



GTEC UPS MODEL:

DISCOVERY

80 – 120 kVA

SERVICE MANUAL

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1 INTRODUCTION

This document provides an outline for the maintenance and/or troubleshooting of the Sentryum UPS series: S3T 80-100-120 kVA.



ALL OPERATIONS MUST EXCLUSIVELY BE CARRIED OUT BY QUALIFIED AND TRAINED PERSONNEL.

2 SWITCHING THE UPS ON/OFF

Read the User manual (code 0MNS3TK80RUENU...) before carrying out any operations on the UPS, in particular refer to the *OPERATIVE PROCEDURES* section for:

2.1 SWITCHING OFF THE UPS WHILST DELIVERING POWER TO THE LOAD

Refer to “*SWITCHING THE SYSTEM FROM ON-LINE TO MANUAL BYPASS*”.

2.2 SWITCHING OFF THE UPS WHILST CUTTING OFF THE POWER SUPPLY TO THE LOAD

Refer to “*SYSTEM OFF COMMAND*”.

Open SWOUT, an eventual external battery switch, SWIN, SWBYP (if present) to shut down the display.

2.3 RESTARTING THE UPS

Refer to “*RESTORE THE ONLINE MODE AFTER MANUAL BYPASS*” or “*SYSTEM ON DIRECT COMMAND*”

2.4 STARTING THE UPS FROM THE BATTERY

Refer to “*SYSTEM ON COMMAND VIA BATTERY (COLD START)*”

Important: this type of start-up should only be carried out if mains power is down and ONLY with the SWMB switch open. Start-up with the SWMB closed is only possible on UPS with a separate bypass option and where the bypass line is present.

NOTE: the minimum voltage for battery start-up is 212Vdc (10,6V for monoblock).

3 SOFTWARE OPERATIONS

3.1 SOFTWARE UcomS3

UComS3 is the package of applications for the advanced configuration and analysis of log files and real-time diagnostics for UPS belonging to the Sentryum series.

Communication between PC and UPS, for the applications that require it, takes place via USB or the serial communication port RS232 (RJ-10 connector).

For proper communication of the PC with the UPS it is required loading the FTDI driver.

The driver is downloadable from FTDI website at the following link:

<https://ftdichip.com/drivers/vcp-drivers/>

The package is currently comprised of seven different applications:

- S3Download – History Downloader
- S3History – History Analyzer
- S3Event – Event Analyzer
- S3RealTime – Status Analyzer
- S3Debug – UPS Debugger
- S3Config – Configurator
- S3setModel – UPS Settings

3.2 SAVING THE UPS LOG FILE

This activity should be performed before any operation is carried out on the UPS.

To save the log file use the History Downloader application provided with the UcomS3 software.

3.3 CONFIGURING THE UPS

To configure the UPS, use the dedicated S3Config of the UcomS3 software.

3.4 UPDATING DSP AND DISPLAY FIRMWARE

In order to update the DSP firmware, the dedicated "**DSPFLASH 2.06**" programming software (or later version) must be used to program the DSP. For the display, the upgrade software is available along with the firmware file.

For the instructions for these applications refer to the:

- **RM034 Revxx-EN (Firmware Upgrade) ****
- **IT-DSPFlash 2 REV.xx (User Manual) ****

* Rev04 or later version

** Rev01 or later version

The firmware to be used is listed below (Tab.1):

UPS family	DSP Firmware code	DISPLAY Firmware code
S3T 80-100-120 kVA	FW098-xxxx	FW079-xxx

Tab. 1

3.5 S3SETMODEL

S3SetModel is a software included in the UcomS3 package used to correctly configure the **6R_SU0275-03x** spare part (S3T Control Card).

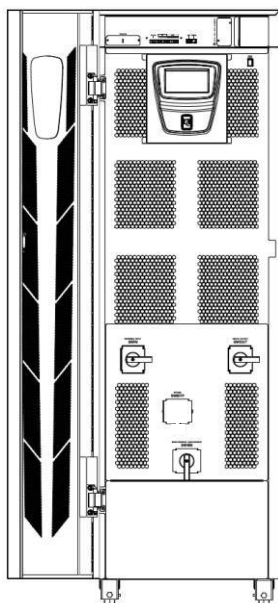
For the complete procedure refer to chap.12.2

4 UPS INTERNAL STRUCTURE

For further details, see the User manual code 0MNS3TK80RUENU..., the Installation manual code 0MNS3TK80RUEN... and the wiring diagrams, code:

- SBS3T_80-120_...

4.1 UPS MODEL



SINGLE INPUT VERSION

Fig. 1

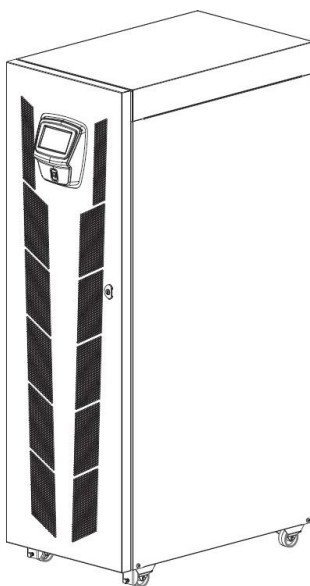
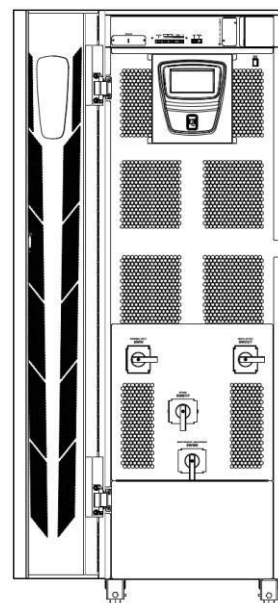


Fig. 2



DUAL INPUT VERSION

Fig. 3

The Sentryum UPS 80-100-120 is available in one version of chassis. It can be divided into single input or dual input version.

MODEL	SIZE WxDxH [mm]	CONNECTIONS SECTION
S3T 80-100-120	500x830x1600	Bottom (front)

Tab. 2

4.2 GENERAL DESCRIPTION

The Sentryum series is a transformerless UPS. The 80-100-120 kVA version has three-phase input and three-phase output, named S3T.

It is built by:

1. A control section that includes the logic Control board (B0275), the Communication board (B0274) and the Parallel board (B0229 – Optional). These boards are common to all the Sentryum UPS except for the B0275 board which has its only specific version. In addition, this section includes the Signal adapter board (B0415) which divides the control signals to the power section.
2. The power section is referred to a single phase. There are three separate power sections for the three phases on the UPS. Each section is composed by:
 - Input board (B0418 for S3T 80-120kVA);
 - Output AC cap. board (B0440 for S3T 80-120kVA);
 - Power DC cap. board (B0420 for S3T 80-120kVA);
 - Output board (B0419 for S3T 80-120kVA).
3. The auxiliary power supply section is located in the upper right side and includes:
 - Aux. Power supply board (B0273 for S3T 80-120kVA);
 - Adapter Aux PS board (B0416 for S3T 80-120kVA);
 - Fan PS board (B0212 for S3T 80-120kVA);
4. The Battery charger section located in the right lower part of the UPS, which includes the Battery Charger board (B0346).
5. The contactor section: the lower part of the UPS includes the input and output contactor and the Input AC cap. board (B0441).
6. The switched and connection section that includes the switches, the bars to connect the power cables and the filter boards (B0442).
7. A display section: that includes the led logo board (B0305) and the display board (B0306).

4.3 THE SECTIONS INSIDE THE UPS.

Inside this paragraph, are introduced the single boards and the parts that compose the UPS.

