



# **CL200T SERIES UPS**

**6-7,5-10-15-20-30 kVA**

**( 3 Phase Input & 1 Phase Output )**

<b>CL-206T</b>	<b>6 kVA</b>
<b>CL-207T</b>	<b>7.5 kVA</b>
<b>CL-210T</b>	<b>10 kVA</b>
<b>CL-215T</b>	<b>15 kVA</b>
<b>CL-220T</b>	<b>20 kVA</b>
<b>CL-230T</b>	<b>30 kVA</b>

**USER MANUAL**



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# SAFETY

## **IMPORTANT NOTICES**

1. Read instructions carefully before installing and starting the UPS
2. All warnings in the manual should be adhered to.
3. All operating instructions should be followed.
4. The unit should be supplied by a grounded outlet. Do not operate the unit without a ground source.
5. Power cord of the UPS should be routed carefully so that they are not to be walked on.
6. Please save this manual.
7. Please save or recycle the packaging materials.

## **WARNING!**

- Do not insert any object into ventilation holes or other openings.
- To reduce the risk of fire or electric shock, install in temperature and humidity controlled indoor area free of conductive contaminants.
- To reduce the risk of fire, replace fuses with the same type and rating when necessary.

## **CAUTION!**

- **Only qualified personnel should install or service UPS/batteries.**
- **Risk of electric shock, do not remove cover. No user serviceable parts inside, refer servicing to qualified service personnel.**
- The output may be energized when the unit is not connected to a mains supply.
- **Risk of electric shock! Hazardous live parts inside. This unit is energized from the battery supply even when the input AC power is disconnected.**
- To reduce the risk of electric shock, disconnect the UPS from the mains supply before installing a computer interface signal cable. Reconnect the power cord only after signalling interconnections have been made.

## **ABOUT THE BATTERIES**

### **CAUTION: RISK OF ELECTRIC SHOCK!**

The battery circuit is not isolated from the mains voltage. Hazardous voltages may occur between the battery terminal and the ground!

- A battery can present a risk of electric shock or burn from high short circuit currents. The following precaution should be observed when working on batteries :
  - \* Remove watches, rings or other metal objects.
  - \* Use tools with insulated handles.
- The batteries in this UPS are recyclable. Batteries must be disposed of according to local environmental laws. The batteries contain lead and pose a hazard to the environment and human health if not disposed of properly.
- Do not dispose of batteries in a fire. The batteries will explode. Do not open or mutilate the batteries. They contain an electrolyte which is toxic and harmful to the skin and eyes. If electrolyte comes into contact with the skin the affected area should be washed immediately.
- The internal energy source (the battery) cannot be de-energized by the user.
- When changing batteries, install the same number and same type of batteries.

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## I. GENERAL DESCRIPTION

### 1.1 Introduction

TESCOM CL200T Series Uninterruptible Power Supplies are double-conversion, on-line UPSs manufactured with the latest IGBT and PWM technology, to produce an uninterruptible, microprocessor controlled pure sine wave output to critical loads.

TESCOM CL200T Series units are 3-phase in/1-phase out devices, and they are installed between a single phase critical load, and a 3-phase+N mains supply

The advantages of using CL200T UPS:

- Power blackout protection:  
If the mains power fails, the UPS continues to supply the critical load using the energy stored in its batteries, keeping the load immune from power disturbances.
- Increased power quality:  
The UPS has its own internal voltage and frequency regulating circuits, which ensure that, its output to the critical load is maintained within close tolerances, independent of voltage and frequency variations on the mains power lines.
- Increased noise rejection:  
By rectifying the input AC power to DC power and then converting it back to AC (Double-Conversion) any electrical noise present on the input mains supply line is effectively isolated from the UPS output. Therefore the critical load is supplied with only clean and uninterrupted AC power.

### Basic Features :

- Microprocessor Controlled
- Double Conversion, on-line UPS
- IGBT Rectifier (PWM)
- High Input PF
- Low THDI
- IGBT Inverter (PWM)
- Low output Voltage THD
- High Nonlinear Load capacity (CF 3:1)
- Efficiency Up to 90%
- Output Isolation Transformer
- Overload and short circuit Protection
- Overtemperature protection
- Static Bypass Switch
- Maintenance Bypass Switch
- Parallel Operation (Optional)
- LCD Display
- Alarm History (Up to 128 Alarms)
- Real time clock (date and time)
- Emergency Power off (EPO)
- Dual Polarity Batteries (Internal)
- Automatic and manual Battery Test
- Automatic and manual Boost Charge
- Battery current limit adjust
- Battery temperature compensation
- Deep discharge protection
- AC input filter
- AC output filter
- Alarm relay contacts (Standard)
- RS232 communication port (Standard)
- RS485 interface (Optional)
- SNMP adapter (Optional)
- Remote monitoring Panel (Optional)
- RS232 port multiplexer (Optional)
- MODBUS adapter (Optional)

## 1.2 Design Concept

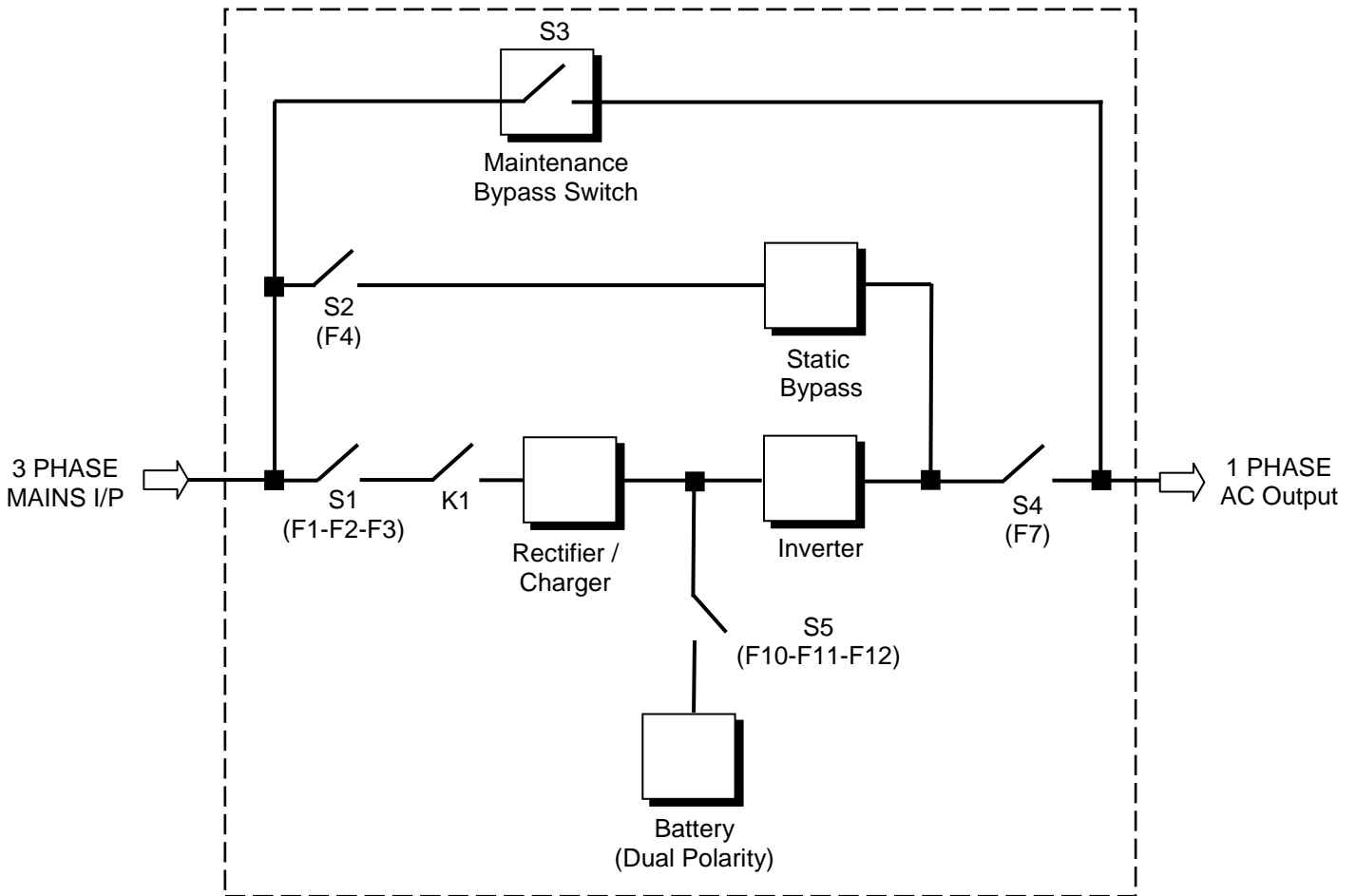


Figure 1.1 Block Diagram Of The UPS

- S1 (F1-F2-F3)** : Rectifier Input Switch / Fuses (MCB)
- S2 (F4)** : Bypass Input Switch / Fuse
- S3** : Maintenance Bypass Switch
- S4 (F7)** : Output Switch / Fuse
- S5 (F10-F11-F12)** : Battery Switch / Fuses (MCB)
- K1** : Rectifier Input Contactor

### DESCRIPTION OF BLOCKS

**RECTIFIER:** In CL200T Series UPSs, a PWM controlled IGBT rectifier is used to increase input power factor (PFC) and to decrease input current harmonics (THDI).

The IGBT rectifier accepts 3-phase AC input and produces a dual polarity DC voltage for both supplying the inverter and charging the batteries.

