DS|POWER SERIES DSP CONTROLLED

3 Phase in / 3 Phase out UPS

SERVICE MANUAL

PRELIMINARY

22 May 2013

CONTENT

GENERAL

DS|POWER series UPS products are DSP controlled, designed in modular structure ,digital control system provides safe control during operation. Fast DSP controller brings many advantages. There are to many digital setting parameters ,see front panel menus for details

INTERNAL MODULAR STRUCTURE

All control modules and communication between modules are showned on the following figure. As showned on figure all modules are connected to each other by CAN interface bus. There are 4 RS232 serial ports at Standard configuration these are:
- Com1 serial port on Front panel module (only user communication)
- Com2 serial port on Front panel module (service purpose or user port)
- Com3 serial port on Inverter module (only factory usage)
- Com4 serial port on PFC rectifier module (only factory usage)

All adjustment and calibration functions can be done from com2 serial port ,to make adjustments from com3 or com4 but service adaptor is required for this.

During service the following hardware and test equipment are required. According to service procedure different equipment can be required ,the following list shows complete service equipment.

a) Oscilloscope
b) AC-DC multimeter (frequency measurement)
c) AC-DC Clamp ampermeter
d) Thermometer (ambient temperature measurement)
e) Resistive load at 50% power of 1 phase maximum power (for 60000 UPS ,for 0.8 output power factor 8.000 watts load)
f) 100 ohms/2000 watts DC dummy load (2 amperes)
g) CC05 RS232 cable
h) Laptop computer for measurments and calibration
i) Device calibrator PLUS software (download from our WEB site)
j) Central service KEY

BLOCK DIAGRAM OF THE UPS
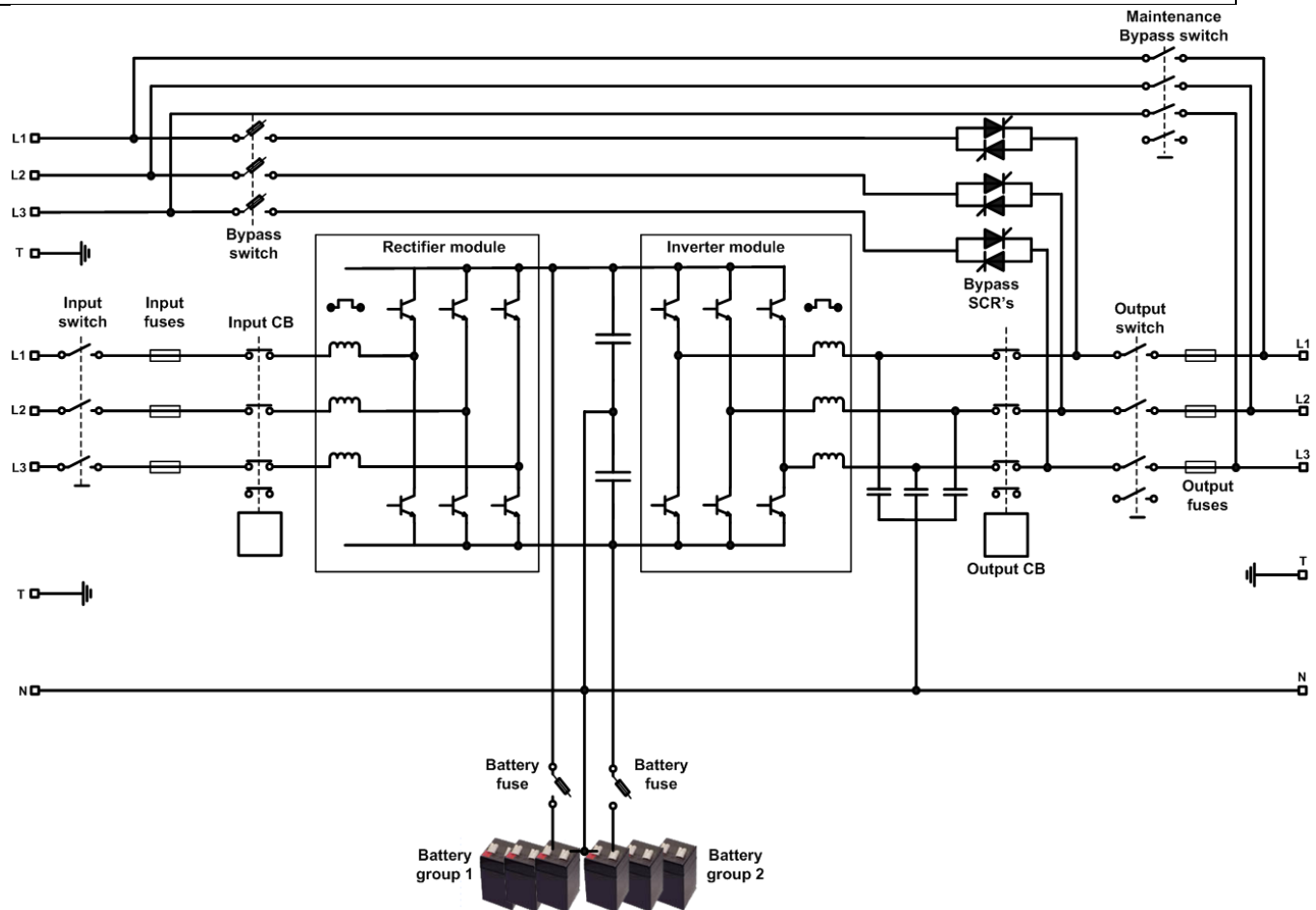
Topology 1 type UPS

Note:
At some UPS models input fuse and input switch is integrated to each other
At some UPS models output fuse and output switch is integrated to each other

ALPHANUMERIC CONTROL PANEL

4X20 Character 4 lines LCD text screen and 5 control buttons option
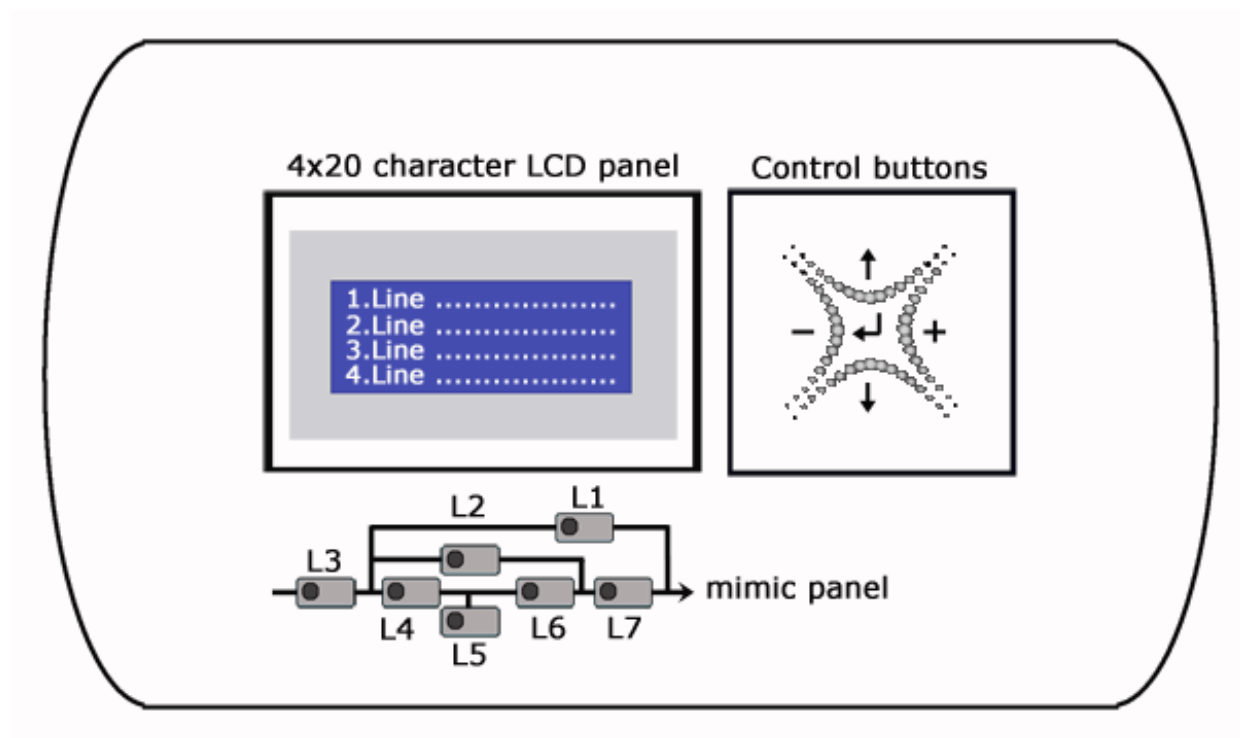
L1	Maintenance bypass switch on indicator lamp
L2	Load on bypass indicator lamp
L3	Input voltage indicator lamp
L4	Rectifier run pilot lamp
L5	Battery operation indicator lamp
L6	Load on UPS indicator lamp
L7	Output switch on indicator lamp
—	Main menu options button
+	Main menu options button
↑	Submenu options button
↓	Submenu options button
↵	Enter button

Graphical LCD and 5 control buttons option
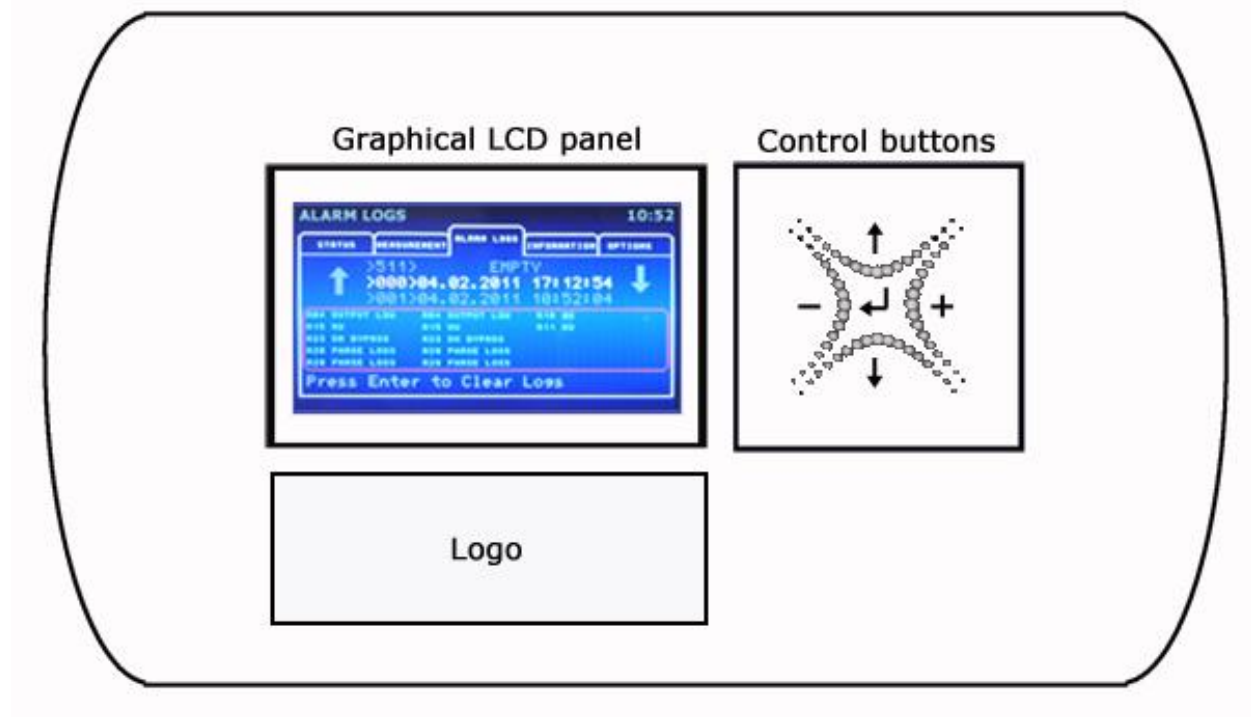
At this option there is no mimic lamps the diagram is showned as graphically ,there are 5 control buttons these are:

—	Main menu options button
+	Main menu options button
↑	Submenu options button
↓	Submenu options button
↵	Enter button

Taking the UPS from off position to normal operation

- Turn on input switch <1>position
- Turn on by-pass input switch <1>position
- Turn on UPS output switch <1>position
- Turn on the on/off switch <1>position
- Front panel backlight will be ON, by-pass lamp will be ON
- Wait after a delay by-pass lamp will be of and load on inverter lamp will be on Turn on battery switch <1>position
- If there is no any alarm on UPS device is running in normal mode

Taking the UPS from normal operation to off position

- From commands menü transfer the load to by-pass
- Turn off the output switch <0> position (output voltage shutdown)
- Turn off battery switch <0>position
- Turn of the on/off switch <0>position (panel backlight off)
- Turn off the By-pass input switch <0>position
- Turn off input switch <0>position
- Now the UPS is in OFF position

Taking the UPS from normal operation to maintenance position

- From commands menü trasnfer the load to by-pass
- After By-pass lamp on turn on maintenance by-pass switch <1>position
- Turn off battery switch <0>position
- Turn off the on/off switch <0>position
- Turn off the output switch <0>position
- Turn off the By-pass input switch <0>position
- Turn of the input switch <0>position
- All voltages are shutdown inside of the UPS but load is fed from maintenance by-pass line
- UPS is ready for service

Taking the UPS from maintenance by-pass position to normal operation

- At this moment only the maintenance by-pass switch must be on <1>position
- All other switches must be off <0>position
- Turn on the input switch <1> position
- Turn on the By-pass input switch <1>position
- Turn on the output switch <1>position
- Turn on the on/off switch <1>position
- Front panel backlight must be on and you must see MAINTENANCE BYPASS message
- Turn off the maintenance by-pass switch <0>position
- After a delay load on inverter lamp will be on
- Turn on the battery switch <1>position
- If there is no any alarm UPS is running in normal mode

REPO stop input and button

Remote emergency power off input is located on IDB-03 board terminals. The connection from REPO button is provided with 2 cables. If these 2 cables are shorted longer then 1 seconds UPS decides that this is an emergecy shutdown signal so inverter stops ,rectifier stops ,charger stops and load will be shutdown.

A NO contact REPO button must be used if otherwise is noted. Install the REPO button to the remote side from UPS select easy accessable places

DISPLAY MENUS OF THE CONTROL PANEL

Control panel of the UPS have fast DSP controller which manages panel and communication functions.