4.3.1 CONTROL SECTION

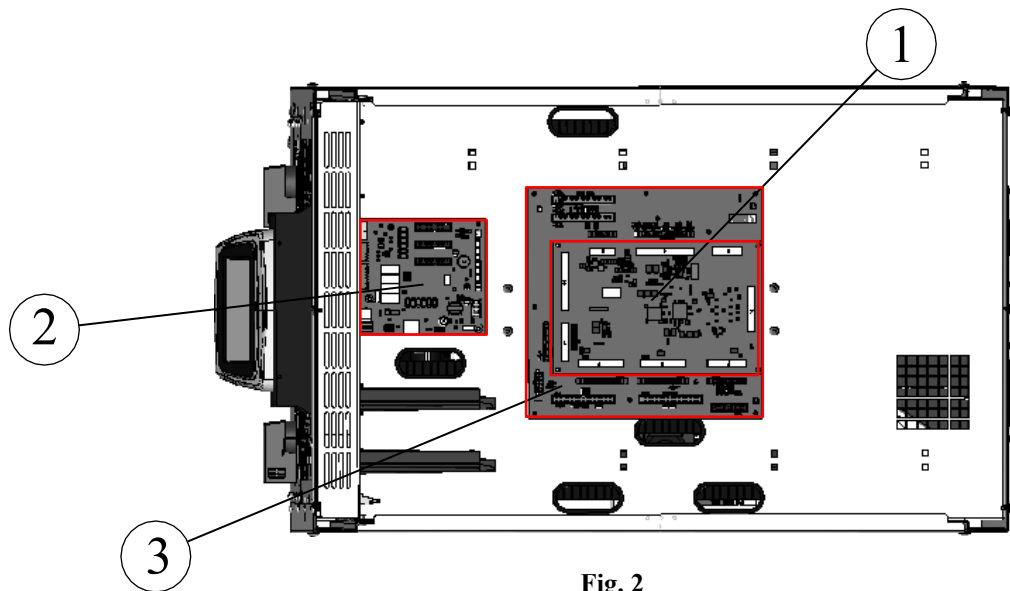


Fig. 2

1	Control Board	B0275-03
2	Signal Adapter Board	B0415-01
3	Communication Board	B0274-01

Tab. 3

4.3.2 POWER SECTION

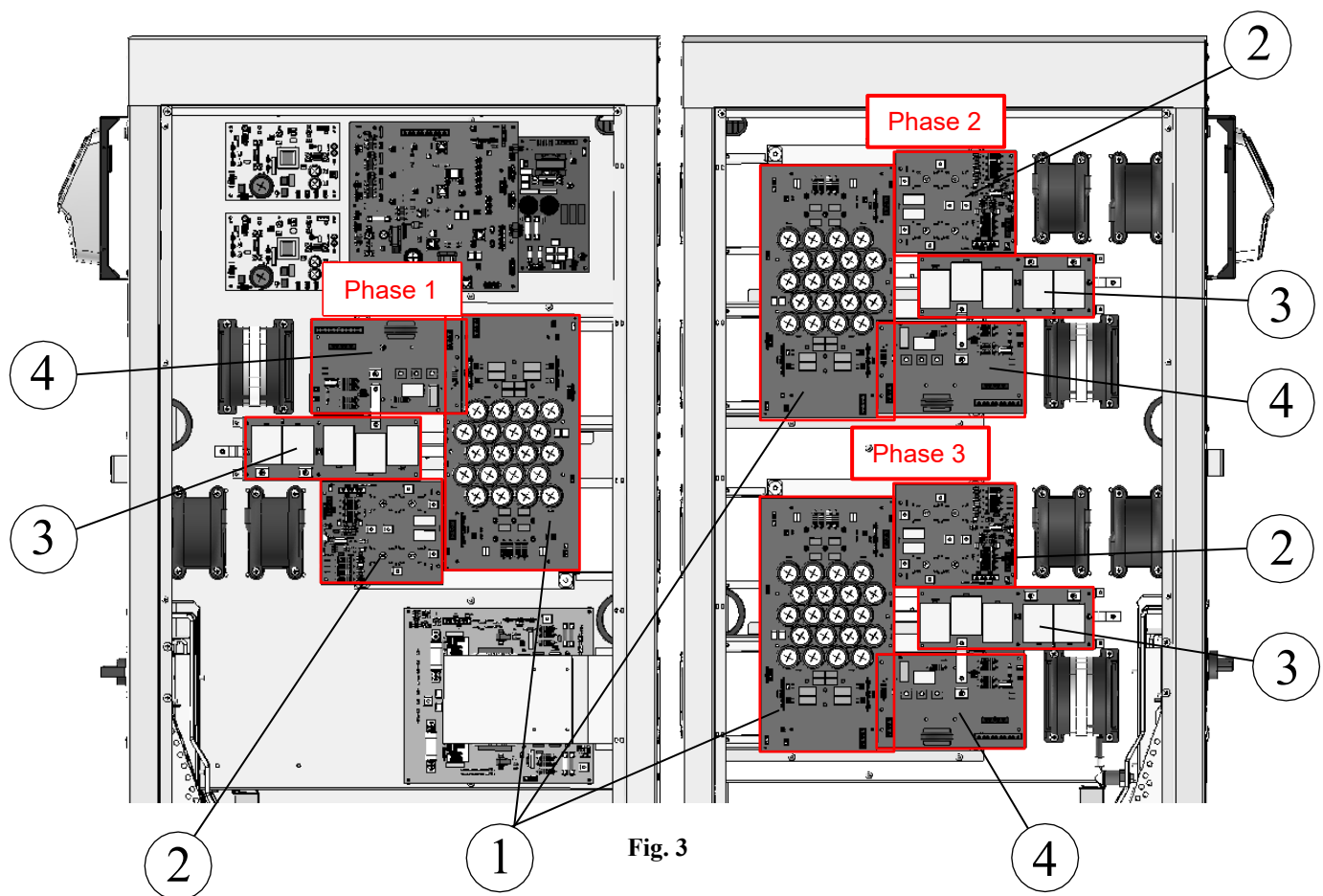


Fig. 3

1	Power DC Cap Board	B0420-0x
2	Input Board	B0418-0x
3	Output AC Cap Board	B0440-0x
4	Output Board	B0419-02

Tab. 4

4.3.3 AUX. POWER SUPPLY SECTION

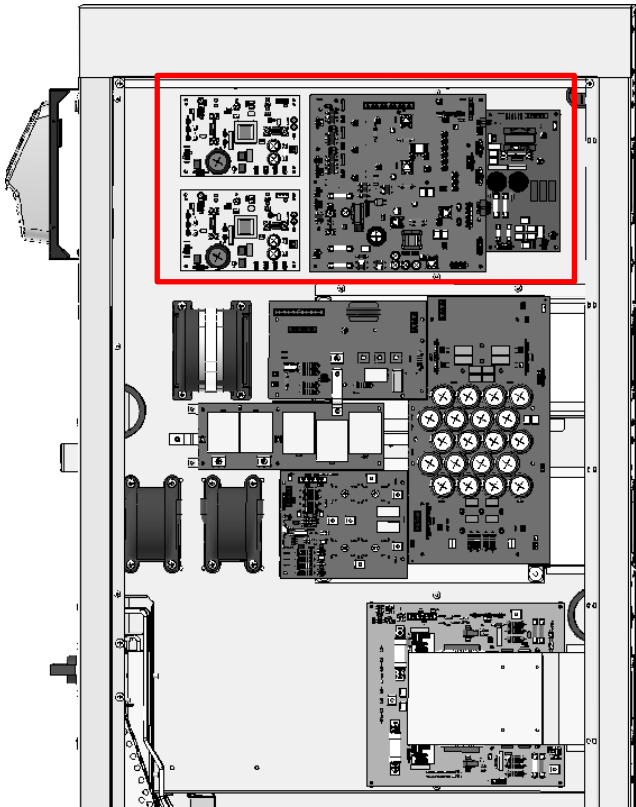


Fig. 4

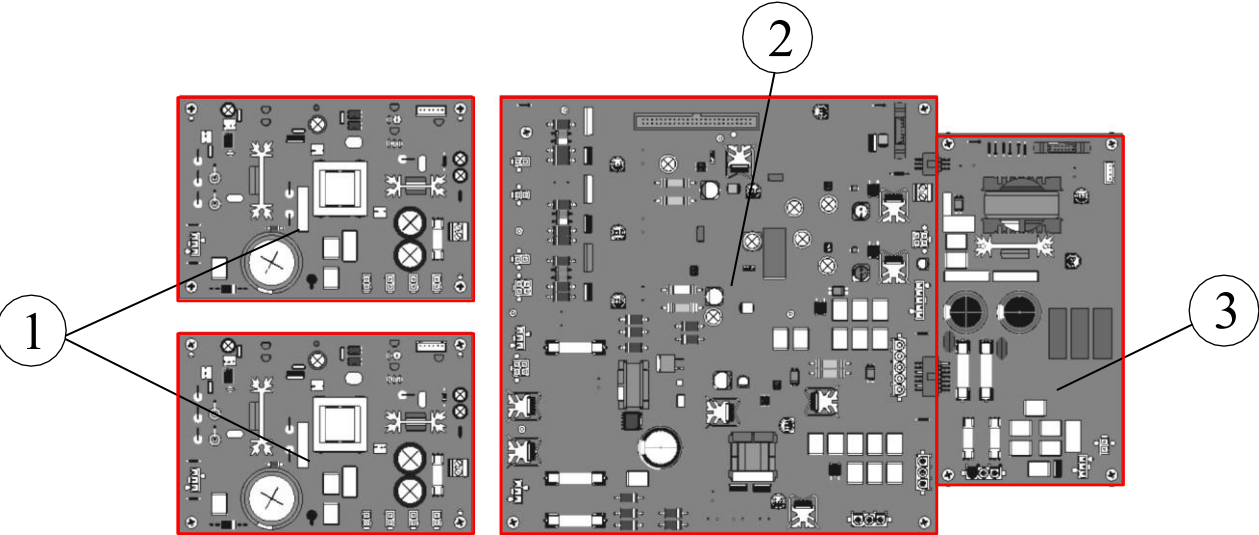


Fig. 5

1	Fan PS Board	B0212-02
2	Adapter Aux PS board	B0416-01
3	Aux. Power Supply board	B0273-01

Tab. 5

4.3.4 BATTERY CHARGER SECTION

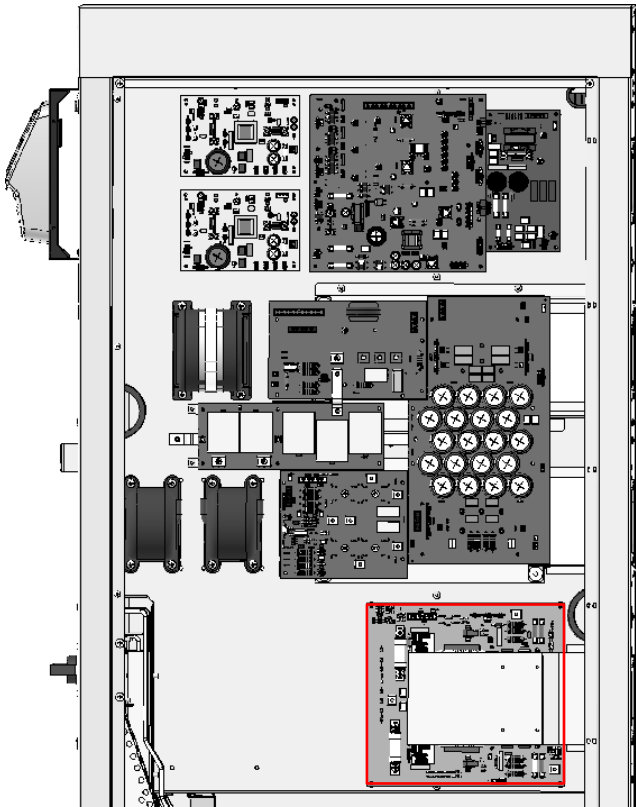


Fig. 6

1	Battery Charger Board	B0436-01
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Tab. 6

4.3.5 CONTACTOR SECTION

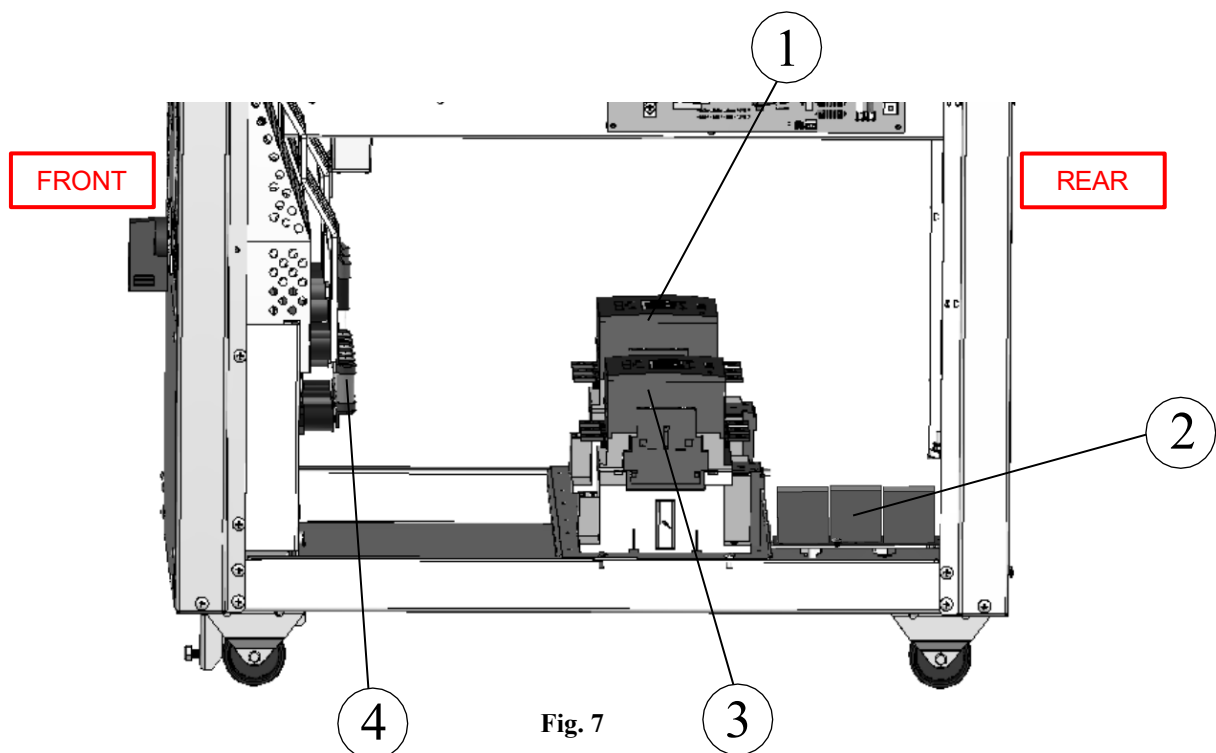


Fig. 7

1	Input Contactor	060104004x
2	Input AC Cap Board	B0441-01
3	Output Contactor	060104004x
4	Fuses on bars	IN / BATT / OUT

Tab. 7

4.4 FUSE LIST

4.4.1 INPUT / OUTPUT FUSES (REAR POWER BARS)

UPS SIZE	POSITION	FUNCTION	FUSE SIZE	FUSE TYPE	CODE
80kVA	L1, L2, L3	IN / OUT fuses	40x23x95	160A 660V aR	060201A024
100kVA	L1, L2, L3	IN / OUT fuses	40x23x95	200A 690V aR	060201A042
120kVA	L1, L2, L3	IN / OUT fuses	40x23x95	250A 660V aR	060201A023

Tab. 8

4.4.2 BATTERY FUSES (REAR POWER BARS)

UPS SIZE	POSITION	FUNCTION	FUSE SIZE	FUSE TYPE	CODE
80kVA	3x (BATT- , BATT+)	Battery fuses	40x23x95	100A 500Vdc Fast	0602010089
100kVA	3x (BATT- , BATT+)	Battery fuses	40x23x95	125A 690V aR	0UL602010008
120kVA	3x (BATT- , BATT+)	Battery fuses	40x23x95	160A 660V aR	0UL602010007

Tab. 9

4.4.3 BYPASS FUSES (REAR POWER BARS)

UPS SIZE	POSITION	FUNCTION	FUSE SIZE	FUSE TYPE	CODE
80kVA 100kVA 120kVA	L1, L2, L3	By. reading fuses	6,3x32	10A 240V Fast	0602010140
80kVA 100kVA 120kVA	L1, L2, L3	By. fuse Phx	100x67x28	400A 690Vac aR	0602010215

Tab. 10

4.4.4 AUXILIARY POWER SUPPLY BOARD (B0273-01)

UPS SIZE	POSITION	FUNCTION	FUSE SIZE	FUSE TYPE	CODE
80kVA 100kVA 120kVA	F1, F3	AC fuses	5X20	3.15A 250V GF	0602010047
	F2, F4	DC fuses	6.3x32	2A 500V GF	0602020066

Tab. 11

5 PRINCIPLE ELECTRICAL DIAGRAM

On the schematic the reading points of the logic board are highlighted. The position of those points would be very helpful in case of any problem with the unit, in particular for the fault detection (refer to chapter 10 for the map of main readings).

