



# **DS300HA SERIES**

**DSP Controlled UPS**

**40 - 60 - 80 kVA**

**3 Phase In - 3 Phase Out**

**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 cables 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 even 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 cables only after signaling interconnections have been made.

### CAUTION !

**Units are designed to operate on the concrete floor.**

### 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 terminals and the ground!**

- A battery can present a risk of electric shock or burn from high short circuit currents. The following precautions should be taken 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 may 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 DS300HA Series Uninterruptible Power Supplies are double-conversion; on-line UPS's manufactured with the latest IGBT and PWM technology, to produce an uninterruptible, **fully DSP (Digital Signal Processor) controlled** pure sine wave output to critical loads.

TESCOM DS300HA Series units are 3-phase in/3-phase out devices, and they are installed between a three phase critical load, and a 3-phase+N mains supply

The advantages of using DS300HA 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 software, which ensures that, its output to the critical load is maintained within close tolerances, independent of voltage and frequency variations on the mains power lines.

- *Fully digital control by three DSP controller for each UPS:*

The UPS is controlled by 3 independent DSP chips which are communicating each other continuously. Rectifier, Inverter and User Interface modules have separate DSP's to achieve the highest performance. Each DSP module has many parameters to control and monitor the system to have the best electrical power output and to help diagnostic.

- *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.

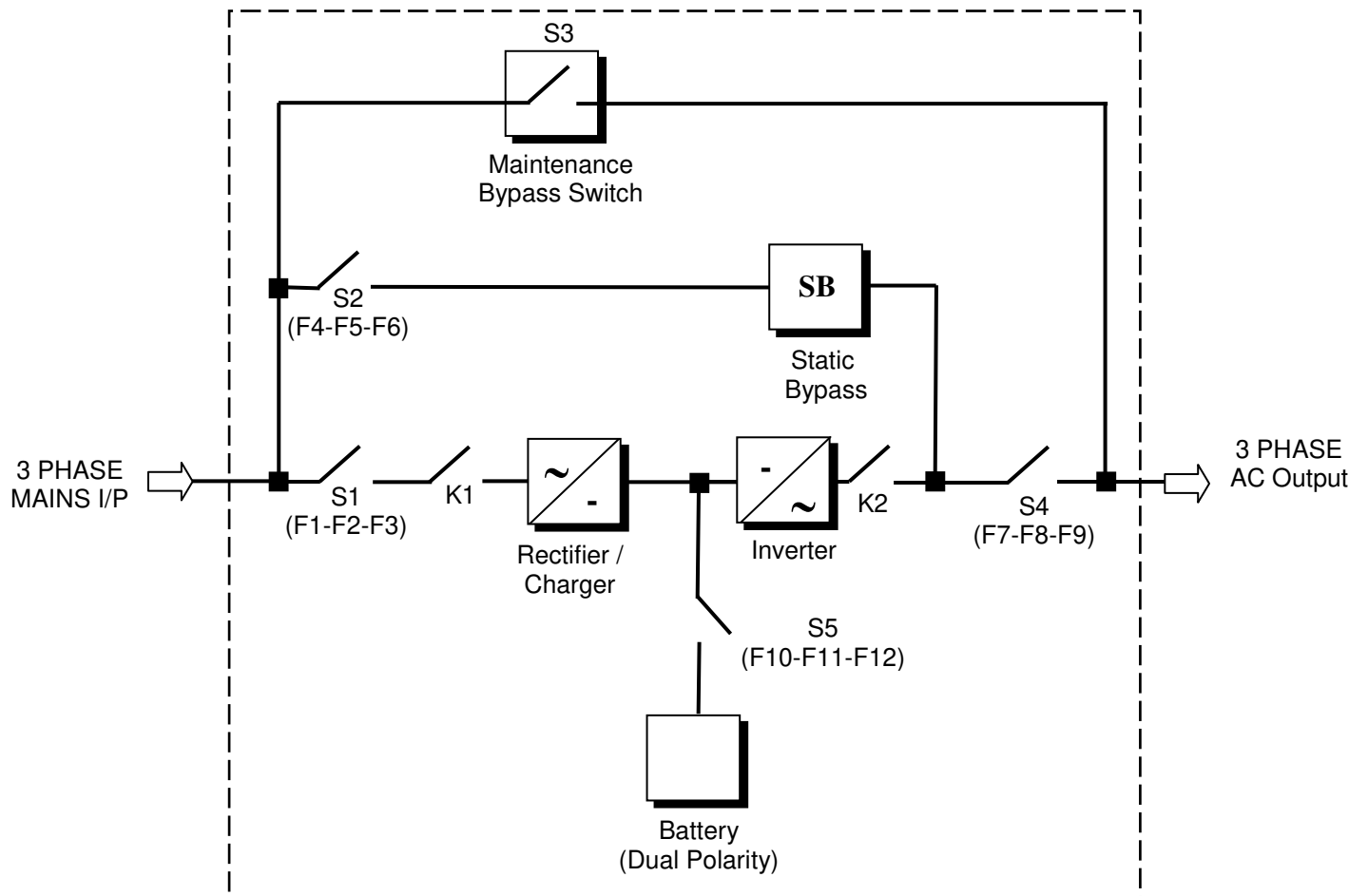
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## **Basic Features:**

- PWM and IGBT technology
- Three level technology
- Pure sinusoidal output wave form and true on-line topology
- High input power factor (IGBT rectifier), Input current limiting
- Low input current THD (IGBT rectifier)
- Low output voltage THD
- High AC/AC and DC/AC efficiency (up to 94%)
- 3 separate DSP (Digital Signal Processor) control
- Cold-start feature
- Static By-Pass feature: Provides uninterruptable transfer to bypass source in case of overload or UPS fault.
- Bypass leakage current sense system
- Maintenance bypass switch and warning system, by-pass short circuit protection
- Separate bypass input facility (split bypass), generator operation sense input
- LCD alphanumeric display panel providing battery, load, voltage, power and status information in detail to user
- Improved diagnostics and correct fault information
- Up to 192 event memory record system (7000 alarms or warnings total)
- Real time clock and calendar system
- Overload operation 10 minutes at 100% - 125% load, 1 minute at 125% - 150% load
- Output overload, over-current and short circuit protection, output current limiting
- Reliable operation at even 100% unbalanced load condition
- Non-linear load supply feature (CF 3:1)
- Double polarity battery (with common terminal)
- Automatic and manual battery test and battery temperature compensation features
- 3 separate maintenance clock counters
- Battery charge with current limiting
- Automatic and manual boost charge feature
- Battery deep discharge protection
- Temperature protection with 3 separate sensors
- Interactive communication
- Diagnostic and settings with PC ability
- 2 separate RS232 communication ports (standard)
- Multi UPS monitoring on same communication line by RS485 (optional)
- 4 dry contact alarm relay outputs as standard (8 optional relay outputs)
- Improved remote monitoring panel system (optional)
- RS232 port multiplexer (optional)
- Direct network connection with optional SNMP support
- MODBUS Adapter (optional)
- AT command set definitions for dumb modems
- Communication via Windows based T-MON software and remote monitoring and control of UPS via modem
- Optional softwares compatible for most computer platforms
- Ability for labeling of UPSs by users
- Emergency power-off support
- Conformity to international and local standards
- AC input and output filters
- Optional graphic front panel
- CE compliance
- Input, bypass and load phase order protection
- Optional leakage current alarm system
- Input and output isolation transformers (optional)
- Enhanced accessory options
- 100.000 hours MTBF
- 2 years system warranty
- 10 years spare parts warranty

## 1.2 Design Concept



**S1 (F1-F2-F3)** : Rectifier Input Switch / Fuse

**S2 (F4-F5-F6)** : Bypass Input Switch / Fuse

**S3** : Maintenance Bypass Switch

**S4 (F7-F8-F9)** : Output Switch / Fuse

**S5 (F10-F11-F12)** : Battery Switch / Fuse

**K1** : Rectifier Input Contactor

**K2** : Inverter Output Contactor



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### 1.2.1 Description of Blocks

**RECTIFIER:** In DS300HA Series UPSs, a DSP controlled IGBT rectifier with PWM technique 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 DS300HA 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 voltage / current limiting basis, if AC mains power is available.

**INVERTER:** It is manufactured by using the latest IGBT and DSP (Digital Signal Processing) technologies, 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, fully digital controlled 3-phase AC voltage with fixed voltage and frequency.

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 by-pass power source. During normal operation, the load is supplied by the inverter output, but in case of an overload or a UPS failure 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.

### 1.2.2. Operating Conditions of UPS

UPS may be in one of the following operating conditions:

#### 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 voltage necessary for the inverter operation is 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 start again automatically, together with the rectifier, when the mains power is restored, and the UPS returns to normal operation. For UPS with a split bypass source, at the end of discharging time, static transfer switch transfers the load to the split bypass source without interruption if the split bypass source is available and in acceptable tolerances about voltage and frequency, as still the rectifier input is not available.

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

### 1.3 Front view of UPS Connection Panel

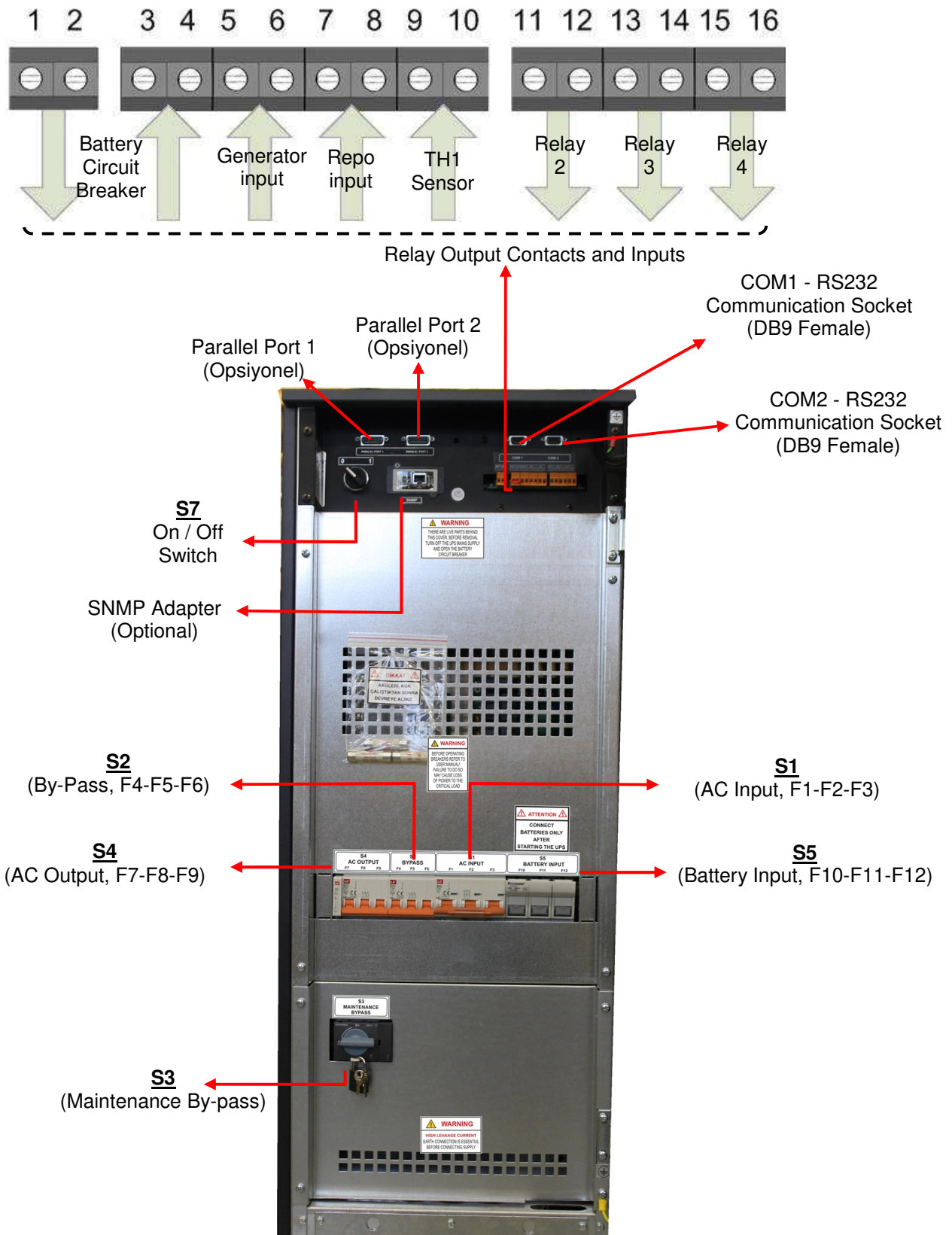
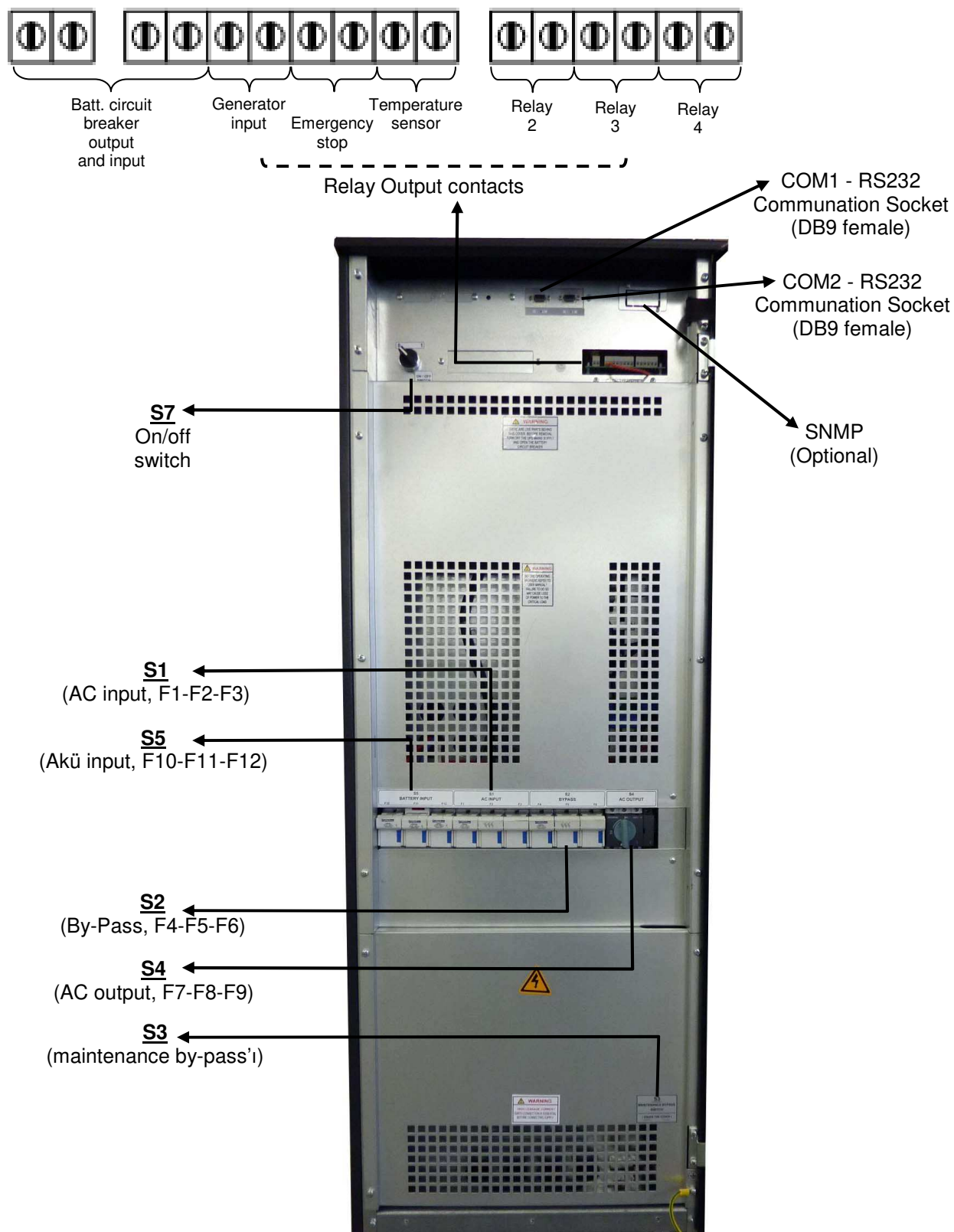


Figure 1.3.a 40 kVA Fuses and Switches Panel



**Figure 1.3 b** 60 - 80 kVA switches, fuses and interface connections

## 1.4 Technical Specifications

| MODEL                                    | DS340HA  | DS360HA | DS380HA |
|--|--|---------|---------|
| Output (KVA)                             | 40 kVA   | 60 kVA  | 80 kVA  |
| Output (KW)                              | 32 kW  | 48 kW   | 64 kW   |
| Output Power Factor                      | 0,8  |         |         |
| INPUT                                    |  |         |         |
| Number of Phases                         | 3 Phase + Neutral                                      |         |         |
| Input Voltage                            | 220/380, 230/400 or 240/415 Vac                        |         |         |
| Input Voltage Tolerance                  | +20% , -25% (+15% at 240/415Vac)                       |         |         |
| Input Power Factor (PF)                  | 0,98 - 0,99 (at full load)                             |         |         |
| Input THDI                               | <= 5% (at full load)                                   |         |         |
| Input Frequency                          | 50/60 Hz. ±10%   |         |         |
| By-pass Voltage                          | 220/380, 230/400 or 240/415 Vac 3 Phase + Neutral      |         |         |
| By-pass Frequency                        | 50 Hz. ±2%   |         |         |
| RFI Level                                | EN62040-2  |         |         |
| OUTPUT                                   |  |         |         |
| Number of Phases                         | 3 Phase + Neutral                                      |         |         |
| Output Voltage                           | 220/380, 230/400 or 240/415 Vac                        |         |         |
| Output Voltage Tolerance                 | ±1%  |         |         |
| Output Frequency                         | 50/60 Hz   |         |         |
| Output Frequency Tolerance (Synchronous) | ±2%  |         |         |
| Output Frequency Tolerance (Battery)     | ±0,1% (free/battery operation mode)                    |         |         |
| Efficiency (100% Load)                   | up to 94%  |         |         |
| Load Crest Factor                        | 3:1  |         |         |
| Output Voltage THD (linear load)         | <=2%   |         |         |
| Overload                                 | 125% Load 10min. , 150% Load 1min.                     |         |         |
| BATTERY                                  |  |         |         |
| Total Number                             | 60 blocks 12V (2x30 serial 60 batteries)               |         |         |
| Float Charge Voltage (25 <sup>0</sup> C) | ± 405V DC  |         |         |
| End of Discharge Voltage                 | ± 300V DC  |         |         |
| Battery Test                             | Automatic and Manual                                   |         |         |
| Boost Charge                             | Available  |         |         |
| COMMUNICATION INTERFACES                 |  |         |         |
| RS232 Com Port                           | 2 each standard (COM1 and COM2)                        |         |         |
| External Temperature Measurement Input   | Available (standard)                                   |         |         |
| RS485 Comm. Port                         | Optional   |         |         |
| Remote Monitoring Panel                  | Optional   |         |         |
| SNMP Adapter                             | Optional   |         |         |
| Modbus Adapter                           | Optional   |         |         |
| Alarm Relay Contacts                     | 4 each dry contacts (function programmable) 8 optional |         |         |
| Digital Inputs                           | 2 each optional  |         |         |
| Emergency Power-Off Input                | Available (standard)                                   |         |         |
| ENVIRONMENT                              |  |         |         |
| Operating Temperature                    | 0 – 40 <sup>0</sup> C                                  |         |         |
| Operating Humidity                       | <= %90 (non-condensing)                                |         |         |
| Acoustic Noise                           | <62dB  |         |         |
| Dimensions (WxDxH) (mm)                  | 515 x 855 x 1450                                       |         |         |
| Device Type and Protection Class         | Class 1 – IP20   |         |         |
| Weight (Without Batteries) (app. kgs)    | 175  | 180     | 194     |

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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 only by qualified service personnel.
- The connection of the batteries and the maintenance should be done by qualified service personnel.
- Do not make any short-circuit to the battery poles. Because of high voltage and high short-circuit current, there is risk 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

**ATTENTION:** Units are designed to operate on the concrete floor.

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 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 power 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) | Recommended cable size (mm <sup>2</sup> ) |                           |                  |   |  |                       |                                    |                         |
|-----------------|---|---------------------------|------------------|---|--|-----------------------|------------------------------------|-------------------------|
|                 | Line input                                | Bypass input / UPS output | External Battery | <u>Input / output</u><br>Cable connections<br>U-V-W-N | <u>Battery</u><br>connections<br>+ & - | <u>INPUT</u><br>Fuses | <u>Output/<br/>Bypass</u><br>Fuses | <u>Battery</u><br>Fuses |
| 40              | 16  | 16                        | 16               | 16mm <sup>2</sup><br>terminal block                   | 16mm <sup>2</sup><br>terminal block    | 80A                   | 63A                                | 50A                     |
| 60              | 25  | 25                        | 25               | 25mm <sup>2</sup><br>terminal block                   | 25mm <sup>2</sup><br>terminal block    | 80A                   | 80A                                | 80A                     |
| 80              | 25  | 25                        | 25               | 25mm <sup>2</sup><br>terminal block                   | 25mm <sup>2</sup><br>terminal block    | 125A                  | 100A                               | 125A                    |

**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.

## 2.5 Safety Earth

The safety earth cable must be connected to the earth BUS BAR and bonded to each cabinet 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.