The functions of the front panel module

- Manages 2 serial RS232 ports
- Manages dry contact alarm relays
- Manages optional interface board
- Drives LCD screen
- Creates messages
- Transfer adjustment parameters to other modules
- Creates graphics for graphical LCD screen
- Sends user commands to other modules
- Saves alarms and log events to log memory
- Sends alarms and faults to manager software on any PC
- Gets all measured values from other modules and shows on screen
- Sens all measured parameters to outside world over RS232 ports
- Manages REPO stop input
- Manages generator set signals
- Controls digital automation
- Manages interactive battery switch
- Provides data for SNMP adaptor
- Provides data for remote monitoring panel
- Provides data for MODBUS adaptor
- Manages sleep mode of the UPS
- Saves UPS labels in permanent memory

3 Front panel options are available:

- 4x20 character LCD alphanumeric text panel with 5 control buttons and mimic lamps
- Graphical LCD panel with 5 buttons
- Graphical LCD touch panel

Details of display menus is different at different options and to much menus are used ,fort his reason each option is decribed at different documents:

Option	Display menus document code
4x20 character LCD panel	Ask document code
Graphical LCD panel	Ask document code
Graphical LCD touch panel	Ask document code

Information about PCB boards

DS3-INV inverter module main DSP controller board

DS3-INV board manages all functions of the inverter module. Over CAN interface this board communicates with the other boards.

Functions of DS3-INV board:
  a) Measures AC By-pass phase voltages and frequency creates alarms according to these measurements
  b) Manages By-pass transfers
  c) Calculates By-pass SCR fireing times and creates drive signals
  d) Controls inverte module PWM signals.
  e) Measures AC inverter output voltages and frequency
  f) Regulates inverter out voltages and frequency
  g) Measures AC UPS output voltages.
  h) Measures DC battery voltages
  i) Creates alarms according to measured DC battery voltage
  j) Calculates the output power as watt and VA.
  k) Calculates load percentage
  l) Measures load crest factor
  m) Measures AC RMS output currents of the UPS
  n) Creates alarm according to measured AC voltages
  o) Creates alarm according to measured frequencies
  p) Manages output CB
  q) Manages overload times and output short circuit events
  r) Makes RMS calculations for all AC voltages and currents
  s) Saves factory adjustments and manages minmum maximum values
  t) During fault saves all inverter module memory to eeprom

DS3-INV board test points	
TP12 (GND) – D12 cathode	+9.5 volts DC
TP12 (GND) – TP8	+5 volts DC
TP12 (GND) – TP11	+3.3 volts DC
TP12 (GND) – TP15	0 volt DC
TP16 (GND) – TP13	+5 volts DC
TP15(AGND) - D16 Diode cathode	+17 volts DC
TP15(AGND) - U17 pin3	+ 12 volt DC
TP15(AGND) - TP24	+5 volts DC
TP15(AGND) - D17 Diode anode	-17 volts DC
TP15(AGND) - U15 pin 3	-12 volts DC
TP15(AGND) - TP25	-5 volts DC

DS3-INV board special components	
D11 LED	Operating monitor lamp
	Short on normal
	On-off time equal alarm
	On time longer fault
J1 jumper	CAN1 line resistor
J2 jumper	Driver power supply jumper

DS3-INV board memory management

Eeprom memory have 3 sections:
- User settings
- Factory settings
- Fault memory

In factory at the end of final test, all calibrations and adjustments are saved to User settings section then user settings are copied to factory settings section. If original user settings are changed it is possible to reload factory settings to user settings section.

During power on first inverter module downloads user settings section and uses these adjustments.

To return factory settings requires two phases

1- Download factory settings section to operating RAM
2- Copy operating RAM to user settings section

To move adjustments from one section to other section is possible with by using device calibrator PLUS software.
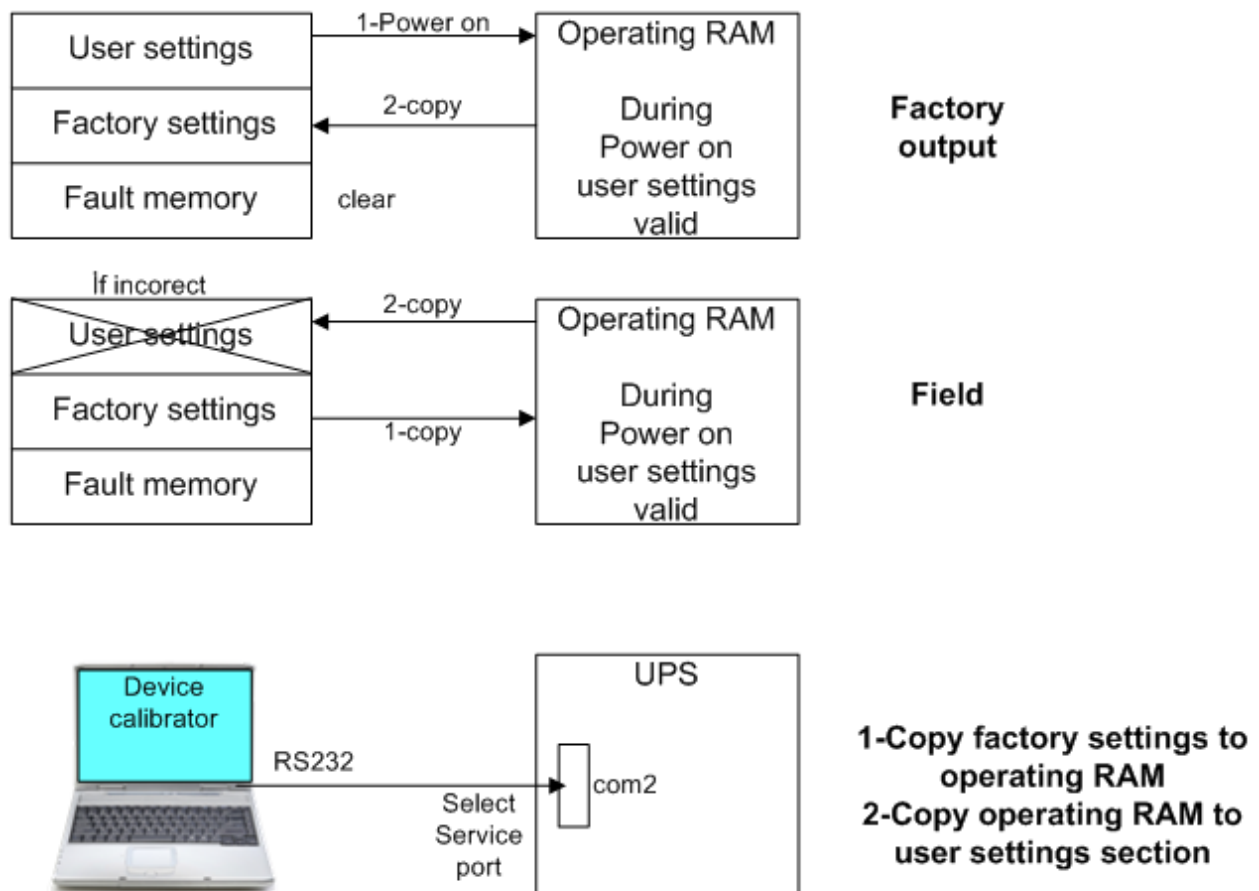
DS3-INV board input and output connections
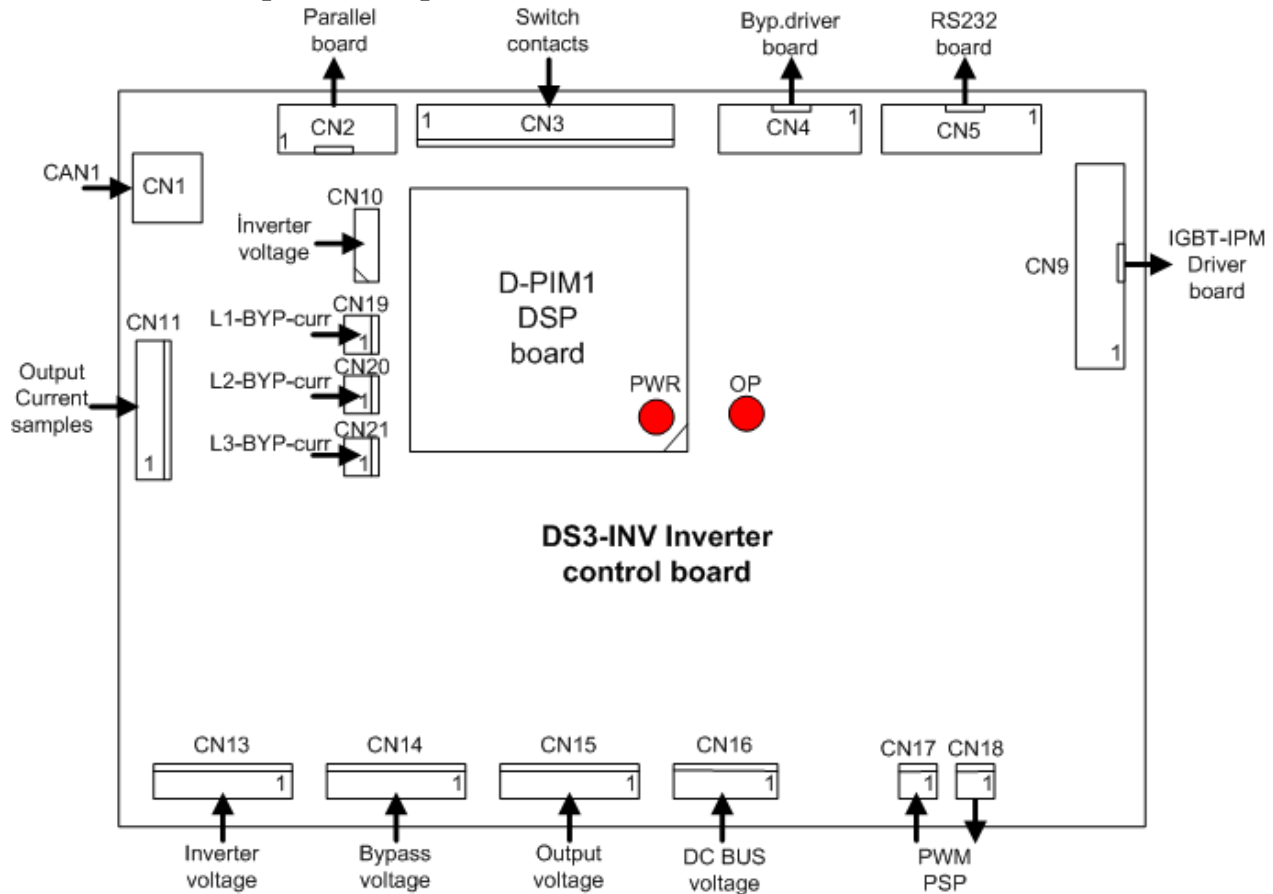
DS3-INV board connector pin functions and test measurements

CN1 – internal CAN1 communication connector	
1	CANL signal in-out	Can not measure
2	Isolated 0 volt	Can not measure
3	CANH signal in-out	Can not measure

CN2 – Parallel CAN communication connector	
1	CAN2 RX signal input	Peak to Peak 0 to 5 volt signal
2	CAN2 TX signal output	Peak to Peak 0 to 5 volt signal
3	0 volt	0 volt
4	U2RX signal input	Peak to Peak 0 to 3.3 volt signal
5	U2TX signal output	Peak to Peak 0 to 3.3 volt signal
6	U2_ENABLE signal output	Peak to Peak 0 to 3.3 volt signal
7	0 volt	0 volt
8	+3.3 volts DC output	+3.3 volts DC
9	+5 volts DC output	+5 volts DC
10	0 volt	0 volt

CN3 – switch and fuse status sense signal connector		
1	Fuse failure sense input	normal 0 volt,blowned 3.3 volts DC
2	0 volt	0 volt
3	Output CB positon sense input	CB on 0V –CB off 3.3V DC
4	0 volt	0 volt
5	Thermal contact sense input	normal 0V – overtemp 3.3V DC
6	0 volt	0 volt
7	Maintenance by-pass switch position sense	Switch on 0V –switch off 3.3V DC
8	0 volt	0 volt
9	Output switch position sense input	Switch on 0V-switch off 3.3V DC
10	0 volt	0 volt

CN4 – By-pass driver board connector		
1	Output CB drive output	CB off 0V – CB on +5V DC
2	DOUT-2 spare out	Not used
3	DOUT-1 spare out	Not used
4	0 volt	0 volt
5	L3 inverter SCR drive out	Not used
6	L2 inverter SCR drive out	Not used
7	L1 inverter SCR drive out	Not used
8	0 volt	0 volt
9	L3 by-pass SCR drive out	On inverter 0V – on by-pass +5V DC
10	L2 by-pass SCR drive out	On inverter 0V – on by-pass +5V DC
11	L1 by-pass SCR drive out	On inverter 0V – on by-pass +5V DC
12	0 volt	0 volt
13	+5 volts DC supply out	+5 volts DC
14	+5 volts DC supply out	+5 volts DC

CN5 – RS232 communication port connector		
1	HF power supply output	
2	HF power supply output	
3	0 volt	0 volt
5	+5 volt DC supply output	+5V DC
6	0 volt	0 volt
7	RS232 TX signal output	Peak to Peak 0 to 5 volt signal
8	Not used	
9	RS232 RX signal input	Peak to Peak 0 to 5 volt signal

CN9 – inverter IGBT or IPM driver board connector		
1	IGBT alarm sense input	Normal 0V – alarm 3.3 V DC
2	Spare digital output	Not used
3	+8.5 volts DC supply output	+8.5V DC
4	+8.5 volts DC supply output	+8.5V DC
5	PWM4L output	Not used
6	PWM4H output	Not used
7	0 volt	0 volt
8	0 volt	0 volt
9	PWM3L output	Peak to Peak 0 to 5 volts signal
10	PWM3L output	Peak to Peak 0 to 5 volts signal
11	PWM3H output	Peak to Peak 0 to 5 volts signal
12	PWM3H output	Peak to Peak 0 to 5 volts signal
13	PWM2L output	Peak to Peak 0 to 5 volts signal

14	PWM2L output	Peak to Peak 0 to 5 volts signal
15	PWM2H output	Peak to Peak 0 to 5 volts signal
16	PWM2H output	Peak to Peak 0 to 5 volts signal
17	PWM1L output	Peak to Peak 0 to 5 volts signal
18	PWM1L output	Peak to Peak 0 to 5 volts signal
19	PWM1H output	Peak to Peak 0 to 5 volts signal
20	PWM1H output	Peak to Peak 0 to 5 volts signal

CN10 – advanced option board connector		
1	Optional analog input 1	--
2	Optional analog input 2	--
3	Optional analog input 3	--
4	Optional analog input 4	--
5	Optional analog input 5	--
6	Optional analog input 6	--
7	0 volt	0 volt
8	0 volt	0 volt
9	Optional digital input	0 to 3.3 volts DC
10	0 volt	0 volt

CN11 – AC output current sense LEM connector		
1	+12 volts DC supply output	+12V DC
2	-12 volts DC supply output	-12V DC
3	0 volt	0 volt
4	L3 output current LEM input	No load 0 volt DC
5	L2 output current LEM input	No load 0 volt DC
6	L1 output current LEM input	No load 0 volt DC

CN13 – AC inverter output voltage samples connector		
1	Neutral sample	0 volt
2	Not used	
3	L3 AC inverter output voltage sample	220 volts AC
4	Not used	
5	L2 AC inverter output voltage sample	220 volts AC
6	Not used	
7	L1 AC inverter output voltage sample	220 volts AC

CN14 – AC By-pass input voltage samples connector		
1	Neutral sample input	0 volt
2	Not used	
3	L3 AC by-pass input voltage sample	220 volts AC
4	Not used	
5	L2 AC by-pass input voltage sample	220 volts AC
6	Not used	
7	L1 AC by-pass input voltage sample	220 volts AC

CN15 – AC UPS output voltage samples connector		
1	Neutral sample input	0 volt
2	Not used	
3	L3 AC output voltage sample	220 volts AC
4	Not used	
5	L2 AC output voltage sample	220 vols AC
6	Not used	
7	L1 AC output voltage sample	220 volts AC

CN16 – DC BUS voltage samples connector		
1	(-)DC BUS voltage measurement input	-400 volt DC
2	Not used	
3	DC BUS common input	0 volt
4	Not used	
5	(+)DC BUS voltage measurement input	+400 volt DC

CN17 – HF power supply connector		
1	HF power supply input	--
2	HF power supply input	--

CN18 – HF power supply connector		
1	HF power supply input	--
2	HF power supply input	--

DS3-INV board replacement

All voltage and current measurement samples are directly connected to DS3-INV board so during board replacement there is no need any adjustment. Only at non standart models such as 120 V AC output types please give information to factory during board order.
You can use UPS chassis or serial number at order.