The **Fig. 8** shows the whole operation of the UPS through the schematic of a single phase. The internal hardware is designed as a triplication of a single-phase structure, each one including:

- The input stage with the rectifier diodes and battery SCR.
- The power stage with the PFC (Power Factor Correction) module, the electrolytic capacitors and the three-level type of NPC (Neutral Point Clamped) inverter module.
- The output stage with the bypass SCR module.

The $VDC\pm$ readings are shown as a simplification on the schematic. There are three reading points, one on each Power DC cap board (B0420).

The PFC and inverter temperatures of each phase are monitored by the NTC located on each heatsink.

To detect the under/over temperature, the logic will consider the lowest/highest temperature among the three phases.

The temperature of the charger is also monitored by NTCs on the two heatsinks mounted on the B0436 board.

5.1 ELECTRICAL DIAGRAM – SINGLE PHASE OPERATION

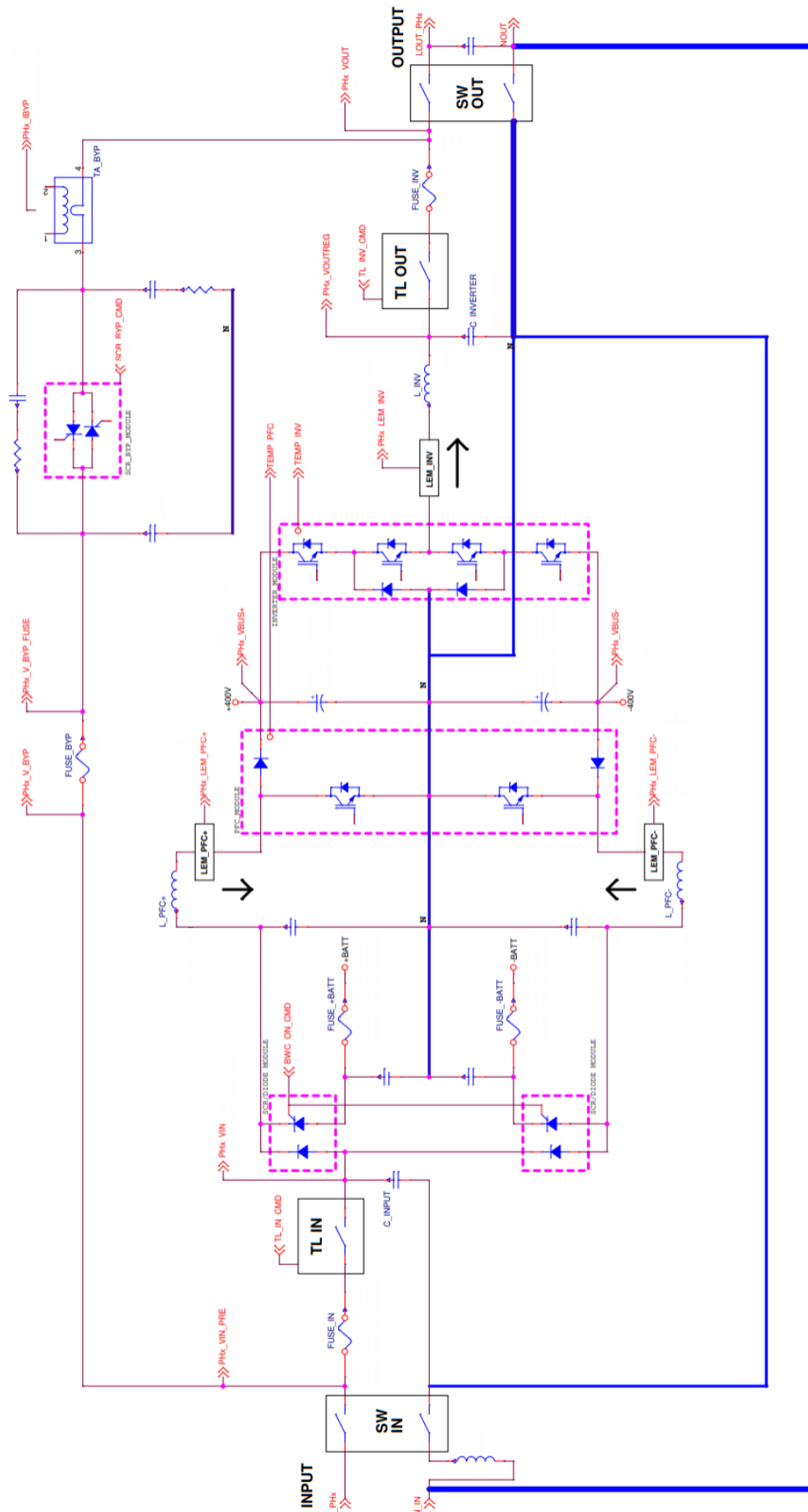


Fig. 8

6 DESCRIPTION OF THE BOARDS

6.1 FAN PS BOARD (B0212)

Version:

B0212-02 Fan PS board for S3T 80-120 kVA

Two identical Aux. fan boards are installed in the UPS, one above the other.

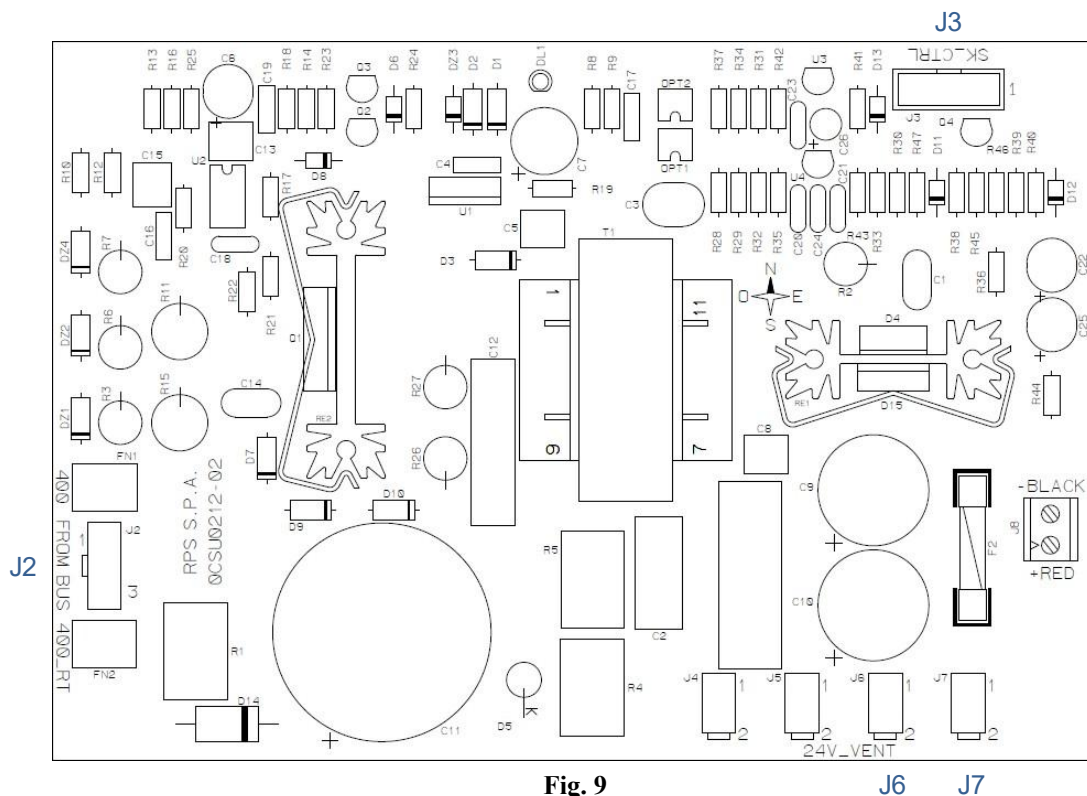


Fig. 9

Connector	Description	Note
J2	Connector to Adapter Aux PS Board	To * of B0416-01
J3	Jumper	Installed only in the upper B0272-02
J6	Connector to Adapter Aux PS Board	To ** of B0416-01
J7	Connector to Adapter Aux PS Board	To ** of B0416-01

Tab. 12

* J2 of the upper board B0212-02 is connected to J14 of B0416-01

* J2 of the lower board B0272-02 is connected to J20 of B0416-01

** J6 and J7 of the upper board B0212-02 are connected to J12 of B0416-01

** J6 and J7 of the lower board B0272-02 are connected to J16 of B0416-01

Pinout connectors:

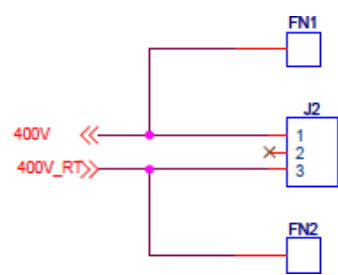


Fig. 10

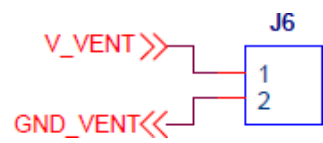


Fig. 11

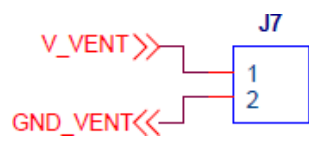


Fig. 12

6.2 AUX. POWER SUPPLY BOARD (B0273)

Version:

B0273-01 Aux. Power Supply Board

In this board there is:

1. Auxiliary power supply section (Flyback);
2. 25V - Step-down for fans (NOT USED on S3T 80-120);
3. Cold start section;
4. Precharge relays (RL1 and RL2 from batteries, RL3 from mains);
5. Precharge resistors.

Auxiliary power supply generates 18V (general), 25V for the B0416 board and 12V for internal board use (integrated).