## 2.6 Cable connection procedure

|   |
|---|
| <b><u>WARNING!!!</u></b> 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)

### **ATTENTION!!!: ENSURE CORRECT PHASE SEQUENCE.**

If there is a phase sequence error, UPS doesn't transfer the load to INVERTER output. If you can't see SYNC:OK in the INFORMATION MENU on LCD, then change the input phase sequence.

3. Connect the output of the UPS to the load distribution panel.
4. Connect the battery groups. Refer to battery installation section.



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**WARNING :**

- CHECK BOTH OF THE BATTERY GROUPS FOR CORRECT POLARITY AND VOLTAGE
- 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.

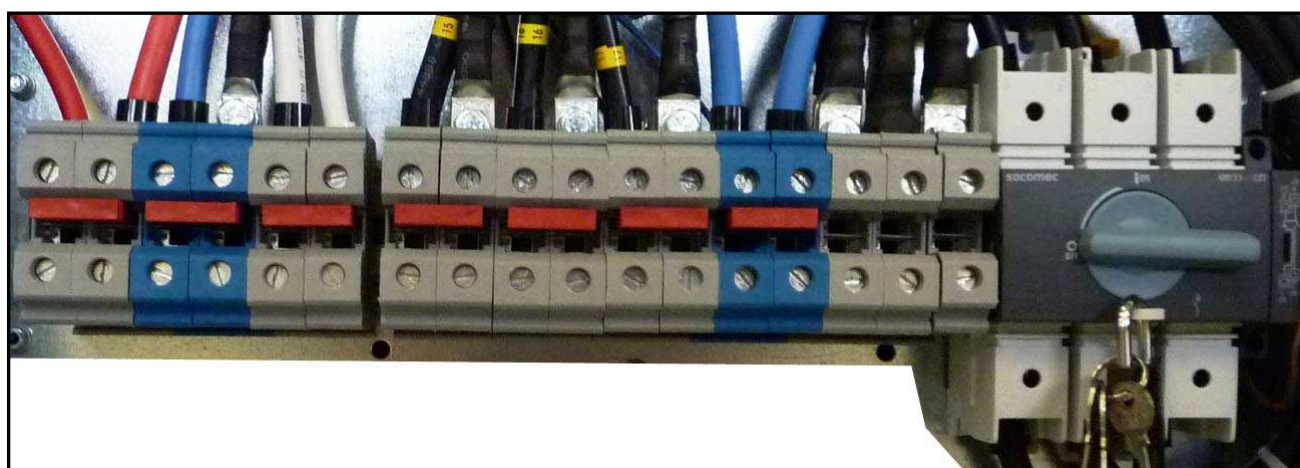
**WARNING:** Note that the Input Neutral (N1) **MUST** also be connected to K10 terminal

### 2.6.1 Description of connection terminals of the UPS :



|         |    |    |     |          |    |    |    |    |    |     |     |           |     |     |
|---------|----|----|-----|----------|----|----|----|----|----|-----|-----|-----------|-----|-----|
| K1      | K2 | K2 | K3  | K4       | K5 | K6 | K7 | K8 | K9 | K10 | K11 | K12       | K13 | K14 |
| (+)     | 0  | 0  | (-) | U1       | U2 | V1 | V2 | W1 | W2 | N1  | N2  | U         | V   | W   |
| BATTERY |    |    |     | AC INPUT |    |    |    |    |    |     |     | AC OUTPUT |     |     |
|         |    |    |     | (BYPASS) |    |    |    |    |    |     |     |           |     |     |

Figure 2.2 a 40 - 60 kVA Cable Connection



|         |     |     |     |     |     |          |    |    |    |    |    |     |     |           |     |     |
|---------|-----|-----|-----|-----|-----|----------|----|----|----|----|----|-----|-----|-----------|-----|-----|
| K1      | K1  | K2  | K2  | K3  | K3  | K4       | K5 | K6 | K7 | K8 | K9 | K10 | K11 | K12       | K13 | K14 |
| (+)     | (0) | (0) | (0) | (-) | (-) | U1       | U2 | V1 | V2 | W1 | W2 | N1  | N2  | U         | V   | W   |
| BATTERY |     |     |     |     |     | AC INPUT |    |    |    |    |    |     |     | AC OUTPUT |     |     |
|         |     |     |     |     |     | (BYPASS) |    |    |    |    |    |     |     |           |     |     |

Figure 2.2 a 80 kVA Cable Connection

- 
- 
- As shown on the power connection label of the UPS, U1, V1 and W1 phase of the incoming 3 phase supply are used as the bypass inputs under normal conditions, if there is not a separate bypass supply (split bypass).

- If there is a separate 3- phase AC supply for bypass (Split Bypass):

a-) Remove the links between K4 – K5, K6 – K7 and K8 – K9.

b-) Connect the phases of the bypass source U2, V2 and W2 to K5, K7 and K9 respectively.

c-) Connect the Neutral (N2) of the Bypass source to K11.

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

## 2.7 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 DS300HA Series 40-60 KVA UPSs, there is enough space for 60 pieces of 12V 7Ah maintenance free batteries.

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.

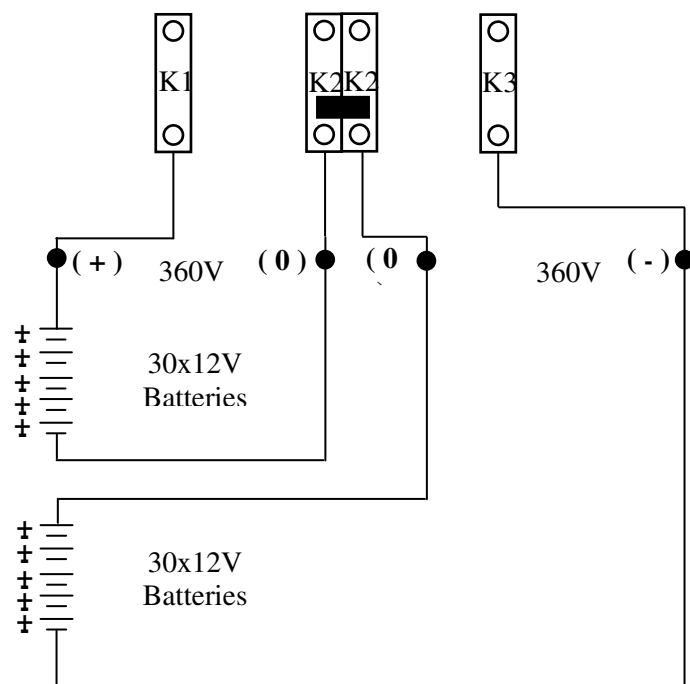
In general a minimum space of 10 mm must be left on all vertical sides of the battery block. A minimum clearance of 20 mm should be allowed between the cell surface and any walls. All metal racks and cabinets must be earthed.

1. Unpack each battery and check its terminal voltage with a suitable load. 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 DS300HA Series UPS, 60 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.

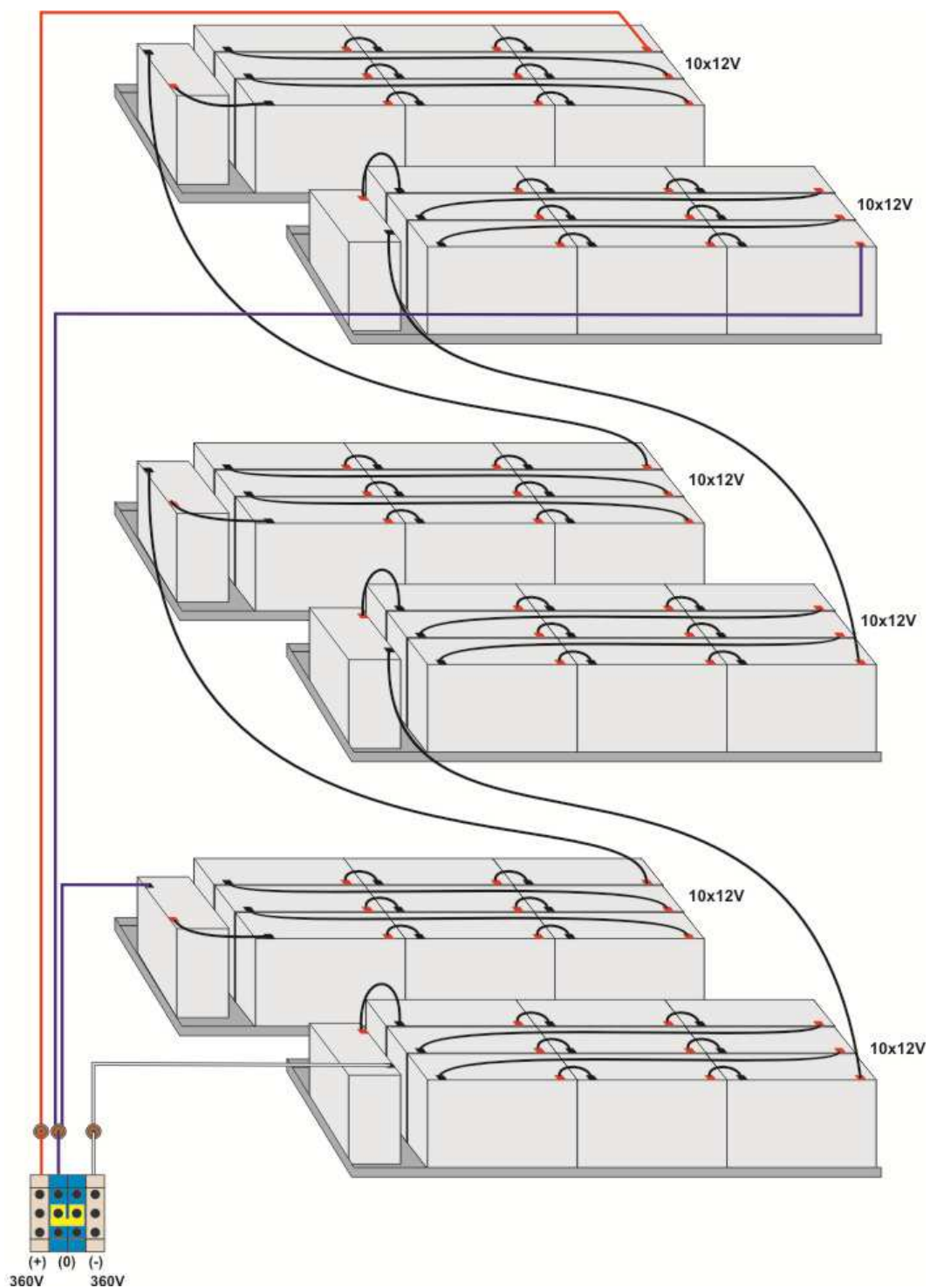
**NOTE THAT SEPARATE CABLES FROM EACH BATTERY GROUP SHOULD BE CONNECTED TO K2 TERMINALS TO FORM THE MIDPOINT CONNECTION.**

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





**Figure 2.3** External Battery Connections (60x12V)



**Figure 2.3a DS300HA Series, 40 - 60 - 80 KVA Internal Battery Connections (2x30=60x12V 7Ah)**

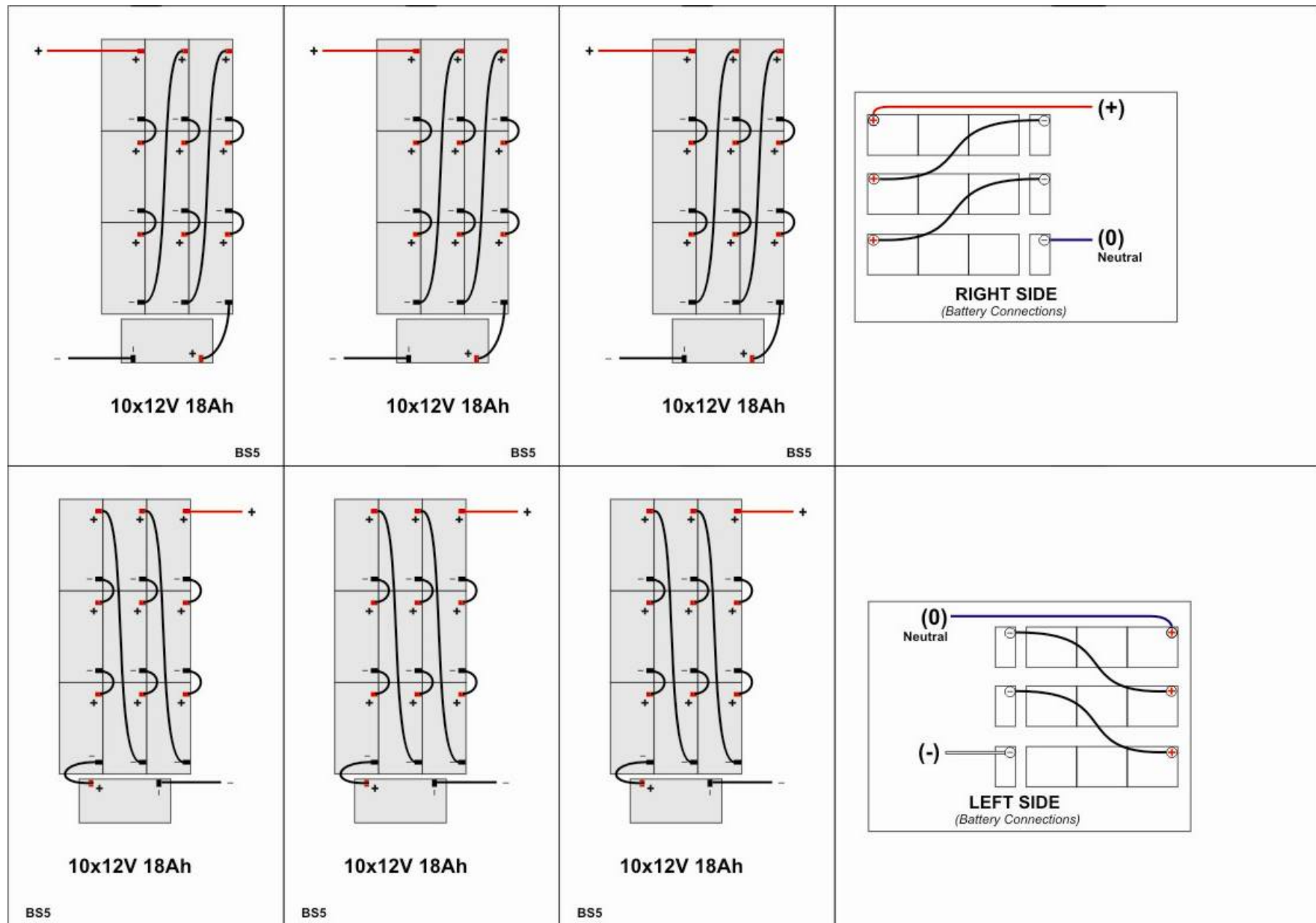
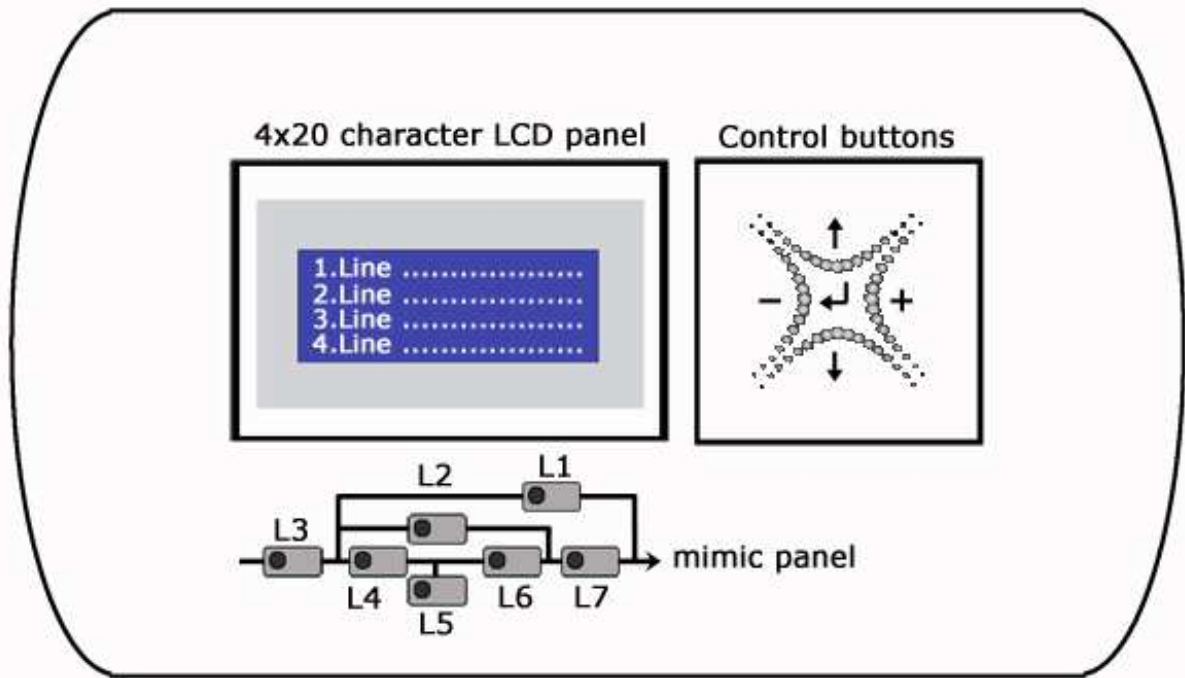


Figure 2.3b DS300HA Series, 40 - 60 - 80 KVA Internal Battery Connections (2x60=120x12V 7Ah)  
two groups of batteries (with common-point) in parallel

### III. FRONT PANEL

#### 3.1 Introduction

The front panel of UPS, consisting of a 4 lines alphanumeric display, 7 status lamps, plus 5 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 moves on menus and change some parameters.