Apply the followings:
a) Take off all fuses of the UPS
b) Turn off all switches <0>position
c) Inverter and Rectifier boards like to each other find INV and PFC letters on board and check
d) Before take of the old board mark all connectors on a paper
e) Unplug all cable connectors
f) Take off the old board from plastic holders
g) Install new board on to the plastic holders
h) Connect all cable connectors
i) Check jumpers of the board

DS3-INV board firmware update

DPIM-1 board connectod to DS3-INV board contains control software of the inverter module ,if new update is necessary take off DPIM-1 board from DS3-INV board and connect new DPIM-1 board on to the DS3-INV board.

Apply the followings:
a) Take off all fuses of the UPS
b) Turn off al switches of the UPS <0>Position
c) DPIM-1 board is connected on to the DS3-INV board with 4 connectors. Take off DPIM-1 board
d) Connect new DPIM-1 board on to the DS3-INV board.

According to different applications DS3-INV board

DS3-INV board can be used at every power range of the DS|POWER series UPS ,maybe some factory settings can be different at various applications. The following tables shows all possible applications:

By-pass leakage current measurement inputs

	CN19 connector	CN20 connector	CN21 connector
3 transformer by-pass curr.measure	L1 current	L2 current	L3 current
1 transformer by-pass curr measure	Common current	Not used	Not used
No By-pass current measurement	Not used	Not used	Not used

Optional AC voltage measurement inputs

	CN10 soketi
Transformerless UPS	Not used
Transformer UPS	used

Parallel applications

	CN2 soketi
ONLINE UPS	Not used
Parallel UPS	used

Inverter heatsink temperature sensor

	CN3 pin-5-6
IPM type UPS	Not used
IGBT type UPS	used

Fuse sense inputs

	CN3 pin-1-2
If fuse aux contact is not installed	Not used
If fuse aux contact installed	used

DS3-PFC rectifier controller board

DS3-PFC board controls all rectifier and charger functions of the UPS. From CAN1 bus board communicates with other boards

The functions of the DS3-PFC board:
  a) Measures AC input frequency and voltages
  b) Creates rectifier PWM signals
  c) Controls PFC function (power factor correction)
  d) Reduces AC input current distorsion
  e) Regulates input power factor
  f) Measures DC BUS voltages
  g) Limits the battery charge current
  h) Manages battery test function
  i) Manages boost charge function
  j) Manages battery temperature compansiation
  k) Manages input contactor
  l) Manages regenerative energy
  m) Manages soft start function
  n) Calculates voltage and current RMS values
  o) Creates input voltage alarms
  p) Creates input frequency alarms
  q) Creates DC BUS alarms
  r) Creates battery alarms
  s) Keeps factory settings at factory settings memory
  t) During system fault copies fault profile to fault profile memory

DS3-PFC Board test points	
TP8 (GND) – D9 cathode	+9.5 volts DC
TP8 (GND) – TP4	+5 volts DC
TP8 (GND) – TP5	+3.3 volts DC
TP8 (GND) – TP9(AGND)	0 volt DC
TP15(GND1) - D10 diode cathode	+10 volts DC
TP15(GND1) - TP17	+5 volts DC
TP9(AGND) - D22 diode cathode	+16 volts DC
TP9(AGND) - U18 pin-3	+12 volts DC
TP9(AGND) - D20 diode cathode	-16 volts DC
TP9(AGND) - U15 pin-3	-12 volts DC
TP9(AGND) - TP22	-5 volts DC
TP9(AGND) - TP23	%5 volts DC

DS3-PFC Board special components	
D3 LED	Short on status normal,on-off equal alarm ,long on fault
J1 jumper	CAN1 line resistor jumper
J2 jumper	Driver supply jumper

DS3-PFC board replacement

At DS|POWER series UPS devices ,DS3-PFC controller board AC and DC voltage samples are connected directly to the board ,for his reason during board replacement there is no any calibration. But if the UPS is not standart (such as 120 volts AC output type) give information to factory during board order.

All board configurations are saved at the factory output if you are not sure about the configuration ask to factory.

    a) Take off all fuses of the UPS
    b) All switches must be off <0>position
    c) Inverter and PFC controller boards like to each other check the INV and PFC letters on the board
    d) Note same pin numbered sockets before take off
    e) Take off all connectors from the board
    f) Take off old board from plastic holders
    g) Install new board on plastic holders
    h) Connect cable connectors
    i) Check all jumpers

DS3-PFC Board firmware update

If firmware update required DPIM-1 board with a new software iss required. Take off old DPIM-1 board and connect the new DPIM-1 board on DS3-PFC board.

Do the followings during firmware update

    a) Take off all fuses
    b) Turn off all switches
    c) Take off old DPIM-1 board from DS3-PFC board
    d) Plug new DPIM-1 board on to the DS3-PFC board. Take care to the direction of the DPIM-1 board

DS3-PFC Board memory management

Permanent memory contains 3 sections:
- User parameters
- Factory parameters
- Fault memory

At the factory output all UPS data is recorded to Tescom database system. Factory parameter page is a copy of the user parameters page. If you want to return factory settings you can load factory settings page to the UPS.

At first power on UPS copies user settings to operating RAM and uses these settings.
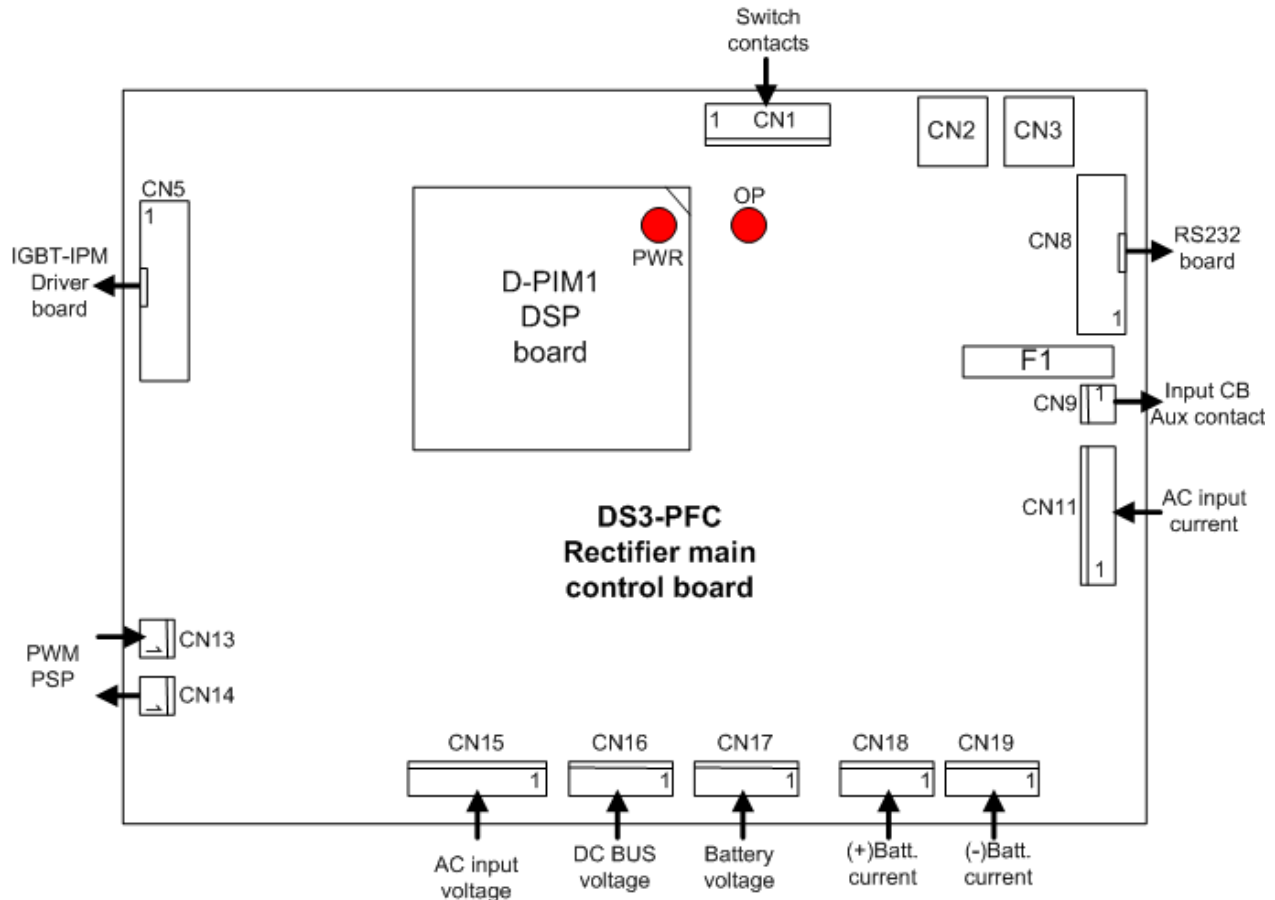
To return factory settings are 2 level process:
1- Factory settings are copied to operating RAM
2- Operating RAM is copied to user settings

The memory transfer can be done from device calibrator plus software.
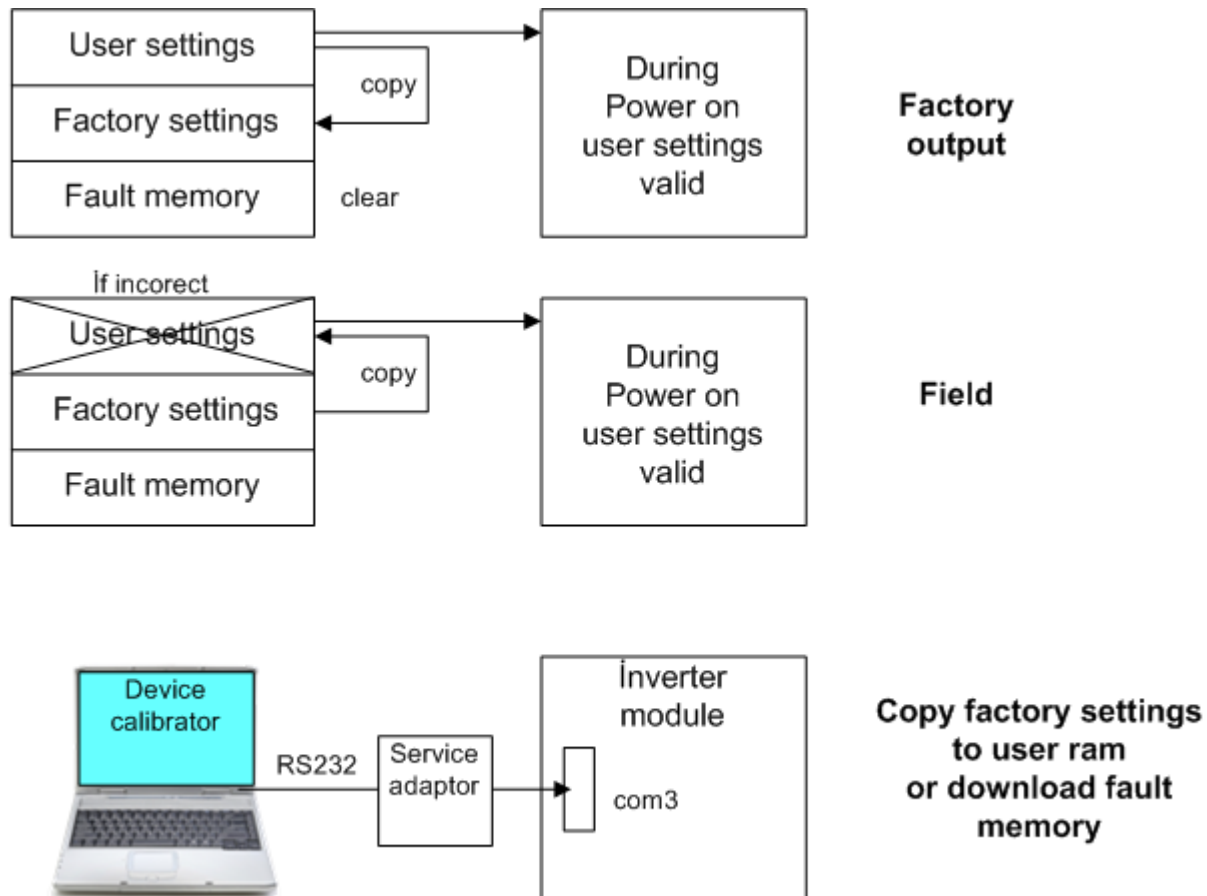
DS3-PFC board input and output connections

DS3-PFC Board connectors

CN1 – contact sense connector		
1	Main board 0 volt	0 volt
2	Input contactor sense input	Input CB on= 0 volt-off= 3.3 volt
3	Main board 0 volt	0 volt
4	Heatsink sensor sense input	Normal= 0 volt –Overtemperature= 3.3 volt DC

CN2 –CAN1 port connector		
1	CANL signal input/ output	
2	Isolated 0 volt	
3	CANH sinyal input output	

CN3 –CAN1 port connector		
1	CANL signal input/ output	
2	Isolated 0 volt	
3	CANH sinyal input output	

CN5 – PFC rectifier driver board connector		
1	IGBT fault sense input	Normal operation= 0 volt –Alarm =3.3 volt
3	+8.5 volts DC supply output	+8.5 volts DC
4	+8.5 volts DC supply output	+8.5 volts DC
5	PWM4L output	Not used
6	PWM4H output	Not used
7	Main board 0 volt	0 volt
8	Main board 0 volt	0 volt
9	PWM3L output	0-5 volts square wave
10	PWM3L output	0-5 volts square wave
11	PWM3H output	0-5 volts square wave
12	PWM3H output	0-5 volts square wave
13	PWM2L output	0-5 volts square wave
14	PWM2L output	0-5 volts square wave
15	PWM2H output	0-5 volts square wave
16	PWM2H output	0-5 volts square wave
17	PWM1L output	0-5 volts square wave
18	PWM1L output	0-5 volts square wave
19	PWM1H output	0-5 volts square wave
20	PWM1H output	0-5 volts square wave

