” menu path and set battery test time in minutes. Battery test time is 1 minute by factory default.
- Go to “DISPLAYS\Battery” menu path and then using “Down” arrow, to test monitoring page.



Figure–45 Battery test monitoring page (no ongoing test procedure)

- When “ENTER” key is pressed, UPS switches to battery operation mode and begins testing the batteries for a designated period of time. During testing, mimic diagram will indicate battery testing procedure as shown on the following drawing.

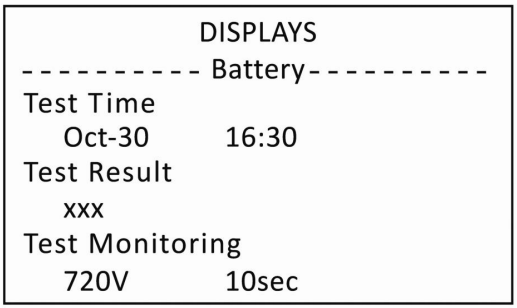


Figure–46 Battery test operation page (during an ongoing test procedure)

This page features information on previous tests while there isn’t any ongoing battery test.

Test Time: This displays the date and time of previous battery test. If there hasn’t been any previous testing, this will not be shown.

Test Result: This displays the result of previous battery test. If there hasn’t been any previous testing, “no tests” will be displayed here. If there has been a test where any problem was detected with the batteries, you will see “fault”; if no problems were detected in previous test you will see “OK” here. If previous test was cancelled, “Cancel” will be displayed.



Figure–47 Battery test monitoring page (during an ongoing test procedure)

"xxx" will be displayed in Test Result field during an ongoing test procedure.

Test Monitoring: Reference battery voltage and remaining test time will be displayed. If battery voltage drops below the reference voltage during testing, this will be interpreted as battery failure. Battery test will be completed once test time elapsed and UPS will switch back to online mode.

If you press "ENTER" key during an ongoing test, battery test procedure will be terminated and UPS will switch back to online (normal) operation mode. UPS will also terminate test procedure and switch back to online (normal) operation mode if any battery failure is detected. Battery failure is notified by a periodical siren. "Test Result" field of battery test monitoring page will show "fault".

Periodical test

Batteries can be tested automatically at intervals defined using "CUSTOM SETTINGS\Battery\Test Period" menu option. Factory default setting for this menu option is 7 days. If you see "CUSTOM SETTINGS\Battery\Test Period" menu option to OFF, periodical battery test procedure will not run.

6.11 Operation on generator

Battery charge feature of the UPS may be disabled to ensure more efficient and problem-free operation of the generator at times when uninterruptible power supply is supplied by the generator instead of the mains voltage. For this purpose, contact information must be supplied from the generator to UPS. These contact ends must be connected to the contacts of "CUSTOM CONTACTS" socket (See: Custom contacts). When generator is activated while the UPS is in battery operation mode, UPS will switch to online (normal) operation mode but batteries will not be charged. Moreover, UPS will transfer the load to generator gradually while device switches

from the battery to generator thereby preventing unbalanced loading on generator. When mains voltage is recovered and generator is deactivated, batteries will begin charging again. Set the menu option “TEST SETTINGS\Hardware Info\Generator Activates” to ON for activating this feature.

6.12 Operation during an overload

When an overload occurs, UPS will go under the following changes:

- “Overload” warning will be displayed in alarm information window and warnings main menu.
- Periodical siren system will be activated. Siren will go off once three times in every 5 seconds.
- Overload counter starts. This counter is located on the third page of “DISPLAYS\Output” menu. Counters speed increases depending on the load amount.

Period of time UPS operates under overload changes depending on the load amount. Factory default settings are given in the following table.

Load Amount (Percentage)	Overload Time
Up to 110% load	Constant
110% load	1 hour
130% load	10 minutes
150% load	1 minute

Table–7 Overload withstand periods

Once overload withstand period elapsed, UPS will transfer the load to static bypass unit automatically. Rectifier and inverter units will be switched off. “Overload Shutdown” will be shown in Warnings main menu. UPS will wait 4 minutes for cooling block to cool down. If load is reduced by the end of this waiting period, UPS will start up again and switch to online mode. If overload is continued after the end of waiting period, UPS will not start up.

If overload is recovered before overload withstands period elapses, periodical siren system will silence. Overload counter begins to decrease. “Overload” warning at alarm information window will be removed.

We do not recommend you to run UPS on overload to prolong the life of the UPS. In case of an overload, loads must be reduced.

7. Parallel operation

A parallel system may be designed by connecting outputs of multiple uninterruptible power supplies to a common load switch. A parallel system will safely supply loads that are overly sensitive against electric power outages. In a parallel system, when any of UPSs malfunction and become offline, other UPSs continue to supply the load, thereby preventing any interruption with supply to load.