**Figure 3.1** Control panel of the UPS

- L1 : Maintenance bypass switch on indicator lamp**
- L2 : Load on bypass indicator lamp**
- L3 : Input voltage indicator lamp**
- L4 : Rectifier run pilot lamp**
- L5 : Battery operation indicator lamp**
- L6 : Load on UPS indicator lamp**
- L7 : Output switch on indicator lamp**

There are 5 control buttons on the UPS Front panel, ENTER button provides selection declaration, up and down buttons provide to surf on menus, (+) and (-) buttons are used for adjustments or option selection.

#### 3.2 Front Panel Menu Descriptions :

By using (↑), (↓) and ENTER buttons you can access the following menus. At the end of each menu there is <ENTER> EXIT message will be showed, if you press enter you will exit to upper menu. All menus have 3 or 4 levels.

## Main menu (Level 1)

|    | Menu         | Usage                     |
|----|--------------|---------------------------|
| 1  | STATUS       | → Enter Status menu       |
| 2  | MEASUREMENTS | → Enter Measurements menu |
| 3  | ALARM LOGS   | → Enter Alarm logs menu   |
| 4  | INFORMATION  | → Enter Information menu  |
| 5  | OPTIONS      | → Enter Options menu      |
| 6  | COMMAND      | → Enter Command menu      |
| 7  | TIME         | → Enter Time menu         |
| 8  | SERVICE      | → Enter Service menu      |
| 9  | PASSWORD     | → Enter Password screen   |
| 10 | ADJUST       | → Enter Adjust menu       |
|    | Goto 1       |                           |

## Sub menus (Level 2)

| Level 1      | Level 2                       | Page  | Level 3               |
|--------------|-------------------------------|-------|-----------------------|
| STATUS       | Status of the UPS             |       |                       |
| MEASUREMENTS | INPUT                         |       | Input measurements    |
|              | BYPASS                        |       | Bypass measurements   |
|              | INVERTER                      |       | Inverter measurements |
|              | OUTPUT                        |       | Output measurements   |
|              | DC                            |       | DC measurements       |
|              | GENERAL                       |       | General measurements  |
|              | ENTER - EXIT                  |       |                       |
| ALARM LOGS   | UPS LOG RECORD                | Page1 |                       |
|              | ENTER CLEAR LOG               | Page1 |                       |
|              | ENTER - EXIT                  |       |                       |
| INFORMATION  | RS232 Comm 1:-- 2:--          | Page1 |                       |
|              | Maximum UPS power             | Page1 |                       |
|              | Nominal voltage and frequency | Page1 |                       |
|              | Inverter firmware version     | Page2 |                       |
|              | PFC firmware version          | Page2 |                       |
|              | Panel firmware version        | Page2 |                       |
|              | UPS Model                     | Page3 |                       |
|              | Communication protocol        | Page3 |                       |
|              | Chassis nr                    | Page3 |                       |
|              | ENTER - EXIT                  |       |                       |
| OPTIONS      | LCD OPTIONS                   |       | LCD panel options     |
|              | COMM.OPTIONS                  |       | Communication options |
|              | ALARM OPTIONS                 |       | Alarm options         |
|              | BYPASS OPTIONS                |       | Bypass options        |
|              | ENTER - EXIT                  |       |                       |
| COMMAND      | By-pass transfer              | Page1 |                       |
|              | Boost charge start            | Page1 |                       |
|              | Short battery test start      | Page1 |                       |
|              | Relay check                   | Page2 |                       |
|              | Dialup modem programming      | Page2 |                       |
|              | Alarm sound ON/OFF            | Page3 |                       |
|              | Warning sound interval        | Page3 |                       |
|              | ENTER - EXIT                  |       |                       |
| TIME         | Current time                  | Page1 |                       |
|              | Current date                  | Page1 |                       |
|              | Set hour                      | Page2 |                       |
|              | Set minute                    | Page2 |                       |
|              | Set day                       | Page3 |                       |

| Level 1         | Level 2                       | Page  | Level 3            |
|-----------------|-------------------------------|-------|--------------------|
|                 | Set month                     | Page3 |                    |
|                 | Set year                      | Page3 |                    |
|                 | Update time and date          | Page4 |                    |
|                 | ENTER - EXIT                  |       |                    |
| <b>SERVICE</b>  | Operating hourmeter           | Page1 |                    |
|                 | Maximum load                  | Page1 |                    |
|                 | ENTER Fault reset             | Page1 |                    |
|                 | Fan maintenance hourmeter     | Page2 |                    |
|                 | Batt.maintenance hourmeter    | Page2 |                    |
|                 | General maintenance hourmeter | Page2 |                    |
|                 | Logout command                | Page3 |                    |
|                 | ENTER - EXIT                  |       |                    |
| <b>PASSWORD</b> | Getting service code          | Page1 |                    |
|                 | Type service password         | Page1 |                    |
|                 | Type user password            | Page1 |                    |
|                 | ENTER - EXIT                  |       |                    |
| <b>ADJUST</b>   |                               |       |                    |
| (in English)    | Group adjustments             |       | Automatic settings |
|                 | Inverter factory options      |       | Options list       |
|                 | Rectifier factory options     |       | Options list       |
|                 | Panel adjustments             |       | Options list       |
|                 | AC input adjustments          |       | AC input settings  |
|                 | AC Bypass adjustments         |       | AC bypass settings |
|                 | AC output adjustments         |       | AC output settings |
|                 | DC adjustments                |       | DC settings        |
|                 | Power adjustments             |       | Power settings     |
|                 | ENTER - EXIT                  |       |                    |

### 3.2.1 MEASUREMENTS menu

All measured values of the UPS can be monitored from this menu.

Use up and down buttons to move on submenu

#### MEASUREMENTS / INPUT (Level 2)

All rectifier input measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / INPUT Page 1 (Level 3) |   |
|---------------------------------------|---|
| P-N L1 L2 L3                          | Page header                                 |
| Vinp: 221/222/223 V                   | Phase to neutral measured AC input voltages |
| Iinp: 000/000/000 A                   | Measured RMS AC input phase currents        |
| .....                                 | Current alarm messages                      |

Up previous page ,down next page

| MEASUREMENTS / INPUT Page 2 (Level 3) |   |
|---------------------------------------|---|
| P-P L13 L21 L32                       | Page header                               |
| Vinp: 381/382/383 V                   | Phase to phase measured AC input voltages |
| Finp: 49.6 Hz                         | Measured rectifier input frequency        |
| .....                                 | Current alarm messages                    |

Up previous page ,down next page

| MEASUREMENTS / INPUT Page 3 (Level 3) |                          |
|---------------------------------------|--------------------------|
| ENTER - EXIT                          | ENTER exit to upper menu |
|                                       |                          |
|                                       |                          |
| .....                                 | Current alarm messages   |

Up previous page, down next page

#### MEASUREMENTS / BYPASS (Level 2)

All by-pass input measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / BYPASS Page 1 (Level 3) |  |
|--|--|
| P-N L1 L2 L3                           | Page header  |
| Vbyp: 221/222/223 V                    | Phase to neutral measured AC bypass input voltages |
| OK OK --                               | Bypass voltage status                              |
| .....                                  | Current alarm messages                             |

Up previous page, down next page

| MEASUREMENTS / BYPASS Page 2(Level 3) |  |
|---------------------------------------|--|
| P-P L13 L21 L32                       | Page header                                      |
| Vbyp: 381/382/383 V                   | Phase to phase measured AC bypass input voltages |
| Fbyp: OK / 50.0 Hz                    | Measured bypass input frequency                  |
| .....                                 | Current alarm messages                           |

Up previous page, down next page

| MEASUREMENTS / BYPASS Page 3(Level 3) |                          |
|---------------------------------------|--------------------------|
| ENTER - EXIT                          | ENTER exit to upper menu |
|                                       |                          |
|                                       |                          |
| .....                                 | Current alarm messages   |

Up previous page, down next page

## MEASUREMENTS / INVERTER MENU (Level 2)

All inverter measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / INVERTER Page 1 (Level 3) |   |
|--|---|
| P-N L1 L2 L3                             | Page header   |
| Vinv: 221/222/223 V                      | Phase to neutral measured AC Inverter output voltages |
| Finv: 50.0 Hz                            | Measured Inverter output frequency                    |
| .....                                    | Current alarm messages                                |

Up previous page, down next page

| MEASUREMENTS / INVERTER Page 2 (Level 3) |                          |
|--|--------------------------|
| ENTER - EXIT                             | ENTER exit to upper menu |
|  |                          |
|  |                          |
| .....                                    | Current alarm messages   |

Up previous page, down next page

## MEASUREMENTS / OUTPUT MENU (Level 2)

All UPS output measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / OUTPUT Page 1 (Level 3) |  |
|--|--|
| P-N L1 L2 L3                           | Page header                                      |
| Vout: 221/222/223 V                    | Phase to neutral measured AC UPS output voltages |
| Iout: 00.0/00.0/00.0 A                 | Measured AC RMS load currents                    |
| .....                                  | Current alarm messages                           |

Up previous page, down next page

| MEASUREMENTS / OUTPUT Page 2 (Level 3) |  |
|--|--|
| P-P L13 L21 L32                        | Page header                                    |
| Vout: 381/382/383 V                    | Phase to phase measured AC UPS output voltages |
| Fout: 50.0 Hz                          | Measured UPS output frequency                  |
| .....                                  | Current alarm messages                         |

Up previous page, down next page

| MEASUREMENTS / OUTPUT Page 3 (Level 3) |                            |
|--|----------------------------|
| Load 000/000/000 %                     | Measured load percentage   |
| KW 000.0/000.0/000.0                   | Measured output watt power |
| KVA 000.0/000.0/000.0                  | Measured output KVA power  |
| .....                                  | Current alarm messages     |

Up previous page, down next page

| MEASUREMENTS / OUTPUT Page 4 (Level 3) |                        |
|--|------------------------|
| PF: --- --- ---                        | Load power factor      |
| C.F: 0.0 / 0.0 / 0.0                   | Load crest factor      |
|  |                        |
| .....                                  | Current alarm messages |

Up previous page, down next page

| MEASUREMENTS / OUTPUT Page 5 (Level 3) |                          |
|--|--------------------------|
| ENTER - EXIT                           | ENTER exit to upper menu |
|  |                          |
|  |                          |
| .....                                  | Current alarm messages   |

Up previous page, down next page



## MEASUREMENTS / DC MENU (Level 2)

All DC measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / DC Page 1 (Level 3) |                                     |
|------------------------------------|-------------------------------------|
| Vbat 405/-405 V                    | Measured battery voltages           |
| Ichrg 00.0/00.0 A                  | Measured battery charge currents    |
| Idisch 00.0/00.0 A                 | Measured battery discharge currents |
| .....                              | Current alarm messages              |

Up previous page, down next page

| MEASUREMENTS / DC Page 2 (Level 3) |                             |
|------------------------------------|-----------------------------|
| Batteries : 30 x 2                 | Batteries in one group      |
| Par.Batts : 1                      | Parallel battery groups     |
| Batt. A/H : 007 Ah                 | Battery amper / hour rating |
| .....                              | Current alarm messages      |

Up previous page, down next page

| MEASUREMENTS / DC Page 3 (Level 3) |                           |
|------------------------------------|---------------------------|
| Backup time 0000 min               | Calculated remaining time |
| .....                              | Current alarm messages    |

Up previous page, down next page

| MEASUREMENTS / DC Page 4 (Level 3) |                          |
|------------------------------------|--------------------------|
| ENTER - EXIT                       | ENTER exit to upper menu |
| .....                              | Current alarm messages   |

Up previous page ,down next page

## MEASUREMENTS / GENERAL MENU

Temperature measurements are located in this menu, use up and down buttons to move on submenu

| MEASUREMENTS / GENERAL Page 1 (Level 3) |   |
|---|---|
| TH1: ---- C                             | Measured external sensor temperature        |
| TH2: 24.2 C                             | Measured battery cabinet inside temperature |
| TH3: ---- C                             | Measured internal sensor temperature        |
| .....                                   | Current alarm messages                      |

Up previous page, down next page

| MEASUREMENTS / GENERAL Page 2 (Level 3) |                          |
|---|--------------------------|
| ENTER - EXIT                            | ENTER exit to upper menu |
| .....                                   | Current alarm messages   |

Up previous page, down next page

### 3.2.2 ALARM LOGS MENU

Use this menu to see the alarm log records

| ALARM LOGS Page 1 (Level 2) |   |
|-----------------------------|---|
| UPS LOG RECORD              | Page header   |
| >001>081110 14:33:26        | Event no ,date and time (left and right buttons move) |
| ENTER CLEAR LOG             | ENTER buton clears all log memory                     |
| .....                       | Current alarm messages                                |

Up upper line, down next line

| ALARM LOGS Page 2 (Level 2) |                          |
|-----------------------------|--------------------------|
| ENTER - EXIT                | ENTER exit to upper menu |
|                             |                          |
|                             |                          |
| .....                       | Current alarm messages   |

Up previous page, down next page

### 3.2.3 INFORMATION MENU

Some usefull informations are located in this menu , use up and down buttons to move on submenu

| INFORMATION MENU Page 1 (Level 2) |   |
|-----------------------------------|---|
| RS232 Comm: 1:-- 2--              | RS232 activity indicator for com1 and com2  |
| MAX Power: 60000 VA               | Maximum ups output power as VA              |
| Nom:220/050 220/050               | Nominal input, output voltage and frequency |
| .....                             | Current alarm messages                      |

Up previous page, down next page

| INFORMATION MENU Page 2 (Level 2) |                                       |
|-----------------------------------|---------------------------------------|
| Inv version: 00001                | Inverter module firmware version      |
| Pfc version:00001                 | PFC rectifier module firmware version |
| Lcd version:00001                 | Front panel modul firmware version    |
| .....                             | Current alarm messages                |

Up previous page, down next page

| INFORMATION MENU Page 3 (Level 2) |                                |
|-----------------------------------|--------------------------------|
| Model:CL360D                      | Model name of the UPS          |
| Protocol:TX301                    | Communication protocol version |
| Chassis nr: 123456                | UPS chassis nr                 |
| .....                             | Current alarm messages         |

Up previous page, down next page

| INFORMATION MENU Page 4 (Level 2) |                          |
|-----------------------------------|--------------------------|
| ENTER - EXIT                      | ENTER exit to upper menu |
|                                   |                          |
|                                   |                          |
| .....                             | Current alarm messages   |

Up previous page, down next page

### 3.2.4 OPTIONS MENU

Use up and down buttons to move cursor on submenu at the end of page you move to next page. Menu has 3 level structure, if user password is enabled some parameters requires user password.

| Level 3 LCD panel options group |                          |       |  |
|---------------------------------|--------------------------|-------|--|
|                                 | Panel language selection | Page1 |  |
|                                 | Button click ON/OFF      | Page1 |  |
|                                 | LCD backlight brightness | Page2 |  |
|                                 | Backlight delay          | Page2 |  |
|                                 | Backlight dim.delay      | Page2 |  |
|                                 | ENTER - EXIT             | Page3 |  |

| OPTIONS / LCD OPTIONS Page 1 (Level 3) |   |
|--|---|
| >LANGUAGE:ENGLISH                      | Left and right change panel language ( <b>P3330</b> ) |
| CLICK: ON/OFF                          | Left and right buton click sound ON/OFF               |
| .....                                  | Current alarm messages                                |

Up upper line, down next line ,(+) or (-) options ,ENTER select an option

| OPTIONS / LCD OPTIONS Page 2 (Level 3) |  |
|--|--|
| >BACKLIGHT:XXXXXXXXX                   | Left and right LCD backlight brightness adjust |
| BL DELAY:CLOSED                        | Backlight delay                                |
| BL DIM:CLOSED                          | Back light half option selection               |
| .....                                  | Current alarm messages                         |

Up upper line, down next line ,(+) or (-) options ,ENTER select an option

| OPTIONS / LCD OPTIONS Page 3 (Level 3) |                          |
|--|--------------------------|
| ENTER - EXIT                           | ENTER exit to upper menu |
| .....                                  | Current alarm messages   |

Up previous page, down next page

| Level 3 – Communication options |                             |       |          |
|---------------------------------|-----------------------------|-------|----------|
|                                 | Remote control ON/OFF       | Page1 |          |
|                                 | COM2 port function          | Page1 |          |
|                                 | SNMP internal/external      | Page1 |          |
|                                 | Relay 1 function selection  | Page2 |          |
|                                 | Relay 2 function selection  | Page2 |          |
|                                 | Relay 3 function selection  | Page2 |          |
|                                 | Relay 4 function selection  | Page3 |          |
|                                 | Relay 5 function selection  | Page3 | Optional |
|                                 | Relay 6 function selection  | Page3 | Optional |
|                                 | Relay 7 function selection  | Page4 | Optional |
|                                 | Relay 8 function selection  | Page4 | Optional |
|                                 | Relay 9 function selection  | Page4 | Optional |
|                                 | Relay 10 function selection | Page5 | Optional |
|                                 | Relay 11 function selection | Page5 | Optional |
|                                 | Relay 12 function selection | Page5 | Optional |
|                                 | REPO input ON/OFF           | Page6 |          |
|                                 | ENTER - EXIT                | Page7 |          |

| OPTIONS / COMMUNICATION OPTIONS Page 1 (Level 3) |                                      |
|--|--------------------------------------|
| REMOTE CNTRL: ON/OFF                             | Left and right remote control ON/OFF |
| >COM2:SERVICE PORT                               | Com 2 serial port function selection |
| SNMP : INTERNAL/EXTERNAL                         | SNMP adaptor location                |
| .....  | Current alarm messages               |