**BATTERIES:** Batteries are used as reserve DC power supply for the Inverter in case of mains failure. In CL200T Series, batteries are connected in series with a center-tap output to obtain a dual polarity DC supply.

Batteries are discharged by the inverter during mains failure. The discharged batteries are re-charged by the IGBT Rectifier on a constant current / constant voltage basis, if AC mains power is available.

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**INVERTER:** It is manufactured by using the latest IGBT technology and Pulse width Modulation (PWM) technique. The Inverter converts the DC BUS voltage supplied by the IGBT Rectifier and / or the batteries into a well regulated AC voltage with fixed voltage (220V) and frequency (50Hz).

The output of the inverter is used to supply the critical loads connected to the UPS output.

**STATIC TRANSFER SWITCH (STATIC BYPASS) :** This is an electronically controlled transfer switch, which enables the critical load to be connected either to inverter output or to a by-pass power source. During normal operation, the load is supplied by the inverter output, but in case of an overload it is automatically transferred to the bypass source without any interruption.

**MAINTENANCE BYPASS SWITCH (MBS) :** This is a manually controlled mechanical switch, which is used to supply the critical load, using the bypass source, when the UPS is shut down for maintenance or troubleshooting purposes.

The load is unprotected against mains supply disturbances and black-outs when it is connected to either static or maintenance bypass supply.

### 1.2.1 OPERATING MODES OF UPS

#### **A. Normal Operation (If mains supply is available):**

All fuses and power switches are closed (except the Maintenance Bypass Switch), and the load is supplied by the Inverter output. During normal operation, the Rectifier supplies DC power to the Inverter and charges the Batteries at the same time.

#### **B. Battery Operation :**

The Batteries are connected to the Rectifier output. In case of a mains failure (mains power outage or AC input voltage out of tolerance), the Rectifier stops operating and the DC voltages necessary for the inverter operation are supplied by the batteries. Therefore the AC voltage output supplying the critical load is not interrupted, until the batteries are fully discharged. At the end of the discharging time the Inverter is turned off and it starts again automatically, together with the Rectifier, when the mains power is restored, and the UPS returns to normal operation.

The Rectifier is also turned off and Inverter operates on batteries during automatic or manual battery test procedure.

#### **C. By-Pass Operation :**

If the Inverter output is overloaded or in case of a problem in the Inverter, the static switch transfers the load to the bypass supply without any interruption, provided that the bypass supply is available and within the tolerated limits.

At the end of the overloading period or if the fault condition is restored, static switch transfers the critical load again to the inverter output. Note that, during operation from bypass supply, the critical load may be effected by any possible disturbances or power failure in the bypass supply.