UPSs operating in parallel system share the load equally. This way, UPS life will be prolonged as each UPS operates under maximum capacity and UPS failures are reduced. This minimizes loss of time and money.

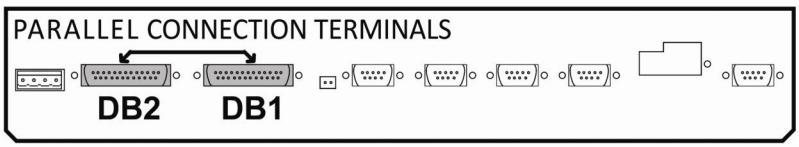
In case where all UPSs in a parallel system malfunction, UPSs will transfer the load automatically to static bypass lines and UPSs will activate again as soon as recovered from malfunction.

7.1 Installation

All electrical connections of all UPSs constituting parallel system must be provided as explained in “Installation” section of this user manual. Note following warnings while installing a parallel system.

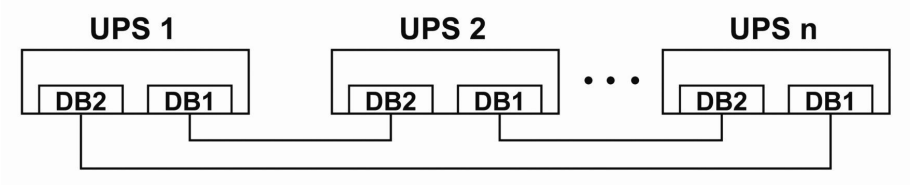
Installing and commissioning a parallel system should be carried out by authorized technical service personnel only.

- Parallel cables should be maximum 20 meters in length. Nevertheless, shorter cables ensure safer operation.
- Use a separate designated grounding cable for each UPS in parallel system.
- Use a separate designated battery group for each UPS.
- All UPSs in parallel system must be of same model and power capacity.
- Air conditioning for the room where UPSs will be located must be installed as appropriate for total power of the parallel system.
- Provide separate input and output cables and mains and load panel connections for UPSs and build a common output busbar here.
- We also recommend you to place a load interrupt switch between common output busbar located on load distribution panel and load system.
- Signal cables must be used to ensure data transmission between the UPSs that constitute a parallel system. These signal cables are connected to sockets of parallel cards located on devices’ communication units.



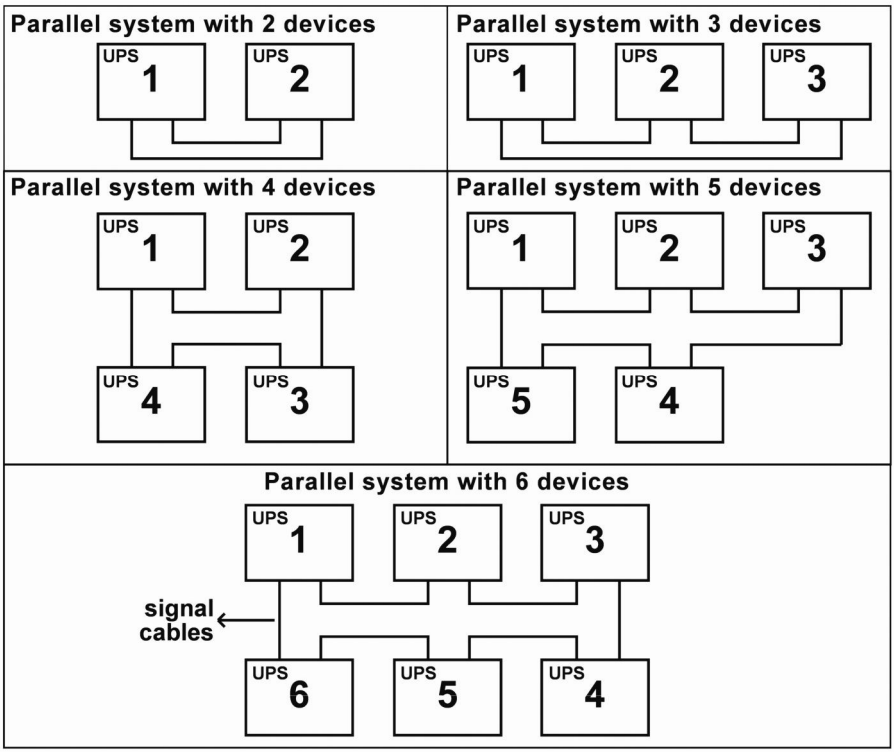
Figure–48 Parallel connection sockets

Safety of data communication is increased by means of ring connection method used in C1 Series UPS. Connect parallel signal cables to parallel port located on communication port as shown in the following drawing.



Figure–49 Connecting signal cable

Due to this connection manner of signal cables, layout of UPSs constituting the parallel system is highly important. Therefore we recommend you to place the UPSs as shown in the following drawing.