Up upper line, down next line ,(+) or (-) options ,ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 2 (Level 3) |   |
|--|---|
| >RELAY1:   | Left and right buton relay function selection |
| RELAY 2:   | Left and right buton relay function selection |
| RELAY 3:   | Left and right buton relay function selection |
| .....  | Current alarm messages                        |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 3 (Level 3) |  |
|--|--|
| > RELAY 4:                                       | Left and right buton relay function selection          |
| RELAY 5:   | Left and right buton relay function selection (option) |
| RELAY 6:   | Left and right buton relay function selection (option) |
| .....  | Current alarm messages                                 |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 4 (Level 3) |  |
|--|--|
| > RELAY 7:                                       | Left and right buton relay function selection (option) |
| RELAY 8:   | Left and right buton relay function selection (option) |
| RELAY 9:   | Left and right buton relay function selection (option) |
| .....  | Current alarm messages                                 |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 5 (Level 3) |  |
|--|--|
| > RELAY 10:                                      | Left and right buton relay function selection (option) |
| RELAY 11:  | Left and right buton relay function selection (option) |
| RELAY 12:  | Left and right buton relay function selection (option) |
| .....  | Current alarm messages                                 |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 6 (Level 3) |  |
|--|--|
| REPO : ON / OFF                                  | Emergency stop input enabled or disabled |
|  |  |
|  |  |
| .....  | Current alarm messages                   |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / COMMUNICATION OPTIONS Page 7 (Level 3) |                          |
|--|--------------------------|
| ENTER - EXIT                                     | ENTER exit to upper menu |
|  |                          |
|  |                          |
| .....  | Current alarm messages   |

Up previous page, down next page

| Level 3 Alarm options |                       |        |  |
|-----------------------|-----------------------|--------|--|
|                       | Warning beep interval | Page1  |  |
|                       | Warning log ON/OFF    | Page1  |  |
|                       | Status log ON/OFF     | Page1  |  |
|                       | ALF restart ON/OFF    | Page2  |  |
|                       | ENTER - EXIT          | Sayfa3 |  |

| OPTIONS / ALARM OPTIONS Page 1 (Level 3) |   |
|--|---|
| >WARNING INTRVL:10 sc                    | Warning beep interval adjustment in seconds |
| WARNING LOG:ON/OFF                       | Left and right warning LOG record ON/OFF    |
| STATUS LOG:ON/OFF                        | Left and right status log record ON/OFF     |
| .....                                    | Current alarm messages                      |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / ALARM OPTIONS Page 2 (Level 3) |  |
|--|--|
| >ALF RESTART: USER/AUTO                  | During mains restore start USER/AUTO (R1174/2) |
|  |  |
|  |  |
| .....                                    | Current alarm messages                         |

Up upper line, down next line ,(+) or (-) options, ENTER select an option

| OPTIONS / ALARM OPTIONS Page 3 (Level 3) |                          |
|--|--------------------------|
| ENTER - EXIT                             | ENTER exit to upper menu |
|  |                          |
|  |                          |
| .....                                    | Current alarm messages   |

Up previous page, down next page

| Level 3 - Bypass options |                         |       |  |
|--------------------------|-------------------------|-------|--|
|                          | VAT transfer ON/OFF     | Page1 |  |
|                          | Gen set bypass ON/OFF   | Page1 |  |
|                          | Gen set synchron ON/OFF | Page1 |  |
|                          | ENTER - EXIT            | Page2 |  |

| OPTIONS / BYPASS OPTIONS Page 1 (Level 3) |  |
|---|--|
| VAT TRANSFER:ON/OFF                       | Left and right VAT transfer system ON/OFF (R1174/3)      |
| >GEN SET BYP:FORBID/FREE                  | Left and right bypass to generator FORBID/FREE (R1174/5) |
| GEN SET SYNC:XTAL/SYNC                    | Left and right generator synchron XTAL/SYNC (R1174/6)    |
| .....                                     | Current alarm messages                                   |

Up upper line ,down next line ,(+) or (-) options ,ENTER select an option

| OPTIONS / BYPASS OPTIONS Page 2 (Level 3) |                          |
|---|--------------------------|
| ENTER - EXIT                              | ENTER exit to upper menu |
|   |                          |
|   |                          |
| .....                                     | Current alarm messages   |

Up previous page ,down next page

### 3.2.5 COMMAND MENU

This menu contains UPS commands be carefull while using commands.

Use up and down buttons to move cursor on submenu at the end of page you move to next page.  
<ENTER> button applies the related command.

| COMMAND MENU Page 1 (Level 2) |                                   |
|-------------------------------|-----------------------------------|
| > ENTER <BYPASS>              | ENTER transfer the load to bypass |
| ENTER <BOOST>                 | ENTER start boost charge mode     |
| ENTER B.TEST > 405            | ENTER start short battery test    |
| .....                         | Current alarm messages            |

Up upper line ,down next line ,(+) or (-) options ,ENTER apply command

| COMMAND MENU Page 2 (Level 2) |  |
|-------------------------------|--|
| > RELAY TEST:OFF              | Left and right test dry contact relays |
| ENTER : MODEM INIT            | ENTER initialize dialup modem          |
| .....                         | Current alarm messages                 |

Up upper line ,down next line ,(+) or (-) options ,ENTER apply command

| COMMAND MENU Page 3 (Level 2) |                                     |
|-------------------------------|-------------------------------------|
| > ALARM SOUND: ON/OFF         | Left and right disable alarm buzzer |
| MIMIC LED TEST                | ENTER lamp test                     |
| .....                         | Current alarm messages              |

Up upper line ,down next line ,(+) or (-) options ,ENTER apply command

| COMMAND MENU Page 4 (Level 2) |                          |
|-------------------------------|--------------------------|
| ENTER - EXIT                  | ENTER exit to upper menu |
| .....                         | Current alarm messages   |

Up previous page ,down next page

### 3.2.6 TIME MENU

You can see Time and date information of the RTC clock in the UPS ,also you can set date and time from this menu.

| TIME MENU Page 1 (Level 2) |                        |
|----------------------------|------------------------|
| >TIME : 15:47:20           | Time of UPS RTC        |
| DATE: 31/12/2010           | Date of UPS RTC        |
| .....                      | Current alarm messages |

Up previous page ,down next page

| TIME MENU Page 2 (Level 2) |                            |
|----------------------------|----------------------------|
| >SET HOURS : 15            | Left and right set hours   |
| SET MINS : 47              | Left and right set minutes |
| .....                      | Current alarm messages     |

Up upper line ,down next line ,(+) or (-) adjust

| TIME MENU Page 3 (Level 2) |                                 |
|----------------------------|---------------------------------|
| >SET DAY : 31              | Left and right set day of month |
| SET MONTH : 12             | Left and right set month        |
| SET YEAR : 11              | Left and right set year         |
| .....                      | Current alarm messages          |

Up upper line ,down next line ,(+) or (-) adjust

| TIME MENU Page 4 (Level 2) |  |
|----------------------------|--|
| ENTER <UPDATE>             | ENTER apply new time and date settings |
|                            |  |
|                            |  |
| .....                      | Current alarm messages                 |

Up previous page ,down next page ,ENTER apply new time and date settings

| TIME MENU Page 5 (Level 2) |                          |
|----------------------------|--------------------------|
| ENTER - EXIT               | ENTER exit to upper menu |
|                            |                          |
|                            |                          |
| .....                      | Current alarm messages   |

Up previous page ,down next page

### 3.2.7 SERVICE MENU

This menu contains some helpfull service information and some commands.

Use up and down buttons to move cursor on submenu at the end of page you move to next page.

| SERVICE MENU Page 1 (Level 2) |                                      |
|-------------------------------|--------------------------------------|
| >HOURMETER:00075              | Total operating hour of the UPS      |
| MAXLOAD:015 020 025 %         | From power on recorded maximum power |
| ENTER<FAULT RESET>            | ENTER fault reset                    |
| .....                         | Current alarm messages               |

Up upper line ,down next line

| SERVICE MENU Page 2 (Level 2) |  |
|-------------------------------|--|
| FAN MAINT: 01000              | Remaining hours to FAN maintenance     |
| BAT MAINT :01200              | Remaining hours to battery maintenance |
| GEN.MAINT: 00500              | Remaining hours to general maintenance |
| .....                         | Current alarm messages                 |

If maintenance counters are disabled CANCEL word is shown.

| SERVICE MENU Page 3 (Level 2) |                                      |
|-------------------------------|--------------------------------------|
| >LOGOUT: --                   | ENTER Exit from service login status |
|                               |                                      |
|                               |                                      |
| .....                         | Current alarm messages               |

Up previous page ,down next page ,ENTER Logout from login status

| SERVICE MENU Page 4 (Level 2) |   |
|-------------------------------|---|
| ENTER - EXIT                  | ENTER to EXIT from menu and return to upper level |
|                               |   |
|                               |   |
| .....                         | current alarms appears sequentially               |

### 3.2.8 ADJUST MENU

This menu is prepared for service purposes there is no user adjustable parameter in this menu.

### 3.2.9 USER PASSWORD

Some commands or some option selections are required user password, if menu position is required password window comes to screen and UPS asks for user password. If you lost user password our service personnel will recover your user password.

User password is 4 digits numbers, move cursor with left and right buttons, select digit and adjust the number with up and down buttons. Do this for all digits and if password is typed completely press ENTER button. If the password is correct A43 USER LOGIN message will be shown on the LCD panel of the UPS.



Only authorized service personnel has the useful password. Therefore it is hidden at above display.

### 3.3 Alarms and warning messages

The internal structure of the DS300HA Series UPS is modular, these are:

**-PFC Rectifier module**

**-Inverter module**

**-Front panel module**

Module alarms and warnings are categorized according to modules at the front of the Alarm or warning message module information is added:

**-RXX Rectifier alarms and warnings**

**-AXX Inverter alarms and warnings**

**-LXX LCD front panel alarms and warnings**

More than one alarm can be shown on the UPS front panel with time shared order. If 4 alarms are occurred at the same time every 2 seconds 1 message will be showed, next 2 seconds 2 message will be showed etc..

If A00 or R00 Alarm is shown on the LCD panel we understand that there is a system fault at the related module. We saw the message in the A00 INV FAULT = XXXX or R00 PFC FAULT = XXXX format. Numbers shown in X determines the status code which tells the problem to us. See status code table for details of codes.

| Rectifier module alarm codes |         |   |
|------------------------------|---------|---|
| REC CODE = XXXX              |         | XXXX SYSTEM fault occurred at the rectifier module          |
| R00 REC FAULT = XXXX         | Fault   | Rectifier AC input voltage is high<br><b>CALL SERVICE !</b> |
| R01 AC INPUT HIGH            | Alarm   | Rectifier AC input voltage is low                           |
| R02 LINE FAILURE             | Alarm   | Rectifier DC output voltage is high                         |
| R03 DC BUS HIGH              | Alarm   | The rectifier DC output voltage is high, rectifier stop     |
| R05 FREQ TOLER               | Alarm   | Rectifier input frequency out of tolerance                  |
| R06 OVERTEMPERATURE          | Alarm   | Rectifier heatsink temperature high                         |
| R07 BLACKOUT                 | Alarm   | Short voltage blackout at rectifier AC input                |
| R08 I/P OVERCURRENT          | Alarm   | Rectifier IGBT saturation alarm                             |
| R09 ROTATE PHASE             | Alarm   | Rectifier input phase sequence incorrect                    |
| R14 PFC MANUAL STOP          | Alarm   | Inverter module stopped rectifier                           |
| R15 DC LOW                   | Alarm   | DC BUS voltage is lower than DC rectifier start voltage     |
| R17 BATTERY TEST             | Warning | Currently battery test is performing                        |
| R18 BOOST CHARGE             | Warning | Currently rectifier is in boost charge mode                 |
| R19 AC HIGH                  | Alarm   | AC Peak voltage is bigger than 20% of nominal range         |
| R20 INPUT CB OPEN            | Warning | Input CB is off   |
| R21 PFC STOP                 | Warning | Currently Rectifier module stop                             |
| R22 POS CHG LIMIT            | Warning | (+)Battery charge current limited                           |
| R23 NEG CHG LIMIT            | Warning | (-)Battery charge current limited                           |



|                      |         |   |
|----------------------|---------|---|
| R24 WAITING DC BUS   | Warning | Rectifier is waiting DC BUS to raise for startup        |
| R25 BATTERY FAILURE  | Warning | Battery test failed                                     |
| R26 BATT TEMP SENSOR | Warning | Battery temperature sensor is defected or not connected |
| R27 BATT TEMP HIGH   | Warning | Battery ambient temperature is high                     |
| R29 PFC RESET        | Warning | Rectifier module power on                               |
| R30 PLEASE WAIT      | Warning | Rectifier waits as adjusted startup delay               |
| R31 RECTIFIER START  | Warning | Rectifier is in soft start stage                        |

| Panel module alarm codes |         |  |
|--------------------------|---------|--|
| L01 TH1 TEMP HIGH        | Warning | TH1 temperature is high                    |
| L02 TH2 TEMP HIGH        | Warning | TH2 temperature is high                    |
| L03 TH1 TEMP LOW         | Warning | TH1 temperature is low                     |
| L04 TH2 TEMP LOW         | Warning | TH2 temperature is low                     |
| L05 FAN MAINT            | Warning | FAN maintenance time                       |
| L06 BATTERY MAINT        | Warning | Battery maintenance time                   |
| L07 OPT MAINTENANCE      | Warning | Optional maintenance time                  |
| L08 TH1 SENSOR FAIL      | Warning | TH1 temperature sensor failure             |
| L09 TH2 SENSOR FAIL      | Warning | TH2 temperature sensor failure             |
| L10 ENTER FAULT RESET    | Warning | UPS is waiting fault reset for startup     |
| L11 BATT CB OPEN         | Warning | External interactive battery switch is off |
| L12 GENERAL MAINT        | Warning | General maintenance time                   |
| L13 PFC CAN COMM ERR     | Warning | PFC module CAN communication timeout       |
| L14 INV CAN COMM ERR     | Warning | INV module CAN communication timeout       |

| Inverter module alarm codes |         |   |
|-----------------------------|---------|---|
| INV CODE = 0XXX             |         | Current inverter module status code                                 |
| A00 INV FAULT = XXXX        | Hata    | XXXX fault occurred at the inverter module<br><b>CALL SERVICE !</b> |
| A01 O/P OVERCURRENT         | Alarm   | IGBT saturation alarm on inverter module                            |
| A02 OVERTEMP SHUT           | Alarm   | Overtemperature at inverter power module                            |
| A03 BATT HIGH               | Alarm   | Inverter module measured battery voltage high                       |
| A04 OUTPUT V.LOW            | Alarm   | Inverter output voltage is low                                      |
| A05 OUTPUT V.HIGH           | Alarm   | Inverter output voltage is high                                     |
| A06 OVERLOAD SHUT           | Alarm   | Overload at UPS output  |
| A07 SHORT CIRCUIT           | Alarm   | Short circuit at UPS output   |
| A08 ON MAINTENANCE          | Alarm   | Maintenance by-pass switch on                                       |
| A09 MANUAL BYPASS           | Alarm   | Load is transferred to by-pass from front panel                     |
| A10 BATTERY LOW SHUT        | Alarm   | Inverter measured battery voltage is low (shutdown level)           |
| A11 REPO STOP               | Alarm   | External REPO input signal sensed                                   |
| A12 DC BALANCE BAD          | Alarm   | Before inverter start filter capacitors don't discharged            |
| A13 PEAK CURRENT            | Alarm   | Very high current at the UPS output                                 |
| A14 INV NOT START           | Alarm   | Inverter module start failed  |
| A17 BYPASS FAILURE          | Warning | By-pass input voltage failure                                       |
| A18 BYPASS VOLT             | Warning | By-pass input voltage out of tolerance                              |
| A19 BYP FREQ.TOLER          | Warning | By-pass input frequency out of tolerance                            |
| A20 OVERLOAD                | Warning | Currently the load exceeded 100% capacity                           |
| A21 OVERTEMP                | Warning | Currently inverter power module heatsink temperature is high        |
| A22 OUTPUT OFF              | Warning | There is no UPS output voltage                                      |
| A23 ON BYPASS               | Warning | Load is on bypass   |
| A24 REVERSE CURRENT         | Warning | Regenerative backfeed to UPS output                                 |

|                      |         |   |
|----------------------|---------|---|
| A25 INV RESET        | Warning | Inverter module power on                                  |
| A26 BATTERY LOW      | Warning | Batteries are going to full discharge                     |
| A27 GENERATOR MODE   | Warning | Generator set is running                                  |
| A28 O/P PHASE LOSS   | Warning | Any one of the UPS output phases there is no voltage      |
| A29 SYNCHRON BAD     | Warning | Inverter is not synchron to by-pass input                 |
| A30 SHORT CIRCUIT    | Warning | Short circuit occurred at the UPS output currently normal |
| A31 OUTPUT SWITCH    | Warning | Output switch of the UPS is off                           |
| A32 SERVICE LOGIN    | Warning | Service login active                                      |
| A34 BYP ROTATE PHASE | Warning | By-pass phase sequence incorrect                          |
| A35 INV STOP         | Warning | Inverter module interrupted                               |
| A36 INV DC DOWN      | Warning | DC BUS voltage is less than 120 volts DC                  |
| A37 AC CURR LIMIT    | Warning | Inverter output current limited                           |
| A38 FUSE FAILURE     | Warning | Any fuse in UPS is blown                                  |
| A39 PSP FAILURE      | Alarm   | Inverter control board power supply out of tolerance      |
| A40 INVERTER START   | Warning | Inverter is in soft start stage wait for finish           |
| A43 USER LOGIN       | Warning | User logged in to UPS                                     |
| A45 SERV.PASSWORD    | Fault   | For UPS startup service password required                 |

If any alarm shown on the LCD panel without A00 and R00 message UPS will start automatically if the conditions are normal. But if you see A00 or R00 code with any alarm together you must CALL SERVICE !  
If the message is warning UPS continues to run there is no problem.

To support technical service status codes are used, each status code tells different event to us.