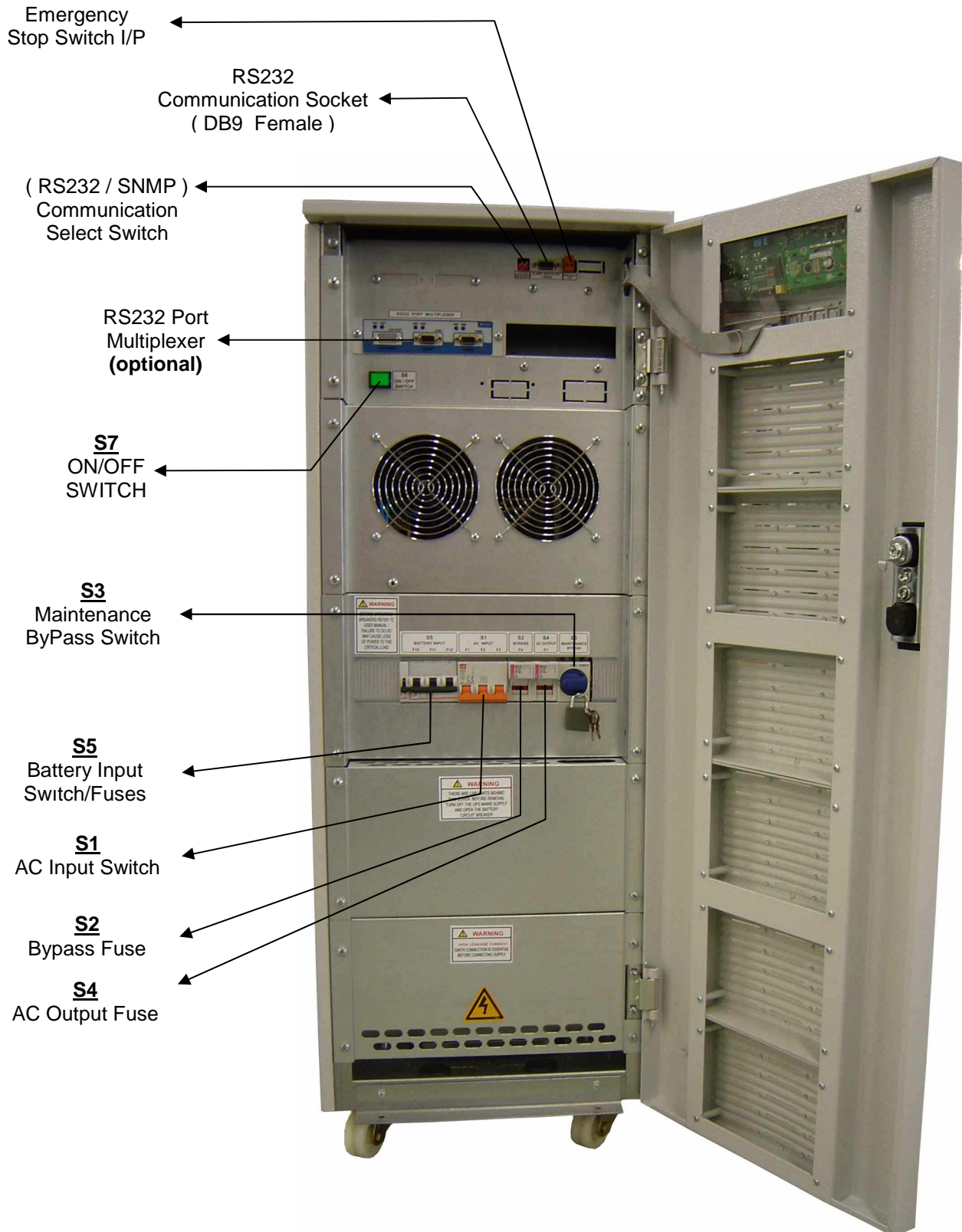


Figure 1.2.a 6-7,5 kVA Fuse and Switch Locations

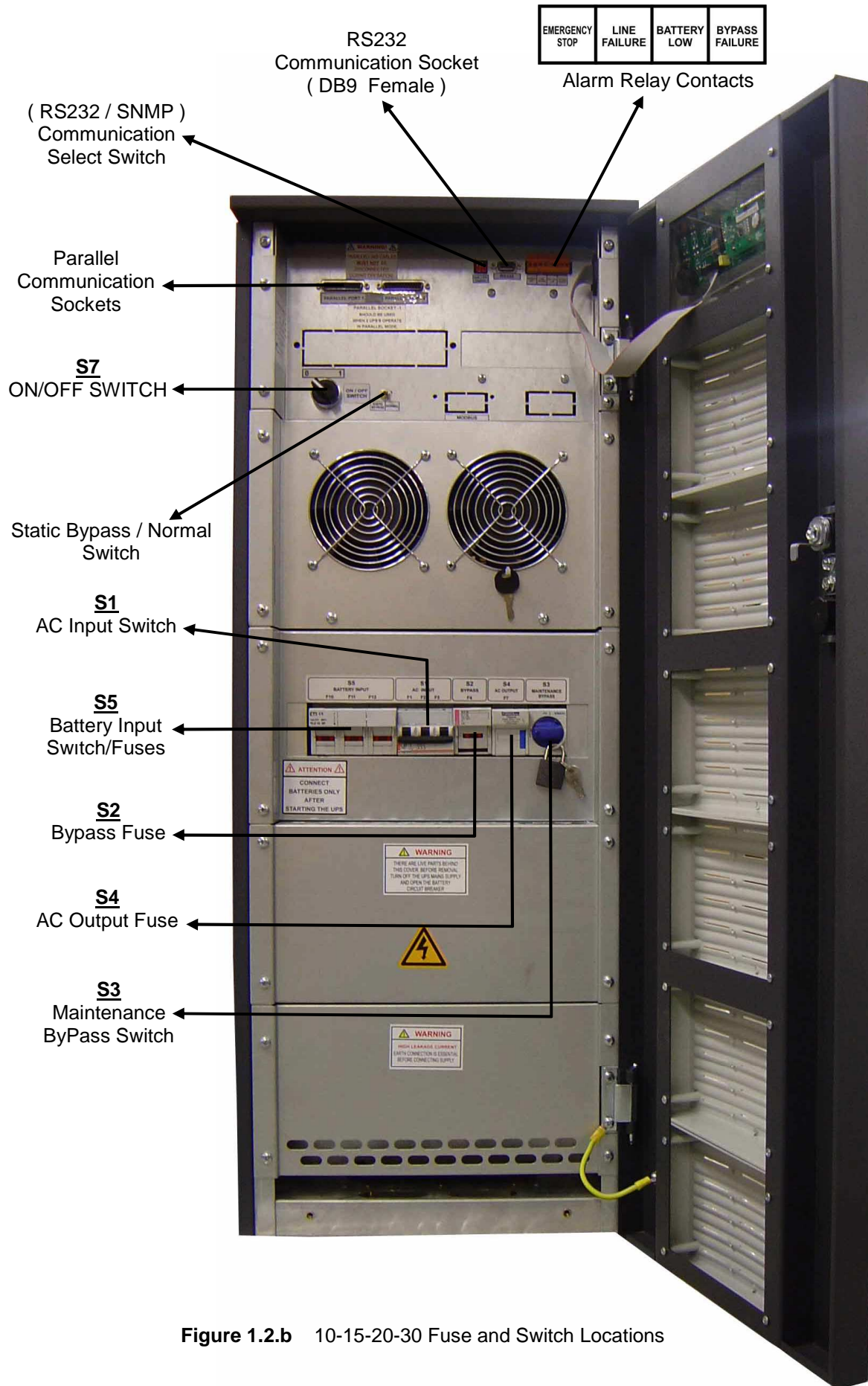


Figure 1.2.b 10-15-20-30 Fuse and Switch Locations

### 1.3 Technical Specifications

MODEL	CL-206T	CL-207T	CL-210T	CL-215T	CL-220T	CL-230T
Output (VA)	6000	7500	10000	15000	20000	30000
Output (W)	4200	5250	7000	10500	14000	21000
Output Power Factor	0,7					
<b>INPUT</b>						
Number of Phases	3 Phase + Neutral					
Input Voltage	220/380 Vac or 230/400Vac 3phase+N					
Input Voltage Tolerance	+10%,-20%					
Input Power Factor (PF)	≥ 0,98 (at full load)					
Input THDI	≤ 8 % (at full load)					
Input Frequency	50Hz ± 5 %					
By-pass Voltage	220Vac or 230Vac 1Phase+N					
By-pass Frequency	50Hz					
By-pass Frequency Tolerance	(± 1-5 % adjustable)					
RFI Level	EN50091					
Split By-pass Connection	Available					
<b>OUTPUT</b>						
Number of phases	1 Phase + Neutral					
Output Voltage	220 Vac or 230Vac 1Phase+N					
Output Voltage Tolerance	± 1 %					
Output Frequency	50 Hz					
Output Frequency Tolerance (line synchron)	(± 1-5 % adjustable)					
Output Frequency Tolerance (free running)	± 0,2 %					
Efficiency (at full linear load)	up to 90 %					
Load Crest Factor	3 : 1					
Output Voltage THD	≤ 3 %					
Overload	125% Load 10min. , 150% Load 1min.					
<b>BATTERIES</b>						
Total Number	52 (2x26) pieces 12V					
Float Charge Voltage (25°C)	± 351 Vdc					
End of Discharge Voltage	± 260 Vdc					
Battery Charge Temperature Compensation	Available					
Battery Test	Automatic and Manual					
Boost Charge	Available					
<b>INTERFACE</b>						
RS 232 comm. port	Standard (Optional port multiplexer available)					
RS 485 comm. port	Optional					
Remote Monitoring Panel	Optional					
SNMP Adapter	Optional					
Mod bus Adapter	Optional					
Alarm Relay Contacts	3x Dry Relay Contacts (Line failure, battery low, bypass)					
Programmable Alarm Relay Contacts	2x Dry Relay Contacts (Optional)					
EPO Input	Standard					
<b>ENVIRONMENT</b>						
Operating Temperature	0 - 40°C					
Operating Humidity	< 90% (Non-Condensing)					
Acoustic Noise	≤ 50 dB			≤ 55 dB		
Dimensions (HxWxD) (mm)	1030 x 375 x 730					
Protection Class	IP20					
Weight (Without Batteries)	115	119	145	175	198	215

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## II. UPS INSTALLATION

### 2.1 Introduction

#### **WARNING!!!**

- Do not apply electrical power to the UPS equipment before the arrival of authorized service personnel.
- **The UPS equipment should be installed by qualified service personnel.**
- The connection of the batteries and the maintenance should be done by qualified service personnel.
- Do not make short-circuit to the batteries poles. Because of the high short-circuit current; it has the danger of electrical shock or burn.
- Eye protection should be worn to prevent injury from accidental electrical arcs. Remove rings, watches and all metal objects. Only use tools with insulated handles. Wear rubber gloves.

This chapter contains location installation information of the UPS and the batteries. All the establishments have their own specialties and needs. So in this part, the installation procedure is not being explained step by step. Instead, general procedure and the applications are explained for the technical personnel.

### 2.2 Unpacking

The UPS is packed and enclosed in a structural cardboard carton to protect it from damage.

- 1) **Inspect for damage that may have occurred during the shipment. If any damage is noted, call the shipper immediately and retain the shipping carton and the UPS.**
- 2) Carefully open the carton and take the UPS out.
- 3) Retain the carton and packing material for future use.

Unit package contents:

- 1) A user manual and Guarantee certificate.
- 2) Battery cabinet and/or shelf (Optional)
- 3) Battery connection cables.

### 2.3 Equipment Positioning

1. The equipment's installation place must be an easy serving place.
2. Install the UPS in a protected area with adequate air flow and free of excessive dust.
3. You must therefore allow for a minimum gap of 250 mm behind the unit to allow adequate air flow
4. Select a suitable place (temperature between 0°C and 40°C) and the relative humidity (%90 max)
5. It is recommended to place the equipment in an air-conditioned the room (24°C)
6. Temperature is a major factor in determining the battery life and capacity. Keep batteries away from main heat sources or main air inlets etc.
7. In case of an operating the UPS in a dusty place, clean the air with a suitable air filtration system.
8. Keep out of your equipment from explosive and flammable items.
9. Avoid direct sunlight, rain, and high humidity.

**WARNING!!!** Check the capacity of the forklift if it is available for lifting.  
**DO NOT LEAN OR LIFT THE UPS CABINET AFTER THE BATTERIES HAVE BEEN INSTALLED.**

## 2.4 Connecting the UPS Power Cables

**WARNING!!!** A separate line should be used to supply the UPS AC input. Never use the same line to supply another electrical device. Do not use any additional cable to increase the length of the UPS's input cable. It is advised to use an MCCB suitable for the input current on the UPS's input line.

**The connection of the electrical panel should be supplied by a grounded outlet.** Otherwise, the UPS and the load connected to the output will be left ungrounded. The grounding system must be checked, and must be strengthened if required. Potential difference between ground and neutral must be less than 3V AC.

Descriptions of the UPS input output cable connection terminals are shown in figure 2.1

Recommended input line cable and fuse ratings are given in the table below.

UPS POWER (kVA)	NOMINAL CURRENT : Amps / Recommended Cable Size (mm <sup>2</sup> )					BUS BAR CONNECTION STUD SIZE	
	Input Mains full capacity recharge, at full load		Bypass / output At full load		Battery at min. Battery Voltage	Input/Output Cable Terminals  U-V-W-N	Battery Terminals  + & -
	380V	400V	220V	230V			
	A / mm <sup>2</sup>	A / mm <sup>2</sup>	A / mm <sup>2</sup>	A / mm <sup>2</sup>	A / mm <sup>2</sup>		
6	9A / 4	8,5A / 4	27A / 10	26A / 10	10A / 6	16 mm <sup>2</sup>	16 mm <sup>2</sup>
7,5	11A / 4	10,5A / 4	34A / 10	32A / 10	12A / 6	16 mm <sup>2</sup>	16 mm <sup>2</sup>
10	15A / 6	14A / 6	45A / 16	43A / 16	15A / 6	16 mm <sup>2</sup>	16 mm <sup>2</sup>
15	21A / 10	20A / 10	68A / 25	65A / 25	22A / 10	16 mm <sup>2</sup>	16 mm <sup>2</sup>
20	30A / 10	28A / 10	90A / 25	86A / 25	30A / 10	16 mm <sup>2</sup>	16 mm <sup>2</sup>
30	42A / 16	40A / 16	136A / 35	130A / 35	45A / 16	35 mm <sup>2</sup>	35 mm <sup>2</sup>

**NOTES:** The neutral conductor should be sized for 1,5 times the output/bypass phase current. These recommendations are for guideline purposes only and are superceded by local regulations and codes of practice.

### 2.4.1 Safety Earth

The safety earth cable must be connected to the earth BUS BAR and bonded to each cabinets in the system and also the earthing and neutral bonding arrangements must be in accordance with the local laws.

**ATTENTION!!!** Failure to follow adequate earthing procedures can result in electric shock hazard to personnel, or the risk of fire.

## 2.4.2 Cable connection procedure

**WARNING!!! All connections of the UPS must be done by qualified service personnel**

After positioning the UPS, the cables must be connected as described below:

1. Verify all switches and fuses in front of the UPS are at “0” position. (OFF)
2. Connect the 3 phase AC input coming from the mains distribution panel to the AC input terminals as shown on the label. (Figure 2.1)
3. Connect the output of the UPS to the load distribution panel.
4. Connect the battery groups. Refer to battery installation section.