CN8 - RS232 port connector		
1	HF power supply output	
2	HF power supply output	
3	Main board 0 volt	0 volt
4	Not used	
5	+5 volts DC supply output	+5 volt DC
6	Main board 0 volt	0 volt
7	RS232 TX signal output	0-5 volts square wave
8	Not used	
9	RS232 RX signal input	0-5 volts square wave
10	Not used	
11	Not used	
12	Not used	
13	Not used	
14	Not used	
15	Not used	
16	Not used	

CN9 – Input contactor driver connector		
1	L1 AC input voltage phase input (fused)	220 volts AC
2	Input CB drive output	If CB is ON= 220 volts AC – OFF= 0 volt

CN11 – AC input current measurment connector	
1	+12 volts DC supply output	+12 volts DC
2	-12 volts DC supply output	-12 volts DC
3	Main board 0 volt	0 volt
4	L3 input current sample input	No load 0.85 volts DC
5	L2 input current sample input	No load 0.85 volts DC
6	L1 input current sample input	No load 0.85 volts DC

CN12 – Battery ambient temperature sensor connector	
1	Temperature sensor signal input	Sensor signal
2	Main board 0 volt	0 volt

CN13 – HF power supply connector	
1	HF power supply input	
2	HF power supply input	

CN14 – HF power supply connector	
1	HF power supply input	
2	HF power supply input	

CN15 – AC input voltage sample connector	
1	Neutral sample input	0 volt
2	Not used	
3	L3 AC input voltage örneği	220 volts AC
4	Not used	
5	L2 AC input voltage örneği	220 volts AC
6	Not used	
7	L1 AC input voltage örneği	220 volts AC

CN16 – DC BUS voltage measurement connector	
1	(-)battery voltage sample input	(-)400 VOLTs DC
2	Not used	
3	Common DC BUS input	0 volt
4	Not used	
5	(+)battery voltage sample input	(+)400 VOLTs DC

CN17 optional battery voltage measurement connector

CN18 – (+)Battery current sample connector	
1	-12 volts DC supply output	-12 volts DC
2	(+)Batt current sample signal	
3	+12 volts DC supply output	+12 volts DC

CN19 – (-)Battery current sample connector	
1	-12 volts DC supply output	-12 volts DC
2	(-)Batt current sample signal	
3	+12 volts DC supply output	+12 volts DC

DS3-DRV IPM driver board

This board is used only at IPM applications if IGBT is used another driver oard is used.
DS3-DRV board is used at rectifier and inverter module there is no difference at two boards. 3 phase IPM modules contains 6 IGBT transistors and their drivers. But main controller board signals must be isolated from IPM module.
Following components are located on DS3-DRV board:
- Output transistor drivers and power supplies
- Output transistor driver isolators
- IGBT saturation and overtemperature protection signals

DS3-DRV Board test poits	
TP7 – TP8	15 volts DC
TP5 – TP6	15 volts DC
TP3 – TP4	15 volts DC
TP1 – TP2	15 volts DC

DS3-DRV Board special components	
JP1 jumper	IGBT failure alarm test jumper (not connected)

CN1 – DSP controller board connector		
1	IGBT fault sense output	Normal operation 0V –if alarm = 3.3 V DC
2	Spare digital input	Not used
3	+8.5 volts DC supply input	+9.5V DC
4	+8.5 volts DC supply input	+9.5V DC
5	PWM4L input	Not used
6	PWM4H input	Not used
7	Main board 0 volt	0 volt
8	Main board 0 volt	0 volt
9	PWM3L input	0-5 volts square wave
10	PWM3L input	0-5 volts square wave
11	PWM3H input	0-5 volts square wave
12	PWM3H input	0-5 volts square wave
13	PWM2L input	0-5 volts square wave
14	PWM2L input	0-5 volts square wave
15	PWM2H input	0-5 volts square wave
16	PWM2H input	0-5 volts square wave
17	PWM1L input	0-5 volts square wave
18	PWM1L input	0-5 volts square wave
19	PWM1H input	0-5 volts square wave
20	PWM1H input	0-5 volts square wave

CN7 – HF power supply connector		
1	HF power supply input	
2	HF power supply input	

CN8 – L1 upper IGBT drive conector		
1	Isolated power supply GND	
2	L1 upper IGBT saturation protect input	
3	L1 upper pwm drive output	
4	Isolated power supply +15 volts	

CN9 – L1 upper IGBT drive connector		
5	Isolated power supply GND	
6	L2 upper IGBT saturation protect input	
7	L2 upper pwm drive output	
8	Isolated power supply +15 volts	

CN10 – L1 upper IGBT drive connector		
5	Isolated power supply GND	
6	L3 upper IGBT saturation protect input	
7	L3 upper pwm drive output	
8	Isolated power supply +15 volts	

CN11 – Lower IGBT drive connector		
13	Isolated power supply GND	
14	Isolated power supply +15 volts	
15	Pull up resistor pin	
16	L1 PWM Low drive output	
17	L2 PWM Low drive output	
18	L3 PWM Low drive output	
19	Low IGBT common saturation alarm input	

DS3-DRV Board drive signal control
Device calibrator plus software starts test mode at the UPS. An oscilloscope is required for signal following.

DS3-DRV Board replacement
- Return to maintenance by-pass position
- Turn off all switches <0>position
- Wait at least 2 seconds for DC BUS capacitor discharge
- Take off all connectors and take off old board
- Install new board over IPM driver connectors
- Check drive signals with device calibrator plus software
- Turn on UPS again

DS3-IPW Rectifier input relay board

Functions:
• Shutdowns or turns on the rectifier AC input voltage
• Provides AC input voltage samples to rectifier controller board
• Provides AC input current samples to rectifier controller board
• Holds UPS ON/OFF switch fuse

DS3-IPW Board replacement:
According to input power of the UPS some components on this board may be different please notify the UPS power while ordering spare parts.

Replacement procedure of this board is showned at DCP software.

DS3-IPW board test points	
TP1	24 V DC supply
TP2	24 V DC supply GND
TP3	Relay drive +24 volts signal
TP4	L1 phase AC input voltage
TP5	L2 phase AC input voltage
TP6	L3 phase AC input voltage
TP7	L1 phase PFC inductor AC output voltage
TP8	L2 phase PFC inductor AC output voltage
TP9	L3 phase PFC inductor AC output voltage

CN1 – cooling fan drive output		
1	Phase	
2	Neutral	

CN2 – AC input current samples to rectifier controller board		
1	+12 V DC supply input	
2	-12 V DC supply input	
3	GND	
4	L3 phase AC input current sample	
5	L2 phase AC input current sample	
6	L1 phase AC input current sample	

CN3 – Input relays drive input connector		
1	+24 V DC output to rectifier controller board	
2	+24 V DC return from rectifier controller board	

CN4 – UPS ON/OFF switch fuse connector		
1	Input	
2	Not used	
3	Output	
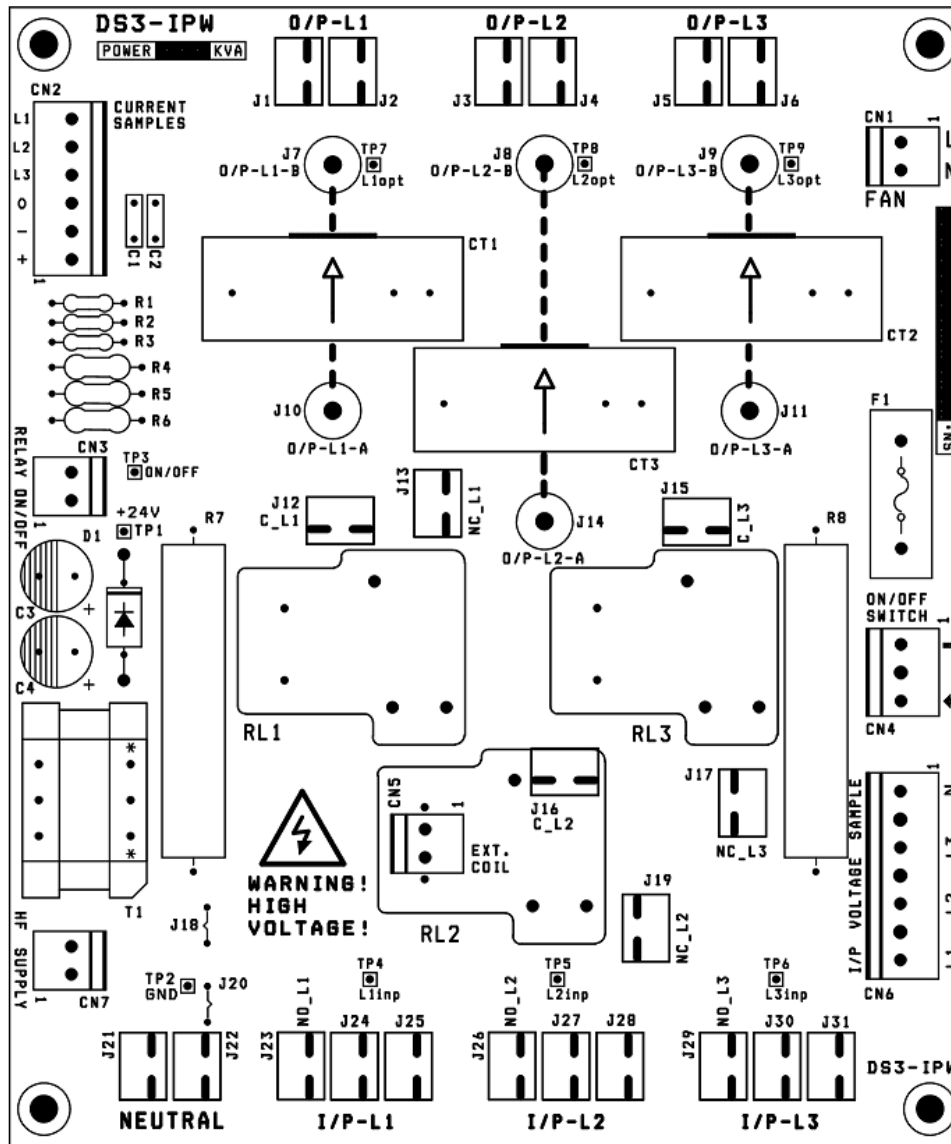
CN5 – External relay connector	
1	+24 V DC drive output	
2	isolated GND	

CN6 – Rectifier AC voltage samples connector	
1	Neutral	
2	Not used	
3	L3 phase AC input voltage sample	
4	Not used	
5	L2 phase AC input voltage sample	
6	Not used	
7	L1 phase AC input voltage sample	

CN7 – HF power supply connector	
1	HF power supply	
2	HF power supply	

Other power connections		
J1	L1 phase PFC inductor output	After current measurement
J2	L1 phase PFC inductor output	After current measurement
J3	L2 phase PFC inductor output	After current measurement
J4	L2 phase PFC inductor output	After current measurement
J5	L3 phase PFC inductor output	After current measurement
J6	L3 phase PFC inductor output	After current measurement
J12	L1 phase relay output	Reserved for future use
J13	L1 phase relay reverse contact	Reserved for future use
J15	L3 phase relay output	Reserved for future use
J16	L2 phase relay output	Reserved for future use
J17	L3 phase relay reverse contact	Reserved for future use
J19	L2 phase relay reverse contact	Reserved for future use
J21	Neutral	
J22	Neutral	
J23	L1 phase AC voltage input	Reserved for future use
J24	L1 phase AC voltage input	
J25	L1 phase AC voltage input	
J26	L2 phase AC voltage input	Reserved for future use
J27	L2 phase AC voltage input	
J28	L2 phase AC voltage input	
J29	L3 phase AC voltage input	Reserved for future use
J30	L3 phase AC voltage input	
J31	L3 phase AC voltage input	

| DS3-PWR Output relay and by-pass board |
| --- |

Function of this board:
 • Provides ac by-pass voltage,inverter output voltage , UPS output voltage and UPS output current samples to the DS3-INV board
 • Drives By-pass relays
 • Drives and isolates By-pass triacs

DS3-IPW Board replacement:
According to input power of the UPS some components on this board may be different please notify the UPS power while ordering spare parts.

Replacement procedure of this board is showned at DCP software.

DS3-PWR Board special components	
LD1	By-pass relay indicator lamp (green)
LD2	By-pass triac indicator lamp (red)
F1	L1 phase triac fuse
F2	L2 phase triac fuse
F3	L3 phase triac fuse
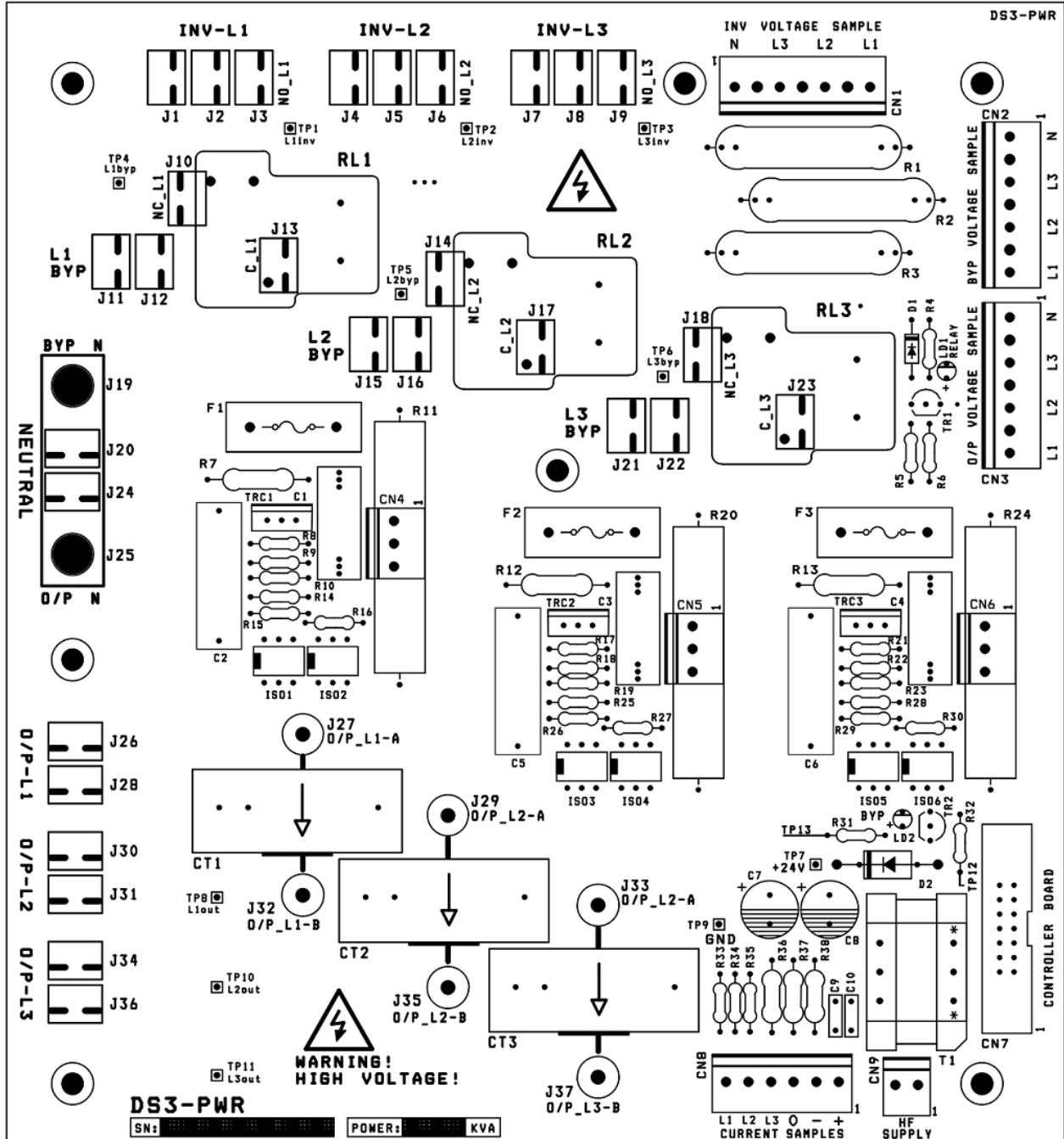
DS3-PWR Board test points	
TP1	L1 phase inverter output voltage
TP2	L2 phase inverter output voltage
TP3	L3 phase inverter output voltage
TP4	L1 phase by-pass input voltage
TP5	L2 phase by-pass input voltage
TP6	L3 phase by-pass input voltage
TP8	L1 phase UPS output voltage
TP10	L2 phase UPS output voltage
TP11	L3 phase UPS output voltage
TP12	Triac drive transistor input
TP13	Triac drive optical couplers common point
TP14	Relay drive transistor input