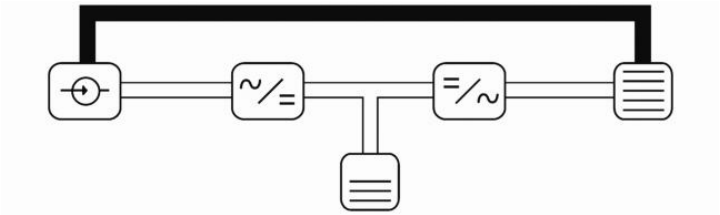
Figure–50 Recommended UPS layout for a parallel system

Make sure that phase sequence is correct when connecting output cables of UPSs to common busbar.

7.2 Settings

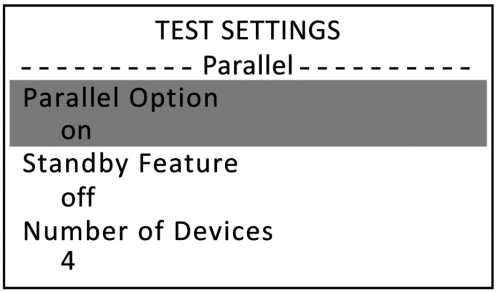
Once electrical connections of all UPSs in the parallel system were provided, make the following adjustments for each UPS constituting the parallel system.

- Switch on all the UPSs in the parallel system. Mimic diagram will display bypass operation mode image. Following settings are made while UPSs are in bypass operation mode.



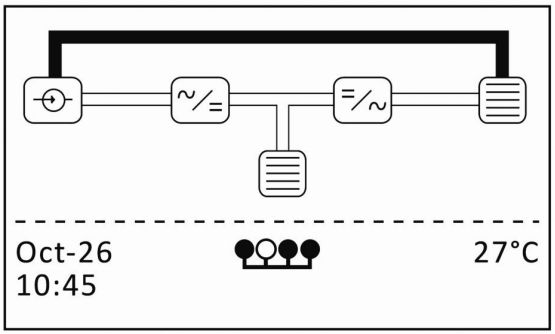
Figure–51 Bypass image

- Set “Test Settings\Parallel\Parallel Option” menu option to ON.
- Enter quantity of devices in the parallel system to “Test Settings\Parallel\Number of Devices” menu option.
- Enter an order number for each UPS in “Test Settings\Parallel\Device ID” menu option. Order numbers assigned to UPSs must be unique and consecutive.
- Set “Test Settings\Parallel\Detect Cable Fault” menu option to ON.



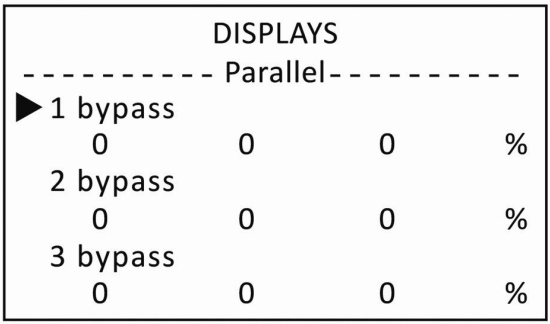
Figure–52 Adjusting parallel settings using test settings menu

Once parallel system settings were completed, boxes that denote each UPS are displayed in mimic diagram window alarm information section. These boxes provide information regarding data transmission between the UPSs. If a box is filled, that means UPS corresponding to that box is on and communicating with the system. If a box is empty, that means the UPS corresponding to that box is off or is not communicating with the system. For instance, in mimic diagram shown in Figure-53, the UPS number 2 is off or is not communicating with the system. The UPSs 1, 3 and 4 are on and communicating with the system.



Figure–53 Mimic diagram in parallel operation

Operating statuses of UPSs constituting parallel system may be monitored from any UPS. Therefore, operation modes (online operation mode, bypass operation mode, battery operation mode, or system off mode) and load percentages can be seen using “Displays/Parallel” menu option. Arrow sign shown on the left side of the menu indicates the UPS itself. For instance, Figure-54 below shows that all UPSs are in bypass operation mode and are not yet loaded from the UPS 1 screen.



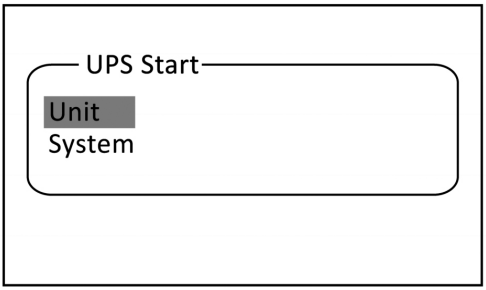
Figure–54 Parallel menu

7.3 Starting parallel system

Before running parallel system, check and make sure that load interrupt switch on distribution panel is in OFF position.