**WARNING :**

- CHECK BOTH OF THE BATTERY GROUPS FOR CORRECT POLARITY
- DO NOT TURN ON THE BATTERY SWITCH (F5) BEFORE STARTING THE UPS

5. Connect the copper earth bus, to the safety earth of the mains distribution panel.

**NOTE :** The earth and the neutral connections must be in accordance with the local Rules.

**WARNING :** Note that the Input Neutral (N1) MUST also be connected to K10 terminal

## 2.4.3 Description of connection terminals of the UPS :

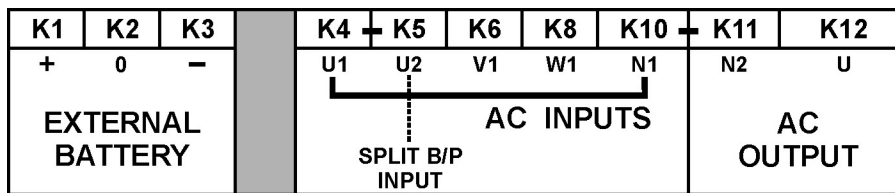


Figure-2.1.a 6-7,5 kVA

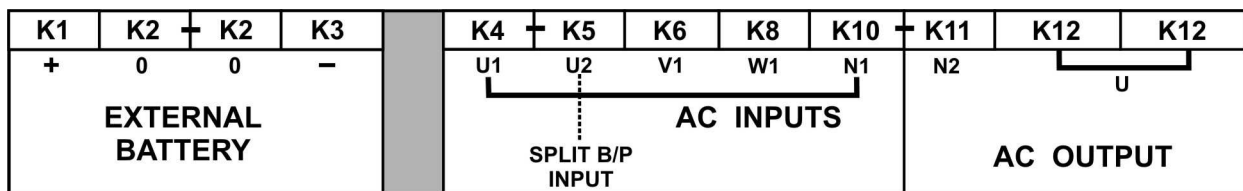


Figure-2.1.b 10-15-20-30 kVA

- As shown on the power connection label of the UPS, U1 phase of the incoming 3 phase supply is used as the bypass input if there is not a separate bypass supply (split bypass). The U1 conductor cross section should be sized accordingly.
- If there is a separate single phase AC supply for bypass (split Bypass)
  - a-) Remove the connection between K4 and K5, (separate U1 and U2)
  - b-) Connect the phase line of the bypass source (U2) to K5 and the neutral (N2) to K11.

Note that the Neutral of the 3 phase input supply (N1) and the neutral of the 1-phase bypass supply (N2) must always be connected together to form the Neutral of the AC output.

## 2.4.4 Battery Installation

**WARNING!!!** Be careful while connecting batteries.

**ATTENTION!!!** Open the battery switch/fuse before making any connection on the batteries.

The batteries associated with the UPS equipment are usually contained in a purpose-built battery cabinet. In CL-206T and CL-207T there is enough space for 52 pieces of 12V 7Ah maintenance free batteries.

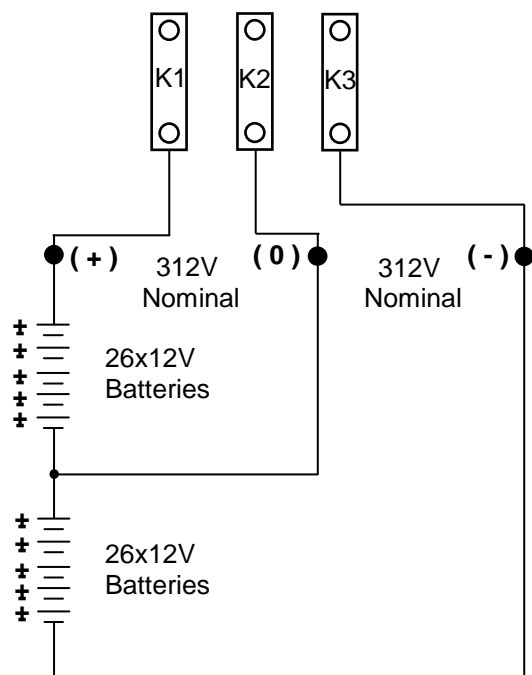
In CL-210T, CL-215T, CL-220T and CL-230T where battery racks are used, they should be sited and assembled in accordance with the battery manufacturer's recommendations. In general, batteries require a well-ventilated, clean and dry environment at reasonable temperatures to obtain efficient battery operation.

In general a minimum space of 10 mm must be left on all vertical sides of the battery block. A minimum clearance of 20 mm should be allowed between the cell surface and any walls. All metal racks and cabinets must be earthed.

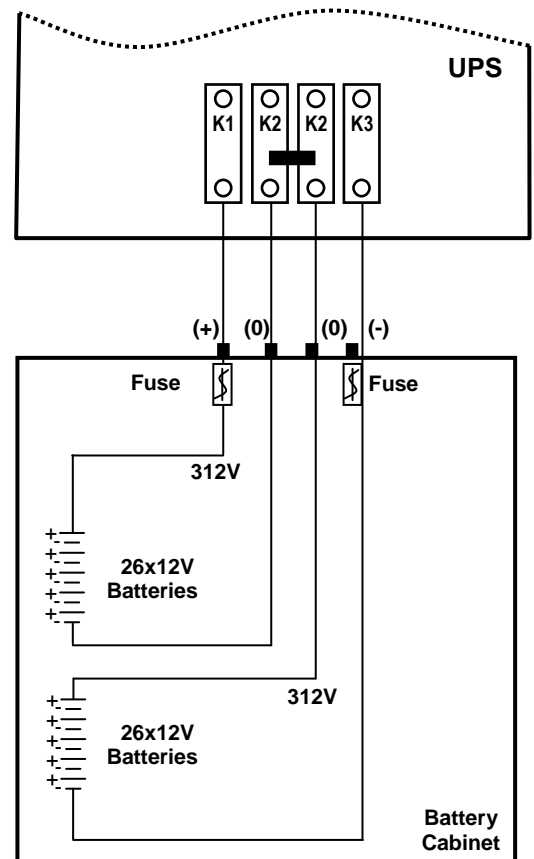
1. Unpack each battery and check its terminal voltage. Any battery with terminal voltage less than 10,5V must be charged before installation.
2. Please check the battery connecting hardware and documents. (cables, trays, connection diagrams)
3. Please locate suitable number of batteries on each rack, according to the battery installation and connection diagram given with the unit.
4. Start locating the batteries from top to the bottom on the racks.
5. Be careful about the connection between the racks and polarities.
6. After interconnecting the batteries, connect “+”, “0” and “-“ leads of the batteries to the battery input terminals on the UPS. Be careful to connect the batteries correctly and do not turn on (S5) before checking all connections and before starting the UPS. In CL200T Series UPS, 52 blocks of batteries are connected in series, in such a way that they form two strings of batteries with opposite polarity; with a center tap connection to the NEUTRAL (N1-N2) internally.

**WARNING!!!**

**NEVER TURN ON S5 (BATTERY FUSE) WITHOUT CENTER POINT CONNECTION TO K2.**



Connection of Batteries (52x12V) (6-7,5 kVA)



Connection of Batteries (52x12V) (10-15-20-30 kVA)

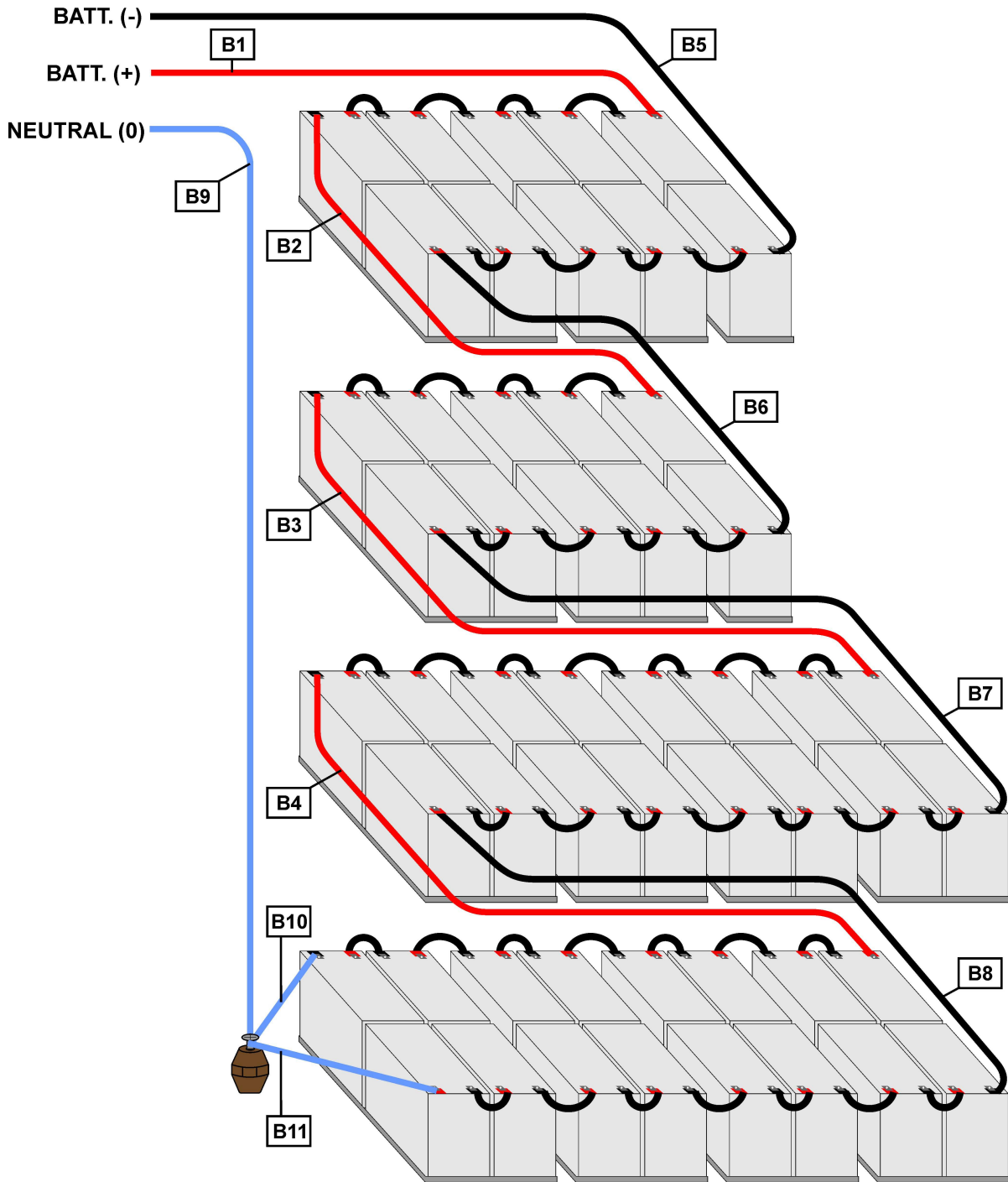


Figure 2.2 CL-206T , CL-207T INTERNAL BATTERY CONNECTIONS  
 ( 2x26=52 x 12V 7Ah )



### III. FRONT PANEL

**WARNING!** The messages in this section are applicable for equipments having software version Y11P3. If the version changes, the messages and functions may change as well.