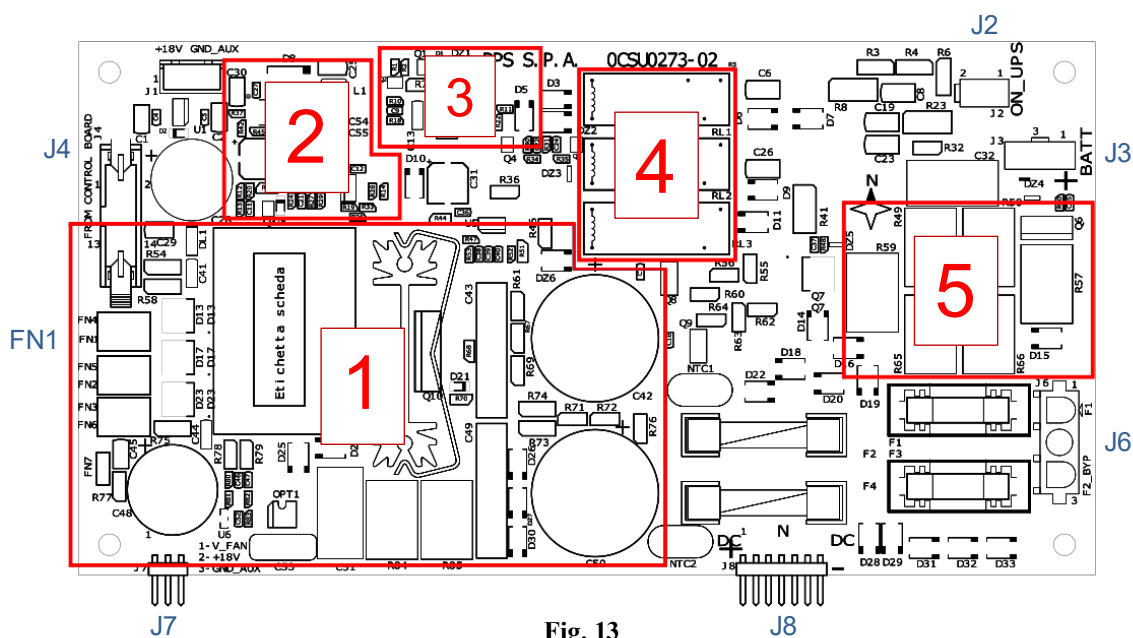


Fig. 13

Connector	Description	Note
FN1	Connector from Adapter Aux PS Board	From FN2 of B0416-01
J1	/	Not used
J2	Connector from Cold Start SW	
J3	Connector from Power DC Cap board (PH1)	From B0420 (PH1)
J4	Connector from Adapter Aux PS Board	From J2 of B0416-01
J7	Connector from Adapter Aux PS Board	From J4 of B0416-01
J8	Connector from Adapter Aux PS Board	From J17 of B0416-01
J6	Power connector from Aux. Board	From J19 of B0416-01

Tab. 13

Pinout connectors:



Fig. 14

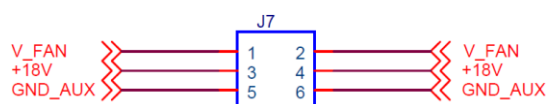


Fig. 15

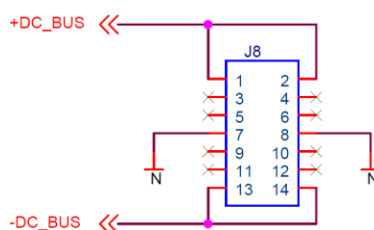


Fig. 16

6.3 COMMUNICATION BOARD (B0274)

Version:

B0274-01 Communication Board

In this board there is:

1. Redundant power supply section for Display and EPO;
2. Output relays;
3. Power supply protection section for the slots (J3, J4, J5);
4. Input opto.

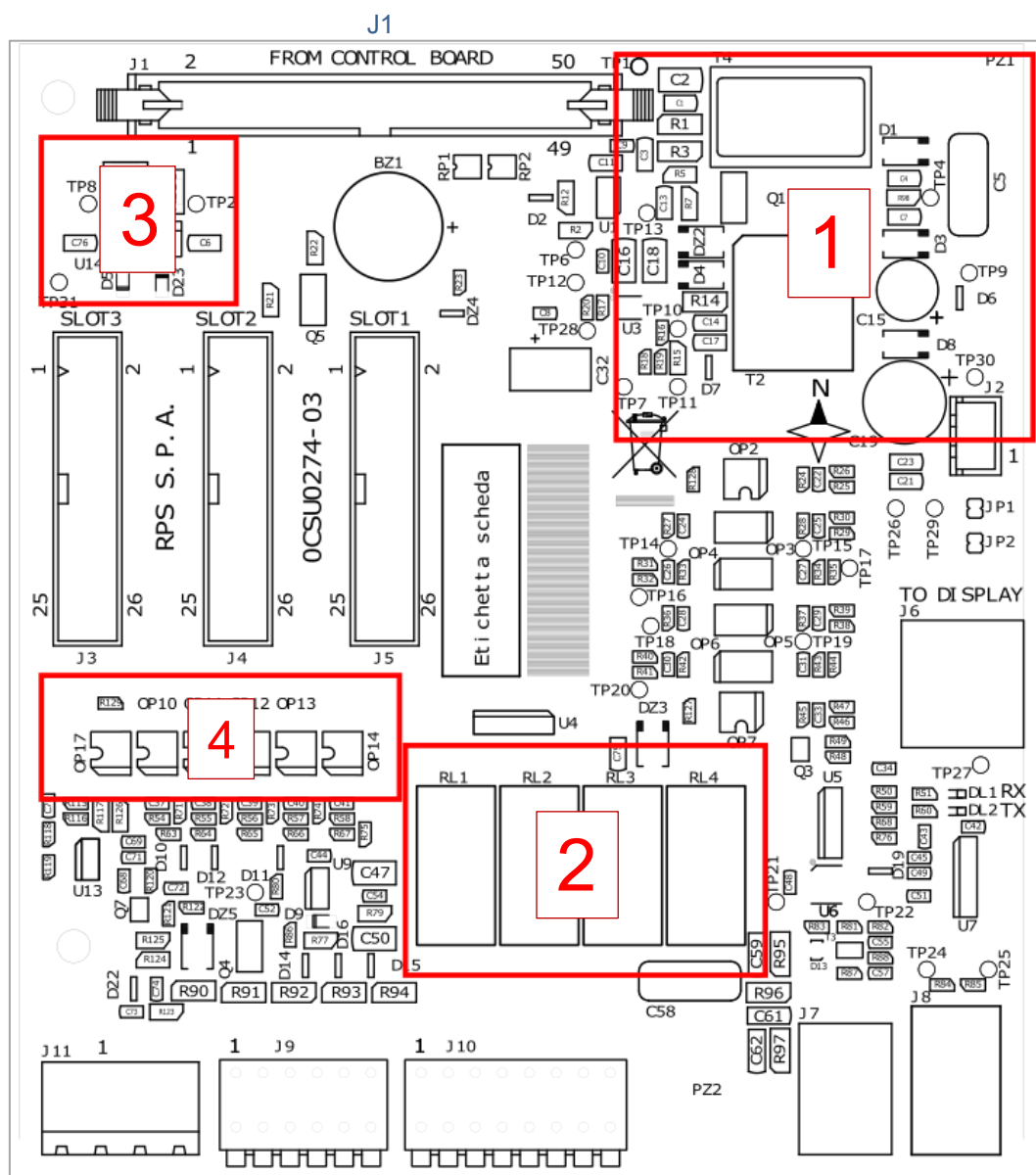


Fig. 17

Connector	Description	Note
J1	Flat connector from Control board	From B0275-03
J3, J4, J5	Slot for optional boards	(J3 is not used)
J6	Connector to display	RJ45 connect.
J7, J8	USB and Serial port RS232	
J9, J10	Auxiliary signal contacts	Input opto and output relay
J11	R.E.P.O. switch (remote emergency power off)	N.C. contact – 12±2 Vdc

Tab. 14

Pinout connector:

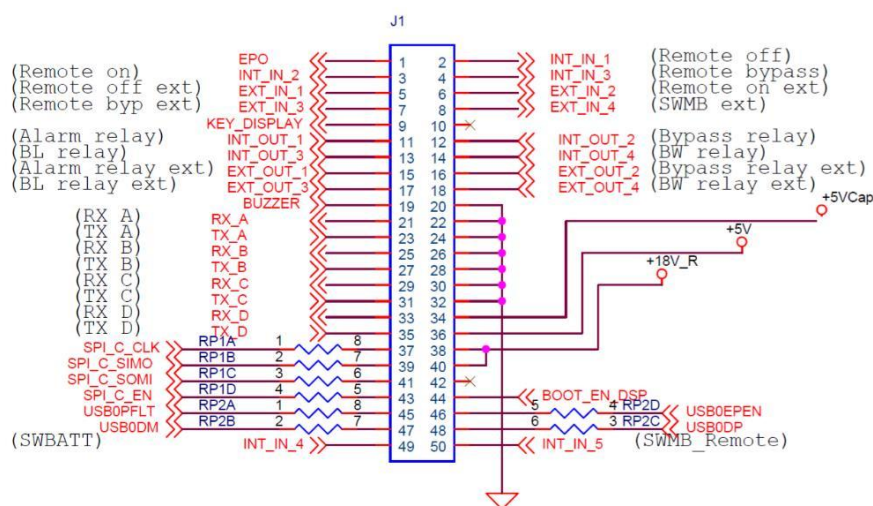


Fig. 18

6.4 CONTROL BOARD (B0275)

Version:

B0275-03 Control Board for S3T 80-120 kVA

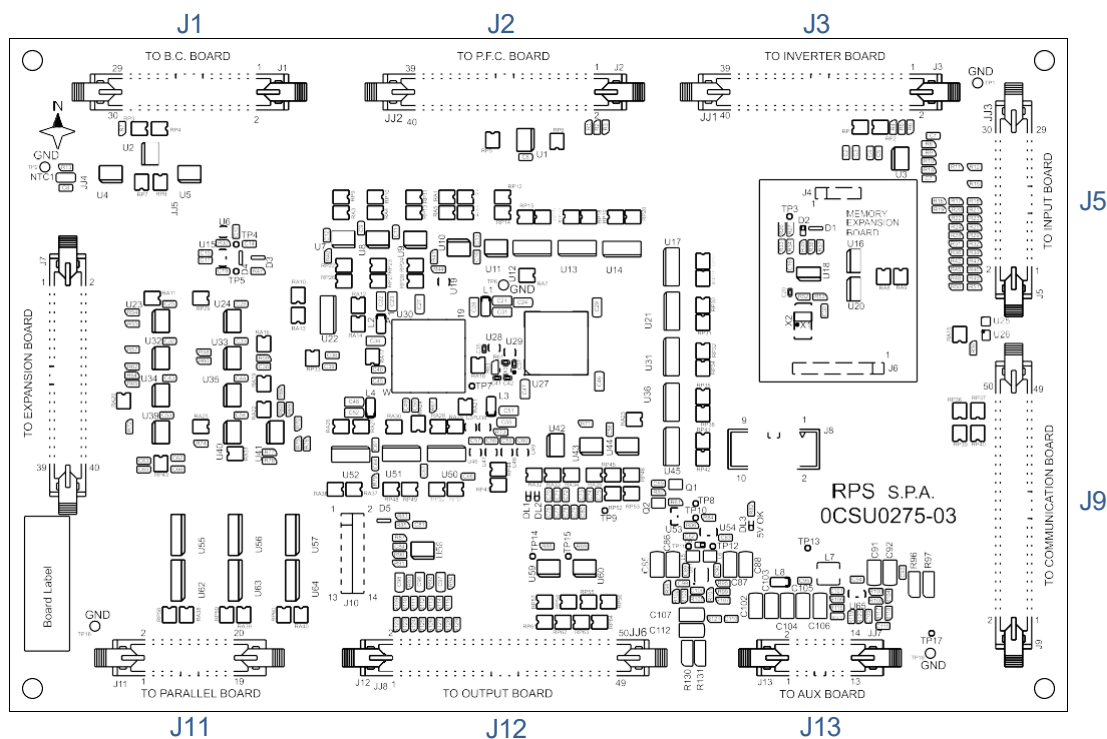


Fig. 19

Connector	Description	Note
J1	Flat connector from Adapt. Board	From J18 of B0415-01
J2	Flat connector from Adapt. Board	From J17 of B0415-01
J3	Flat connector from Adapt. Board	From J16 of B0415-01
J5	Flat connector from Adapt. Board	From J6 of B0415-01
J9	Flat connector from Communication board	From J1 of B0274-01
J11	Flat connector from Parallel board	Parallel Option
J12	Flat connector from Adapt. Board	From J4 of B0415-01
J13	Flat connector from Adapt. Board	From J5 of B0415-01