The UPSs in parallel system can be run individually using their screens. Alternatively all system can be run together using LCD screen of any UPS in the system. Nevertheless, we recommend you to run each UPS individually when commissioning the system for the first time.

- Starting from any UPS, press and briefly hold “EXT” button on the front panel. Following selection menu will be displayed. Select “Unit” option using arrow keys and press “ENTER” key. In this case only that UPS will start up.

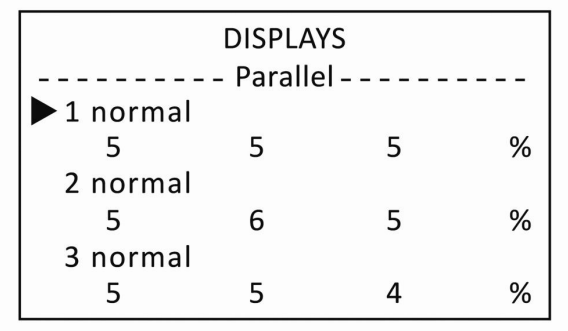


Figure–55 Starting up a UPS parallel system

- Soon later the UPS will switch to online operation mode and LED bar will be lit in green. Right at that moment, all other UPSs will switch to system off mode.
- Startup all the UPSs by repeating this step for all other UPS in the parallel system.
- Once all the UPSs are in online operation mode, throw battery switch (SW3) to ON position.
- Throw output switches (SW4) of the UPSs in parallel system to “UPS” position one by one.
- Throw main interrupt switch on load panel to ON position.

Once all the UPSs in parallel system were started, you can monitor operating statuses and load sharing of all the UPSs in LCD screen of any UPS in “Displays/Parallel” menu. (Figure-56) Load sharing among the UPSs must be equal to the extent possible.

In case of a significant unbalance between individual loads taken by the UPSs, contact authorized technical service.



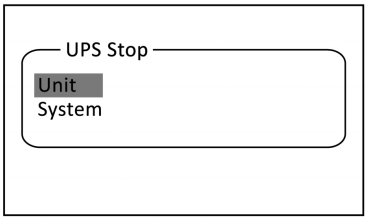
Figure–56 Parallel menu

7.4 Stopping parallel system

7.4.1 Stopping any UPS in the system

When you wish to deactivate any UPS in parallel system manually or otherwise following a malfunction, follow these steps to prevent any interruption with power supplied to load.

- Press and hold briefly “EXT” button on front panel. Mimic diagram will display the following. Select “Unit” option using arrow keys and press “ENTER” key.



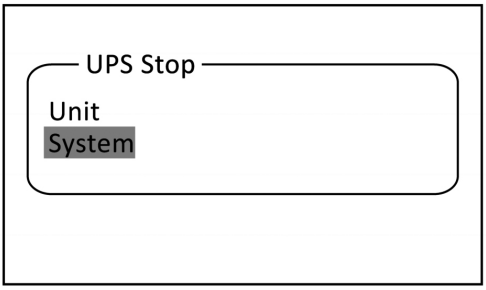
Figure–57 Stopping a UPS in parallel system

- At this moment, UPS will switch to system off mode.
- Throw output switch (SW4) to OFF position.
- Throw battery switch (SW3) to OFF position.
- Throw input (SW2) switch to OFF position.(If dual input device also turn static bypass switch to OFF position)
- Once the UPS is deactivated, check to make sure that remaining UPSs share the load equally, using “Displays/Parallel” menu option.