#### 3.1 Introduction

The front panel of UPS, consisting of a 2 lines alphanumeric display, 2 status lamps, plus 4 function keys, allows the complete monitoring of the UPS status. The mimic flow diagram helps to comprehend the operating status of the UPS. By using the function keys, operator can move on menus and change some parameters.

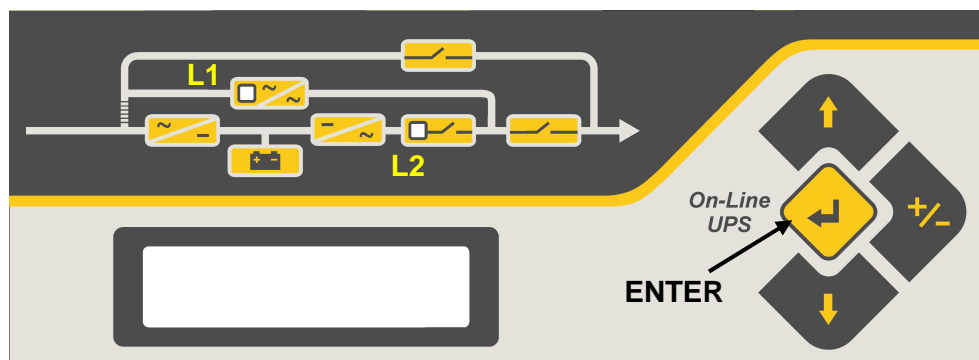


Figure 3

- L1** : If lamp is lit static bypass is active and load is connected to mains voltage
- L2** : If lamp is lit inverter supplies the load

There are 4 function keys on front panel, these are ENTER, UP (↑), DOWN (↓) and (+/-). (↑) and (↓) keys help moving in menus, (+/-) key selects options, ENTER key means the selected option or menu is valid.

**NOTE :** During parameter settings, “+” sign will change into “—” sign if “+/-” button is pressed for 3 seconds and the parameter values will start decreasing.

#### 3.2 Front Panel Menu Descriptions

By using menu buttons on the front panel you can move on main menu functions. You can enter the submenu of the item seen on the LCD panel (MEASURES, ALARMS, INFORMATION, ETC) and navigate within it by using again ↓, ↑, ↵ (Enter) buttons.

The Main Menu items are listed below. You can choose any requested menu using (↑) and (↓) keys. By pressing ENTER key, you can choose that menu and you can reach all submenu items using (↑) and (↓) keys again. At the end of submenus of each Menu an <ENTER> EXIT message is seen, and if you press ENTER, you exit from the selected menu and go back to the beginning of the Main Menu.

Main menu items	Function
<b>STATUS</b>	The status message which shows the UPS status
<b>COMMAND MENU</b>	→ Enter “go to Command submenu”
<b>MEASURES MENU</b>	→ Enter “go to Measures submenu”
<b>ALARMS MENU</b>	→ Enter “go to Alarms submenu”
<b>USER OPTIONS</b>	→ Enter “go to User Option submenu”
<b>TIME MENU</b>	→ Enter “go to Time submenu”
<b>CALIBRATION MENU</b>	→ Enter “go to Calibration submenu”
<b>ADJUST MENU</b>	→ Enter “go to Adjust submenu”
<b>INFORMATION MENU</b>	→ Enter “go to Information submenu”
<b>Go to STATUS MENU</b>	

### 3.2.1 COMMAND Menu items

This menu is used to give various commands to the UPS or perform tests on it.

	Submenu item	Function
1	<b>SOUND : ON/OFF</b>	Used for turning on/off the audible alarm. If you press ENTER key the option will change (push ON, push OFF). If the OFF option is selected audible alarm is turned off but in case of a new alarm, UPS changes the option to ON state.
2	<b>ENTER &lt;BYPASS&gt;</b>	If you press ENTER for 3 seconds, the load is transferred to BYPASS automatically and the submenu item changes to ENTER <INVERTER> this time. If you press ENTER for 3 seconds, the load is transferred back to Inverter.
3	<b>ENTER B.TEST&gt;702</b>	If you press enter for 3 seconds battery test starts and lasts for 15 seconds. If battery test fails <b>A6 BATT FAULT</b> message is shown on panel and this message stays until you press ENTER key for 3 seconds. The value on at the right shows the battery voltage during battery test. Starting time of battery test is recorded to log event menu. If the test is performed successfully, you can see only <b>BATTERY TEST</b> message on log records.
4	<b>ENTER &lt;BOOST&gt;</b>	If you press ENTER key for 3 seconds boost charge starts. The given time for boost charge is 10 hours. At the end of this time UPS stops the boost charge. If the boost charge is active this submenu item changes to <b>STOP BOOST&gt; 005H</b> message the 005H shows that boost charge is going on for 5 hours. If the number is 10 boost charge stops. If you press ENTER key boost charge stops immediately. Boost charge starting and boost charge end times are recorded to log event menu. If boost is active UPS beeps every 15 seconds
5	<b>SIMULATION OFF</b>	The purpose of this submenu to check dry contact connections. Normally to check line failure contact you must turn off mains power. This is not necessary with this utility. 3 options are available. <b>SIMULATION OFF</b> simulation mode is off <b>SIM: LINE FAILURE</b> if you press ENTER key for 3 seconds the line failure relay on the interface board is energized. <b>SIM:LIN.F+BT.LOW</b> if you press enter key for 3 seconds the line failure and battery low relays are energized. <b>SIM:BYPASS</b> if you press ENTER key for 3 seconds the bypass relay is energized. <b>SIM:AUX1 RELAY</b> If you press ENTER key for 3 seconds, the AUX1 Relay (if installed) is energized. <b>SIM:AUX2 RELAY</b> If you press ENTER key for 3 seconds, the AUX2 Relay (if installed) is energized. So you can check dry contact connections
6	<b>ENTER FAULT RESET</b>	Faults reset selection.
7	<b>ENTER &lt;EXIT&gt;</b>	→ Enter (↵) exit from submenu
	<b>Goto MAIN MENU</b>	

### 3.2.2 MEASURES Menu items

Many UPS parameters can be monitored in this menu, navigation through the items is performed using (↑) and (↓) keys.

	Submenu item	Function
1	LOAD..: 060%	Output load percentage
2	OP CURR : 011A	Output current
3	OUTPUT: 220	Output voltage
4	IPV: 380 388 380	3 Phase input voltages
5	BATTERY: 702 V	Battery voltage (Total voltage of 52 batteries)
6	BYPASS: 220V	By-pass voltage
7	FR: 50.0 Hz 50.0 Hz	Input frequency – Output frequency
8	TEMP: 030 c	UPS cabinet temperature
9	ENTER <EXIT>	→ Enter (↓) exit from submenu
	Goto MAIN MENU	

### 3.2.3 ALARMS Menu items

The last 128 events can be monitored in this menu.

	Submenu item	Function
1	UPS STATUS	Alarm status at that instant.
2	000>311201 23:15	Monitoring past alarms: First 3 digit number indicates the event number, 000 event is the last one. Date is in ddmmyy and time is in hh:mm format. On the second line, the alarm events on the first line are listed. Using ↔ button 128 events can be viewed.
3	PARR.ERR.NR : 017	Parallel controller board error (If parallel hardware exists) If this value is 0 then the parallel is OK
4	ENTER <EXIT>	→ Enter (↓) exit from submenu
	Goto MAIN MENU	

### 3.2.4 USER OPTIONS Menu items

From this menu the user selects some important parameters and apply them.