Tab. 15

6.6 LED NEUTRAL BAR BOARD (B0322)

Version:

B0322-01 Led Neutral bar board

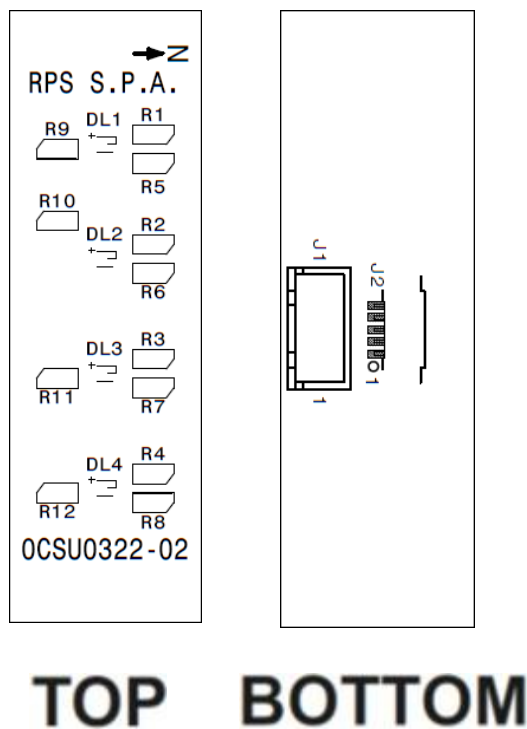


Fig. 21

Connector	Description	Note
J2	Connection to Display board	To J4 of B0306-01
J1	Arrangement for the connection to J4 of B0306	NOT USED

Tab. 17

6.7 DISPLAY BOARD (B0306)

Version:
B0306-01 Display board

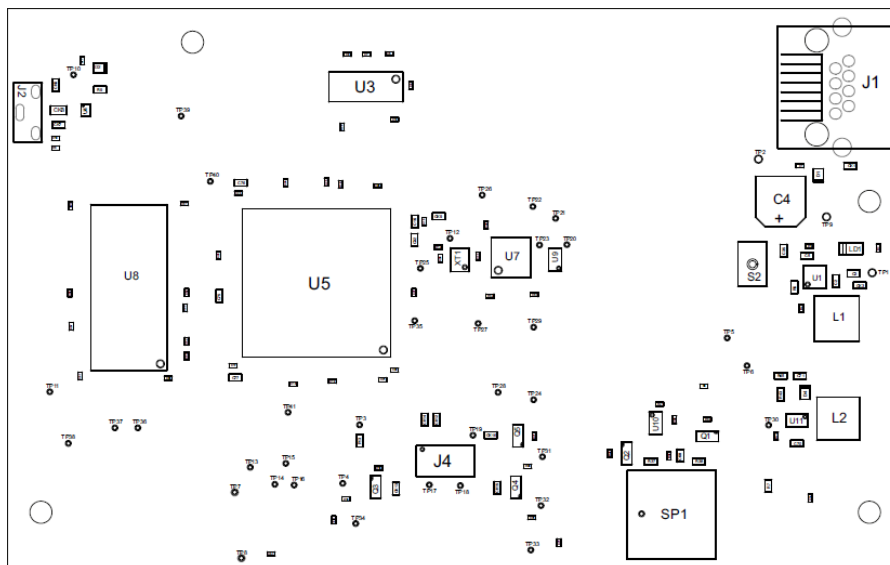


Fig. 22

Connector	Description	Note
J1	Connector UPS-display	RJ45
J2	Micro-USB connector	
J4	Connection from logo board or from Led neutral bar board	From J2 of B0305-01 or From J2 of B0322-01

Tab. 18

6.8 SIGNAL ADAPTER BOARD (B0415)

Version:

B0415-01 signal Adapter Board for S3T 80-120 kVA

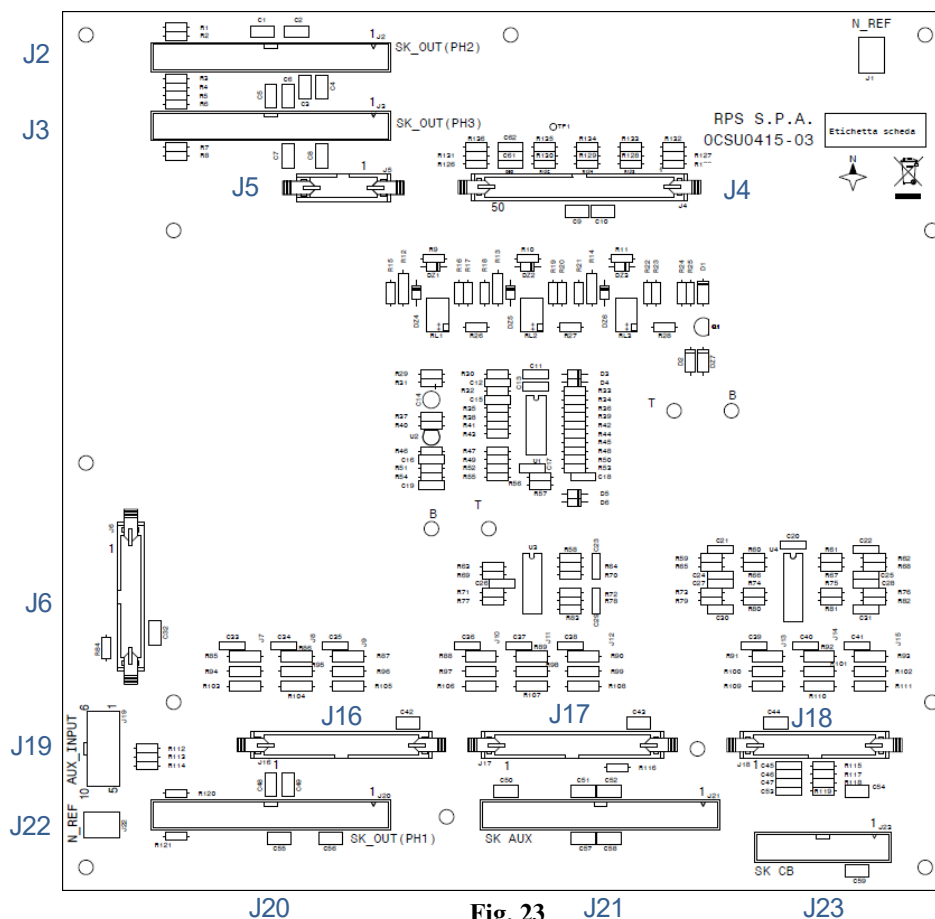


Fig. 23

Connector	Description	Note
J1	/	Not used
J2	Flat connector to Output board	To J1 of B0419-02 (PH2)
J3	Flat connector to Output board	To J1 of B0419-02 (PH3)
J4	Flat connector to Control board	To J12 of B0275-03
J5	Flat connector to Control board	To J13 of B0275-03
J6	Flat connector to Control board	To J5 of B0275-03
J16	Flat connector to Control board	To J3 of B0275-03
J17	Flat connector to Control board	To J2 of B0275-03
J18	Flat connector to Control board	To J1 of B0275-03
J19	Connector to SWMB/SWOUT switch and to external sync/batt temp.	
J20	Flat connector to Output board	To J1 of B0419-02 (PH1)
J21	Flat connector to Aux. board	To J1 of B0416-01
J22	Connector from Neutral bar	From OSBAU0365
J23	Flat connector to Battery charger board	To J3 of B0436-02

Tab. 19

6.9 ADAPTER AUX. PS BOARD (B0416)

Version:

B0416-01 Aux. Board for S3T 80-120 kVA

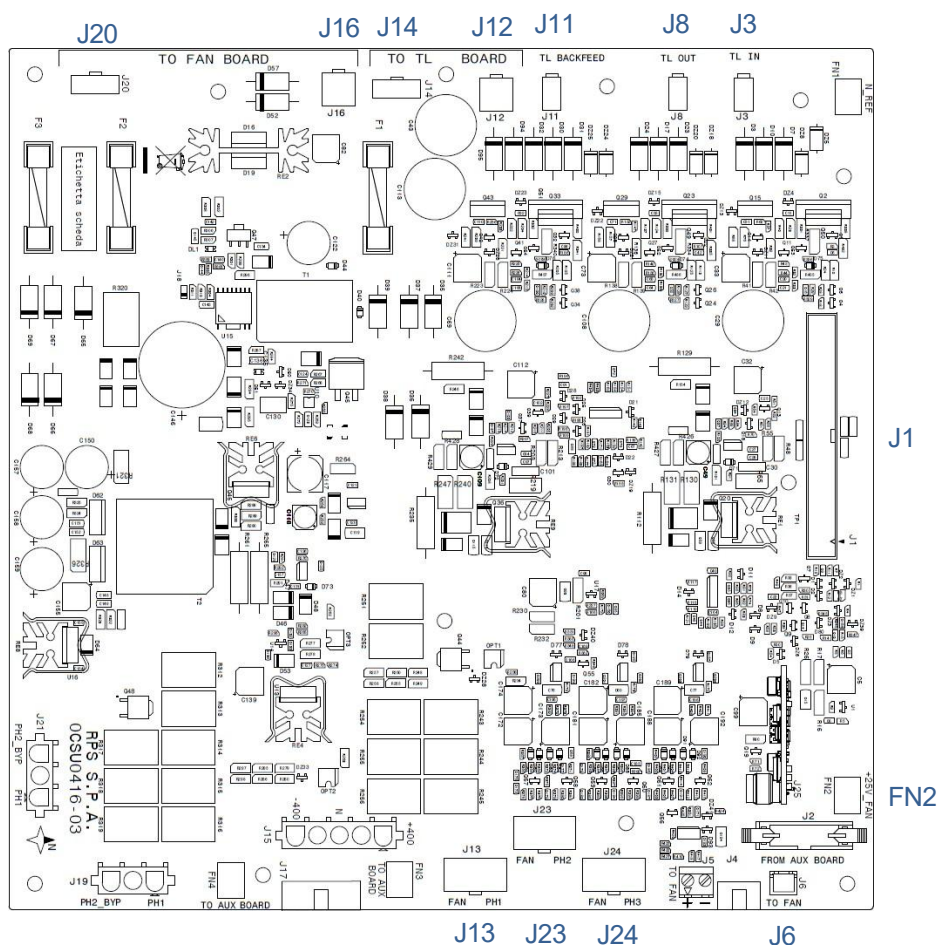


Fig. 24

Connector	Description	Note
FN2	Connector from Aux. power supply board	From FN1 of B0273-01
J1	Flat Connector from Signal adapt. board	From J21 of B0415-01
J2	Flat connector to Aux. power supply board	To J4 of B0273-01
J3	Connector to TL_IN and TL_OUT	/
J4	Connector to Aux. power supply board	To J7 of B0273-01
J5	Connector to AUX FAN	/
J12	Connector to Fan PS board	To J6 and J7 of B0212-02*
J13	Connector to Power DC cap. board	To J5 of B0420-0x (PH1)
J14	Connector to Fan PS board	To J2 of B0212-02*
J15	Connector from Power DC cap. board	From FN1-2-3 of B0420-0x (PH1)
J16	Connector to Fan PS board	To J6 and J7 of B0212-02**
J17	Connector to Aux. power supply board	To J8 of B0273-01
J19	Connector to Aux. power supply board	To J6 of B0273-01
J20	Connector to Fan PS board	To J2 of B0212-02**
J21	Connector from Input board PH1 and Output board PH2	From FN1 of B0418-0x (PH1) From FN2 of B0419-02 (PH2)
J23	Connector to Power DC cap. board	To J5 of B0420-0x (PH2)
J24	Connector to Power DC cap. board	To J5 of B0420-0x (PH3)