CN1 Inverter main controller board Inverter output voltage samples		
1	Neutral	
2	Not used	
3	L3 phase inveter AC output voltage sample	
4	Not used	
5	L2 phase inveter AC output voltage sample	
6	Not used	
7	L1 phase inveter AC output voltage sample	

CN2 Inverter main controller board By-pass input voltage samples		
1	Neutral	
2	Not used	
3	L3 phase by-pass input voltage sample	
4	Not used	
5	L2 phase by-pass input voltage sample	
6	Not used	
7	L1 phase by-pass input voltage sample	

CN3 Inverter main controller board UPS output voltage samples		
1	Neutral	
2	Not used	
3	L3 Phase UPS output voltage sample	
4	Not used	
5	L2 Phase UPS output voltage sample	
6	Not used	
7	L1 Phase UPS output voltage sample	

CN4 : L1 phase optional by-pass inductor connector

CN5 : L2 phase optional by-pass inductor connector

CN6 : L3 phase optional by-pass inductor connector

CN7 Inverter Main controller board signal connector	
1	By-pass relay drive input
2	Not used
3	Not used
4	GND
5	Not used
6	Not used
7	Not used
8	GND
9	Not used
10	Not used
11	Triac drive input
12	GND
13	+5 V DC power supply input
14	+5 V DC power supply input

CN8 Inverter main controller board UPS output current samples	
1	+12 V DC power supply input
2	-12 V DC power supply input
3	GND
4	L3 phase UPS output current sample
5	L2 phase UPS output current sample
6	L1 phase UPS output current sample

CN9 – HF power supply bağlantı soketi pin görevleri	
1	HF power supply input
2	HF power supply input

By-pass input power connectors	
J11	L1 phase by-pass input voltage
J12	L1 phase by-pass input voltage
J15	L2 phase by-pass input voltage
J16	L2 phase by-pass input voltage
J21	L3 phase by-pass input voltage
J22	L3 phase by-pass input voltage
J24	Neutral
J25	Neutral

Inverter output voltage power connectors	
J1	L1 phase inverter output voltage
J2	L1 phase inverter output voltage
J4	L2 phase inverter output voltage
J5	L2 phase inverter output voltage
J7	L3 phase inverter output voltage
J8	L3 phase inverter output voltage
J24	Neutral
J25	Neutral

UPS output voltage power connectors	
J26	L1 phase UPS output voltage
J28	L1 phase UPS output voltage
J30	L2 phase UPS output voltage
J31	L2 phase UPS output voltage
J34	L3 phase UPS output voltage
J36	L3 phase UPS output voltage
J24	Neutral
J25	Neutral

ITC-03 Front panel adaptör board

Functions:
• Arranges data way from front panel to CAN1 data bus
• Measures cabinet inside temperature
• Provides data connection from RS232 board to front panel controller board
• Provides power to front panel boards
• Connects DRY contact relay drive signals to RS232 communication board

J1 jumper on this board enables or disables the CAN1 BUS line end resistor

ITC-03 Board replacement:
There is no need any adjustment during board replacement. Turn off the UPS replace the board and turn on UPS again.

Replacement procedure of this board is showned at DCP software

| ITC-03 Board tesp points	
TP1	+5 volts DC CAN1 supply GND
TP3	+12 volts DC relay supply (TP4 GND)
TP4	+5 volts isolated front panel supply GND

There is no any other test point on this board if required measure signals on component pins directly

CN1 – TH1 Thermal sensor connector	
1	GND
2	Canlı pin

CN2 – TH2 cabinet inside thermal sensor connector	
1	GND
2	Canlı pin

Note: Normally cabinet inside temperature sensor is mounted on this board but some applications external sensors are required in this case disconnrct the sensor on PCD and connect an external sensor to this connector

CN3 RS232 communication board connector	
1	HF power supply output
2	HF power supply output
3	GND (front panel GND)
4	+12 V DC supply output
5	+5 V DC supply output
6	GND (front panel GND)
7	RS232 TXD output
8	REPO stop signal input from RS232 board
9	RS232 RXD input
10	AUX1 relay drive output
11	SNMP-RS232 data way selection relay drive output
12	Line failure alarm relay drive output
13	Spare digital input
14	Battery low alarm relay drive output
15	AUX2 relay drive output
16	By-pass alarm relay drive output
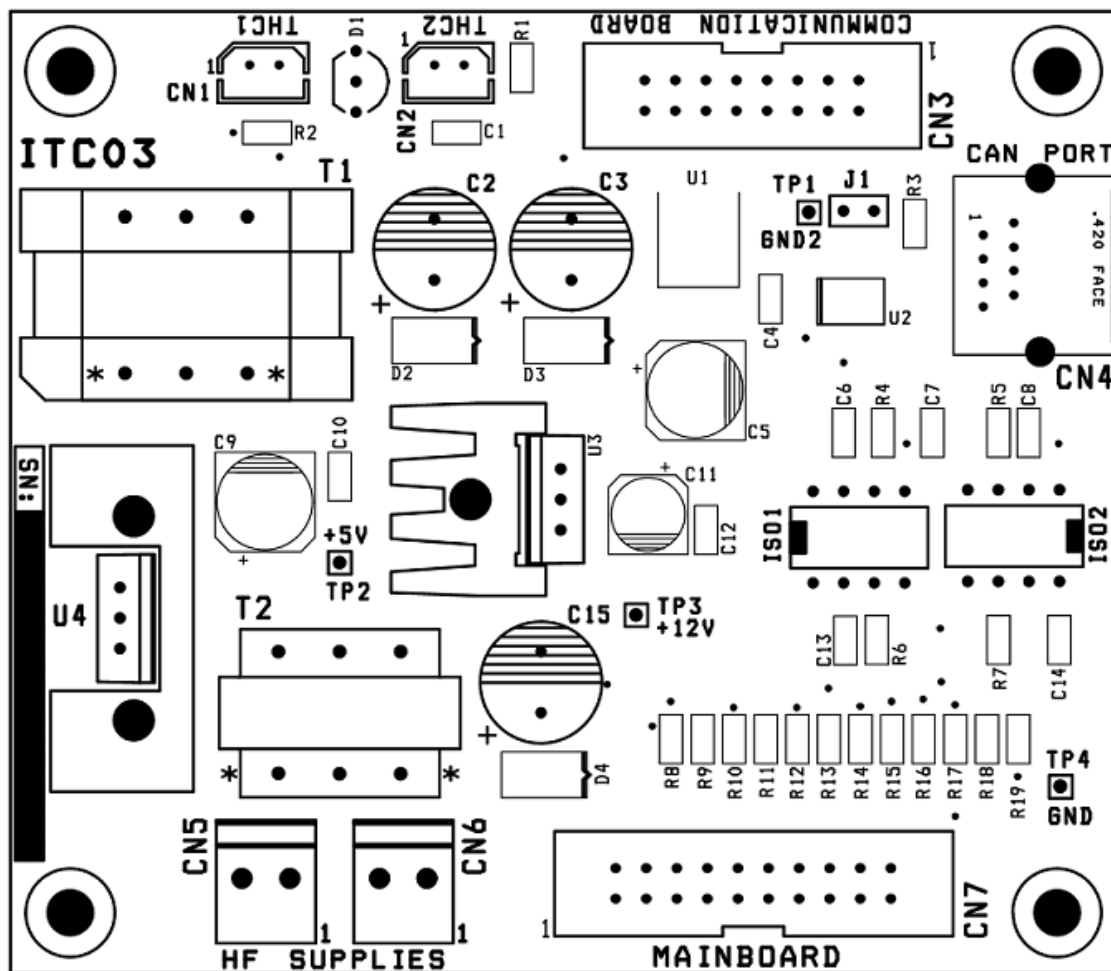
CN4 – CAN1 data line connector	
1	CAN1-L	
2	GND	
3	CAN1-H	

Warning! If this connector is unplugged the data connection from front panel to other boards are interrupted.

CN5 – HF power supply connector	
1	HF power supply input	
2	HF power supply input	

Warning! If this connector unplugged power of the RS232 board or front panel board is shutdown

CN6 – HF power supply connector	
1	HF power supply input	
2	HF power supply input	

Warning! If this connector unplugged power of the RS232 board or front panel board is shutdown

CN7 Front panel controller board connector	
1	Not used	
2	AUX2 relay drive input	
3	RS232 RX2	
4	RS232 TX2	
5	CAN1 TX	
6	CAN1 RX	
7	Not used	
8	Spare digital input signal	
9	AUX1 relay drive input	
10	Line failure relay drive input	
11	By-pass relay drive input	
12	Battery low relay drive input	
13	SNMP/RS232 data way selection relay drive input	
14	TH1 thermal sensor signal	
15	TH2 thermal sensor signal	
16	Not used	
17	REPO (EMC) stop output	
18	+12 V DC supply output	
19	GND	
20	+5 V DC supply output	

IDB-03 Interface board

IDB-03 Board isolates communication data from outside world. All signal from this board are isolated.

IDB-03 Board replacement:
There is no need any adjustment during board replacement. Turn off the UPS replace the board and turn on UPS again.
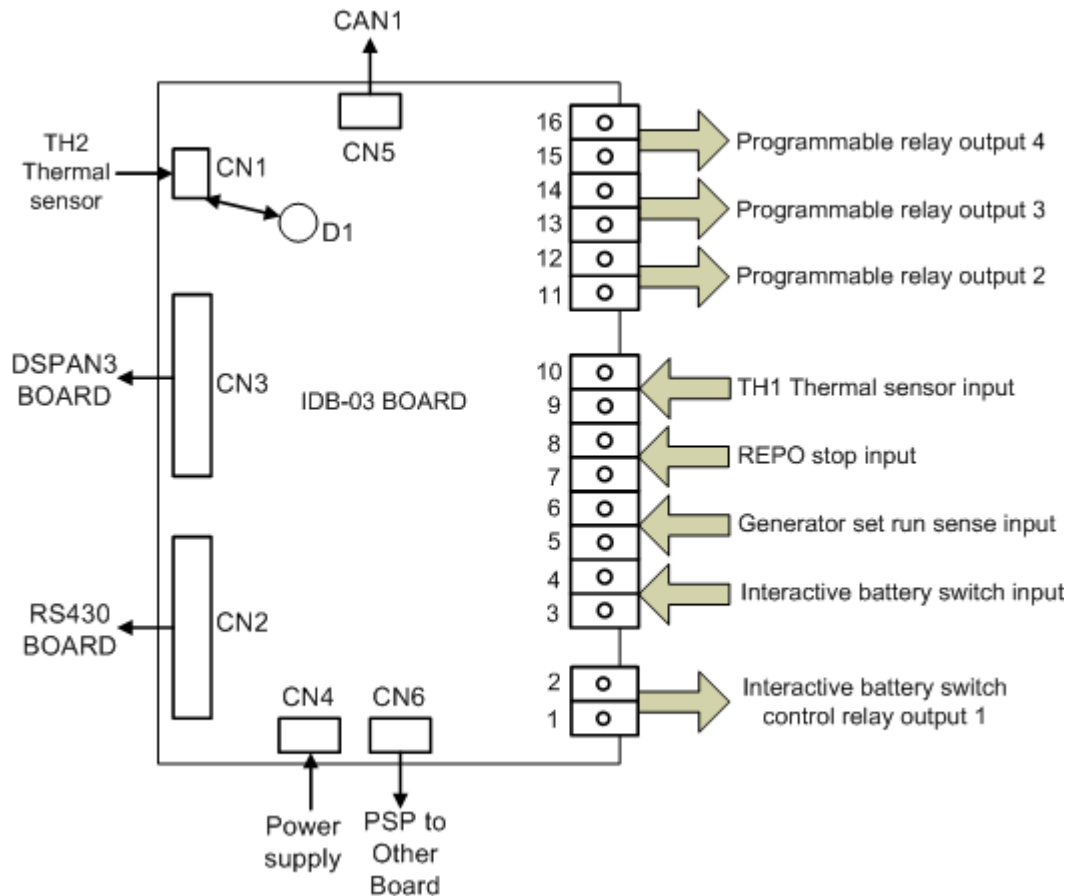
On the board D1 thermal sensor is located ,this sensor measures the cabinet inside temperature. If the cabinet inside temperature sensor is located another part of the cabinet D1 sensor not used another sensor is connected to CN1 connector.