	Submenu item	Function
1	MODE: ONLINE	4 Operating modes can be selected using (↑) and (↓) buttons. <b>ONLINE</b> : normal operating mode. <b>PARALLEL</b> : (optional) <b>ECONO</b> : (optional) <b>REDUNDANT</b> : (optional) → Press ENTER for 3 seconds to save the selected mode.
2	UPS No : 001	By using PLUS and MINUS keys you can change number 0 to 7. In parallel operation (if parallel option is present) select different numbers for each UPS. If you select the same number DUBL UPS NUMBER message tells the fault. → press ENTER for 3 seconds and then the selection is valid
3	BYP.PROTECT ON/OFF	By using +/- key you can change on and off options. <b>ON</b> : if the bypass source is out of tolerance, UPS turns off load power in case of a fault or overload.. <b>OFF</b> : UPS turn off load power for a short time only during transition from inverter to bypass. If bypass period is completed UPS continues to supply the load. → press ENTER for 3 seconds and then the selection is valid

	Submenu item	Function
4	RESTART:ON/OFF	By using +/- key you can change on and off options. <b>ON</b> : during mains failure, at the end of battery discharge UPS shutdowns and, after mains is restored UPS starts again. <b>OFF</b> : after mains restoration UPS doesn't start by itself again. You must turn off and then turn on the UPS. → press ENTER for 3 seconds and then the selection is valid
5	REMOTE : ON/OFF	By using +/- key you can change ON and OFF options. <b>ON</b> : remote battery test, shutdown and bypass functions are enabled through RS232. <b>OFF</b> : these functions are disabled → press ENTER for 3 seconds and then the selection is valid
6	LANGUAGE: ENGLISH	Display language selection.
7	BOOST TIME	Boost charge period of 1-15 hours is set. Boost charge is disabled if 0 is entered during boost charging.
8	BOOST	Manual – automatic modes are selected using +/- key. In automatic mode, if the line is off, each time input line voltage is restored the boost charge starts automatically.
9	DIRECT START: ON/OFF	<b>ON</b> : Inverter starts automatically. When the UPS is turned on. <b>OFF</b> : The inverter stays in standby mode when the UPS is turned on. The inverter starts when ENTER key is pressed. Until this moment the load is supplied by the bypass line.
10	XFER MOD: CURRENT	<b>CURRENT</b> : Switches into bypass without delay when the load current is zero <b>DELAY</b> : If the UPS is not synchronized to the bypass voltage, switching to bypass is performed with a 15msec. delay.
11	RL5	DC LOW or COMMON (The function of the relay is selectable)
12	AUX1 COMMON	Alarms : COMMON , BATT. LOW, OUTPUT HIGH, OVERLOAD, LINE FAILURE, OVER TEMP., OVER CURRENT, OUTPUT LOW, BATTERY HIGH, BATT. FAULT, BY-PASS BAD, BOOST CHARGE, MANUEL BYP, ROT. PHASE, OUTP. OFF, UPS FAILURE.  AUX1 relay can be defined for any desired alarm. (If installed)
13	AUX2 COMMON	Alarms : COMMON , BATT. LOW, OUTPUT HIGH, OVERLOAD, LINE FAILURE, OVER TEMP., OVER CURRENT, OUTPUT LOW, BATTERY HIGH, BATT. FAULT, BY-PASS BAD, BOOST CHARGE, MANUEL BYP, ROT. PHASE, OUTP. OFF, UPS FAILURE.  AUX2 relay can be defined for any desired alarm. (If installed)
14	ENTER <EXIT>	→ Enter (↵) exit from submenu
	Goto MAIN MENU	

### 3.2.5 TIME Menu items

You can see date and time of RTC (real time clock) on UPS. And you can adjust date and time.

	Submenu item	Function
1	TIME : 23 :15	time
2	DATE : 11-10-2001	date
3	SET HOURS: 11	(+) and (-) adjust hours (0-23)
4	SET MINS : 38	(+) and (-) adjust minutes (0-59)
5	SET DAY : 21	(+) and (-) adjust day (1-31)
6	SET MONTH : 06	(+) and (-) adjust month(1-12)
7	SET YEAR : 2001	(+) and (-) adjust year (2000-2099)
8	ENTER <UPDATE>	→ Enter update new date and time
9	ENTER <EXIT>	→ Enter (↵) exit from submenu
	Goto MAIN MENU	

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### 3.2.6 CALIBRATION Menu items

	Submenu item	Function
1	(Password required )	Measurement Menu display parameter adjustments.
	<b>ENTER &lt;EXIT&gt;</b>	→ Enter           (↵) exit from submenu
	<b>Goto MAIN MENU</b>	

### 3.2.7 ADJUST MAIN Menu Items

	Submenu item	Function
1	(Password required )	System parameter adjustments.
	<b>ENTER &lt;EXIT&gt;</b>	→ Enter           (↵) exit from submenu
	<b>Goto MAIN MENU</b>	

### 3.2.8 INFORMATION Menu items

This menu gives information about the UPS

	Submenu item	Function
1	<b>COMM :OK SYNC :OK</b>	If the UPS is operating in synchron to mains SYNC:OK ,if not synchron SYNC:-- If communication is active COMM:OK ,if not active COMM:--
2	<b>POWER: 7500 VA</b>	The maximum power rating of the UPS
3	<b>VERSION : Y11P3-TX100</b>	Shows the UPS software version
4	<b>ENTER &lt;EXIT&gt;</b>	→ Enter           (↵) exit from submenu
	<b>Goto MAIN MENU</b>	

### 3.3 STATUS Messages

This message group simply shows the UPS STATUS on the upper line of LCD PANEL.

**RECTIFIER START !** : UPS started the rectifier  
**ENTER START** : Press ENTER to start the UPS.  
**INVERTER START !** : UPS started the inverter.  
**MAINT SWITCH ON !** : Maintenance bypass switch is on  
**STATUS NORMAL !** : UPS is operating normally.  
**EMERGENCY STOP !** : External emergency stop signal is applied to UPS.  
**WAITING SYNC !** : Inverter started waiting for mains synchronization.  
**STATUS FAULT !** : Fault status

#### **RECTIFIER START :**

At start up the UPS controller board checks for input voltage, frequency, battery voltage for starting, if these parameters are normal, it starts up.

#### **INVERTER START :**

If the inverter stops by any reason, controller board tries to restart the inverter. Each time the inverter is started, this message appears on the first line of LCD PANEL

#### **MAINT SWITCH ON:**

Maintenance bypass switch is connected from bypass input to the output of UPS directly .If the maintenance bypass switch is on (1 position) controller stops the inverter against any accidental short circuits between mains voltage and inverter output. If the user turns off the maintenance bypass switch, inverter starts again.

#### **EMERGENCY STOP :**

If an external EPO switch is installed to system (connected to interface board), it is possible to stop all UPS parts (rectifier, static bypass, inverter, etc...). After pressing EPO switch the rectifier and inverter are turned off and the power to the critical load is turned off. To start again, turn off the ON/OFF switch and turn it on again.

#### **FAULT STATUS :**

In some cases controller checks events but can not find solutions, in this case controller decide to stop system, for restarting the user must turn off the ON/OFF switch and turn it on again.

### 3.4 Shutdown messages :

CL-200 series UPS can operate interactive with the operating system. You can send commands to UPS from operating system by using some softwares .UPS takes these commands and produces some messages listed below:

- WAITING SHUTDOWN** : Shutdown command is performed by the operating system and UPS is waiting for a certain delay for shutdown.
- UPS SHUTDOWN** : UPS is in shutdown status
- WAITING RESTART** : UPS is shutdown but it is waiting for a certain delay for restart
- PAR.SHUTDOWN** : In parallel systems the other UPS sends shutdown command and UPS is in shutdown status.
- CANCEL SHUTDOWN** : Shutdown command is cancelled.

Only operating system or a PC computer can send these commands.

If the shutdown command is performed during line failure UPS shutdowns and if the mains is okay UPS starts again automatically.

### 3.5 Fault Messages and Quick Troubleshooting

All alarms contained in Y11P3 version are listed in the following table.

ALARM	POSSIBLE CAUSE
<b>A1 BYPASS FAILURE</b>	Bypass system failure. Bypass elements may be faulty.
<b>A2 INVERTER FAILURE</b>	Inverter digital start system is failed. Call the service.
<b>A3 3 OVERTEMP</b>	Overtemperature in UPS repeated 3 times in the last 30 mins. 1) Check for UPS air inlets and outlets for any blocking by dust etc. 2) Fan failure 3) Bad UPS location 4) Check for Overload
<b>A4 OUT FAILURE</b>	UPS output voltage is out of tolerance for 3 times in the last 30 min. Call the service.
<b>A5 BATT AUT END</b>	Batteries are completely discharged; wait for restoration of electric power input. This message occurs only during a line failure
<b>A6 CHARGER FAULT</b>	Rectifier could not produce DC bus voltage.
<b>A7 BATTERY LOW</b>	Battery voltage is low. 1) UPS operation for a long time when line out 2) Charger system failure
<b>A8 OUTPUT HIGH</b>	Inverter output voltage is higher than the max. tolerated value. Inverter is stopped 1) Inverter failure
<b>A9 OVERLOAD</b>	UPS loaded more than 100% of nominal power rating.
<b>A10 LINE FAILURE</b>	Line failure. 1) Mains may be off. 2) Check all three input phases. 3) Check UPS input fuses.
<b>A11 HIGH TEMPER</b>	Overtemperature. 1. Overload for inverter 2. Excessive ambient temperature. 3. Fan failure or dirty air inlets 4. Bad UPS location (not enough ventilation)
<b>A12 OVERCURRENT</b>	Inverter output system failure 1) Internal overcurrent 2) Output short circuit. 3) UPS failure. Call the service.
<b>A13 OUTPUT LOW</b>	Inverter output voltage is lower than the min tolerated value. Inverter is stopped.