7.4.2 Stopping all the UPSs in the system

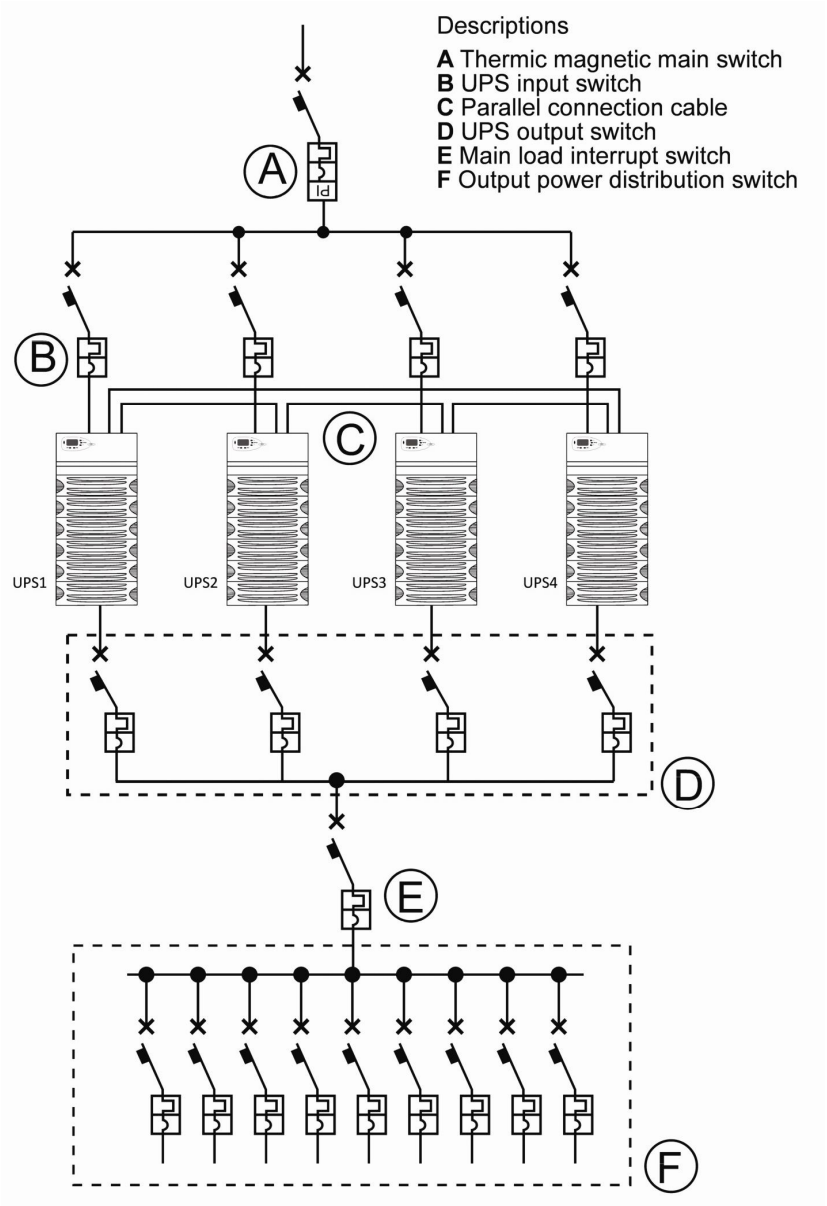
All UPSs in parallel system can be stopped using any UPS. Follow these steps to ensure that system can be stopped safely.

- Press and briefly hold “EXT” button on front panel. Mimic diagram will display the following. Using arrow keys, select “System” option and press “ENTER” key. All devices in the system will switch to bypass operation mode at the same time.



Figure–58 Stopping parallel system

- Turn off loads connected to system.
- Throw output switch (SW4) to OFF position.
- Throw battery switch (SW3) to OFF position.
- Throw input (SW2) switch to OFF position.(In dual input devices turn off also static bypass switch (SW6))



Figure–59 Electrical parallel connection diagram

8. Communication

8.1 RS–232 and RS–485 communication options

RS–232

This is used to enable uninterruptible power supply communicate with a nearby computer (within 20 meters range maximum) over RS–232 protocol. To enable this feature, go to “TEST SETTINGS\Communication\Hardware Protocol” menu and select “rs232” option. Communication speed can be changed using “TEST SETTINGS\Communication\Baudrate” menu option.

By use of assisting software, RS–232 protocol provides the following features.

- Compatible with Windows, UNIX, Macintosh operating systems.
- Status changes that occur on UPS can be monitored.
- UPS status can be sent to desired addresses via e-mail.
- It can be used to turn off the computer and running programs as desired by using suitable software.

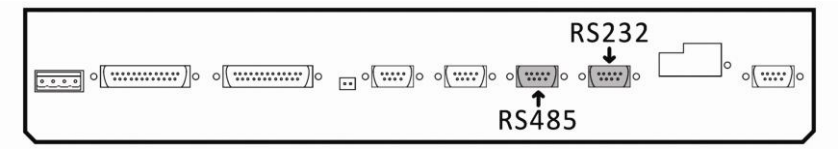
RS–485

RS-485 option is used to make use of advantages of RS–232 in longer ranges. Because RS–485 communication is kind of a signal transformation, an adaptor (RS-485 adaptor) is necessary for connection to computer end.

Pin	Signal	Signal Description
1	B	Signals sent and received
2	A	
5	GND	Ground

Table–8 RS–485 Socket structure

To enable RS–485 option, set “TEST SETTINGS\Communication\Hardware Protocol” menu option to “rs485”. Communication speed can be changed using “TEST SETTINGS\Communication\Baudrate” menu option.