CN1 – Thermal sensor 2 connector	
1	0 volt	
2	Sensor signal input	

CN2 – RS232 commu014cation board connector	
1	TX1
2	RX1
3	ISO1 - 0 volt
4	TX2
5	RX2
6	ISO1 - 0 volt
7	+5 volts ISO1 isolated supply output
8	+5 volts ISO1 isolated supply output
9	TP2 0 volt
10	TP2 0 volt
11	TP3 + 5 volts DC
12	TP3 + 5 volts DC
13	Com1 SNMP/RS232 select signal
14	TP1 +10 volts DC supply output

CN3 – Panel DSP board connector	
1	RS232-RX1 output
2	RS232-TX1 input
3	RS232-RX2 output
4	RS232-TX2 input
5	CAN1 TX input
6	CAN1 RX output
7	Batt.switch sense output
8	generatör sense output
9	Relay 1 drive input
10	Relay 2 drive input
11	Relay 3 drive input
12	Relay 4 drive input
13	Com1 SNMP/RS232 select input
14	Thermal sensor 1 output
15	Thermal sensor 2 output
16	Not used
17	REPO stop signal output
18	TP1 +12 volts DC supply output
19	TP2 0 volt
20	TP3 +5 volts DC

CN4 – HF power supply connector	
1	HF power supply input
2	HF power supply input

CN6 – HF power supply connector	
1	HF power supply input
2	HF power supply input

| CN5 – CAN1 connector	
1	CANL signal
2	0 volt
3	CANH signal

IDB-03 Board test points	
TP2(GND) –TP3	+5 volts DC
U3 pin2 (GND) – U3 pin3	+5 volts DC
U4 pin2 (GND) – U4 pin3	+5 volts DC
CN8 pin7(GND) – D4 cathode	+12 volts DC
TP2 GND - TP	+10 volts DC
D1 temp sensor pins	If sensor connected= 2.9 volt DC

OPT03 OPTIONAL INTERFACE BOARD

The standart configuration of DS|POWER series UPS is 4 dry contact outputs ,with optional interface board these relays will be total 12 relays ,seperately 6 analog inputs and 2 digital automation inputs are available

OPT03 Board replacement:
There is no need any calibration or adjustment during board replacement. Turn off the UPS replace the board and turn on UPS again.
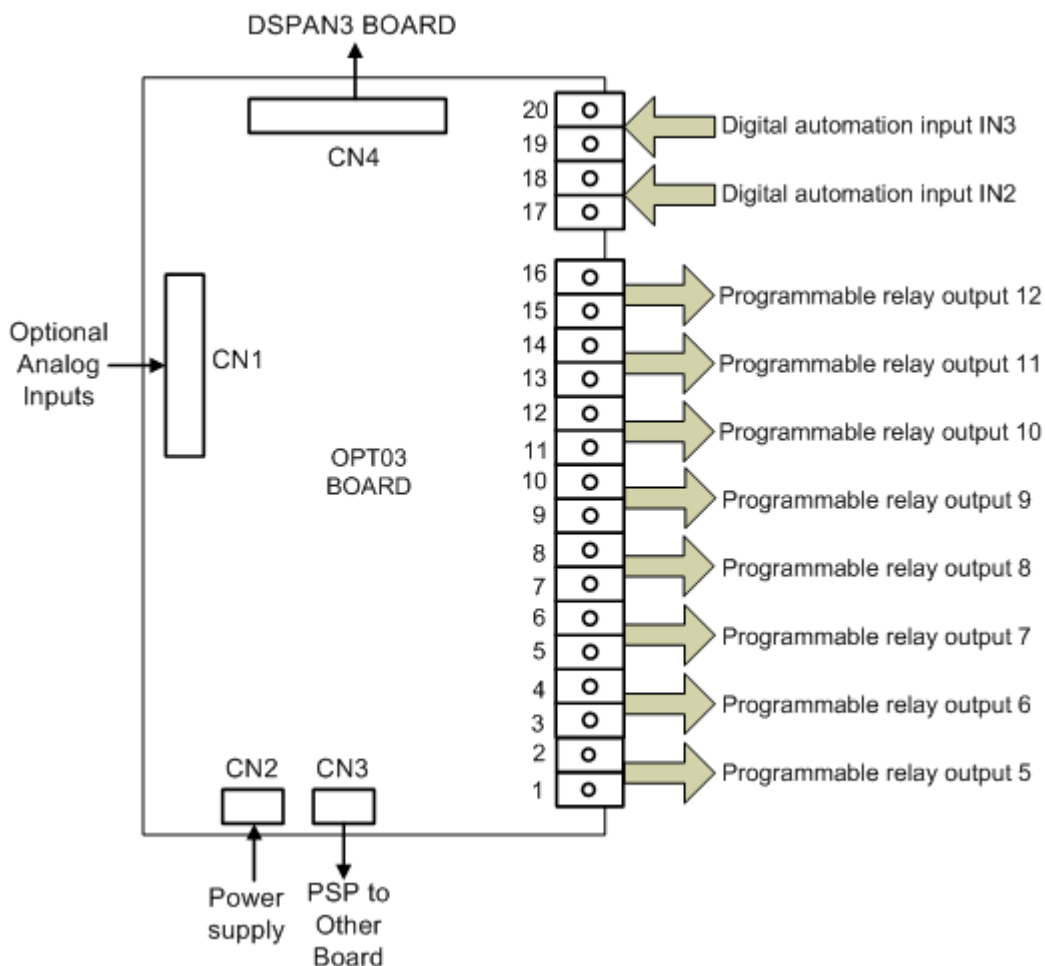
CN1 – Optional analog input connector		
1	+5 volts DC supply output	+5 volt DC
2	0 volt	0 volt
3	Analog input 8	
4	Analog input 7	
5	Analog input 6	
5	Analog input 5	
7	Analog input 4	
8	Analog input 3	
9	0 volt	0 volt
10	0 volt	0 volt

CN2 – HF power supply connector		
1	HF power supply besleme input	
2	HF power supply besleme input	

CN3 – HF power supply connector		
1	HF power supply supply input	
2	HF power supply supply input	

CN4 – Panel DSP board connector		
1	Analog output 3	
2	Analog output 4	
3	Analog output 5	
4	Analog output 6	
5	Analog output 7	
6	Analog output 8	
7	Option relay 5 drive input	
8	Option relay 6 drive input	
9	Option relay 7 drive input	
10	Option relay 8 drive input	
11	Option relay 9 drive input	
12	Option relay 10 drive input	
13	Option relay 11 drive input	
14	Option relay 12 drive input	
15	Digital automation output IN2	
16	Digital automation output IN3	
17	0 volt supplye input	
18	+5 volts DC supply input	
19	Not used	
20	Not used	

OPT03 Board test points	
TP3(GND) –TP2	+12 volts DC
U1 pin2 (GND) – U1 pin3	+5 volts DC

DSPAN03 Front panel DSP control board

All front panel functions are managed the DSP which is located on this board.

DSPAN03 Board replacement:
There is no need any adjustment or calibration during panel board replacement. Turn off the UPS ,take off old board and install new board. The turn on UPS again.

CN1 DSP programming connector

CN2 – FP1 Panel board connector	
1	CD_RS	
2	CD_E	
3	Not used	
4	CD_D0	
5	CD_D1	
6	CD_D2	
7	CD_D3	
8	CD_D4	
9	CD_D5	
10	CD_D6	
11	OPT1	
12	CD_D7	
13	OPT2	
14	BACKLIGHT	
15	Not used	
16	CONTRAST	
17	+5 volts DC panel supplyoutput	
18	+5 volts DC panel supply output	
19	To Panel 0 volt	
20	To Panel 0 volt	
21	Not used	
22	Not used	
23	Not used	
24	Not used	
25	Not used	
26	Not used	

CN3 – FP1 Panel board connector		
1	Panel LED2 drive output	
2	Not used	
3	Not used	
4	Panel LED1 drive output	
5	+3.3 volts supply output	
6	+3.3 volts supply output	
7	To Panel buzzer output	
8	Not used	
9	To panel 0 volt output	
10	To panel 0 volt output	
11	OPT3	
12	OPT4	
13	OPT5	
14	OPT6	
15	OPT7	
16	SW1 buton input	
17	SW2 buton input	
18	SW3 buton input	
19	SW4 buton input	
20	SW5 buton input	

CN4 – IDB03 interface board connector		
1	RS232-RX1 input	
2	RS232-TX1 output	
3	RS232-RX2 input	
4	RS232-TX2 output	
5	CAN1 TX output	
6	CAN1 RX input	
7	Batt.sitch sense input	
8	generatör set sense input	
9	Relay 1 drive output	
10	Relay 2 drive output	
11	Relay 3 drive output	
12	Relay 4 drive output	
13	Com1 SNMP/RS232 select output	
14	Thermal sensor 1 input	
15	Thermal sensor 2 input	
16	Not use	
17	REPO stop signal input	
18	TP1 +12 volts DC supply input	
19	TP2 0 volt	
20	TP3 +5 volts DC upply input	

CN5 – OPT03 option board connector		
1	Analog input 3	
2	Analog input 4	
3	Analog input 5	
4	Analog input 6	
5	Analog input 7	
6	Analog input 8	
7	Option relay 5 drive output	
8	Option relay 6 drive output	
9	Option relay 7 drive output	
10	Option relay 8 drive output	
11	Option relay 9 drive output	
12	Option relay 10 drive output	
13	Option relay 11 drive output	
14	Option relay 12 drive output	
15	Digital otomation input IN2	
16	Digital otomation input IN3	
17	0 volt supply output	
18	+5 volt DC supply output	
19	Not used	
20	Not used	

DSPAN03 Board test points	
TP10(GND) –TP11	+5 volts DC
TP10(GND) –TP13	+3.3 volts DC
TP10(GND) –TP12	0 volt DC
TP12(GND) –TP2	If TH1 connected = 1.9 V- not connected=2.35V
TP12(GND) –TP3	If TH1 connected = 1.9 V- not connected=2.35V
TP12(GND) –TP4	Different according to option
TP12(GND) –TP5	Different according to option
TP12(GND) –TP6	Different according to option
TP12(GND) –TP7	Different according to option
TP12(GND) –TP8	Different according to option
TP12(GND) –TP9	Different according to option
U4 pin 10 (GND) – U4 pin 20	+5 volts DC
U5 pin 10 (GND) – U5 pin 20	+5 volts DC
U6 pin 10 (GND) – U6 pin 20	+5 volts DC
U2 pin 5 (GND) – U2 pin 10	+5 volts DC
TP10(GND) –TP1 arası	+12 volts DC
BT1 battery teminals	3.6 volts DC

DSPAN03 Board DSP firmware update
At firmware updates of the front panel replace DCPAN03 board with a new version.

FP1 LCD Panel adaptor board

LCD Alphanumeric display and mimic panel lamps are located on this board and lamp buffers are on this board.

DSPAN03 Board is integrates to this board with connectors without cable.

If any problem on mimic lamps or LCD display replace this board with a new one.

DS3-BYP By-pass driver board

Functions of this board:
- Isolation of the DS3-INV by-pass SCR drive signals from SCR's
- Isolation of the DS3-INV output CB drive signal
- To arrange power on SCR drive signals
- To prevent cross currents between UPS's during paralel operation
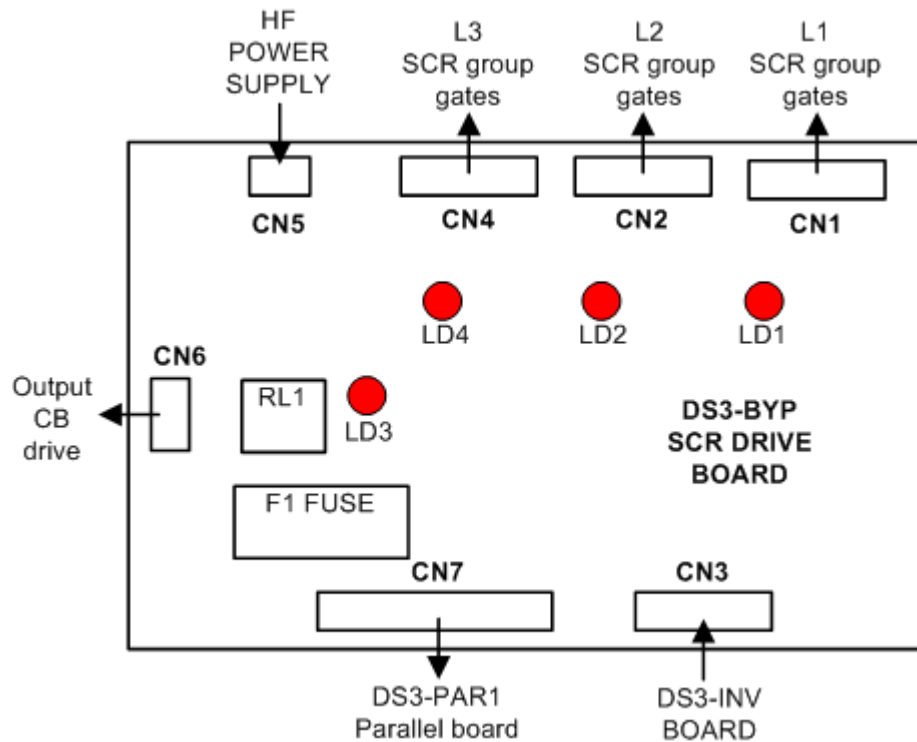
DS3-BYP board special components	
LD1	L1 by-pass SCR drive pulse monitor lamp
LD2	L2 by-pass SCR drive pulse monitor lamp
LD3	Output CB drive relay on monitor lamp
LD4	L4 by-pass SCR drive pulse monitor lamp
F1	Output CB coil fuse
RL1	Output CB drive relay

CN1 –L1 SCR gate drive connector		
1	L1 SCR G1 pin	Gate
2	L1 SCR K1 pin	Katod
3	Not used	
4	L1 SCR G2 pin	Gate
5	L1 SCR G2 pin	Katod

CN2 –L2 SCR gate drive connector		
1	L1 SCR G3 pin	Gate
2	L1 SCR K3 pin	Catode
3	Not used	
4	L1 SCR G4 pin	Gate
5	L1 SCR G4 pin	Katod

CN3 – BYP-INV DSP control board connector		
1	Output CB drive signal input	Output CB off 0V - on +5V DC
2	DOUT-2 spare input	Not used
3	DOUT-1 spare input	Not used
4	Main board ground	0 volt
5	L3 inverter SCR drive input	Not used
6	L2 inverter SCR drive input	Not used
7	L1 inverter SCR drive input	Not used
8	Main board ground	0 volt
9	L3 by-pass SCR drive input	On inverter 0V – on by-pass +5V DC
10	L2 by-pass SCR drive input	On inverter 0V – on by-pass +5V DC
11	L1 by-pass SCR drive input	On inverter 0V – on by-pass +5V DC
12	Main board ground	0 volt
13	+5 volt DC PSP input	+5 volt DC
14	+5 volt DC PSP input	+5 volt DC

CN4 –L3 SCR gate drive connector		
1	L1 SCR G5 pin	Gate
2	L1 SCR K5 pin	Katod
3	Not used	
4	L1 SCR G6 pin	Gate
5	L1 SCR G6 pin	Katod

CN5 – HF power supply input connector		
1	HF power supply input	-
2	HF power supply input	-

CN6 – Output CB drive connector		
1	AC 220 volts input (FUSED)	
2	AC 220 volts output	

CN7 – DS3-PAR paralel communication board connector		
1	HF power supply output	-
2	HF power supply output	-
3	HF power supply output	-
4	HF power supply output	-
5	Not used	
6	Not used	
7	Not used	
8	Not used	
9	Not used	
10	Not used	
11	Not used	
12	Not used	
13	Load on inverter security output	
14	Load on inverter security output	
15	Any UPS inverter feeds the load sense input	
16	Any UPS inverter feeds the load sense input	

IGDN03 IGBT Driver board

Functions of the IGDN03 Driver board:

- Isolates main controller board drive signals from power components
- To send drive signals to driver modules
- To interface driver signals and to drive power components
- To sense saturation alarm of the IGBT transistors and send signals to main controller board
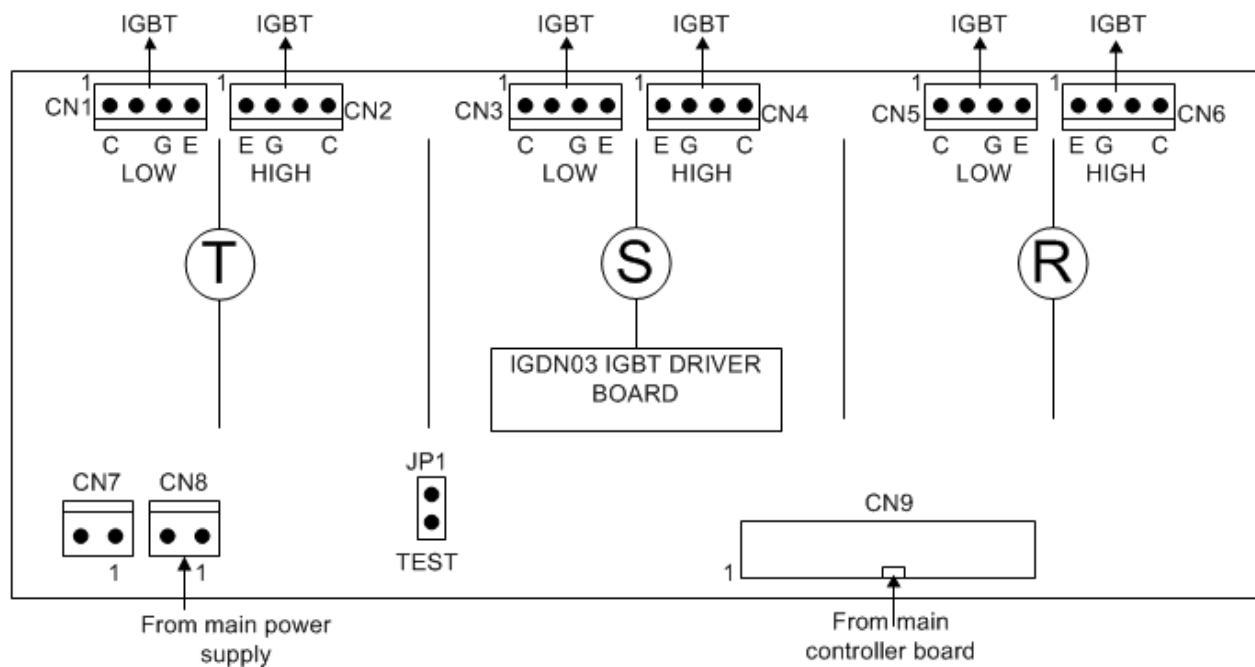
IGDN03 Board replacement:
Warning ! During board order send information to factory about UPS power ,because according to UPS power some components on IGDN03 board will be different. Serial number of the UPS is enough.
There is no need any adjustment during replacement.
Turn off UPS
Take off old board
Install new board
Before start UPS check CN1,CN2,CN3,CN4,CN5,CN6 connectors are plugged in to correct IGBTS.

RS430 serial RS232 communication board

RS430 Serial communication board isolates data signals from outside World of the UPS ,drives RS232 BUS. Two serial ports are available on board. Com1 port is user port and it is shared with internal data adaptors such as SNMP or MODBUS adaptör. RL1 relay on board changes data way to RS232 port or data adaptör.

If the relay is OFF data will be redirected to COM1 port ,CN3 connector is not used in this position.
If relay is ON data is redirected to CN3 connector in this position COM1 port is out of function.
The relay is managed from DSP control panel

RS430 Board replacement:
Any adjustment is not necesssary if this board is replaced with a new board. Turn off UPS ,take off old board and install new board. Turn on UPS again.
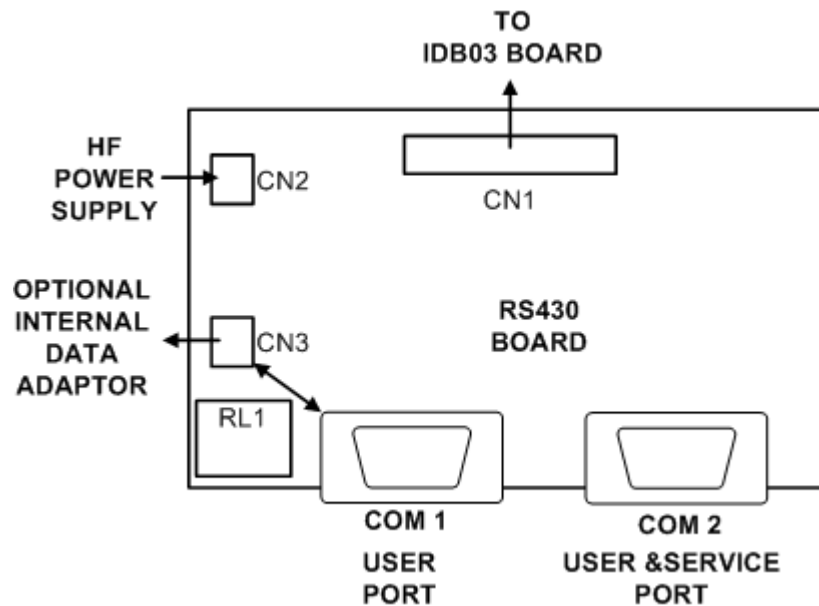
CN1 – RS232 IDB03 board connector pin functions		
1	TX1	
2	RX1	
3	ISO1 - 0 volt	
4	TX2	
5	RX2	
6	ISO1 - 0 volt	
7	+5 volts ISO1 isolated supply input	
8	+5 volts ISO1 isolated supply input	
9	IDB03 Board TP2 0 volt	
10	IDB03 Board TP2 0 volt	
11	IDB03 Board TP3 + 5 volts DC	
12	IDB03 Board TP3 + 5 volts DC	
13	Com1 SNMP/RS232 select relay drive out	
14	IDB03 Board TP1 +10 volts DC supply out	

RS430 Board test points	
U1 pin2 (GND) – U1 pin1	+10.5 volts DC
U1 pin2 (GND) – U1 pin3	+5 volts DC
U2 pin 15 (GND) – U1 pin16	+ 5 volts DC
U3 pin 15 (GND) – U3 pin16	+ 5 volts DC

DS3-PSU Main power supply board

All boards of the UPS are powered from main power supply board
Main functions of the board is:

- Supply fuse protection
- To produce high frequency PWM energy
- Undervolage power supply shutdown function
- To regulate all board supply signals
- To get power from by-pass input
- To monitör supply status from LED lamps
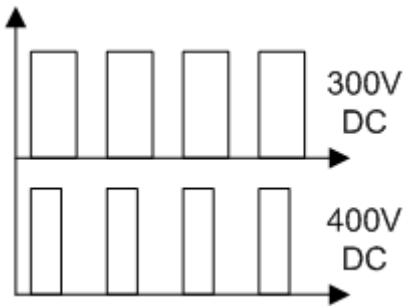
This board produces PWM regulated power and sends this signal to other boards as power supply, each board has it's own isolation transformer.At the output of the transformer there are DC voltage regulators. At this application power supplies are isolated. The figüre shows how the board regulates PWM signal according to different DC BUS voltages. If DC voltage is low PWM signal is longer.
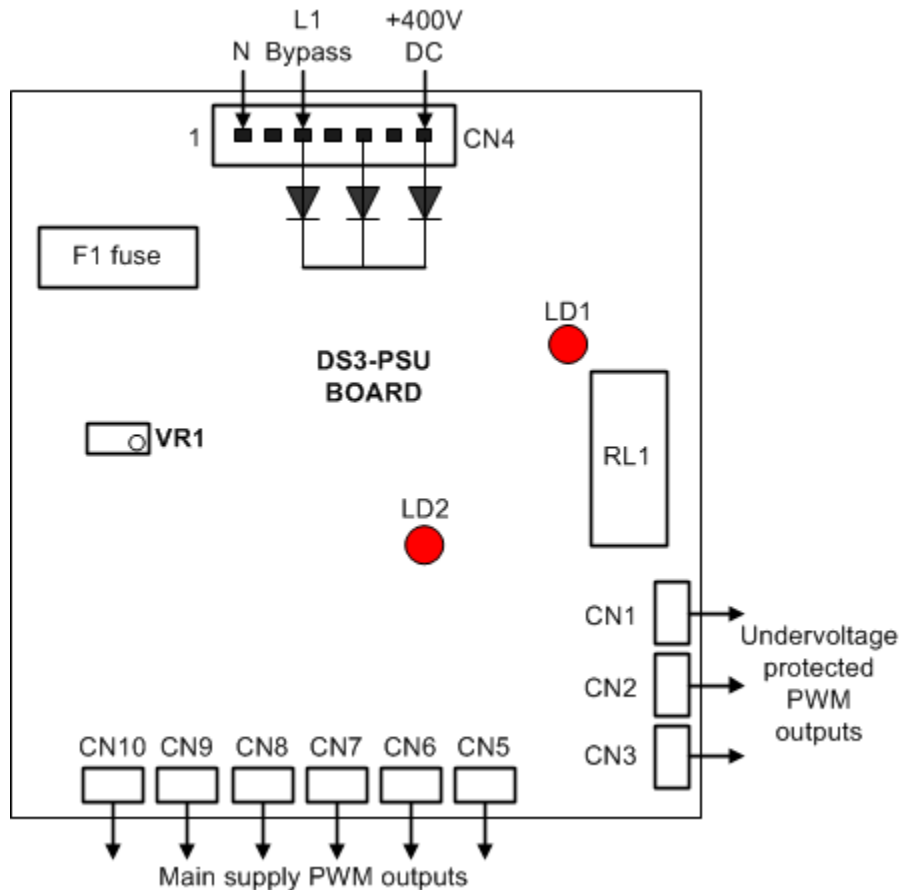
LD1	There is PWM at the undervoltage protected connectors
LD2	Main supply is running
F1	Board power input fuse
VR1	Main supply voltage adjustment
RL1	Underoltage shutdown relay

DS3-PSU Board test points	
CN4 pin1 (GND) – pin7	+405 volts DC
CN4 pin1 (GND) – pin3	220 volts AC

If the UPS is on ,power will be applied to the power input connector and board produze PWM rregulated signal in this case LD2 lamp is ON.
If the DC BUS voltage is higher then 200 volts DC RL1 relay is on ,LD1 lamp is on . If the relay is on PWM supply comes to undervoltage protected connectors.
By-pass L1 phase input is connected to the input power of the power supply board ,so only by-pass is enough for power supply operation

CN4 – Power input connector		
1	**Neutral**	
2	**Not used**	
3	**L1 bypass input**	
4	**Not used**	
5	Not used	
6	Not used	
7	DC BUS input	

CN1,CN2,CN3 – Undervoltage protected PWM outputs		
1	**HF power supply output**	**Can not measure with multimeter**
2	**HF power supply output**	**Can not measure with multimeter**

| CN5,CN6,CN7,CN8,CN9,CN10 – Direct PWM outputs		
1	**HF power supply output**	**Can not measure with multimeter**
2	**HF power supply output**	**Can not measure with multimeter**

CPC-02 DC BUS Capacitor charge board

If the DC BUS voltage is zero if energy applied to DC BUS very high current passes through DC BUS capacitors.To prevent this current CPS-02 DC BUS soft charge board is used.
This board is used at early versions of the DS|POWER series UPS at last versions this board usage cancelled.

Function of CPC-02 board
• To provide soft charge of the DC BUS capacitors
• To provide DC voltage to on/off switch
• Fuse protection at high currents
• To provide AC input voltage samples to DS3-PFC Board

CPC-02 Board components	
F1	(-) DC BUS protection fuse
F2	(+) DC BUS protection fuse
F3	R phase AC input protection fuse
F4	S phase AC input protection fuse
R1	(+)DC BUS capacitor charge resistor
R2	(-)DC BUS capacitor charge resistor
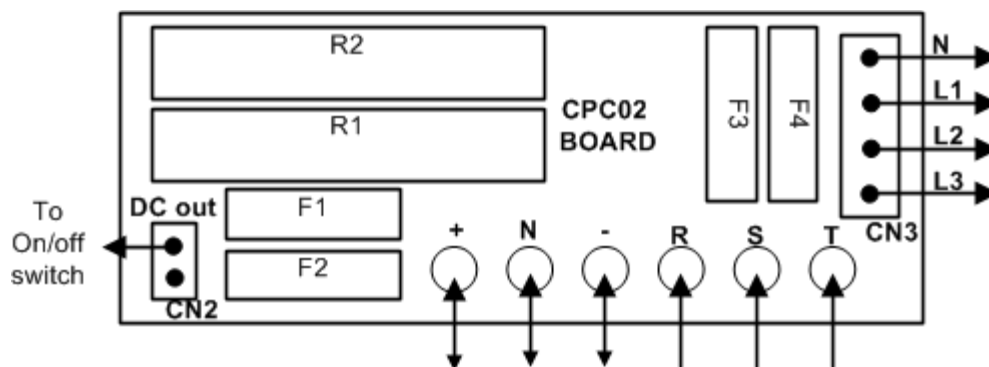
CN3 AC input voltage sample connector		
1	Neutral sample	
2	not used	
3	L1 Phase AC voltage sample	
4	not used	
5	L2 Phase AC voltage sample	
6	not used	
7	L3 Phase AC voltage sample	

CN2 On/off switch DC supply output		
1	not used	
2	DC output	

| DS3-LKG1 IGBT Leakage sense board |
|---|

DS3-LKG1 board sense the returning DC BUS voltage from PFC rectifier power components ,if there is a DC leakage at the rectifier power components it prevents to start rectifier.

The function of the DS3-LKG1 Board:
• To measure the DC leakage of the rectifier power components
• If there is leakage it prevents rectifier start

DS3-LKG1 Board special components	
R1-R2-R3	Leakage compansiation resistors
VR1	Reference adjustment (factory setting)
JP1-JP2	Supply jumpers (JP2 SHORTED)
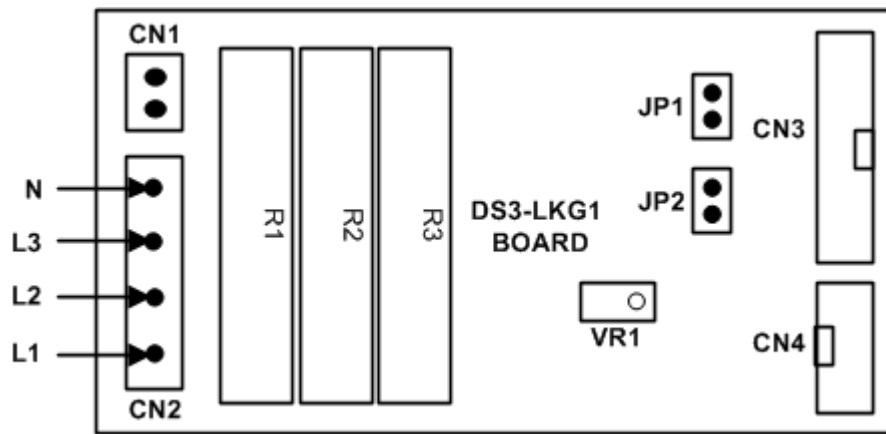
CN1 HF PWM Power supply input connector (not used)

CN2 DC leakage sense input connector		
1	L1 phase leakage sample	
2	not used	
3	L2 phase leakage sample	
4	not used	
5	L3 phase leakage sample	
6	not used	
7	Neutral sample	

CN3 DSPAN-03 Board connector

CN4 OPT03 Board connector

Replacement of the DS3-LKG1 Board
There is no different component on this board according to different power ranges and models you can give only board name during order.