### 3.4 STATUS CODES

#### Inverter module status codes

| INV L1-L2-L3 phase status codes |  |
|---------------------------------|--|
| 163                             | During soft start at the end of 4 seconds L1 output voltage is less then 30 volts AC             |
| 263                             | During soft start at the end of 4 seconds L2 output voltage is less then 30 volts AC             |
| 363                             | During soft start at the end of 4 seconds L3 output voltage is less then 30 volts AC             |
| 164                             | During soft start at the end of 4 seconds L1 output voltage is bigger then (output high/2) value |
| 264                             | During soft start at the end of 4 seconds L2 output voltage is bigger then (output high/2) value |
| 364                             | During soft start at the end of 4 seconds L3 output voltage is bigger then (output high/2) value |
| 165                             | During inverter run the L1 phase AC output voltage is bigger then output high alarm level        |
| 265                             | During inverter run the L2 phase AC output voltage is bigger then output high alarm level        |
| 365                             | During inverter run the L3 phase AC output voltage is bigger then output high alarm level        |
| 166                             | During inverter run the L1 phase AC output voltage is less then output low alarm level           |
| 266                             | During inverter run the L2 phase AC output voltage is less then output low alarm level           |
| 366                             | During inverter run the L3 phase AC output voltage is less then output low alarm level           |
| 167                             | L1 phase by-pass SCR must be off but at there is AC voltage at the L1 output of the UPS          |
| 267                             | L2 phase by-pass SCR must be off but at there is AC voltage at the L2 output of the UPS          |
| 367                             | L3 phase by-pass SCR must be off but at there is AC voltage at the L3 output of the UPS          |
| 168                             | L1 phase overload shutdown   |
| 268                             | L2 phase overload shutdown   |
| 368                             | L3 phase overload shutdown   |
| 169                             | Overcurrent occured on L1 phase longer then allowed time   |
| 269                             | Overcurrent occured on L2 phase longer then allowed time   |
| 369                             | Overcurrent occured on L3 phase longer then allowed time   |
| 170                             | On L1 phase momentary short circuit conditions occured but now inverter is running               |
| 270                             | On L2 phase momentary short circuit conditions occured but now inverter is running               |
| 370                             | On L3 phase momentary short circuit conditions occured but now inverter is running               |
| 171                             | On L1 phase output short circuit occured output shutdown   |
| 271                             | On L2 phase output short circuit occured output shutdown   |
| 371                             | On L3 phase output short circuit occured output shutdown   |
| 172                             | Within time window 4 times L1 phase output is less then output low alarm level                   |
| 272                             | Within time window 4 times L2 phase output is less then output low alarm level                   |
| 372                             | Within time window 4 times L3 phase output is less then output low alarm level                   |
| 173                             | Within time window 4 times L1 phase output is higher then output high alarm level                |
| 273                             | Within time window 4 times L2 phase output is higher then output high alarm level                |
| 373                             | Within time window 4 times L3 phase output is higher then output high alarm level                |
| 174                             | On L1 phase UPS output at last 100 milliseconds the alternance don't changed                     |
| 274                             | On L2 phase UPS output at last 100 milliseconds the alternance don't changed                     |
| 374                             | On L3 phase UPS output at last 100 milliseconds the alternance don't changed                     |
| 175                             | On L1 bypass input phase at last 100 milliseconds the alternance don't changed                   |
| 275                             | On L2 bypass input phase at last 100 milliseconds the alternance don't changed                   |
| 375                             | On L3 bypass input phase at last 100 milliseconds the alternance don't changed                   |
| 176                             | On L1 inverter output phase at last 100 milliseconds the alternance don't changed                |
| 276                             | On L2 inverter output phase at last 100 milliseconds the alternance don't changed                |
| 376                             | On L3 inverter output phase at last 100 milliseconds the alternance don't changed                |
| 177                             | L1 phase output current sensor open  |
| 277                             | L2 phase output current sensor open  |
| 377                             | L3 phase output current sensor open  |

| <b>INV L1-L2-L3 phase status codes</b> |  |
|--|--|
| 178                                    | Inverter stopped but on inverter L1 phase output still DC voltage sensed   |
| 278                                    | Inverter stopped but on inverter L2 phase output still DC voltage sensed   |
| 378                                    | Inverter stopped but on inverter L3 phase output still DC voltage sensed   |
| 179                                    | During inverter run at last 25 milliseconds the L1 phase output alternance is not changed                                    |
| 279                                    | During inverter run at last 25 milliseconds the L2 phase output alternance is not changed                                    |
| 379                                    | During inverter run at last 25 milliseconds the L3 phase output alternance is not changed                                    |
| 180                                    | At the end of 4 times retry During soft start after 4 seconds still the L1 phase output voltage is less then 30 volts AC     |
| 280                                    | At the end of 4 times retry During soft start after 4 seconds still the L2 phase output voltage is less then 30 volts AC     |
| 380                                    | At the end of 4 times retry During soft start after 4 seconds still the L3 phase output voltage is less then 30 volts AC     |
| 181                                    | At the end of 4 times retry During soft start at the end of 4 seconds L1 output voltage is bigger then (output high/2) value |
| 281                                    | At the end of 4 times retry During soft start at the end of 4 seconds L2 output voltage is bigger then (output high/2) value |
| 381                                    | At the end of 4 times retry During soft start at the end of 4 seconds L3 output voltage is bigger then (output high/2) value |
| 182                                    | During power on L1 phase bypass SCR must be off but at the L1 phase output there is AC voltage                               |
| 282                                    | During power on L2 phase bypass SCR must be off but at the L2 phase output there is AC voltage                               |
| 382                                    | During power on L3 phase bypass SCR must be off but at the L3 phase output there is AC voltage                               |
| 183                                    | L1 phase by-pass SCR must be on but there is only positive alternance at the UPS output                                      |
| 283                                    | L2 phase by-pass SCR must be on but there is only positive alternance at the UPS output                                      |
| 383                                    | L3 phase by-pass SCR must be on but there is only positive alternance at the UPS output                                      |
| 184                                    | L1 phase by-pass SCR must be on but there is only negative alternance at the UPS output                                      |
| 284                                    | L2 phase by-pass SCR must be on but there is only negative alternance at the UPS output                                      |
| 384                                    | L3 phase by-pass SCR must be on but there is only negative alternance at the UPS output                                      |
| 185                                    | L1 phase by-pass SCR must be on but there is no output voltage at the UPS output   |
| 285                                    | L2 phase by-pass SCR must be on but there is no output voltage at the UPS output   |
| 385                                    | L3 phase by-pass SCR must be on but there is no output voltage at the UPS output   |
| 186                                    | Output CB is energized but at the L1 phase output there is only positive alternance  |
| 286                                    | Output CB is energized but at the L2 phase output there is only positive alternance  |
| 386                                    | Output CB is energized but at the L3 phase output there is only positive alternance  |
| 187                                    | Output CB is energized but at the L1 phase output there is only negative alternance  |
| 287                                    | Output CB is energized but at the L2 phase output there is only negative alternance  |
| 387                                    | Output CB is energized but at the L3 phase output there is only negative alternance  |
| 188                                    | Output CB is energized but at the L1 phase output there is no AC voltage   |
| 288                                    | Output CB is energized but at the L2 phase output there is no AC voltage   |
| 388                                    | Output CB is energized but at the L3 phase output there is no AC voltage   |
| 189                                    | During load on by-pass on the L1 output short circuit sensed   |
| 289                                    | During load on by-pass on the L2 output short circuit sensed   |
| 389                                    | During load on by-pass on the L3 output short circuit sensed   |
| 190                                    | On L1 phase output reverse current sensed  |
| 290                                    | On L2 phase output reverse current sensed  |
| 390                                    | On L3 phase output reverse current sensed  |
| 191                                    | During load on inverter ,on L1 phase by-pass line leakage current sensed   |
| 291                                    | During load on inverter ,on L2 phase by-pass line leakage current sensed   |
| 391                                    | During load on inverter ,on L3 phase by-pass line leakage current sensed   |

| <b>INV DC status codes</b> |  |
|----------------------------|--|
| 400                        | DC bus voltage high  |
| 401                        | Inverter controller board power supply 1 out of tolerant   |
| 402                        | Inverter controller board power supply 2 out of tolerant   |
| 404                        | Inverter stop because (+)DC bus voltage is low             |
| 405                        | Inverter stop because (-)DC bus voltage is low             |
| 406                        | Inverter within time window 4 times DC bus voltage is high |

| <b>INV General status codes tablosu</b> |   |
|---|---|
| 500                                     | Inverter received remote power off signal from RS232                                      |
| 501                                     | Inverter received remote power off signal from CAN interface                              |
| 502                                     | Inverter sensed IGBT fault alarm 4 times within time window (30 minutes)                  |
| 503                                     | Inverter sensed Overtemperature alarm 4 times within time window (30 minutes)             |
| 504                                     | Inverter sensed 3 phase AC O/P voltage low alarm 4 times within time window (30 minutes)  |
| 505                                     | Inverter sensed 3 phase AC O/P voltage high alarm 4 times within time window (30 minutes) |
| 506                                     | Inverter Timeout error during eeprom read or write  |
| 507                                     | Inverter Memory checksum error  |
| 508                                     | Inverter 3 output phases overloaded output shutdown                                       |
| 509                                     | Inverter maintenance by-pass switch closed  |
| 510                                     | Inverter IGBT fault error   |
| 511                                     | Inverter overtemperature shutdown   |
| 512                                     | Inverter 3 phase AC output voltage low  |
| 513                                     | Inverter 3 phase AC output voltage high   |
| 514                                     | Inverter output CB energized but still it looks like not energized                        |
| 515                                     | Inverter output CB not energized but still it looks like energized                        |
| 516                                     | Inverter fault occurred for restart password required                                     |
| 517                                     | Inverter output CB energized but at the UPS output there is no 3 phase AC voltage         |
| 518                                     | Inverter By-pass voltage is OK but at the UPS output there is no 3 phase AC voltage       |

| <b>INV Control activity status codes</b> |   |
|--|---|
| 612                                      | INV Over RS232 interface battery quantity updated                                     |
| 613                                      | INV Over CAN1 interface battery quantity updated                                      |
| 614                                      | INV Over RS232 interface by-pass and output frequency updated                         |
| 615                                      | INV Over CAN1 interface by-pass and output frequency updated                          |
| 616                                      | INV Over RS232 interface By-pass and output voltage updated                           |
| 617                                      | INV Over CAN1 interface By-pass and output voltage updated                            |
| 618                                      | INV Over RS232 interface factory options updated                                      |
| 619                                      | INV Over CAN1 interface factory options updated                                       |
| 620                                      | INV Over RS232 interface user options updated   |
| 621                                      | INV Over CAN1 interface user options updated  |
| 622                                      | INV Over RS232 interface general test command received                                |
| 623                                      | INV Over CAN1 interface general test command received                                 |
| 624                                      | INV Over RS232 interface transfer load to by-pass command received                    |
| 625                                      | INV Over CAN1 interface transfer load to by-pass command received                     |
| 626                                      | INV Over RS232 interface transfer load to UPS command received                        |
| 627                                      | INV Over CAN1 interface transfer load to UPS command received                         |
| 628                                      | INV Over RS232 interface Copy operating RAM to Factory settings zone command received |
| 629                                      | INV Over CAN1 interface Copy operating RAM to Factory settings zone command received  |
| 630                                      | INV Over RS232 interface Copy factory settings to operating RAM command received      |
| 631                                      | INV Over CAN1 interface Copy factory settings to operating RAM command received       |
| 632                                      | INV Over RS232 interface Copy operating RAM to User settings zone command received    |
| 633                                      | INV Over CAN1 interface Copy operating RAM to User settings zone command received     |
| 634                                      | INV Over RS232 interface regenerative back feed activated                             |
| 635                                      | INV Over CAN1 interface regenerative back feed activated                              |

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|     |  |
|-----|--|
| 636 | INV Over RS232 interface fault reset command received          |
| 637 | INV Over CAN1 interface fault reset command received           |
| 638 | INV Over RS232 interface short battery test command received   |
| 639 | INV Over CAN1 interface short battery test command received    |
| 640 | INV Over RS232 interface long battery test command received    |
| 641 | INV Over CAN1 interface long battery test command received     |
| 642 | INV Over RS232 interface battery test cancel command received  |
| 643 | INV Over CAN1 interface battery test cancel command received   |
| 644 | INV Over RS232 interface start boost charge command received   |
| 645 | INV Over CAN1 interface start boost charge command received    |
| 646 | INV Over RS232 interface stop boost charge command received    |
| 647 | INV Over CAN1 interface stop boost charge command received     |
| 648 | INV Over RS232 interface PFC short stop command received       |
| 649 | INV Over CAN1 interface PFC short stop command received        |
| 650 | INV Over RS232 interface generator mode start command received |
| 651 | INV Over CAN1 interface generator mode start command received  |
| 652 | INV Over RS232 interface start sleep mode command received     |
| 653 | INV Over CAN1 interface start sleep mode command received      |
| 654 | INV Over RS232 interface exit sleep mode command received      |
| 655 | INV Over CAN1 interface exit sleep mode command received       |
| 656 | INV Over RS232 interface service login command received        |
| 657 | INV Over CAN1 interface service login command received         |
| 658 | INV Over RS232 interface logout command received               |
| 659 | INV Over CAN1 interface logout command received                |
| 660 | INV Over RS232 interface user login command received           |
| 661 | INV Over CAN1 interface user login command received            |
| 662 | INV over RS232 service level fault reset command received      |
| 663 | INV over CAN1 service level fault reset command received       |
| 664 | INV over RS232 delete fault profile memory command received    |
| 665 | INV over CAN1 delete fault profile memory command received     |
| 666 | INV over RS232 start regenerative mode command received        |
| 667 | INV over CAN1 start regenerative mode command received         |
| 668 | INV over RS232 user level fault reset command received         |
| 669 | INV over CAN1 user level fault reset command received          |

## PFC rectifier status codes

| PFC L1-L2-L3 phase status codes |  |
|---------------------------------|--|
| 1101                            | PFC L1 phase AC input current LEM sensor error                               |
| 1201                            | PFC L2 phase AC input current LEM sensor error                               |
| 1301                            | PFC L3 phase AC input current LEM sensor error                               |
| 1102                            | L1 phase AC input voltage sample is irregular or DC                          |
| 1202                            | L2 phase AC input voltage sample is irregular or DC                          |
| 1302                            | L3 phase AC input voltage sample is irregular or DC                          |
| 1103                            | PFC AC rectifier input voltage is lower then <b>R2187</b> on L1 phase input  |
| 1203                            | PFC AC rectifier input voltage is lower then <b>R2187</b> on L2 phase input  |
| 1303                            | PFC AC rectifier input voltage is lower then <b>R2187</b> on L3 phase input  |
| 1104                            | PFC AC rectifier input voltage is higher then <b>R2186</b> on L1 phase input |
| 1204                            | PFC AC rectifier input voltage is higher then <b>R2186</b> on L2 phase input |
| 1304                            | PFC AC rectifier input voltage is higher then <b>R2186</b> on L3 phase input |
| 1105                            | PFC L1 phase AC peak input voltage is bigger 20% from nominal range value    |
| 1205                            | PFC L2 phase AC peak input voltage is bigger 20% from nominal range value    |
| 1305                            | PFC L3 phase AC peak input voltage is bigger 20% from nominal range value    |
| 1106                            | PFC L1 phase AC input current limited  |
| 1206                            | PFC L2 phase AC input current limited  |
| 1306                            | PFC L3 phase AC input current limited  |

## PFC DC status codes

|      |  |
|------|--|
| 1400 | PFC +DC bus voltage is higher then <b>R2131 adjustment</b>                             |
| 1401 | PFC -DC bus voltage is higher the <b>R2131 adjustment</b>                              |
| 1402 | PFC DC LEM current sensor error  |
| 1403 | PFC module +DC BUS voltage high alarm repeated 4 times within <b>R2166</b> time window |
| 1404 | PFC module -DC BUS voltage high alarm repeated 4 times within <b>R2166</b> time window |
| 1405 | PFC board isolated power supply voltage failure  |
| 1406 | PFC rectifier power component DC leakage sensed  |

## PFC General status codes

|      |  |
|------|--|
| 1500 | PFC remote emergency power off command received from RS232 or CAN interface            |
| 1501 | PFC IGBT saturation alarm  |
| 1502 | PFC overcurrent alarm  |
| 1503 | PFC input CB not energized but still it looks like energized                           |
| 1504 | PFC input CB energized but still it looks like not energized                           |
| 1505 | PFC eeprom timeout error   |
| 1506 | PFC eeprom memory error  |
| 1507 | PFC modul IGBT fault alarm repeated 4 times within <b>R2165</b> time window            |
| 1508 | PFC modul overtemperature alarm repeated 4 times within <b>R2167</b> time window       |
| 1509 | PFC 3 phase AC power failure on UPS input (2.5 seconds later after mains failure)      |
| 1510 | PFC 3 phase AC rectifier input voltage is high (2.5 seconds later after mains failure) |
| 1511 | PFC AC power failure on L1-L2 phases(phase to phase)                                   |
| 1512 | PFC AC power failure on L1-L3 phases(phase to phase)                                   |
| 1513 | PFC AC power failure on L2-L3 phases(phase to phase)                                   |
| 1514 | PFC AC input voltage high on L1-L2 phases(phase to phase)                              |
| 1515 | PFC AC input voltage high on L1-L3 phases(phase to phase)                              |
| 1516 | PFC AC input voltage high on L2-L3 phases(phase to phase)                              |

| <b>PFC Control activity status codes</b> |   |
|--|---|
| 1612                                     | PFC Battery quantity updated over RS232 interface                                       |
| 1613                                     | PFC Battery quantity updated over CAN interface   |
| 1614                                     | PFC rectifier Input frequency range updated over RS232 interface                        |
| 1615                                     | PFC rectifier Input frequency range updated over CAN interface                          |
| 1616                                     | PFC factory settings updated over RS232 interface                                       |
| 1617                                     | PFC factory settings updated over CAN interface   |
| 1618                                     | PFC rectifier Input AC voltage range updated over RS232 interface                       |
| 1619                                     | PFC rectifier Input AC voltage range updated over CAN interface                         |
| 1626                                     | PFC over RS232 interface Test AC input signals command received                         |
| 1627                                     | PFC over CAN interface Test AC input signals command received                           |
| 1628                                     | PFC over RS232 interface copy operating RAM to Factory settings memory command received |
| 1629                                     | PFC over CAN1 interface copy operating RAM to Factory settings memory command received  |
| 1630                                     | PFC over RS232 interface Copy factory settings to operating RAM command received        |
| 1631                                     | PFC over CAN1 interface Copy factory settings to operating RAM command received         |
| 1632                                     | PFC over RS232 interface Copy operating RAM to User settings memory command received    |
| 1633                                     | PFC over CAN1 interface Copy operating RAM to User settings memory command received     |
| 1636                                     | PFC over RS232 memory checksum lock command received                                    |
| 1637                                     | PFC over CAN1 memory checksum lock command received                                     |
| 1638                                     | PFC over RS232 interface start short battery test command received                      |
| 1639                                     | PFC over CAN1 interface start short battery test command received                       |
| 1640                                     | PFC over RS232 interface start long battery test command received                       |
| 1641                                     | PFC over CAN1 interface start long battery test command received                        |
| 1642                                     | PFC over RS232 interface cancel battery test command received                           |
| 1643                                     | PFC over CAN1 interface cancel battery test command received                            |
| 1644                                     | PFC over RS232 interface start boost charge mode command received                       |
| 1645                                     | PFC over CAN1 interface start boost charge mode command received                        |
| 1646                                     | PFC over RS232 interface stop boost charge command received                             |
| 1647                                     | PFC over CAN1 interface stop boost charge command received                              |
| 1648                                     | PFC over RS232 interface short stop command received                                    |
| 1649                                     | PFC over CAN1 interface short stop command received                                     |
| 1650                                     | PFC over RS232 interface start generator mode command received                          |
| 1651                                     | PFC over CAN1 interface start generator mode command received                           |
| 1652                                     | PFC over RS232 interface enter sleep mode command received                              |
| 1653                                     | PFC over CAN1 interface enter sleep mode command received                               |
| 1654                                     | PFC over RS232 interface exit from sleep mode command received                          |
| 1655                                     | PFC over CAN1 interface exit from sleep mode command received                           |
| 1656                                     | PFC over RS232 interface service login command received                                 |
| 1657                                     | PFC over CAN1 interface service login command received                                  |
| 1658                                     | PFC over RS232 interface logout command received  |
| 1659                                     | PFC over CAN1 interface logout command received   |
| 1660                                     | PFC over RS232 interface user login command received                                    |
| 1661                                     | PFC over CAN1 interface user login command received                                     |
| 1662                                     | PFC over RS232 interface service level fault reset command received                     |
| 1663                                     | PFC over CAN1 interface service level fault reset command received                      |
| 1664                                     | PFC over RS232 delete fault profile memory command received                             |
| 1665                                     | PFC over CAN1 delete fault profile memory command received                              |
| 1666                                     | PFC over RS232 interface backfeed regenerative energy to mains input command received   |
| 1667                                     | PFC over CAN1 interface backfeed regenerative energy to mains input command received    |
| 1668                                     | PFC over RS232 user level fault reset command received                                  |
| 1669                                     | PFC over CAN1 interface user level fault reset command received                         |

For detailed description of the status codes please refer to service manual



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### 3.5 Alarm messages and quick troubleshooting

Alarm codes and messages are showed at the 4.line of the LCD panel various messages tells different events at some messages user can make some simple controls and they can decide that they must call service or not.