<b>ALARM</b>	<b>POSSIBLE CAUSE</b>
<b>A14 BATTERY HIGH</b>	Battery voltage is higher than max. tolerated value. Rectifier fault, call the service.
<b>A16 BYP INPUT BAD</b>	During normal (inverter) operation some times you can see this message. 1) During bypass if the bypass protection option is ON, and if the bypass source is out of tolerance, UPS turns off the static bypass for load protection. 2) Check the bypass fuse
<b>A17 BATT CB. OPEN</b>	Battery CB (S5) is left open.
<b>A19 REPLACE BATT</b>	Battery test aborted. And batteries are not OKAY UPS gives beep sound within 15 sec You can clear this message by pressing the ENTER key for 3 seconds. 1) Rectifier fault 2) Damaged battery cells 3) Poor battery connections
<b>A20 BOOST CHARGE</b>	Boost charge is active. At the end of the boost charging time UPS stops the boost charge. UPS gives beep sound every 15 sec during boost charge
<b>A22 OUTPUT OFF</b>	Output OFF alarm - No bypass or inverter output voltage at the UPS output. - A fault may be in the output. Check the output components.
<b>A23 MODE FAILURE</b>	In parallel operation the slave device tries to operate as the same mode as the master device, If the modes are different this message will appear. Change the mode of the slave UPS from USER OPTION MENU. Press ENTER button for 3 seconds after mode selection, then restart the UPS.
<b>A24 P.FAILURE 10</b>	RS485 failure
<b>A25 PAR. PSP FAIL</b>	Power supply error in parallel controller board.
<b>A26 4 CABLE FAIL</b>	Master-Slave digital cable connection error.
<b>A27 P.FAILURE 13</b>	Parallel controller board failure, online UPS found in parallel system.
<b>A28 PLUG IN DIG.</b>	Digital connection cable plug in failure
<b>A31 DUBL UPS NUMBER</b>	Parallel UPS numbers are same change one of them
<b>A40 CANT FIND PR</b>	Parallel mode is selected but main controller could not find parallel control board. Select ONLINE mode from SETTING MENU. Turn off the ups and turn on again.
<b>A41 P.BAL.FAILURE</b>	In parallel operation current sharing is not okay
<b>A42 BATTERY TEST</b>	Performing battery test
<b>A43 P.SYNC.FAIL</b>	In parallel system SLAVE UPS is not synchronized to MASTER UPS 1) Wait for 10 seconds the UPS will be restart
<b>A48 STATIC BYPS.</b>	Load is transferred statically to bypass
<b>A50 EMERGE. STOP</b>	Emergency stop button is pressed.
<b>A51 MAINT SW. ON</b>	Maintenance bypass switch is ON.
<b>A52 MANUAL BYPASS</b>	The load is transferred to bypass manually.
<b>A53 CHECK +6V</b>	Check +6V on the supply main controller board.
<b>A54 CHECK DC1</b>	Battery voltage is below the lower limit.
<b>A55 PDLY FAIL</b>	Parallel delay fault
<b>A59 REF FAILURE</b>	2.5 V ADC reference voltage on MPB211 main controller board exceeds predefined tolerances.

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## IV. OPERATING INSTRUCTIONS

After completing the installation of the unit, and connecting all the power cables with all switches and fuses in "OFF" position,

- Check the battery polarities.
  - K. 1 : + V (+312V Nominal)
  - K. 2 : 0 Volts (connected to the midpoint of the 52 blocks battery string)
  - K. 3 : - V (-312V Nominal)
- Check the 3 phase AC input and neutral connections. (Phase sequence is not important)

**WARNING !!!** The UPS must never be turned on without input neutral connection.

- Check the output (load) connections.

### 4.1 Procedure for turning on the UPS to supply the load from a complete power-off condition

1. Turn on S1 (AC Input)
2. Turn on S2 (Bypass)

**ATTENTION !!!** If S2 (Bypass) is "ON", as soon as you turn on S4 (AC Output) bypass supply voltage (220V 50Hz) will appear on the output terminals.

3. Turn on S4 (AC Output)

**WARNING !!!** ENERGY IS PRESENT AT THE OUTPUT TERMINALS.

4. Press S7 (ON/OFF Switch) (LCD panel will start running). "RECTIFIER START" message will appear on the front panel.
5. When "INVERTER START" or "START" appears on the front panel turn on S5 (Battery) into "1" position.

After a few seconds, the bypass led (red) will turn off and the UPS led (green) will turn on. The UPS is ready for uninterrupted operation when "STATUS NORMAL/ONLINE MODE" message appears on the front panel.

**NOTE :** This is the case if DIRECT START is "ON" in USER OPTIONS menu. If DIRECT START is "OFF" in this menu, then the inverter doesn't start by itself when you press S7, instead you will see a message "START" on the panel and you must use the ENTER key to start or stop the inverter independently.

### 4.2 Power Off

After turning of all the loads connected to UPS output:

1. Turn off S4 (AC Output) into "0" position.
2. Press S7 again (ON/OFF Switch) to turn off the UPS. The LCD panel will turn off too.
3. Turn off S5 (Battery) into "0" position.
4. Turn off S2 (Bypass) into "0" position.
5. Turn off S1 (AC Input) into "0" position.

This is a complete power off condition and, both RECTIFIER and INVERTER are not operative in this case.

**NOTE :** After the loads are turned off :

If you want to run the rectifier for battery charging, and if you don't need inverter operation, you can choose "DIRECT START" OFF in USER OPTIONS MENU and you can turn on the UPS again following the procedure in 4.1 without "STARTING" the inverter and keeping S1, S5, S7 "ON" and having S2 and S4 "OFF".



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### 4.3 Switching into Maintenance Bypass Mode

1. Use (↓) button to choose COMMAND MENU and press ENTER. Use (↓) button again to reach ENTER <BYPASS> message. Press ENTER, to switch the UPS into bypass mode. "MANUAL BYPASS" and "A52 MANU. BYPASS" messages will appear on the screen.
2. Remove the padlock on S3 (Maintenance Bypass Switch) and turn it on into "1" position.
3. Turn off S7, S5, S1, S2 and S4.

Now there is bypass voltage directly on the load, but there is no AC or DC power in the UPS for maintenance and servicing purposes.

### 4.4 Switching From Maintenance Bypass into Normal Operation

1. Turn on S1 (AC Input)
2. Turn on S2 (Bypass)
3. Turn on S4 (AC Output)
4. Press S7 (ON/OFF Switch) (LCD panel will start running). "RECTIFIER START" message will appear on the front panel. After the rectifier is started, the inverter will not start and the message MAINT. SW. ON will be seen on the panel instead of INVERTER START.
5. Turn off S3 (Maintenance Bypass Switch) and lock again. The inverter will start either automatically or manually depending on the "DIRECT START" setting in the USER OPTIONS MENU.
6. Turn on S5 (Battery).

Now, the UPS is ready for normal operation.

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## V. MAINTENANCE

**WARNING!!!** DO NOT OPEN the covers of the UPS because there are no user serviceable parts inside. DO NOT TOUCH battery leads. There is high voltage even if the UPS is off. Therefore no one should open the covers of the UPS except authorized service personnel. Otherwise, serious injuries may occur.

### 5.1 Scheduled Maintenance

Some semiconductor devices inside the UPS do not require any maintenance. Cooling fans are the only moving parts. If the environment is clean and cool enough, the scheduled maintenance requirements will be at minimum level. On the other hand, periodic checks and maintenance based on well prepared documents will increase the performance of the UPS and prevent some unimportant faults to become serious ones.

**The equipment has been designed to require minimum maintenance effort. The user should follow the instructions below.**

### 5.2 Daily checks

Check the UPS everyday and be careful about the following:

1. Check the operator control panel. Verify that all LEDs and parameter measurements are normal and there is no alarm message on the indicator panel.
2. Check if the device is overheated.
3. Check the cooling fans' operations.
4. Check if there is any sensible change in the noise level of the equipment.
5. Check if there is any stoppage on the ventilation path. If so, clean the dust using a vacuum cleaner.
6. Make sure that there is nothing placed on the UPS.

### 5.3 Weekly checks

1. Record the results on the indicator panel.
2. Measure and record voltages on each phase.
3. Measure and record currents on the output of the UPS.
4. Check batteries status by performing a manual battery test. Use a dry humid gland to clean the cover of the UPS.

Record the observations if possible. Check if there is any difference with the previous records (observations). If the last recorded values are significantly different from previous records, please check if the load has been changed, and if so please record the type, size, and position of this load. These information will be very valuable in helping the service personal in determining any possible errors. If there is significant change in the parameter values without any reason please immediately call the qualified service personnel.

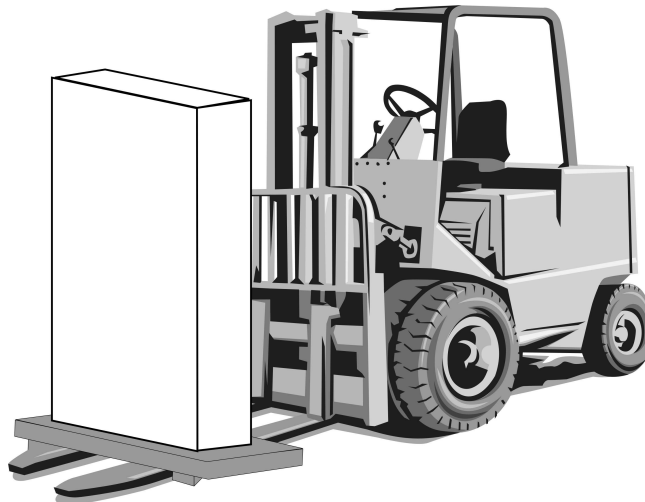
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## 5.4 Annual maintenance

To get reliable and efficient performance from the UPS, please call the qualified service personal at least once a year.

## 5.5 UPS Storage and transportation

1. Check the batteries charge by performing manual battery test before storage. If the charge is not enough then charge the batteries at least for 12 hours.
2. Qualified service personal should disconnect the electrical connections.
3. Batteries should be charged every six months during storage period.
4. Keep the UPS and batteries in dry and cool place.  
UPS ideal storage temp.: 0 °C ~ 40 °C max.  
Battery ideal storage temp.: 10 °C ~ 35 °C max.
5. The UPS must be placed on a suitable palette for transportation purposes.