Figure–60 RS–232 and RS–485 ports on communication board

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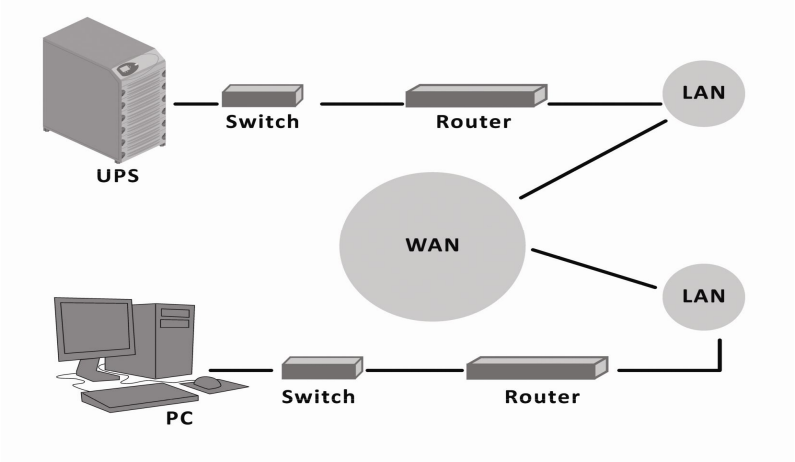
8.2 Mod-bus communication option

This is a standard communication protocol that enables data transmission between uninterruptible power supply and PLC or other industrial systems. To enable mod-bus feature, set “TEST SETTINGS\Communication\Hardware Protocol” menu option to “rs485” and “TEST SETTINGS\Communication\Software Protocol” to “modbus (rtu)”. Communication speed can be changed using “TEST SETTINGS\Communication\Baudrate” menu option.

Please consult your mod-bus manual for greater detail.

8.3 SNMP communication

This is a communication protocol that was designed and developed to enable monitoring and controlling of multiple UPSs from a single center simultaneously. Each UPS that will be used in network environment is connected to network over an SNMP adaptor.



Figure–61 Connecting UPS to network over an SNMP adaptor

You can connect to UPSs and check all information regarding their latest status by assigning them individual IP addresses over SNMP.

- You can monitor operating status of the UPS on a computer screen.
- Input, output and battery information of the UPS can be monitored on computer screen.
- Latest condition of the battery can be monitored while the UPS is operating in battery mode.
- You can see failure statuses of the UPS and ensure timely intervention by the technical unit.
- More than one UPS connected in a network environment can be monitored just from one computer of the network.

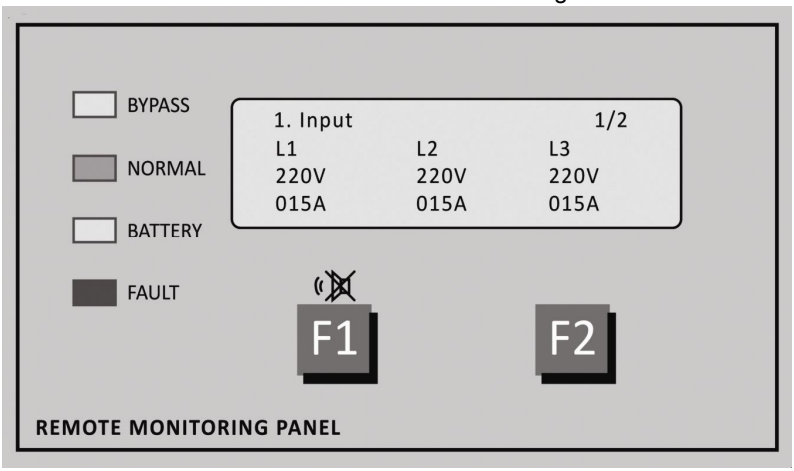
For greater detail, please consult you SNMP manual.

8.4 Remote monitoring panel

This is a panel designed to enable remote monitoring of the uninterruptible power supply. Typically, this shows UPS's operation mode, voltage, current, load and frequency information.

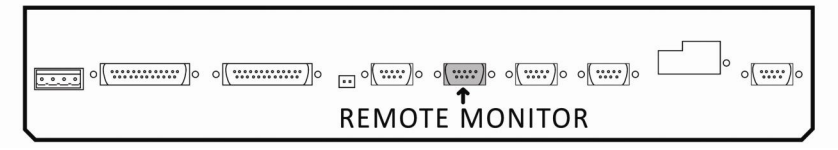
- This works over RS–485 communication protocol.
- Multiple panels can be connected in parallel (maximum 32 panels).
- Panel can be moved up to 100 meters away from the UPS.
- This only for monitoring purpose and does not provide controlling capability.

To enable use of remote monitoring panel, please select the choice 'on' in the "TEST SETTINGS\Communication\Remote Monitoring" menu.



Figure–62 Remote monitoring panel view

"REMOTE MONITORING" socket located on communication board is as follows.



Figure–63 Remote monitoring socket located on communication board

Communication signal layout in the port is as follows.