NOTE : If **R00 REC FAULT = XXXX** or **A00 INV FAULT = XXXX** message is shown on the LCD panel the other alarm or warning messages will not be shown.

#### **R00 REC FAULT = XXXX**

Call service

#### **R01 AC INPUT HIGH**

The input voltage of the UPS is very high check the AC input voltage if really high wait until the voltage is normal.

#### **R02 LINE FAILURE**

The input voltage of the UPS is very low ,check the AC input voltage if the input voltage is low wait until the AC input voltage is normal.

#### **R03 DC BUS HIGH**

Call service

#### **R05 FREQ TOLER**

The AC input voltage frequency of the UPS is out of tolerance wait until the input frequency is normal.

#### **R06 OVERTEMPERATURE**

Overtemperature at rectifier module call service.

#### **R07 BLACKOUT**

There is a short blackout at the AC input voltage of the UPS, this is temporary wait until the AC input voltage is normal.

#### **R08 I/P OVERCURRENT**

Call service

#### **R09 ROTATE PHASE**

The phase sequency at the UPS input is reverse please refer to a technical personnel to provide correct phase sequency

#### **R14 PFC MANUAL STOP**

This message shows that rectifier is stopped for any alarm reason check the other alarm shown together with this alarm.

#### **R15 DC LOW**

DC BUS voltage or battery voltage is very low wait 10 minutes then call service

#### **R17 BATTERY TEST**

For 30 seconds UPS is performing battery test at the end of the test UPS decides batries are OKEY or not, then UPS returns to normal operation automatically.

#### **R18 BOOST CHARGE**

For 10 hours boost charge mode is activated from UPS, at the end of 10 hours UPS returns to normal charge mode

#### **R19 AC HIGH**

The AC input votage of the UPS is 20% higher then nominal input votage, wait until the AC input voltage is normal.

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**R20 INPUT CB OPEN**

The input of the UPS is isolated from mains power with contactor ,this message will be shown with another alarm always. Check the other alarm code.

**R21 PFC STOP**

Rectifier is stopped itself wait it must start again, another alarm code shows the reason of the rectifier stop. Wait for 1 minute if alarm continues call service.

**R22 POS CHG LIMIT, R23 NEG CHG LIMIT**

This message is normal if the battery charge current is reached to limit value during battery charge.

**R24 WAITING DC BUS**

The DC BUS voltage of the UPS is not enough to startup wait 2 minutes if message continues call service.

**R25 BATTERY FAILURE**

At the last battery test one or more defected batteries found, call service.

**R26 BATT TEMP SENSOR**

Battery temperature sensor malfunction, call service.

**R27 BATT TEMP HIGH**

If batteries are located at the outside of the UPS cabinet check battery ambient temperature if hot use air cooling system. If batteries are internal check the UPS ambient temperature if normal call service.

**L02 TH2 TEMP HIGH, L04 TH2 TEMP LOW**

UPS TH2 cabinet inside temperature is out of tolerance check the followings:

- If UPS air inlets and outlets covered by dust clean
- If any material prevents air flow at UPS air inlets or outlets take the material
- If UPS ambient temperature is high then 45 C ,use air cooling system

**L05 FAN MAINT**

Maintenance due of the cooling fans of the UPS, call service.

**L06 BATTERY MAINT**

Maintenance due of the UPS batteries, call service.

**L08 TH1 SENSOR FAIL, L09 TH2 SENSOR FAIL**

TH1 or TH2 temperature measurement sensors are defected, call service.

**L10 ENTER FAULT RESET**

Call service

**L11 BATT CB OPEN**

The battery switch of the UPS is OFF, in this case UPS runs normally but if mains failure alarm occurs the output voltage of the UPS shutdown. Please turn ON the battery switch.

**L12 GENERAL MAINT**

Maintenance due of the general maintenance, call service.

**L13 PFC CAN COMM ERR**

Call service.

**L14 INV CAN COMM ERR**

Call service.

**A00 INV FAULT = XXXX**

Call service.

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### **A01 O/P OVERCURRENT**

Check the new load which are connected to UPS nowadays the total load power maybe exceeds maximum power of the UPS. Otherwise call service.

### **A02 OVERTEMP SHUT**

Inverter module heatsink temperature is out of tolerance check the followings:

- If UPS air inlets and outlets covered by dust clean
- If any material prevents air flow at UPS air inlets or outlets take the material
- If UPS ambient temperature is high then 45 C, use air cooling system

### **A03 BATT HIGH**

DC BUS voltage or battery voltage of the UPS is high, if inductive load is used this event sometimes occurs if alarm continues call service.

### **A04 OUTPUT V.LOW**

The output voltage of the inverter is low call service

### **A05 OUTPUT V.HIGH**

The output voltage of the inverter is high call service

### **A06 OVERLOAD SHUT**

The total load which is connected to the UPS is exceeded 100% capacity of the UPS if message continues call service they will check UPS, but probably you need higher power range UPS.

Note: Some load inrush currents causes overload event then current is normal.

### **A07 SHORT CIRCUIT**

There is short circuit at the output of the UPS check installation and loads.

### **A08 ON MAINTENANCE**

The maintenance by-pass switch of the UPS is ON <1>position, there is a lock on this switch which prevents unauthorized personnel use.

### **A09 MANUAL BYPASS**

Load is transferred to by-pass from UPS command menu, transfer the load to the inverter.

### **A10 BATTERY LOW SHUT**

The DC BUS or battery voltage of the UPS is low. If the mains is OKEY call service.

If there is no mains voltage wait until mains OKEY UPS will start automatically.

### **A11 REPO STOP**

External repo button pressed, to restart turn off and on the UPS

### **A12 DC BALANCE BAD**

Call service

### **A13 PEAK CURRENT**

Very high current measured at the UPS output, check loads

### **A14 INV NOT START**

Call service

### **A17 BYPASS FAILURE, A18 BYPASS VOLT, A19 BYP FREQ.TOLER**

The input of the UPS or by-pass input of the UPS voltage or frequency is out of tolerance, wait until the voltage is normal if message continues long time check input fuses, switches etc. at the distribution panel.

### **A20 OVERLOAD**

UPS is currently running but the load percentage exceeds 100% capacity of the UPS, if this situation continues inverter will stop after a delay. Check the loads at the UPS output.

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### **A21 OVERTEMP**

Inverter module heatsink temperature is high check the followings:

- If UPS air inlets and outlets covered by dust clean
- If any material prevents air flow at UPS air inlets or outlets take the material
- If UPS ambient temperature is high then 45 C, use air cooling system

### **A22 OUTPUT OFF**

During mains failure if the battery backup time is finished this message is normal ,there is no energy so the UPS shutdown the output voltage.

If this message is permanent call service, otherwise wait until the message is deleted automatically from LCD screen.

### **A23 ON BYPASS**

From any reason UPS transferred the load to bypass, check the other alarm code which shown together with this alarm it shows the by-pass reason.

If the UPS stays at this position for a long time call service.

### **A24 REVERSE CURRENT**

Any load such as motors are connected to UPS output and the load in regenerative mode ,it is applying reverse energy to the UPS output. Call service

### **A25 INV RESET**

This is the power on indicator of the inverter module, during power on for 10 seconds this message will be shown at the end of 10 seconds the message will be cleared.

### **A26 BATTERY LOW**

The DC BUS or battery voltage of the UPS is low, still UPS is running but DC voltage is going down.

If this alarm occurs during mains failure it means that there is no energy from batteries this is normal.

But if this alarm occurs during mains OK call service.

### **A27 GENERATOR MODE**

UPS is running in generator mode when generator set stops UPS returns to normal operating mode automatically.

### **A28 O/P PHASE LOSS**

Call service

### **A29 SYNCHRON BAD**

This is only warning that shows the inverter and by-pass voltages are not synchron to each other ,there is nothing to do wait until they matches.

### **A30 SHORT CIRCUIT**

Shorter than 4 alternance (40 milliseconds) short circuit occurred at the output of the UPS, now UPS is running but you must check the installation and loads.

### **A31 OUTPUT SWITCH**

The output switch of the UPS is OFF <0>position, turn on <1>position the output switch

### **A32 SERVICE LOGIN**

Service personnel logged in to UPS this is only warning.

### **A34 BYP ROTATE PHASE**

The phase sequence of the by-pass source is not match the UPS output phase sequence. Please check the by-pass phase sequence if wrong change phases.

### **A35 INV STOP**

The message shows that the inverter module stopped from any reason ,check the other alarm code which is shown together with this message.

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### **A36 INV DC DOWN**

Call service

### **A37 AC CURR LIMIT**

Alarm shows us the output current is very high (higher then 150%) the UPS limited the output current. This status is temporary but if continues call service.

### **A38 FUSE FAILURE**

Call service

### **A39 PSP FAILURE**

Call service

### **A43 USER LOGIN**

User logged in to UPS this is only warning

### **A45 SERV.PASSWORD**

Call service , **UPS start impossible**

## IV. PARALLEL OPERATION

### 4.1 Introduction

Two (or more) identical DS300HA series UPSs can be interconnected for parallel operation. The main purposes for parallel use of DS300HA series UPSs are:

- Redundancy for Increased Reliability
- Power Increase

Although recent UPS designs are perfect and have high MTBF figures, a second (or more) UPS can be used in parallel with the first one, for supplying the critical load in case of any possible failure of the first UPS. In such an application the faulty UPS is isolated automatically from the parallel system and the other UPS (or UPSs) continues to supply the critical load. Use of Redundant UPSs in parallel, therefore, provides increased reliability for the critical load connected to the parallel system output.

If power demand increases in a certain UPS application exceeding the power rating of an already installed stand-alone UPS, a second (or more) UPS of the same model and power rating can be added in parallel to the existing UPS to increase the output power capacity.

Schematic diagram of parallel connection of two DS300HA series UPS units is shown in Figure 4.1

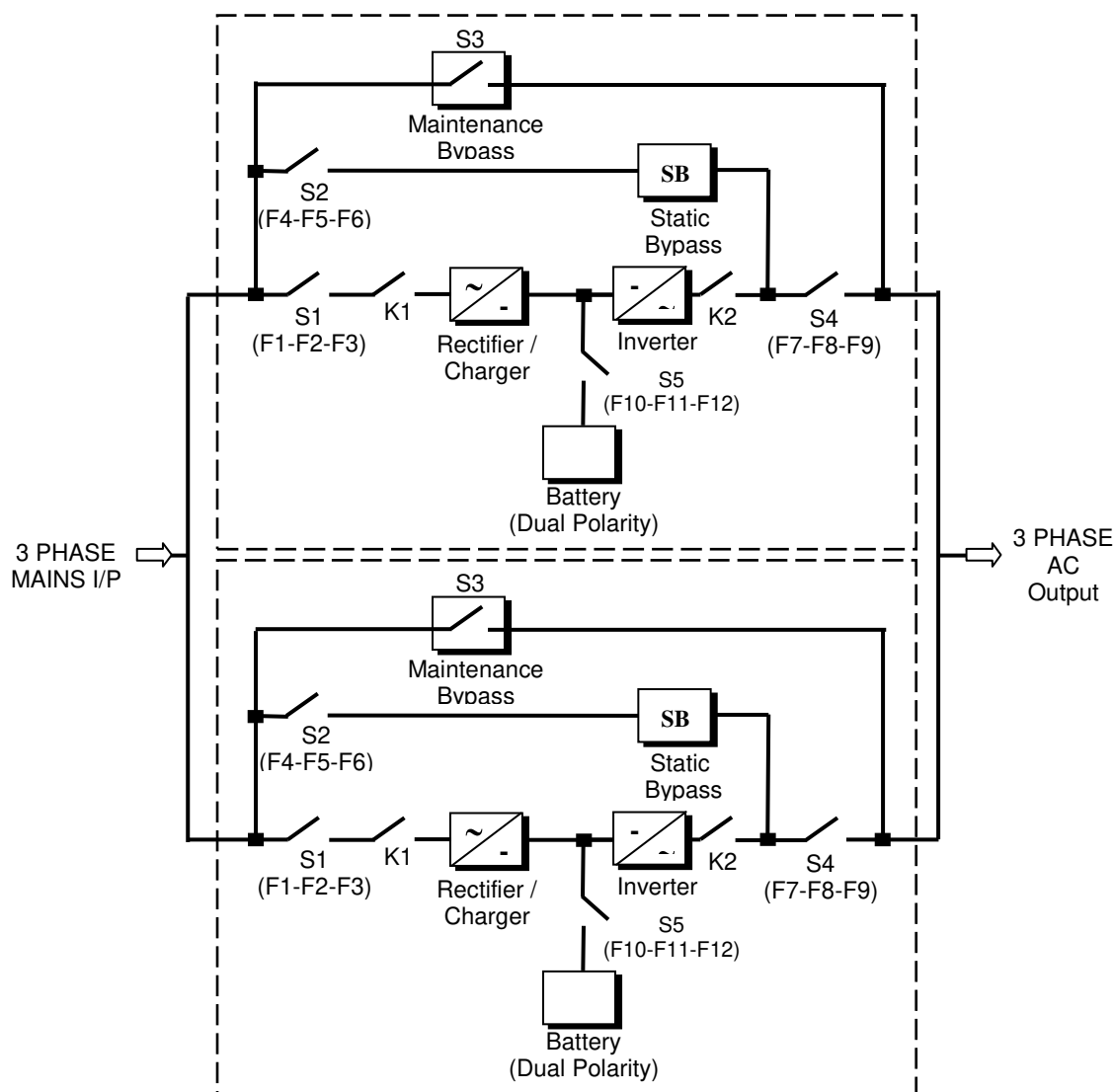


Figure 4.1 Parallel Connection of two UPSs

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The AC inputs of all UPSs in the parallel system are connected to the same mains, and all the AC outputs are connected to each other. Each UPS has its own battery group. The critical load is connected to the common output of the parallel system. There are also some signal cable connections between the UPS units necessary for parallel operation, and will be described later.

## 4.2 Parallel Operation Mode settings of DS300HA Series UPSs

**NOTE: Parallel operation hardware (parallel communication board) are not installed in a standard DS300HA series UPS, but parallel operation option is available and can easily be added to all UPSs.**

N+1 REDUNDANT parallel operation

For parallel operation some parameters must be given by the service personnel these are:

- 1- Select Parallel mode must be selected from ADJUST MENU (ADJUST MENU/INV FACTORY OPTIONS/OPERATING MODE:)
- 2- A unique UPS network no must be given from ADJUST MENU(ADJUST MENU/INV FACTORY OPTIONS/UPS NO:) (each UPS must be assigned a unique UPS number)
- 3- Minimum UPS quantity requirement must be given from ADJUST MENU (ADJUST MENU/INV FACTORY OPTIONS/N+1 MINIMUM:) (N number in the system)

Shown parameters can not be adjust by the user, these parameters are located on ADJUST MENU also adjust menu is password protected only authorized service personnel can access this menu.

### PARALLEL mode

This mode is used for operation of at least two (1+1 configuration) UPS units connected in parallel for increased reliability. If this mode is selected, the load is shared equally by each UPS available in the parallel system (N+1 numbers of UPS units), during normal operation.

In case of a failure of any one of the UPS units, the faulty UPS is isolated from the parallel system and the critical load is supplied by the remaining N number of UPSs. If any one of those UPS units fails too, then the critical load is transferred to bypass supply via the static bypass switches of the parallel connected UPSs. If the faulty UPS returns to normal operation, it joins the parallel system again and starts sharing the load.

**In parallel mode, the total VA rating of the parallel system is equal to the VA rating of a single UPS multiplied by N.**

In parallel mode, you will see "PARALLEL MODE /MS"(master UPS) or "PARALLEL MODE /sl" (slave UPS) message on the LCD panels of all the all UPS units.

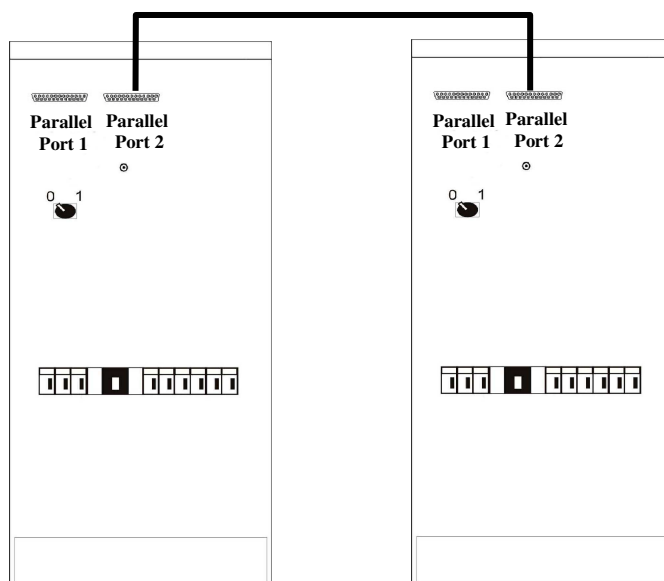
More detailed diagrams for two (or more) DS300HA series UPSs connected in parallel are given in Figures 4.2 and 4.3

Communication between parallel UPSs are provided over one pair cable (PCC06). The length of the cable is limited up to six meters.