DS3-PAR board is optional if parallel UPS system will be used this board must be installed into the each UPS in parallel system.

Board Functions:
 • Provides communication in parallel UPS system
 • Isolates UPS to UPS parallel communication signals
 • Interfaces parallel communication signals ,prevents noise interference

DS3-PAR Board special components	
R17	1. data line load resistor
R18	2. data line load resistor
D3	ISO2 power supply control lamp
D4	ISO1 power supply control lamp

DS3-PAR Board test points	
TP1	ISO2 power supply ground
TP2	ISO1 power supply ground
TP3	1. data line test point B
TP4	1. data line test point A
TP5	2. data line test point A
TP6	2. data line test point B
TP7	ISO1 power supply + 5 volts
TP8	ISO2 power supply + 5 volts
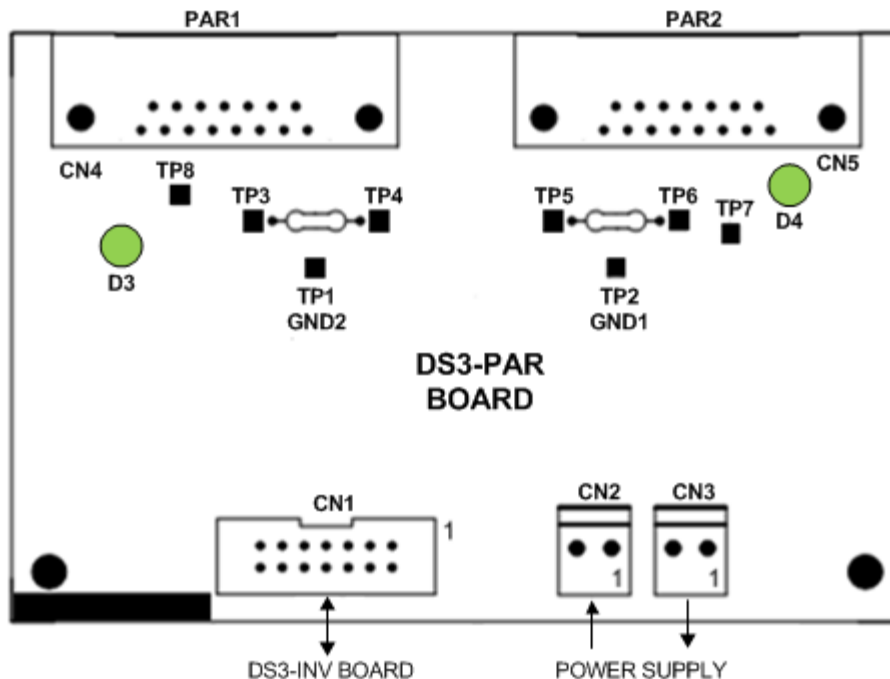
CN1 DS3-INV Main control board connection connector pins	
1	2.data line RX signal
2	2.data line TX signal
3	Main board ground
4	1.data line RX signal
5	1.data line TX signal
6	1.data line direction
7	Main board ground
8	1.parallel connector plugin sense
9	Main board +5 volt supply
10	Main board ground
11	not used
12	not used
13	2.parallel connector plugin sense
14	2.data line direction

CN2 – HF power supply connector pin functions		
1	HF power supply input	Can not measure
2	HF power supply input	Can not measure

CN3 – HF power supply connector pin functions		
1	HF power supply input	Can not measure
2	HF power supply input	Can not measure

CN4 – PARALLEL communication connector	
1	1.data line B signal
2	ISO2 supply ground
3	1.data line A signal
4	not used
5	not used
6	2.data line A signal
7	ISO1 supply ground
8	2.data line B signal
9	not used
10	not used
11	not used
12	not used
13	not used
14	ISO2 supply +5 volt output
15	PAR1 connector plugin sense input

CN5 – PARALLEL communication connector	
1	1.data line B signal
2	ISO2 supply ground
3	1.data line A signal
4	not used
5	not used
6	2.data line A signal
7	ISO1 supply ground
8	2.data line B signal
9	not used
10	not used
11	not used
12	not used
13	not used
14	ISO1 supply +5 volt output
15	PAR2 connector plugin sense input

Replacement of the DS3-PAR Board
There is no different component on this board according to different power ranges and models you can give only board name during order.
After replacement there is no need to any adjusment

FRONT PANEL OPTIONS

Front panel module functions
- Drives 4x20 characters LCD alphanumeric panel
- Drives optional graphical LCD front panel
- Controls the front pane button functions
- Controls the mimic panel lamps
- Sends fro panel commands to the related modules
- Sends adjustments from front panel to related modules
- Sends RS232 commands and adjustments to other modules
- Creates alarm messages
- Supports MEGATEC communication protocol
- Supports T-MON commnunication protocol
- Records alarms and theie dates and times
- Controls RTC clock
- Manages dry contact alarm relays
- Manages temperature sensors
- Manages operating and maintenance hourmeters
- Manages optional interface board functions
- Manages interactive battery switch
- Manages REPO input
- Manages sound buzzer functions
- Supports SNMP adaptör protocol
- Supports MODBUS adaptör protocol
- Manages remote monitöring panel
- Communicates with **Device calibrator plus** software
- Sends logs to the outside World over RS232 port
- Sends fault profile over RS232 port

All front panel applications are as follows:

- 4x20 alphanumeric LCD ,5 buttons ,mimic panel (standart)
- 4x20 alphanumeric LCD,5 buttons and option board (optional)
- Graphical LCD panel ,5 buttons (optional)
- Graphical LCD touch panel (optional)

Standart panel is 4x20 characters LCD other configurations are available for special order.

The following options are available for front panel

Alphanumeric 4x20 characters alphanumeric front panel application

This application is standart for DS|POWER series UPS
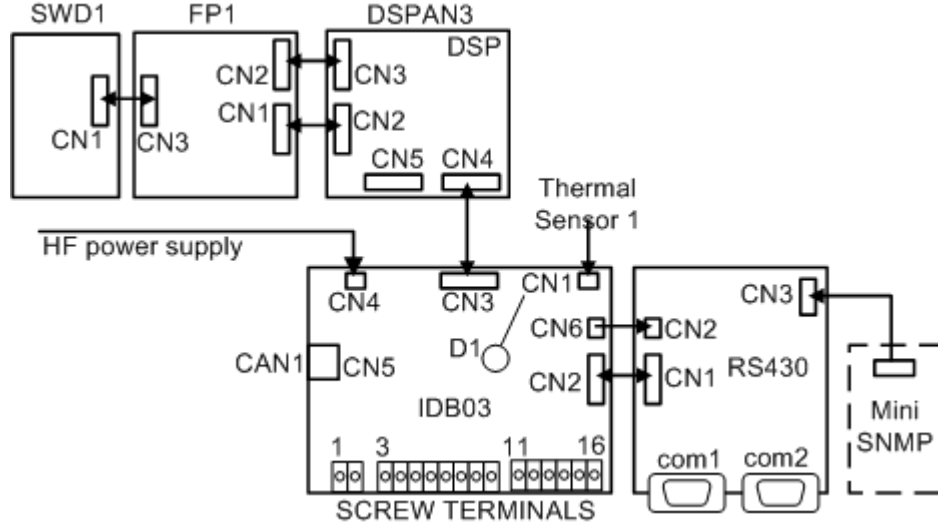
Uygulama ile cihazda elde edilen kullanıcı arabirimleri aşağıda listelenmiştir:

a) **2 RS232 serial ports**
b) **Optional SNMP adaptör support**
c) **Optional MODBUS adaptör support**
d) **Remote monitoring panel support**
e) **1 interactive battery switch position sense input**
f) **1 interactive battery switch coil drive output**
g) **1 REPO stop input**
h) **1 generator set sense input**
i) **1 external temperature sensor input**
j) **3 function programmable relay outputs**
k) **4 x20 character LCD alphanumeric panel**
l) **5 control buttons**
m) **Mimic panel lamps**
n) **Sound buzzer**
o) **MEGATEC protocol support**
p) **T-MON protocol support**

Alphanumeric 4x20 characters LCD panel and optional interface board application

This application is good for some automation and during UPS order you must order this option.
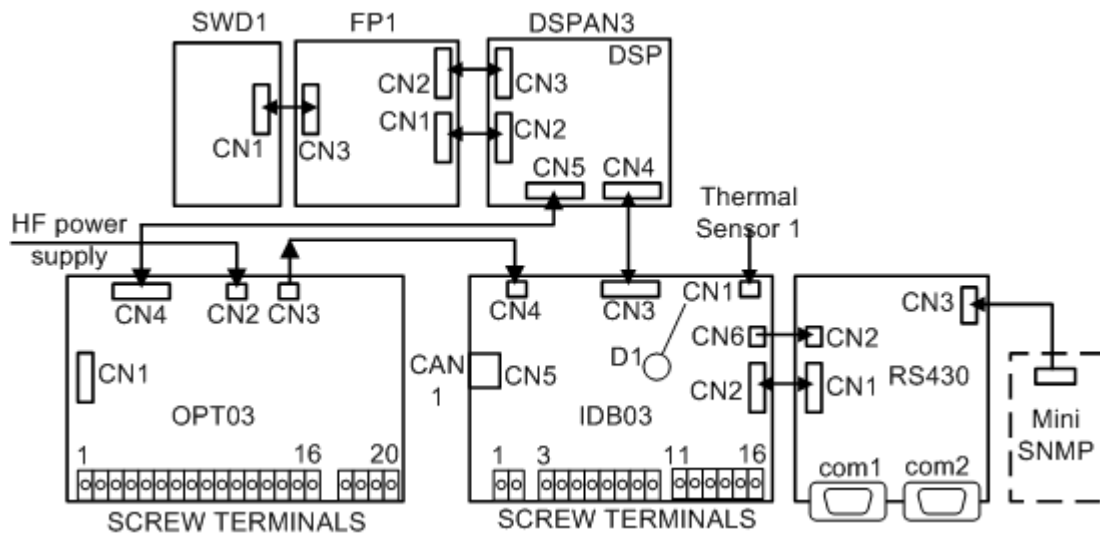
With option board the follwing functions are available

a) **2 RS232 serial ports**
b) **Optional SNMP adaptor connection**
c) **Optional MODBUS adaptör connection**
d) **Remotre monitoring panel**
e) **1 interactive battery switch position sense input**
f) **1 interactive battery switch coil drive output**
g) **1 REPO button input**
h) **1 optional external temperature sensor**
i) **1 generator set sense input**
j) **2 digital autoımation inputs**
k) **3+8 function programmable relay outputs**
l) **4 lines 20 characters LCD alphanumeric panel**
m) **5 control buttons**
n) **Mimic panel lamps**
o) **6 analog inputs**
p) **Sound buzzer**
q) **MEGATEC protocol support**
r) **T-MON protocol support**

The main power supply is PWM waveform output ,these PWM goes to each PCB board seperately. Each board has its own isolation transformer and it converts PWM signal to DC these structure prevents interferance between boards.

Topology 1 –IPM– CPC02 Board type application power supply distrubution
At early versions of the DS|POWER series CPC02 DC BUS charge board is used at this type of application the following figüre shows power supply distribution.
Note : At topology 1 , 6 SCR's,1 output contactor for bypass and batteries are connected to DC BUS directly.
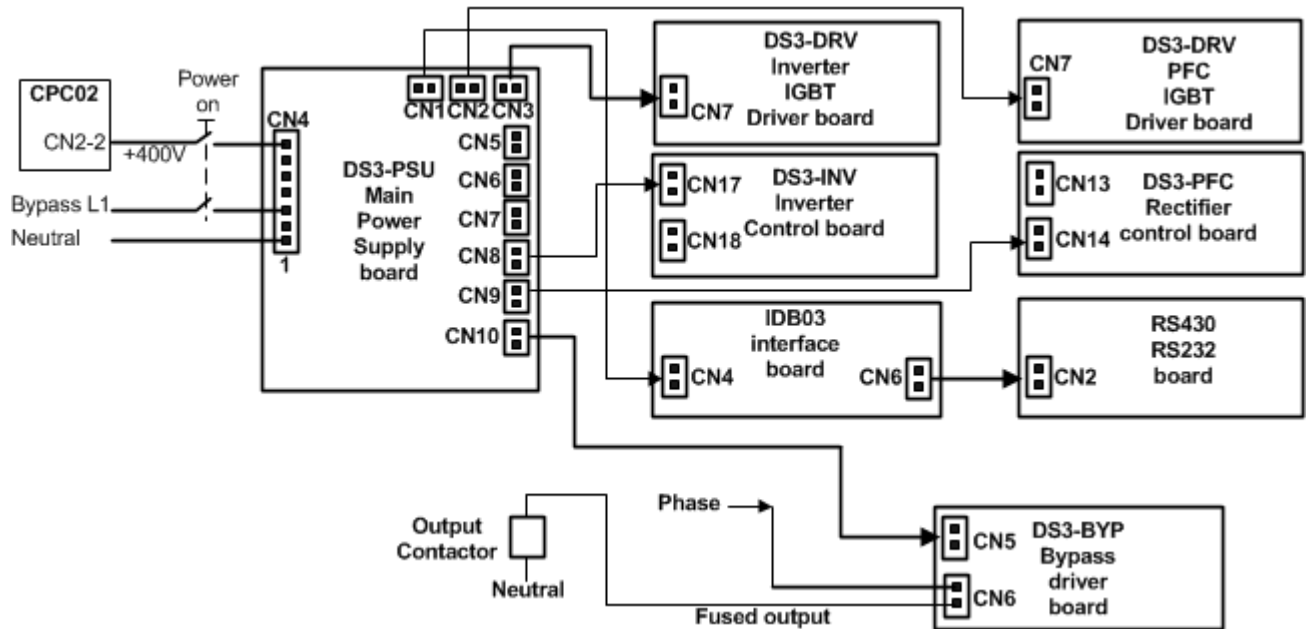
WARNING ! During board replacement please make power supply connections according to the figure

Firmware update directions

DS3-INV or DS3-PFC board DSP chips are located on small DPIM-1 DSP board if firmware update is required new DPIM-1 board will be replace.
Update reasons
- DSP chip is burned out
- New DSP firmware software is in progress

Maket he following while DPIM-1 board replacement
- All adjustments are on DS3-INV or DS3-PFC board changing DPIM-1 board doesn't change adjustments.
- Turn off the UPS
- Turn off all switches <0>position
- Wait at least 2 minutes for DC BUS capacitor discharge
- Take off DPIM-1 board from DS3-INV or DS3-PFC board
- Check new DPIM-1 board is for inverter or rectifier
- Plug new DPIM-1 board on to the main board be carefull the board direction must be same
- WARNING ! All pins must be plugged in please check again