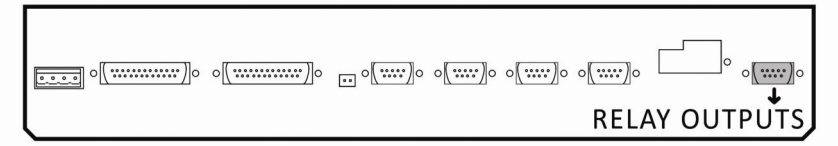
Pin	Signal	Signal Description
3	B	Signals sent and received
4	A	
5	GND	Ground

Table–9 Remote monitoring socket structure

8.5 Programmable relay unit

This is a unit that consists of 3 relays that transmit the status signals of the uninterruptible power supply to user. Each relay can be individually programmed by the user. A status that will activate the relay can be designated from the front panel for each relay. When designated condition occurs, relay will be activated and contact position will change. Maximum 220V/1A AC or 30V/3A DC voltage can be applied to relay contacts.

Relay contacts can be accessed via "RELAY OUTPUTS" (DB-9) female socket located on the communication unit. Relay contact layout in relay port is given in the following table.



Figurel–64 Relay port located on communication board

Contact \ Relay	RL1	RL2	RL3
NO (normally on)	1	7	4
NC (normally close)	6	3	9
COM (common)	2	8	5

Table–10 Relay contacts layout in relay unit

Programming relay unit

- Go to “CUSTOM SETTINGS\Relays” menu.
- There are three sub menus for three relays in this menu, respectively RL1, RL2, and RL3.
- Using selection arrows, select the relay that you wish to program in accordance with the status information given in the following table.
- Save by pressing “ENTER” key.

Status	Default Relay	Explanation
normal operation	RL1	UPS is in online operation mode.
bypass operation	-	UPS is in bypass operation mode.
battery operation	RL2	UPS is in battery operation mode.
standby mode	-	Currently not in active use.
mains out of limit	-	Mains voltage is out of limits.
bypass out of limit	-	Bypass voltage is out of limits.
output out of limit	-	Output voltage is out of limits.
battery low	RL3	Batteries are about to deplete.
battery fault	-	Battery fault detected.
overload	-	There is an overload case.
overheat	-	There is an overheat case.
fan failure	-	One or more cooling fan(s) malfunctioned.
fuse failure	-	One of fast fuses blown.
general failure	-	There is a general failure in the system.

generator active	-	Generator is running.
battery breaker off	-	Battery switch is off.
service breaker on	-	Manual bypass switch is on.
emergency stop	-	Ongoing emergency stop.
remote shutdown	-	UPS was shutdown via remote access.
rectifier fault	-	Rectifier unit malfunctioned.
general alarm	-	There is a general alarm with the UPS.

Table–11 Status list

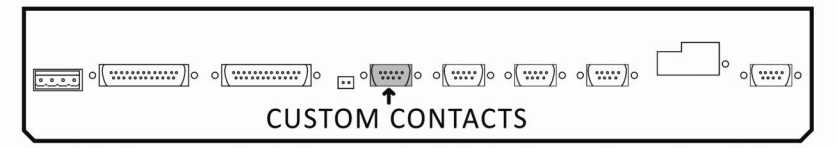
8.6 Custom contacts

Status information can be received from the pins located on custom contacts of the uninterruptible power supply to control the UPS.

Status Information	Pin
Remote startup/shutdown	1–2
Operation on generator	3–4
Emergency stop	8–9

Table–12 Status information of socket output pins

"Custom contacts" located on communication board is as follows.



Figure–65 Custom contacts located on communication board

9. Troubleshooting

If any problem is encountered with operation of uninterruptible power supply, please perform following checks before contacting authorized technical service.

Necessary checks on UPS must be performed by authorized technical service personnel only.

Check to make sure that input, output, and battery connections of the UPS were provided correctly.

Check to make sure that interrupt switches connected to input and output of UPS are appropriate.

Check to make sure that protection grounding of the UPS was provided as appropriate.

Electrical and installation infrastructure is of utmost importance for efficient UPS system operation. Basic issues associated with UPS devices that you may encounter with and things you must do in those cases are given in the following.

- **Overload**

The power required by the loads is higher than the power available. Check that the load is well balanced on three phases by checking the measurements on the display. If needed, disconnect any loads that do not need UPS.

- **Mains out of limit**

Check to make sure that mains voltage and frequency are in line with the limits set forth in technical specifications section of this user manual.

- **Overheat**

Check to make sure that UPS' operation environment temperature is within the recommended temperature limits. Check air conditioning system in the environment where UPS is located.

- **Failure to run with a generator**

Check and make sure that the generator used with uninterruptible power supply is of adequate power.

- **Battery operation time too short**

Charge batteries for at least 10 hours and try again.

Review recommended environment specifications for batteries. Operating environment temperature is one of the factors that affect battery life.

In systems that are subject to frequent power outages where batteries activated and deactivated very frequently, battery life will be shorter inevitably.