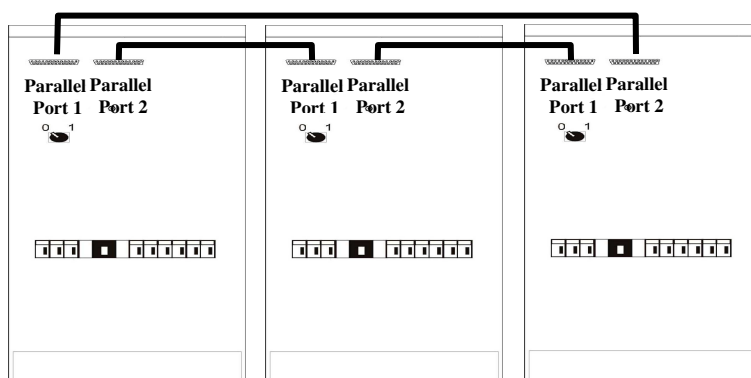
A link cable is used for connecting the first UPS to the last UPS ,this cable is redundant for normal communication cables.

If communication is lost on SLAVE UPS the UPS will shutdown but the MASTER UPS will go on running if the communication is provided at SLAVE UPS it will start automatically again.

**Figure 4.2** DS300HA Series Parallel UPS Signal Cable  
(PCC06) Connections

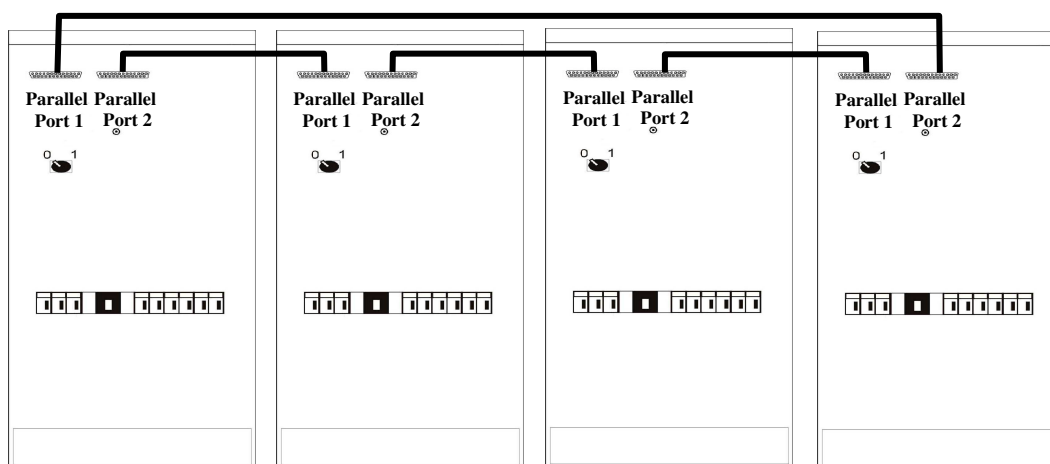


**Figure 4.2.a** 2 units in parallel if port2 jumper is



**Figure 4.2.b**

3 units in  
parallel

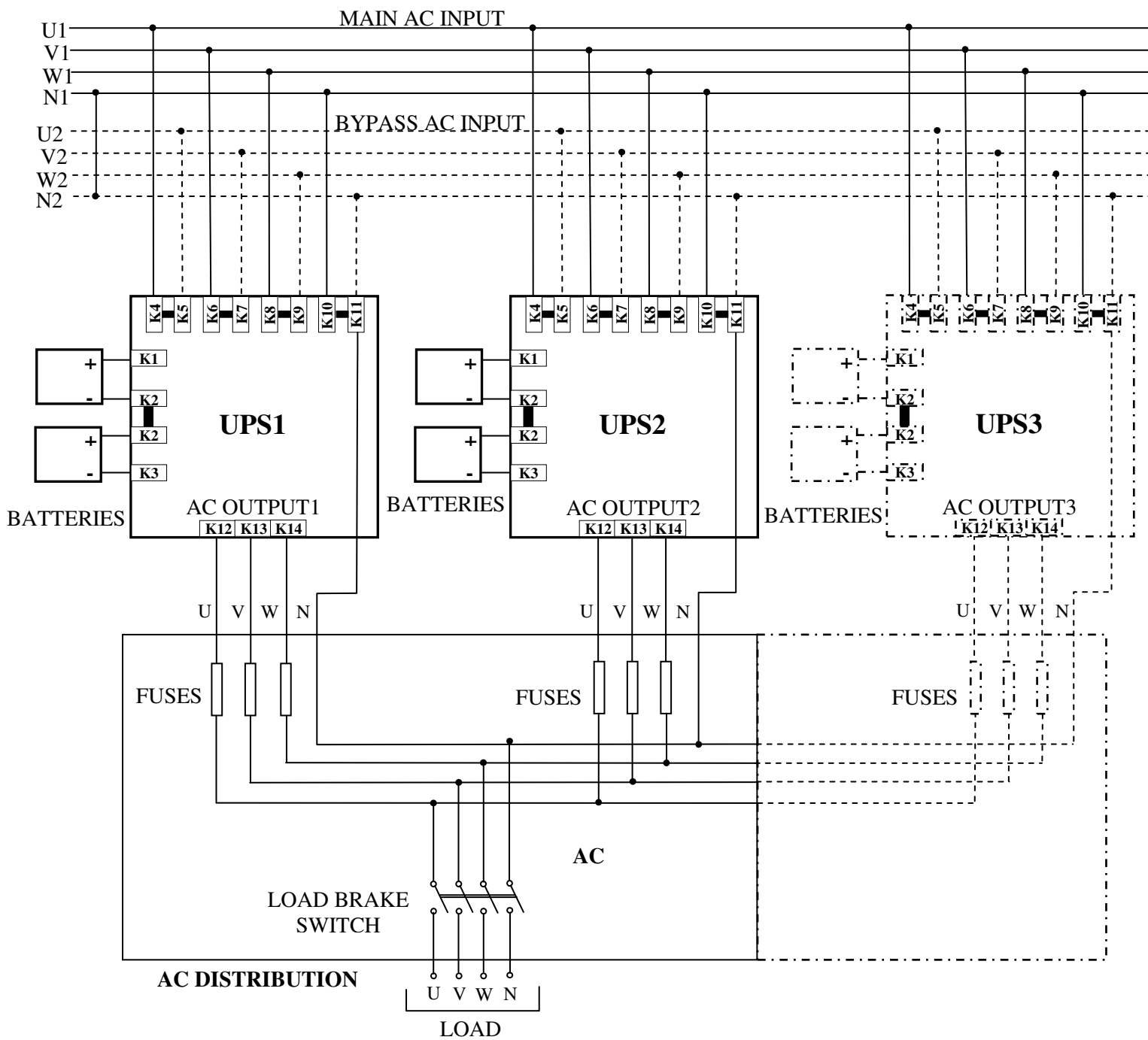


**Figure 4.2.c** 4 units in parallel

All the units must be set for the **same operation mode** and must have a **different UPS number**.

**CAUTION !!!** You must **never** set the operation modes of parallel connected UPS units to **“ONLINE”**, otherwise serious damage may occur in UPSs.





**Figure 4.3** DS300HA Series Parallel UPS Power Connections

**Note:** As seen in the figure, the outputs of parallel UPS units should be connected to each other using an AC distribution board.

**ATTENTION!!!**

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The cables from input distribution panel to the UPS by-pass input must be of the same size and length for proper bypass load sharing.

The cables from each UPS output to the load distribution panel must be of the same size and length for proper load sharing during parallel operation.

#### 4.3 Parallel mode status codes of the UPS

##### 801 Status code

|                    |   |
|--------------------|---|
| Status             | Inverter system fault   |
| Description        | The UPS number of this UPS is same with MASTER UPS in parallel system |
| Restart            | Change UPS number and Restart UPS again                               |
| Returning to fault | Directly fault  |

In parallel system each UPS must have a unique UPS number. If the UPS number is used in system, the last UPS joined to parallel system produces this status code

##### 802 Status code

|                    |  |
|--------------------|--|
| Status             | Inverter system fault  |
| Description        | The Operation mode of this UPS is different with MASTER UPS in parallel system |
| Restart            | Change operating mode and Restart UPS again                                    |
| Returning to fault | Directly fault   |

In parallel UPS system master and slave UPS operating modes must be same

##### 803 Status code

|                    |   |
|--------------------|---|
| Status             | Inverter system fault   |
| Description        | Parallel Operation mode is selected but there is no paralleling board |
| Restart            | Install parallel communication board and Restart UPS again            |
| Returning to fault | Directly fault  |

##### 804 Status code

|                    |   |
|--------------------|---|
| Status             | Inverter system fault   |
| Description        | Parallel communication connector disconnected in slave mode inverter down |
| Restart            | Connect parallel communication cable and Restart UPS again                |
| Returning to fault | Directly fault  |

Check the followings

- Parallel or synchron mode selected but parallel data cable unplugged
- Call service

##### 805 Status code

|                    |  |
|--------------------|--|
| Status             | Inverter warning   |
| Description        | Parallel communication connector disconnected in master mode inverter continues to run |
| Restart            | Connect parallel communication cable and wait  |
| Returning to fault | --   |

Check the followings

- Parallel or synchron mode selected but parallel data cable unplugged
- Call service

| 806 Status code    |  |
|--------------------|--|
| Status             | Inverter system fault  |
| Description        | In parallel system SLAVE UPS started but the output voltage is not match to my inverter output voltage |
| Restart            | Restart UPS again  |
| Returning to fault | Directly fault   |

Check the followings

- Check the UPS nominal voltage ratings
- Call service

| 807 Status code    |   |
|--------------------|---|
| Status             | Inverter system fault   |
| Description        | In parallel system UPS decided to be master but there is AC voltage at the UPS output |
| Restart            | Restart UPS again   |
| Returning to fault | Directly fault  |

Check the followings:

- Turn off all UPSs in parallel system and restart again
- If the code is still showned call service

| 820 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | In parallel system while in slave mode , MASTER communication lost for 8 periodes ,inverter stopped |
| Restart            | Wait until UPS provide MASTER communication   |
| Returning to fault | --  |
| Fault code         | --  |

| 821 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | MASTER syncron failed while SLAVE UPS ,inverter stopped |
| Restart            | Wait until UPS provide MASTER synchronization           |
| Returning to fault | --  |
| Fault code         | --  |

| 822 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | MASTER frequency exceeded minimum limit ,inverter stopped |
| Restart            | If master frequency is okay automatic                     |
| Returning to fault | --  |

Check the followings:

- Check each UPS output frequency selection in parallel system

| 823 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | MASTER frequency exceeded maximum limit ,inverter stopped |
| Restart            | If master frequency is okay automatic                     |
| Returning to fault | --  |

Check the followings:

- Check each UPS output frequency selection in parallel system

| 824 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | MASTER DC voltage zone 7,My DC voltage zone 1 inverter down |
| Restart            | If mains input voltage is okay automatic                    |
| Returning to fault | --  |

Check the followings:

- Check the mains input power of the UPS
- If input power is OK wait until batteries are fully charged
- If the mains input power is shutdown check the other UPSs mains input power (in parallel system if the same A/H rating batteries are used at each UPS the battery discharge timebe same for each UPS) If the other UPS is continue to run check the batteries of this UPS.
- Call service

| 825 Status code    |  |
|--------------------|--|
| Status             | Inverter alarm   |
| Description        | SLAVE DC voltage zone 7,My DC voltage zone 1 inverter down |
| Restart            | If mains input voltage is okay automatic                   |
| Returning to fault | --   |

Check the followings:

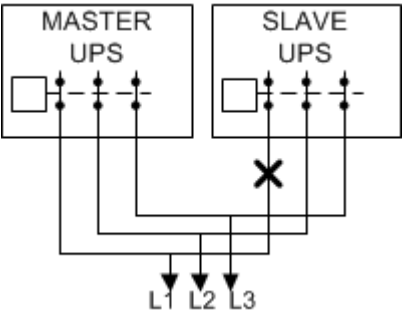
- Check the mains input power of the UPS
- Check the battery status of this UPS
- Call service

| 826 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | MASTER DC voltage zone 7,My DC voltage zone 1 trying to join system |
| Restart            | If mains input voltage is okay automatic                            |
| Returning to fault | --  |

| 827 Status code    |  |
|--------------------|--|
| Status             | Inverter alarm   |
| Description        | SLAVE DC voltage zone 7,My DC voltage zone 1 trying to join system |
| Restart            | If mains input voltage is okay automatic                           |
| Returning to fault | --   |

**831 Status code**

|             |  |
|-------------|--|
| Status      | Inverter warning                                   |
| Description | SLAVE UPS L1 phase output is not connected to load |
| Restart     | --   |

|   |  |
|---|--|
|  | <p>Possible causes of this status code:</p> <ul style="list-style-type: none"><li>-Check L1 phase UPS output fuse</li><li>-Check L1 phase output switch LEG</li><li>-Check the SLAVE UPS L1 phase output terminal for bad connection</li><li>- Check the SLAVE UPS L1 phase output cable to load L1 phase</li><li>- Call service</li></ul> |
|---|--|

**832 Status code**

|             |  |
|-------------|--|
| Status      | Inverter warning                                   |
| Description | SLAVE UPS L2 phase output is not connected to load |
| Restart     | --   |

831 Status code causes are valid for L2 phase

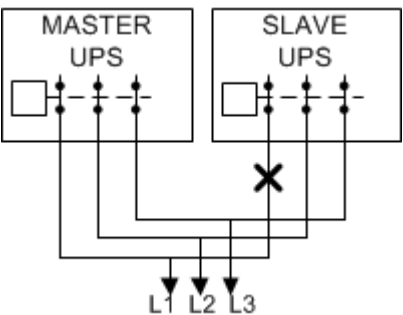
**833 Status code**

|             |  |
|-------------|--|
| Status      | Inverter warning                                   |
| Description | SLAVE UPS L3 phase output is not connected to load |
| Restart     | --   |

831 Status code causes are valid for L3 phase

**841 Status code**

|             |   |
|-------------|---|
| Status      | Inverter warning                                    |
| Description | MASTER UPS L1 phase output is not connected to load |
| Restart     | --  |

|   |  |
|---|--|
|  | <p>Possible causes of this status code:</p> <ul style="list-style-type: none"><li>-Check L1 phase UPS output fuse</li><li>-Check L1 phase output switch LEG</li><li>-Check the SLAVE UPS L1 phase output terminal for bad connection</li><li>-Check the SLAVE UPS L1 phase output cable to load L1 phase</li><li>-Call service</li></ul> |
|---|--|

| 842 Status code |   |
|-----------------|---|
| Status          | Inverter warning                                    |
| Description     | MASTER UPS L2 phase output is not connected to load |
| Restart         | --  |

841 Status code causes are valid for L2 phase

| 843 Status code |   |
|-----------------|---|
| Status          | Inverter warning                                    |
| Description     | MASTER UPS L3 phase output is not connected to load |
| Restart         | --  |

841 Status code causes are valid for L3 phase

| 850 Status code    |  |
|--------------------|--|
| Status             | Inverter warning                         |
| Description        | MASTER UPS send by-pass transfer command |
| Restart            | --                                       |
| Returning to fault | --                                       |

| 851 Status code    |  |
|--------------------|--|
| Status             | Inverter warning                                 |
| Description        | MASTER UPS send transfer the load to UPS command |
| Restart            | --   |
| Returning to fault | --   |

| 852 Status code    |   |
|--------------------|---|
| Status             | Inverter warning  |
| Description        | Enter to sleep mode command received from parallel system |
| Restart            | --  |
| Returning to fault | --  |

| 853 Status code    |  |
|--------------------|--|
| Status             | Inverter warning   |
| Description        | Exit from sleep mode command received from parallel system |
| Restart            | --   |
| Returning to fault | --   |

| 854 Status code    |   |
|--------------------|---|
| Status             | Inverter warning  |
| Description        | REPO (remote emergency power off) command received from parallel system |
| Restart            | --  |
| Returning to fault | --  |

| 855 Status code    |  |
|--------------------|--|
| Status             | Inverter warning   |
| Description        | Enter to MASTER mode command received from parallel system |
| Restart            | --   |
| Returning to fault | --   |

| 856 Status code    |  |
|--------------------|--|
| Status             | Inverter warning   |
| Description        | UPS is currently in SLAVE mode ,MASTER function transferred to another UPS |
| Restart            | --   |
| Returning to fault | --   |

| 857 Status code    |   |
|--------------------|---|
| Status             | Inverter warning  |
| Description        | In parallel system there is no MASTER communication packages ,output switch turned on after 2 seconds MASTER mode started |
| Restart            | --  |
| Returning to fault | --  |

| 858 Status code    |  |
|--------------------|--|
| Status             | Inverter warning   |
| Description        | In parallel system there is no MASTER communication packages ,output switch turned on after 2 seconds MASTER mode started during on bypass |
| Restart            | --   |
| Returning to fault | --   |

| 859 Status code    |   |
|--------------------|---|
| Status             | Inverter alarm  |
| Description        | In parallel system transfer the load to maintenance bypass command received |
| Restart            | --  |
| Returning to fault | --  |

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## V. PARALLEL OPERATING INSTRUCTIONS

### 5.1 INTRODUCTION

After all the electrical connections of UPS have been made and while all the circuit breakers and switches of the device are turned OFF (at "0" position);

1. Check the polarities of battery connections:

K1 : + V (nominal voltage +360V, float charge voltage +405V)  
K2-K2 : 0 V (common terminal for "+" and "-" battery groups)  
K3 : - V (nominal voltage -360V, float charge voltage -405V)

2. Check 3-phase AC input and neutral connections (care should be taken for the phase order).

**ATTENTION!!!** TWO CABLES FOR EACH BATTERY GROUP SHOULD BE USED FOR EXTERNAL BATTERY CONNECTION, AND THE COMMON POINT CONNECTION SHOULD BE MADE ON K2 TERMINAL BLOCK!

**WARNING !** : UPS should never be operated without neutral connection.

3. Check the output load connections of UPS.

### 5.2 OPERATING INSTRUCTIONS FOR PARALLEL CONNECTED UPSs.

#### 5.2.1 Starting UPSs from a completely shut down position:

1. Turn ON S1 (AC Input) switch (switch to "1" position)
2. Turn ON S2 (Bypass) switch (switch to "1" position)
3. Turn on S7 (On/Off) switch (to "1" position). LCD panel activates, and "INV RESET" or "PFC RESET" message appears on the display meaning that the rectifier starts to operate.
4. Turn ON S4 (AC Output) switch (switch to "1" position)
5. A few seconds later red bypass light (L2) on front panel turns off and green inverter light (L6) turns on. L6 light indicates that the UPS has started normal operation and generating uninterruptible power for the critical load.
6. Turn on S5 switch (to "1" position) to connect the battery group to UPS.
7. UPS is ready and in normal operation now.