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## VI. FAULTS AND TROUBLESHOOTING

### 6.1 General Procedure For Fault Checking And Troubleshooting

UPS contains complicated electronic control circuits. In order to locate any fault occurring circuits, an advanced knowledge about the circuitry and its operation principles must be known. The aim of this section is to give the knowledge required at the first intervention.

There is no practical way to locate any possible fault. Most of the faults do not occur as a performance decrement. Generally, the UPS operates normally or switches into by-pass mode. But in order to determine any change in load or the system the parameters must be recorded regularly as mentioned previously.

Generally, the output voltage can deviate %2 from the predefined values. If values differ more than this percentage then reasons must be investigated.

The following general structure must be systematically followed while trying to indicate the error:

**Fault determination:** First step is to record the messages, indicator panel LEDs, operating parameter values and last status of switches. This must be done before

**Fixing interventions:** After recording all indications, check the meaning of the fault and alarm messages using "The operator control indicator panel". If anything related, follow the related procedure.

**Reporting the fault:** Service personal must clearly report the work done. Hence, if any other error occurs there will be enough information to fix it.

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## VII. UPS's REMOTE CONTROL CONNECTION

Following external connections are available in CL200T series

- Communication By serial port connection
- Dry contacts (interface board) connection.

### 7.1 Using Serial Port

A standard Serial communication port is installed to all CL-200 series UPS, by using this port user can take all information about UPS. All measured parameters, alarms can be monitored by this port. This port is interactive and some commands for UPS operation are available. These commands are listed below:

- Switch to BYPASS
- Switch to INVERTER
- SOUND on/off
- Adjust UPS time and date
- Start SIMULATION mode
- Quick BATTERY TEST
- BATTERY TEST until battery low alarm
- CANCEL battery test
- Turn off UPS output voltage immediately (SHUTDOWN)
- Turn off UPS output voltage after delay (WAITING SHUTDOWN)
- Turn off UPS output voltage (SHUTDOWN) and turn on UPS output voltage (WAITING RESTART)
- CANCEL SHUTDOWN
- RENAME UPS

Special softwares are required to use the serial port. Some of the commands above are special functions. These can be used only with TMON software.

### 7.2 The external communication and alarm relay connections are shown below:

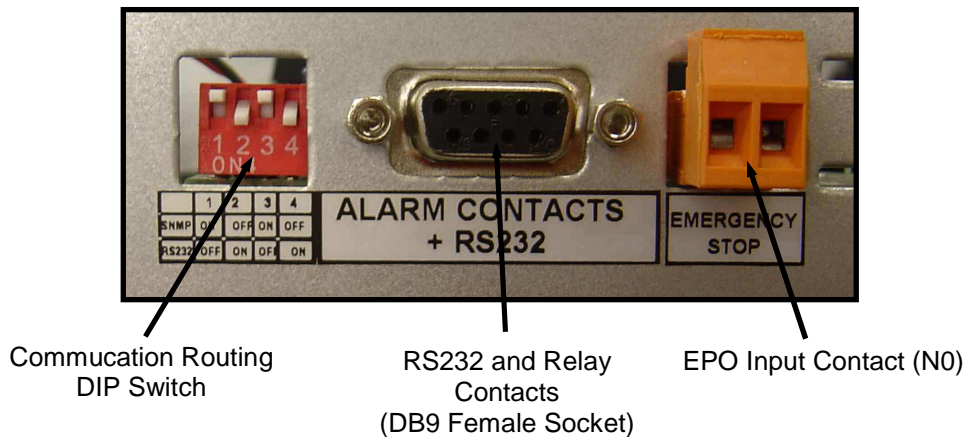


Figure 7.

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### 7.2.1 Communication Routing Switch:

RS232 Communication of the UPS can be routed either to an internal (e.g ML100 port multiplexer, MD1 MODBUS adapter, SNMP unit etc.) or to an external device.

There are two sets of DIP switch positions:

	1	2	3	4
INTERNAL (e.g. SNMP)	ON	OFF	ON	OFF
RS232 (EXTERNAL)	OFF	ON	OFF	ON

In "RS232" position of DIP switches, RS232 communication with an external device is performed through the standard DB9 socket shown above. If DIP switches are in "INTERNAL" position, communication through the standard socket is turned off and routed to an internally connected device. For example, if an ML100 Port Multiplexer has been installed in the UPS, standard DB9 socket is not used for RS232 communication, instead, the two ports, COM1 and COM2 on the ML100 can be used for external communication simultaneously.

### 7.2.2 The pin configuration of the standard DB9 socket is as follows:

Pin no.	Function
1	Not Connected
2	Line Failure Alarm Relay Contact (N0)
3	Not Connected
4	Common Contact for all Alarm Relays (C)
5	Battery Low Alarm Relay Contact (N0)
6	RXD (RS232)
7	Signal Ground
8	Bypass Alarm Relay Contact (N0)
9	TXD (RS232)

### 7.2.3 Emergency Power off (EPO) input:

This is a contact input and EPO is activated when the contacts of this input are short-circuited by an external EPO switch.

### 7.3 Serial port connection cable

RS485 cables connections are as follows:

UPS Side	Panel Side
9 Tx	2 Rx
7 Gnd	5 Gnd
6 Rx	3 Tx

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## 7.4 Remote control/connection with a modem

The UPS can be connected to a phone line using its RS232 port and a modem. The operator connects to the UPS by a computer containing TMON program and a modem. By this way a modem can be monitored using a telephone line.

### 7.4.1 Hardware Configuration

All requirements for modem connection are as follows:

- PC with modem
- WINDOWS 98
- Available UPS control software
- DUMP modem which is connected to UPS

The UPS, has AT command set to switch the DUMP modem into auto – answer mode. To perform this process go to COMMAND MENU and then goto ENTER:MODEM INIT subitem and press enter button for 3 seconds after installing the hardware. A short warning beep will be heard after pressing the button. Modem's RX and TX LEDs will start operating. Then, the modem will be configured to answer incoming calls. To test this, calls the phone number connected to the modem and hear modem's voice.

### 7.4.2 Functioning Principle

The remote operator, by means of a PC and a modem device and using the remote connection function of the control software, calls the UPS through the number to which this is connected.

The dumb modem device, connected to the UPS, will answer the call and convert the data coming from UPS serial on the telephone line. This way all measures and controls allowed by the RS232 serial port can be carried out.

### 7.4.3 Modem programming procedure

Smart modem (SM) is the one connected to PC, and (DUMB) DM is the one connected to the UPS. Standard Hayes AT programming language is the suitable language for modems. In applications a modem which uses AT command set must be selected.

The NULL modem connected to the UPS by connecting to a PC should be programmed, Connect the null modem to the PC's modem using a standard modem connection cable, then run Hyperterminal program and send AT command group to the modem, the AT command set used in configuration is given in the following table:

AT Command	Description
ATS0=1	Modem will auto-answer after one ring.
AT&K0	Flow control disable in some modem models (Check for equivalents in other types)
AT&D0	DTR signal usage.
AT&Y0	Load 0 <sup>th</sup> setting values at the modem start.
<b><u>Speed configuration string</u></b>	<b>Look for speed configuration table (Below)</b>
AT&W0	Save the values in table as 0 <sup>th</sup> setting.

Different modem models can use different command sets. Below communication speed configuration of some modem models are given. Select the one suitable for your mode, if your modem's model is not listed then try each command one by one. If your modem supports the command you will receive <OK> answer from the NULL modem in the hyperterminal, otherwise you will get <ERROR>

Speed configuration table	
Modem model	Speed configuration string
US ROBOTICS sportster voice	AT&N3
APACHE AE56SP-R	ATN0S37=6
BOCAMODEM V.32 BIS	ATN0S37=6

---

---

**The configuration flow in Hyperteminal will be as follows:**

```
ATS0=1 <enter>
OK answer from the modem
AT&K0 <enter>
OK answer from the modem
AT&D0 <enter>
OK answer from the modem
AT&Y0 <enter>
OK answer from the modem
AT&N3 <enter> (US ROBOTICS ICIN)
OK answer from the modem
AT&W0 <enter>
OK answer from the modem
```

**7.4.3.1 Smart Modem (SM) configuration (programming)**

Smart modem will configure itself from the program when using TMON.  
The default settings are as follows:

```
B0 E1 F1 M1 Q0 V1 X3
BAUD = 2400          PARITY = N      WORDLEN = 8
DIAL = PULSE        (TONE which can be programmed)

&A3 &B1 &C1 &D0 &H1 &I0 &K1 &M4
&N0 &R2 &S0 &T5 &Y1
```

This configuration is done by TMON program.

**7.4.4 Modem connection cables**

A standard modem connection cable is used to connect SM to a PC. This cable is required if an external modem is used, but instead if an internal modem is used then no need for this cable.

The connection cable between the UPS and DM must as follows:

UPS DB9 Pin	MODEM DB25 Male
6	3
7	7
9	2

**7.5 UPS Remote monitoring panel connection**

Remote monitoring panel is used to monitor the UPS from 400m distance. This panel is installed to control/monitor room. If the distance is less than 25m then RS232 cable is used, and RS485 for larger distances. Additional adaptor is required for RS485.

The remote monitoring panel transfers the data to the user from the UPS. The remote monitoring panel requires 230Vac 50 Hz AC voltages to operate, and it is better to use the output of the ups as a power supply.





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