Do not service inside the UPS in cases of malfunction.

10. Maintenance

Customer must pay utmost attention during commissioning, use and maintenance of UPS devices. Modern UPS devices consist of delicate electronic circuits and are very sensitive to temperature and sanitary conditions. UPS devices and battery banks must be operated in a cool place (air conditioning room) in clean environment that does not have humidity, and their maintenance must be performed at regular intervals. Otherwise UPS' useful life will shorten and failures and malfunctions will occur more frequently.

We recommend you to have periodical maintenance (twice a year) performed to ensure maximum efficiency from C1 Series UPS.

All maintenance on the UPS must be performed by authorized technical service personnel only.

- Fans in uninterruptible power supply must be checked and cleaned once in every three (3) months.
- Air inlets and outlets must be checked and cleaned.
- Front panel must be cleaned periodically (once in every three months).
- We recommend you to change condensers in rectifier and inverter sections once in every five (5) years.
- Batteries used in the system must be checked periodically
- Environment where batteries are used must be clean and at appropriate temperature.

11. Technical specifications

General specifications							
Power (KVA)		**30**	**40**	**60**	**80**	**100**	**120**
UPS topology		Online, Double-Cycle, SPWM Controlled, without transformer					
Efficiency (AC ÷ AC)		up to 92% in online mode, 98% eco mode					
UPS environment temperature (°C)		(0) - (+40)					
UPS storing temperature (°C)		(-10) - (+55)					
Relative humidity		85% (noncondensing)					
Cooling type		Forced air conditioning					
Noise level (as per EN 50091)		< 65 dB					
Protection class		IP 20					
Standard box color		RAL 7012					
Dimensions without palette (mm)	Width	480				480	
	Depth	895				1000	
	Height	1225				1225	
Weight (Kg) without battery		170	185	200	265	330	350
Custom contacts		Three programmable relays					
Communication		RS232 / RS485 / SNMP / MODEM / MODBUS / Remote Monitoring					
Parallel Connection Feature		Up to 6 units					
Rectifier							
Topology		Vector-controlled IGBT technology					
Nominal input voltage (Vac)		220/380, 230/400, 240/415					

Input voltage range	±15% (at full load)					
Nominal input frequency (Hz)	50 / 60					
Input frequency range	±10%					
Maximum input current (A)	50	66	99	132	165	198
Input current distortion (THDi)	< 4%					
Input power factor	≥ 0.99					
DC output voltage accuracy	±1%					
DC output voltage ripple (rms)	1%					
Maximum charge current (at nominal load) (A)	4	5	7	9	11	13
Input protection	Fast acting fuse					

Inverter	
Topology	Vector controlled IGBT technology
Nominal output voltage (Vac)	220/380, 230/400, 240/415
Output voltage stability	
Static balanced load	±1%
50% unbalanced load	±2%
100% unbalanced load	±2%
Dynamic 50% load trans.	±2%
Dynamic 100% load trans.	±3%

Recovery time	< 2 ms					
Output voltage distortion At linear load At non-linear load	 < 2% Complies with IEC/EN 62040-3					
Phase angle At balanced load At 100% unbalanced load	 120° ±1% 120° ±2%					
Output frequency (Hz)	50 / 60					
Output frequency change Mains synchronized Original synchronized	 ±1% ± 0.1%					
Nominal output power Appearing power (KVA) Active power (KW)	 30 24	 40 32	 60 48	 80 64	 100 80	 120 96
Output nominal power factor	0.8					
Overload capacity At 110% load At 130% load At 150% load	 1 hour 10 minutes 1 minute					
Short-circuit protection	Electronic protection against short-circuit					
Crest factor	3:1					
Battery						
Standard battery type	Dry, maintenance free					
Battery operating environment temperature (°C)	(0) - (+25)					
Battery storing environment temperature (°C)	(-10) - (+60)					
Battery storage life (at +25°C temperature)	3 months					
Standard battery cell quantity	384					
Buffer charge voltage (at +25°C) (Vdc)	855					
Minimum discharge voltage (Vdc)	655					
Battery protection	Fast acting fuse					
Battery test feature	Manual or periodical (adjustable)					

Bypass	
External bypass (dual-input)	Standard
Nominal voltage (Vac)	220/380, 230/400, 240/415
Voltage range	±15% (adjustable)
Nominal frequency (Hz)	50 / 60
Frequency range	±10%
Overload capacity At 150% load At 200% load	 Continuous 1 minute
Static and Manual bypass	Standard

Before contacting us …

Please fill in following information and call technical service in cases of malfunction or whenever you need assistance in relation to your device.

Model	C1 Series
Power (KVA)	.....
Serial Number	.....
Purchase Date	.....
Commissioning Date	.....
Battery Backup Time	.....
Company Name	.....

AUTHORIZED TECHNICAL SERVICE