#### 5.2.2 Shutting down the UPS

After closing all the critical loads supplied by the UPSs output:

1. Turn off S4 (AC Output) switch (to "0" position).
2. Turn off S7 (On/Off) switch (to "0" position).
3. Turn off S5 (Battery) switch (to "0" position).
4. Turn off S2 (Bypass) switch (to "0" position).
5. Turn off S1 (AC Input) switch (to "0" position).

After performing the above procedure, UPSs is completely shut-down. In this case PFC rectifier and inverter is not operating and the batteries are not being charged.



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### 5.2.3 Switching the UPS from a Normal Operation to Maintenance Bypass Condition

1. Enter COMMANDS menu by using UP and DOWN buttons on front panel during normal operation. Select ENTER<BYPASS> command by using again the UP and DOWN buttons and press ENTER button. The critical load is transferred to bypass supply in this case and it is shown at LCD display with **"A09 MANUAL BYPASS"** message. Besides L6 (load on UPS) light on front panel will be off and L2 light (bypass) will be on.
2. Turn on S3 (Maintenance Bypass) switch (after unlocking and taking away the padlock on it) to "1" position.
3. Turn off S7, S5, S1, S2 and S4 switches (to "0" position).

In this case, bypass voltage is connected directly to the output of UPSs and the critical load is supplied via maintenance bypass switch. No AC or DC supply is connected to the inside and the circuits of UPSs.

### 5.2.4 Switching the UPS from a Maintenance Bypass Condition to Normal Operation

1. Turn on S1 (AC Input) switch (to "1" position).
2. Turn on S2 (Bypass) switch (to "1" position).
3. Turn on S7 (On/Off) switch (to "1" position). LCD panel activates, and main menu will appear at the display. Also **"A08 ON MAINTENANCE"** message shown and the inverter will not start yet.
4. Turn on S4 (AC Output) switch (to "1" position).
5. Turn off S3 (Maintenance Bypass) switch (to "0" position). Inverter will start automatically following the turning off of S3 switch.
6. Connect the batteries by turning on S5 (Battery) switch (to "1" position).

Now UPSs are ready for uninterruptable operation.

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## VI. NORMAL OPERATING INSTRUCTIONS

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## 6.1 OPERATING UPS IN ONLINE MODE

### 6.1.1 Starting UPS from a completely shut down position:

1. Turn ON S1 (AC Input) switch (switch to "1" position)
2. Turn ON S2 (Bypass) switch (switch to "1" position)
3. Turn ON S4 (AC Output) switch (switch to "1" position)

**ATTENTION!!!** BYPASS VOLTAGE WILL BE CONNECTED TO THE OUTPUT TERMINALS OF UPS WHEN THE ON/OFF SWITCH (S7) IS SWITCHED ON !

4. Turn on S7 (On/Off) switch (to "1" position). LCD panel activates, and "INV RESET" or "PFC RESET" message appears on the display meaning that the rectifier starts to operate.
5. A few seconds later red bypass light (L2) on front panel turns off and green inverter light (L6) turns on. L6 light indicates that the UPS has started normal operation and generating uninterruptable power for the critical load.
6. Turn on S5 switch (to "1" position) to connect the battery group to UPS.
7. UPS is ready and in normal operation now.

### 6.1.2 Shutting down the UPS

After closing all the critical loads supplied by the UPS output:

1. Turn off S4 (AC Output) switch (to "0" position).
2. Turn off S7 (On/Off) switch (to "0" position).
3. Turn off S5 (Battery) switch (to "0" position).
4. Turn off S2 (Bypass) switch (to "0" position).
5. Turn off S1 (AC Input) switch (to "0" position).

After performing the above procedure, UPS is completely shut-down. In this case PFC rectifier and inverter is not operating and the batteries are not being charged.

### 6.1.3 Switching the UPS from a Normal Operation to Maintenance Bypass Condition

1. Enter COMMANDS menu by using UP and DOWN buttons on front panel during normal operation. Select ENTER<BYPASS> command by using again the UP and DOWN buttons and press ENTER button. The critical load is transferred to bypass supply in this case and it is shown at LCD display with "**A09 MANUAL BYPASS**" message. Besides L6 (load on UPS) light on front panel will be off and L2 light (bypass) will be on.
2. Turn on S3 (Maintenance Bypass) switch (after unlocking and taking away the padlock on it) to "1" position.
3. Turn off S7, S5, S1, S2 and S4 switches (to "0" position).

In this case, bypass voltage is connected directly to the output of UPS and the critical load is supplied via maintenance bypass switch. No AC or DC supply is connected to the inside and the circuits of UPS.

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### 6.1.4 Switching the UPS from a Maintenance Bypass Condition to Normal Operation

1. Turn on S1 (AC Input) switch (to "1" position).
2. Turn on S2 (Bypass) switch (to "1" position).
3. Turn on S4 (AC Output) switch (to "1" position).
4. Turn on S7 (On/Off) switch (to "1" position). LCD panel activates, and main menu will appear at the display. Also "**A08 ON MAINTENANCE**" message shown and the inverter will not start yet.
5. Turn off S3 (Maintenance Bypass) switch (to "0" position). Inverter will start automatically following the turning off of S3 switch.
6. Connect the batteries by turning on S5 (Battery) switch (to "1" position).

Now UPS is ready for uninterruptable operation.

|   |
|---|
| <h3>6.2 UPS Behavior During Mains Outage</h3> |
|---|

When the mains voltage is not available "**R02 LINE FAILURE**" message appears on LCD display. Sound warning on and off is heard at the same time. UPS continues to supply the critical loads by converting the battery voltage to AC voltage and provides operation without data losses or any other fault. Battery autonomy time may be prolonged by shutting down the unnecessary loads for that moment.

But do not turn on these loads again during battery operation.

After a short period of time when the line voltage is available again, UPS returns to normal operation automatically and the alarm message on the display disappears.

Shut down the critical loads in a period of minimum possible autonomy time (depends on the Ah capacity, charge status, age of the batteries, actual load percentage of UPS and the ambient temperature). Otherwise critical loads will be out of power at the end of battery autonomy time.

"**A26 BATTERY LOW**" message appears first on front panel display during battery operation if battery voltage drops below a defined level.

"**A10 BATTERY LOW SHUT**" message appears on front panel display when the battery voltage drops to the end of discharge voltage and UPS shuts itself down. Critical loads will be out of electrical power.

If a reserved generator in the system and if it's available, that will start to supply the necessary electrical power to UPS input and batteries start to be charged immediately. By means of using UPS together with a immediately available generator system, battery discharge time decreases and so they will be charged quickly after a mains outage.

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## VII. MAINTENANCE

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**ATTENTION !!!** There are no parts inside the UPS or battery group that needs service or maintenance work that should be done by user. Therefore DO NOT OPEN THE COVER OF UPS. Never touch on any terminal of battery group. There is risk of electric shock inside the UPS even when it is completely turned off (because of energy storage components). Therefore unauthorized opening of the UPS cabinet for repairment, maintenance etc. is not recommended and forbidden. Otherwise serious injuries may happen.

## 7.1 Scheduled Maintenance

Some parts and components used inside UPS requires periodic maintenance by service personnel. Besides, some power equipment inside the UPS need good air circulation for cooling functions. In this case, the UPS should be cleaned against dust periodically. Cooling fans are mechanical and moving parts and they should be checked periodically for this reason. Also the batteries should be checked periodically that if they are in good condition or not.

DS300HA Series UPS informs the user about these procedures when the maintenance time is up with its 3 independent hour counter as warnings:

**FAN MAINTENANCE counter**

**BATTERY MAINTENANCE counter**

**GENERAL MAINTENANCE counter**

This type of protective maintenance prevents small problems turning up to big failures.

**DS300HA Series UPS has been designed to require very low user maintenance work. User should only make below maintenance procedure for long years of trouble-free operation.**

## 7.2 Daily Checks

Observe the UPS daily and check the following:

Examine the operator control panel (front panel). Ensure that all LED indicators and parameter measurements are normal and there is no warning or alarm messages on LCD display.

Examine that there is any sign of overheating the UPS or not.

Check the rotation of cooling fans visually.

Check if there is a remarkable change in the sound of UPS or not.

Check if air inlets of the cabinet cooling system are not congested with dust or any other foreign object. Clean them with a vacuum cleaner if any present.

Take care not to leave any object on the UPS cabinet.

## 7.3 Weekly Checks

1. Examine the front panel and record the results.
2. Measure (from Measurements Menu) each of three phase voltages and record the values.
3. Measure (from Measurements Menu) UPS output current values and record the values.
4. Perform a Manual Battery Test (from Commands Menu) and check the status of the batteries.
5. Cabinet covers may be cleaned with a soft dampened (not wet) cloth.

Take notes if possible when you are examining the UPS. Compare the notes with previous ones and try to determine if there is a change or not. If there is a difference between the previous notes and the new ones,

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search for and record any new load added to UPS output between two records and the magnitude, place and type of the new load, if possible. This information may help to technical authority who will search for the cause of event in case of a failure.

If there is a remarkable difference between the records without any obvious reason, call technical service immediately.

#### **7.4 Annual Maintenance**

Annual maintenance by authorized service should be done at least two times a year in order to provide safe and efficient operation your UPS and battery group. UPS generates a warning message when the maintenance time has expired.

#### **7.5 Storage Conditions and Transportation of UPS**

- 1- Check battery charge status by performing a manual battery test before living the UPS in a storage place. If charge level is not high enough, leave the UPS for at least 12 hours to charge the batteries.
- 2- Disconnection of the cables should be done by an authorized service personnel.
- 3- Batteries should be recharged once every 6 months during storage.
- 4- Store the UPS and the batteries in a cool and dry place.  
Ideal storage temperature for UPS: 0 °C to 40 °C max.  
Ideal storage temperature for batteries: 10 °C to 35 °C max.
- 5- UPS should be fixed on its pallet for transporting. It should be carried by a forklift with its pallet.





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## 8.1 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.

## 8.2 Before Calling Service

Please check and note the following:

- 1- Did you read the user manual carefully and applied the procedures accordingly?
- 2- Are the switches and circuit breakers of UPS in their normal position?
- 3- Is there electric power at the UPS line connection distribution panel?
- 4- Did you turn the battery switch on (to "1" position) when UPS started to operate in normal mode?
- 5- Which of the warning lights on front panel is (are) on?
- 6- Is there any change in the load level at the output of UPS?
- 7- Did any overload condition happen or not?

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## IX. UPS REMOTE MONITORING AND CONTROL

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Following external connections are available for DS300HA Series UPSs.

- Communication by serial port connection.
- Dry contact (interface board) connections.
- Remote monitoring panel.

Using one of above communication options is satisfactory for remote monitoring and control in most of the systems. But in some systems may use 2 or 3 of above options at the same time. In this case accessories group produced by TESCO M may help to make appropriate solutions.

### 9.1 Using Serial Port

Two serial communication port is included on DS300HA Series UPS cabinet (com1 and com2). Both of them may be used for user communication. But in service status duty of com2 port is changed and set as service port in Options Menu.

All data of UPS can be accessed by this communication way. All the voltage and current values measured by UPS, alarms, warning and status messages can be monitored.

Because the communication system is designed in an interactive manner, UPS may get commands from monitoring and control units. These commands are listed below:

- Switch to BYPASS
- Switch to INVERTER
- SOUND on/off
- Adjust UPS time and date
- 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

These commands are evaluated only if **REMOTE CNTRL: ON** option is selected in **OPTIONS/COMMUNICATION OPTIONS** menu and if user password is sent from this (com2) port. Otherwise UPS doesn't perform these commands and only information can be obtained from the ports.

Special softwares are required in order to use the serial communication ports. Some of the commands above have special functions and they can only be activated and used by operating TMON program groups on a PC that is serially connected to UPS.

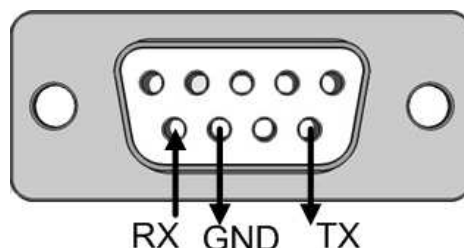
TMON program group includes softwares developed by TESCO M.

Additionally, remote monitoring and control is provided in every kind of operating systems, by using worldwide known and continuously developing software programs. These softwares can be supplied from TESCO M.

### 9.2 Serial Communication Port Connection Cable

The maximum length for RS232 communication cable should be 25 meters. For remote panel and UPS connection the same pin configuration is valid. Connection terminals of RS232 cable is shown below for com1 and com2 ports:

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



### 9.3 Modem Connection



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A DS300HA Series UPS can be controlled through a normal telephone line by means of a remote operator connected through a PC with modem device, who performs a phone call to the UPS connected number. So the operator can see all parameters and control the UPS (if permitted from OPTIONS MENU).

### 9.3.1 Hardware Configuration

All requirements for modem connection are as follows:

- PC with modem
- WINDOWS 98
- Available UPS control software (T-MON)
- NULL modem which is connected to UPS

UPS has its command set to set NULL modem to auto answer mode. In order to do this, press ENTER button for 3 seconds in ENTER: MODEM INIT item in COMMAND MENU after the hardware is installed. A short beep sound warning is heard after pressing the button. RX and TX lights of the connected modem activates. Modem is set after this to answer external calls by telephone line. To test this, call the telephone number that the modem is connected with another phone and listen the modem sound.

**NOTE :** Not all the modems are compatible with the command set on UPS. In such a case modem should be set by connecting a PC.

### 9.3.2 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 NULL modem device, connected to the UPS, will answer the call and convert the data coming from UPS's serial port on to the telephone line. This way all measurements and controls allowed by the RS232 serial port can be carried out.

### 9.3.3 Modem Programming Procedure

Smart modem (SM) is the one connected to PC, and NULL Modem (NM) is the one connected to the UPS. **Standard Hayes AT** programming language is the suitable language for modems. In usual applications a modem which uses AT command set should be selected.

#### 9.3.3.1 Smart Modem (SM) Programming

The connected modem to PC (smart modem) will be programmed from UPS control software (T-Mon) automatically.

B0 E1 F1 M1 Q0 V1 X3

BAUD = 2400 PARITY = N WORDLEN = 8

DIAL = TONE (TONE which can be programmed)

&A3 &B1 &C1 &D0 &H1 &I0 &K1 &M4

&N0 &R2 &S0 &T5 &Y1

### 9.3.4 Modem – UPS Connection Cable

Connection of Smart Modem device to UPS is made with standard modem cable and it's supplied as standard accessory for smart modem. This cable is required if an external modem will be used, and not necessary for internal modems.

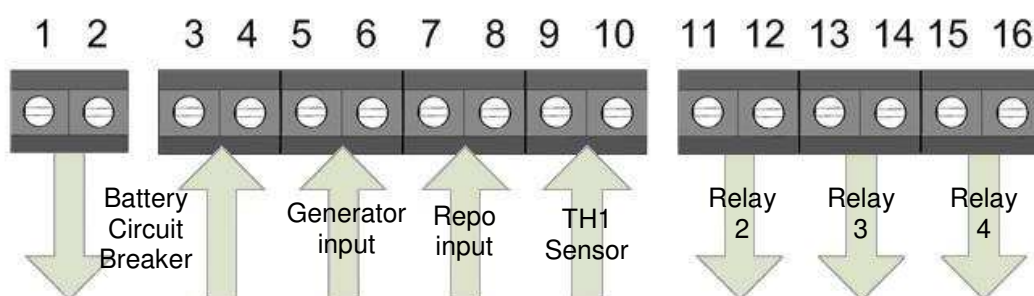
Connection cable between NULL Modem and UPS should be installed as follows:

| UPS<br>DB9 Female | MODEM<br>DB25 Male |
|-------------------|--------------------|
| 6                 | 3                  |
| 7                 | 7                  |
| 9                 | 2                  |

## 9.4 Dry Contact (Interface) Connections

Some important events of the UPS can be monitored or controlled by these connections. These functions are listed below:

| Terminal |   |
|----------|---|
| 1-2      | Interactive battery circuit breaker drive output or programmable alarm relay output |
| 3-4      | Interactive battery circuit breaker position sense input                            |
| 5-6      | Generator operation sense input   |
| 7-8      | Remote Emergency Power Off button input (REPO)                                      |
| 9-10     | External TH1 temperature sensor input   |
| 11-12    | Function programmable relay contact output 2  |
| 13-14    | Function programmable relay contact output 3  |
| 15-16    | Function programmable relay contact output 4  |



### **ATTENTION:**

Maximum 42Vac or 60Vac voltage may be applied to the dry contacts of the interface. Dry contact relay outputs are NO (Normally Open) type, ie. the relay is not activated if alarm is not present and the contacts are open circuit.

## 9.5 Remote Monitoring Panel Connection of UPS

This panel is used to control and monitor UPS remotely up to 400 m. distance from it. Panel is located in monitoring and control room. If the distance is not longer than 25 m. RS232, if longer RS485 communication protocol is used. RS485 requires additional adapter.

Remote monitoring panel communicates UPS in a serial way and transfers information to user. Remote panel requires 220Vac 50Hz supply voltage and it is recommended to get this supply from UPS output.

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## **X. EFFICIENT USAGE OF UPS IN TERMS OF ENERGY CONSUMPTION**

Products should be used according to the conditions and procedures defined in the manual. When this is made the most efficient usage of the product is guaranteed.

**1.** Energy efficiency means, decreasing consumed energy amount to the minimum level possible in every step of living activities, without a decrease in quality or amount of produced work or product, and keeping this principle permanent.

An efficiency value is said in operation of every energy consuming device. Roughly, efficiency can be defined as the ratio of work or power -we obtain- at the output of a system, to that of -we give- at the input of same system.

Keeping below recommendations during the selection and operation of an electric powered product, provide more useful, economical and long-lasting usage in terms of energy efficiency. Therefore, user profits economically, as well as supporting to create a cleaner environment and protecting our world sources.

**2.** Every electric powered device is designed appropriate to a defined power level. Device capacity should be selected according to its load requirement for an efficient operation.

**3.** Ensure to operate your device in convenient electrical conditions defined in technical specifications table. It will work more efficiently in those conditions.

**4.** Check that operating environment is compatible to defined conditions.

**5.** Check if the place of installation is suitable as per the conditions mentioned in the relevant section of the manual.

**6.** By means of the periodically maintenance work, faulty or unefficient components of the device may be detected before the major failures. This results in more efficient operation and prevention of failures.

**7.** Usage of recyclable materials is one of a remarkable keys to more efficient energy consumption in total. Users should dispose the expired recyclable materials (batteries, electronic components etc.) according to local directions and laws.



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