Tab. 20

* Upper board B0212-02

** Lower board B0212-02

Pinout connectors:

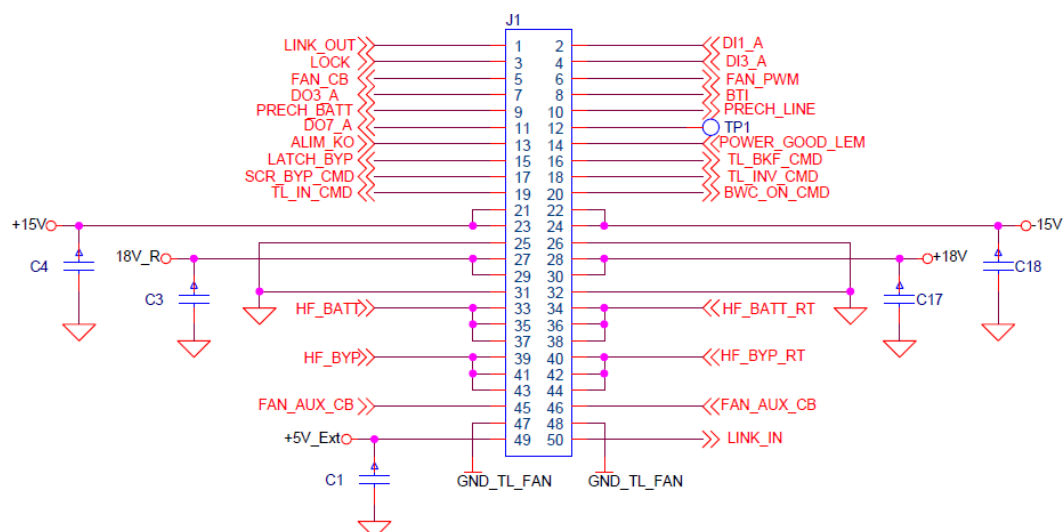


Fig. 25

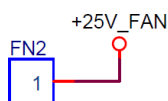


Fig. 26

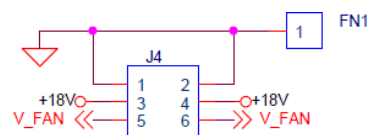


Fig. 27

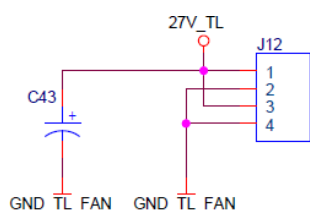


Fig. 28

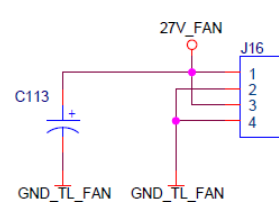


Fig. 29

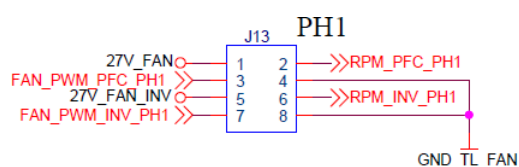


Fig. 30

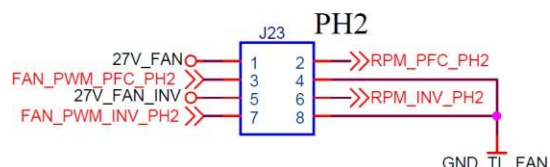


Fig. 31

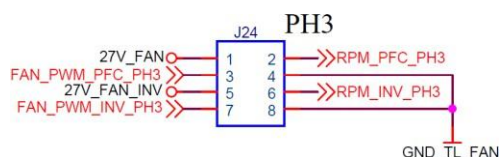


Fig. 32

Connector	Description	Note
J2	Flat connector to Output board	To J3 of B0419-02
J4	Flat connector to Power DC cap. board	To J14 of B0420-0x
FN1	Connector to Adapter Aux PS board PH1	To J21 of B0416-01 (PH1)
FN2	Connector to Power DC cap. board	To FN5 of B0420-0x
FN3	Connector Output board	To FN6 of B0419-02
FN4	Connector to Aux. power supply board (only for PH1)	To J3 of B0273-01
FN5	Connector to Aux. power supply board (only for PH1)	To J3 of B0273-01
RN2	Connector to Inductance Lup	/
RN3	Connector from battery fuse	positive
RN4	Connector from TL_IN	/
RN5	Connector from TL_IN	/
RN6	Connector from battery fuse	negative
RN8	Connector to Out AC Capacitor board	To RN2 of B0440-0x

Tab. 21

Pinout connectors:

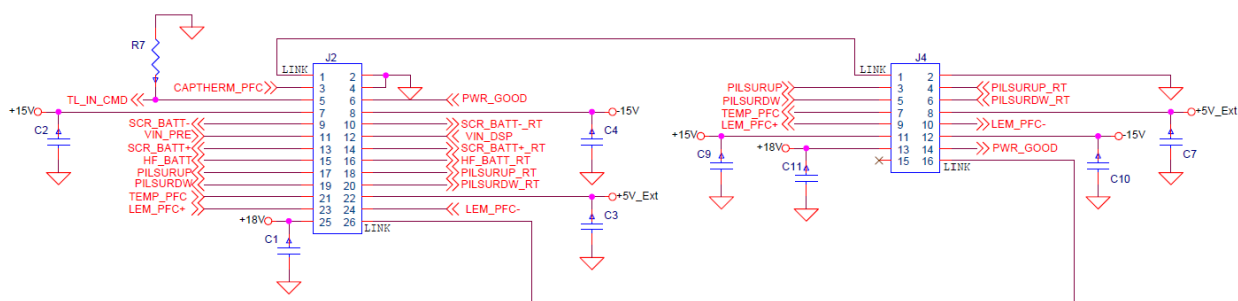


Fig. 34

6.11 OUTPUT BOARD (B0419)

Version:

B0419-01 Output Board for S3T 80 kVA

B0419-02 Output Board for S3T 100-120 kVA

Below this board there is:

1. Bypass SCR module

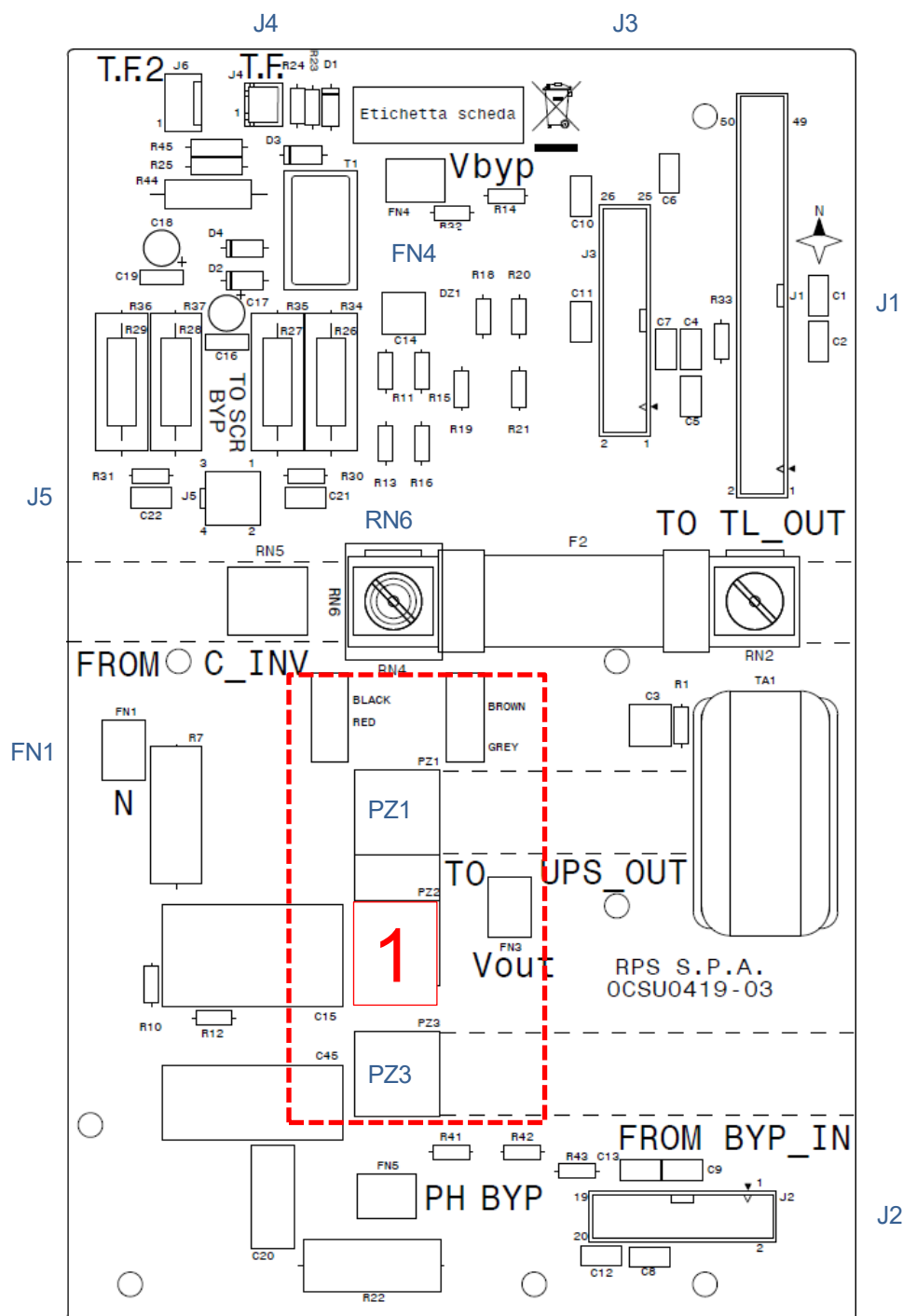


Fig. 35

Connector	Description	Note
J1	Flat connector from Adapt. board	From J20 of B0415-01
J2	Flat connector from Power DC cap. board	From J3 of B0420-0x
J3	Flat connector from Input board	From J2 of B0418-0x
J4	Connector from Out AC Cap board (PH1 and PH2)	From J1 of B0440-0x
J5	Connector to bypass SCR	/
J6	Connector from IN AC Cap board and Out AC Cap board (PH3)	From J1 of B0440-0x From J1 of B0441-01
FN1	Connector from Power DC cap. board	From FN4 of B0420-0x
FN4	Connector from Input board	From FN3 of B0418-0x
RN6	Connector from Linv to OUTx and to TL_OUT	/
PZ1	Connector from TA	/
PZ3	Connector from bypass line	To SCR bypass module

Fig. 36

Pinout connectors:

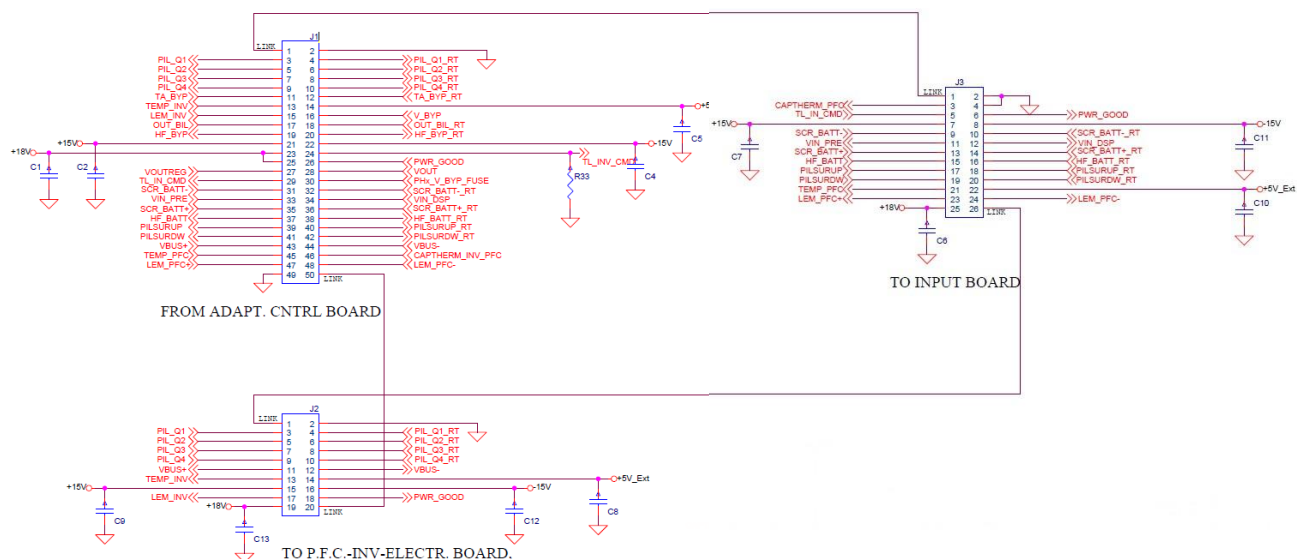


Fig. 37

6.12 Power DC Cap board (B0420)

Version:

B0420-01 Power DC cap board for S3T 80 kVA

B0420-02 Power DC cap board for S3T 100 kVA

B0420-03 Power Dc cap board for S3T 120 kVA

In this board there is:

1. PFC section (with PFC module and PFC driver);
2. Inverter section (with inverter module and inverter driver);
3. Vdc electrolytic capacitors.

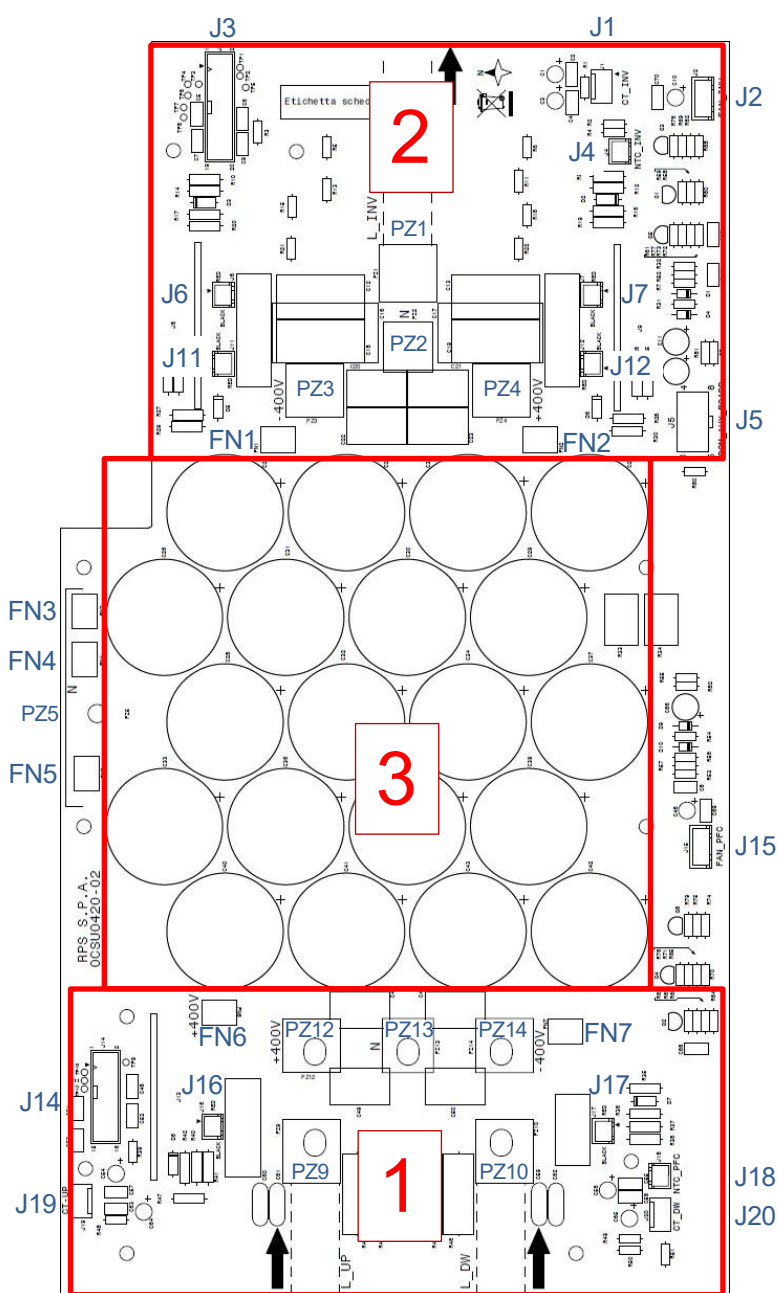


Fig. 38

Connector	Description	Note
J1	Connector to inverter current transducer	/
J2	Connector to inverter fan	/
J3	Flat connector to Output board	To J2 of B0419-02
J4	Connector to inverter NTC	/
J5	Connector from Adapter aux. PS board	From J13 of B0416-01 (PH1) From J23 of B0416-01 (PH2) From J24 of B0416-01 (PH3)
J6	Connection to inverter module	/
J7	Connection to inverter module	/
J11	Connection to inverter module	/
J12	Connection to inverter module	/
J14	Flat connector from Input board	From J4 of B0418-0x
J15	Connector to PFC fan	/
J16	Connection to PFC module	/
J17	Connection to PFC module	/
J18	Connector to PFC NTC	/
J19	Connector to PFC current transducer	/
J20	Connector to PFC current transducer	/
FN1 (-400V)	Connector to Aux PS section (only PH1 and PH3)	To J15 of B0416-01 (PH1) To RN8 of B0436-01 (PH3)
FN2 (+400V)	Connector to Aux PS section (only PH1 and PH3)	To J15 of B0416-01 (PH1) To RN1 of B0436-01 (PH3)
FN3	Connector to Aux PS section (only PH1 and PH3)	To J15 of B0416-01 (PH1) To RN5 of B0436-01 (PH3)
FN4	Connector to Output board	To FN1 of B0419-02
FN5	Connector from Input board	From FN2 of B0418-0x
FN6	+400V	NOT USED
FN7	-400V	NOT USED
PZ1	Connector to L_INV	/
PZ2	Neutral for inverter module	NOT USED
PZ3 (-400)	Connection to Power DC cap. board	*
PZ4 (+400)	Connection to Power DC cap. board	**
PZ5	Connection to Neutral bar	To 0SBAU0365
PZ9	Connector from Lup	/
PZ10	Connector from Ldw	/
PZ12 (+400)	Connection from Power DC cap. board	*
PZ13	Neutral for PFC module	NOT USED
PZ14 (-400)	Connection from Power DC cap. board	**

Tab. 22

- * PZ3 of the B0420-0x (Phase 3) is connected to PZ14 of the B0420-0x (Phase 1)
- * PZ3 of the B0420-0x (Phase 1) is connected to PZ14 of the B0420-0x (Phase 2)
- * PZ3 of the B0420-0x (Phase 2) is connected to PZ14 of the B0420-0x (Phase 3)

- ** PZ4 of the B0420-0x (Phase 3) is connected to PZ12 of the B0420-0x (Phase 1)
- ** PZ4 of the B0420-0x (Phase 1) is connected to PZ12 of the B0420-0x (Phase 2)
- ** PZ4 of the B0420-0x (Phase 2) is connected to PZ12 of the B0420-0x (Phase 3)

Pinout connectors:

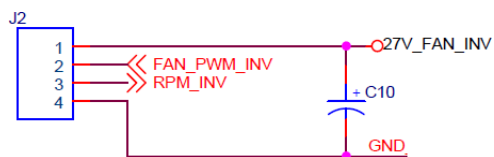


Fig. 39

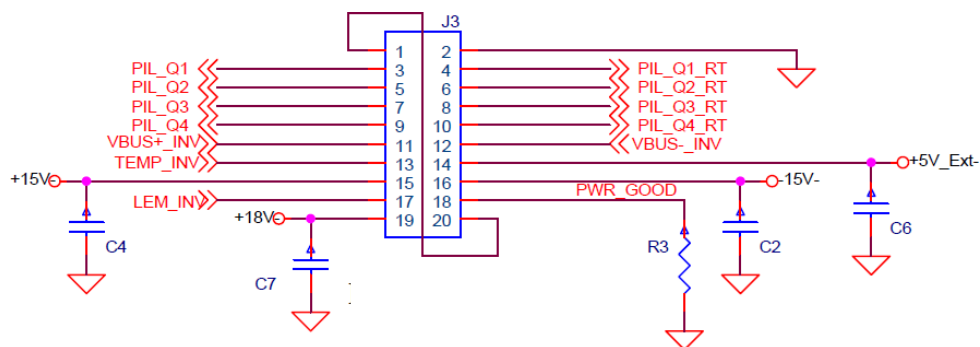


Fig. 40

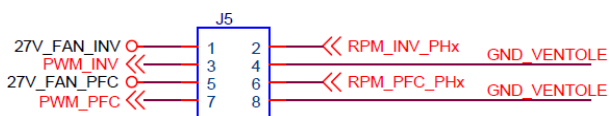


Fig. 41

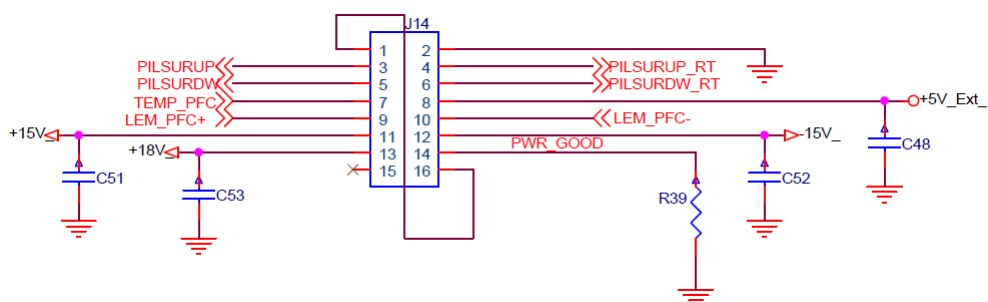


Fig. 42

6.13 BATTERY CHARGER BOARD (B0436)

Version:

B0436-01 Battery Charger Board

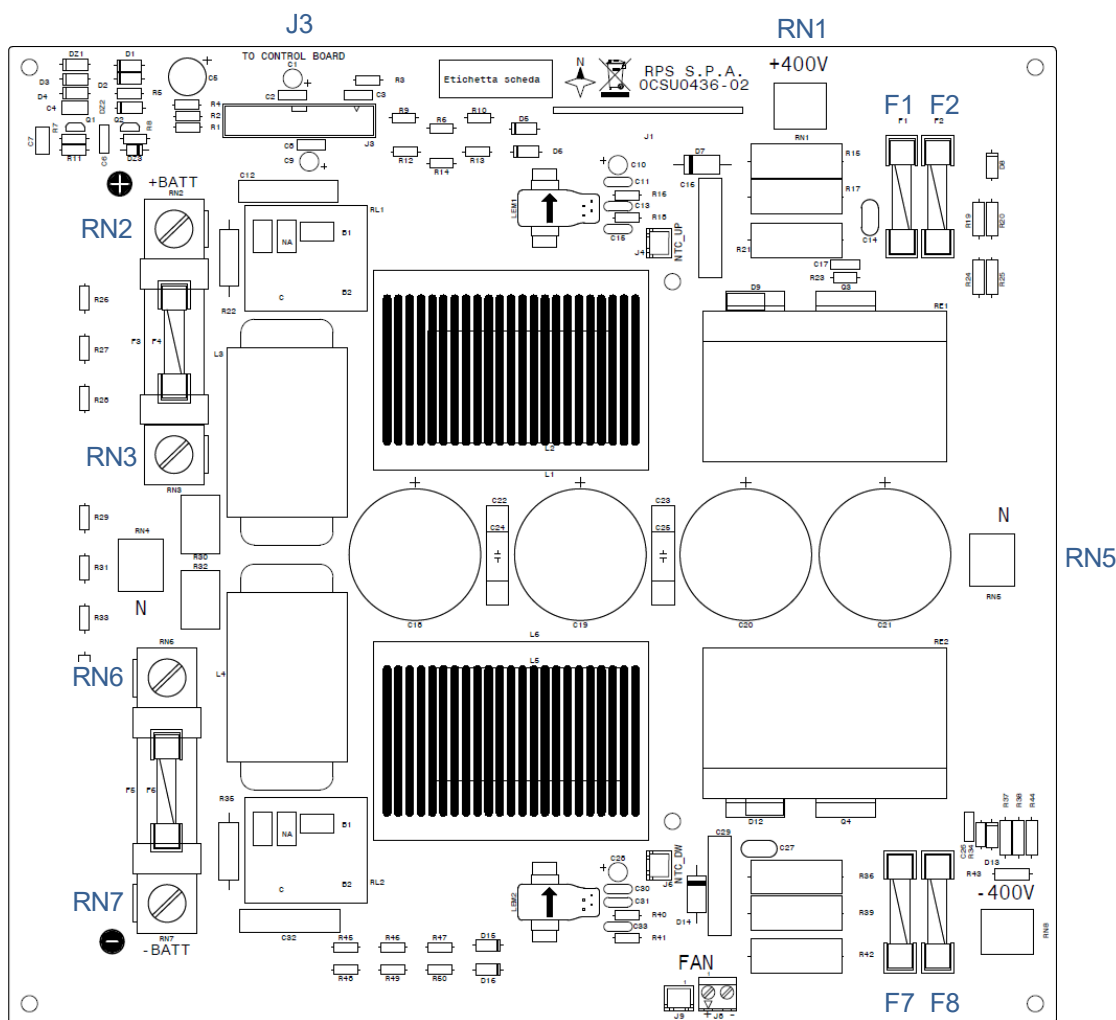


Fig. 43

J9 J8

Connector	Description	Note
J3	Flat connector to Signal adapter board	To J23 of B0415-01
J8	Connector to CB Fan	-
J9	NOT USED	-
RN1	Connection from Power DC cap board	From FN2 of B0420-0x (PH3)
RN2	Connection from battery fuse (+BATT_CB)	-
RN5	Neutral Connection from Power DC cap board	From FN3 of B0420-0x (PH3)
RN7	Connection from battery fuse (-BATT_CB)	-
RN8	Connection from Power DC cap board	From FN1 of B0420-0x (PH3)

Fig. 44

6.14 OUT AC CAP BOARD (B0440)

Version:

B0440-01 Out AC Capacitors Board for S3T 80-100 kVA

B0440-02 Out AC Capacitors Board for S3T 120 kVA

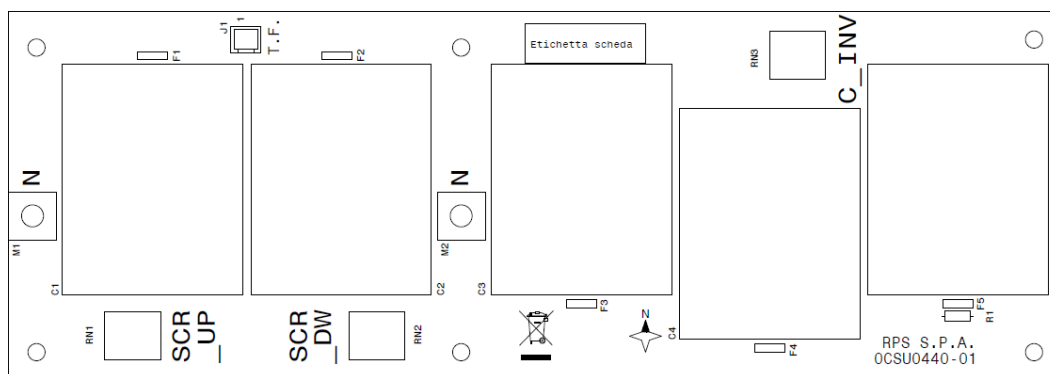


Fig. 45

Connector	Description	Note
J1	Connector to Output board	To J4 of B0419-02 (PH1 – PH2) To J6 of B0419-02 (PH3)
RN1	Connection from PFC inductance	Lup
RN2	Connection from PFC inductance	Ldown
RN3	Connection to Output board	To RN5 of B0419-02

Tab. 23

6.15 IN AC CAP BOARD (B0441)

Version:

B0441-01 Input AC Capacitors Board for S3T 80-120 kVA

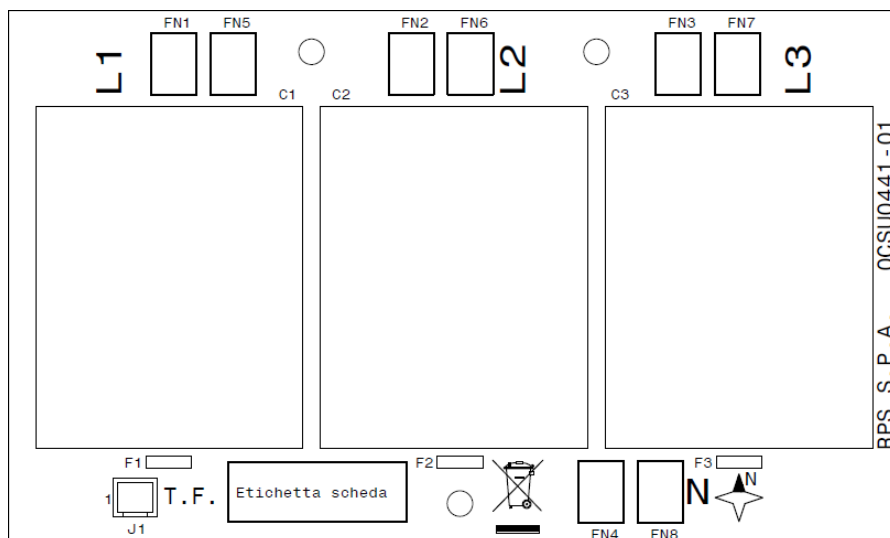


Fig. 46

Connector	Description	Note
J1	Connection to Power DC cap board	To J6 of B0419-02
FN1	Connection from TL_IN	Phase 3
FN2	Connection from TL_IN	Phase 2
FN3	Connection from TL_IN	Phase 1
FN4	Neutral connection from neutral bar	0SBAU03656

Tab. 24

6.16 FILTER CY BOARD (B0442)

Version:

B0442-01 Filter Cy Board for S3T 80-120 kVA

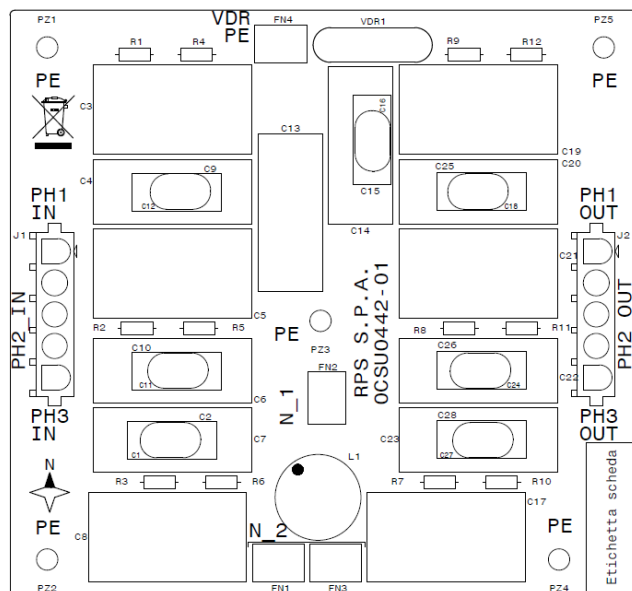


Fig. 47

Connector	Description	Note
J1	Phase connection to SW_IN	-
J2	Phase connection to SW_OUT	-
FN1	Neutral Connection	To SW_IN
FN2	Neutral Connection	To SW_OUT
FN3	NOT USED	-
FN4	Protective Earth connection	To screw on frontal panel

Tab. 25

7 FOCUS ON THE AUXILIARY POWER SUPPLY

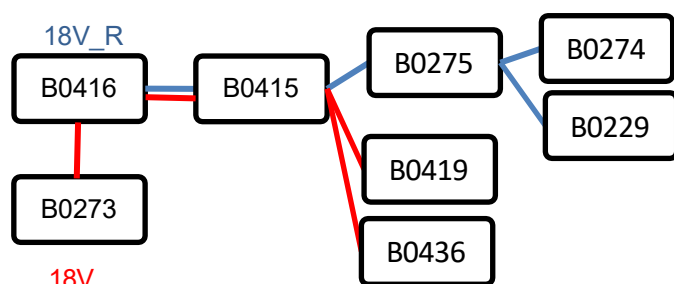
The auxiliary power supply section (B0273 - B0416 - B0212) takes the power from four different sources:

- Phase 1 of the input mains power;
- Phase 2 of the input mains power or the bypass input mains power if the UPS is dual input (this power source is also used for the redundant power supply of the static bypass)
- Direct current from the DC capacitor bank;
- Battery voltage when the UPS is turned on from battery.

The board B0273 generates the **18V** to supply the different sections of the UPS, besides the 25V_FAN that are used in the B0416 board to generate the 15V for the current sensor.

On the Adapter Aux PS board (B0416) there is a redundant flyback that supplies some specific boards in case of a failure of the auxiliary power supply situated on the B0273 to guarantee power to the load and the communication. The redundant flyback generates the "17V5" (see the 7.1 Power supply scheme). The voltage resulting from the 18V or 17V5 is called "**18V_R**".

The schematic below shows the 18V and the 18V_R path:



In case of an auxiliary power supply failure, the PFC and the inverter stop to work, but the logic and the communication still work by the redundant flyback on the B0416 in order to supply the load with the bypass.

In the power supply section of the UPS, there are two Fan power supply boards B0212.

The voltage (27V_FAN) for the fans and the contactors (27V_TL) is produced by the Fan PS board (B0212) not equipped with the jumper.

The other B0212 (the one with the jumper) is only dedicated to in-rush current of the contactors for a few seconds. After a few seconds, the power supply of the contactor is switched to the B0212 without the jumper.

In the event of failure of the UPS, it goes into redundant bypass (latch bypass) and only the Inverter /SRC bypass and AUX/CB fans remain active at full power.

The same happens in case of failure of the main B0212 (board without the jumper), the UPS goes to latch bypass and the second B0212 can support the Inverter /SRC bypass and AUX/CB fans.

OTHER POWER SUPPLIES:

- **B0274:** the Communication board (B0274) has a **5-12V** flyback for the SELV supplies (for the display, the USB and the R.E.P.O.) and a redundant supply only for the R.E.P.O. in case of a 5-12V flyback failure.

For more power supply details refer to the Power supply scheme in the next page.

7.1 POWER SUPPLY SCHEME

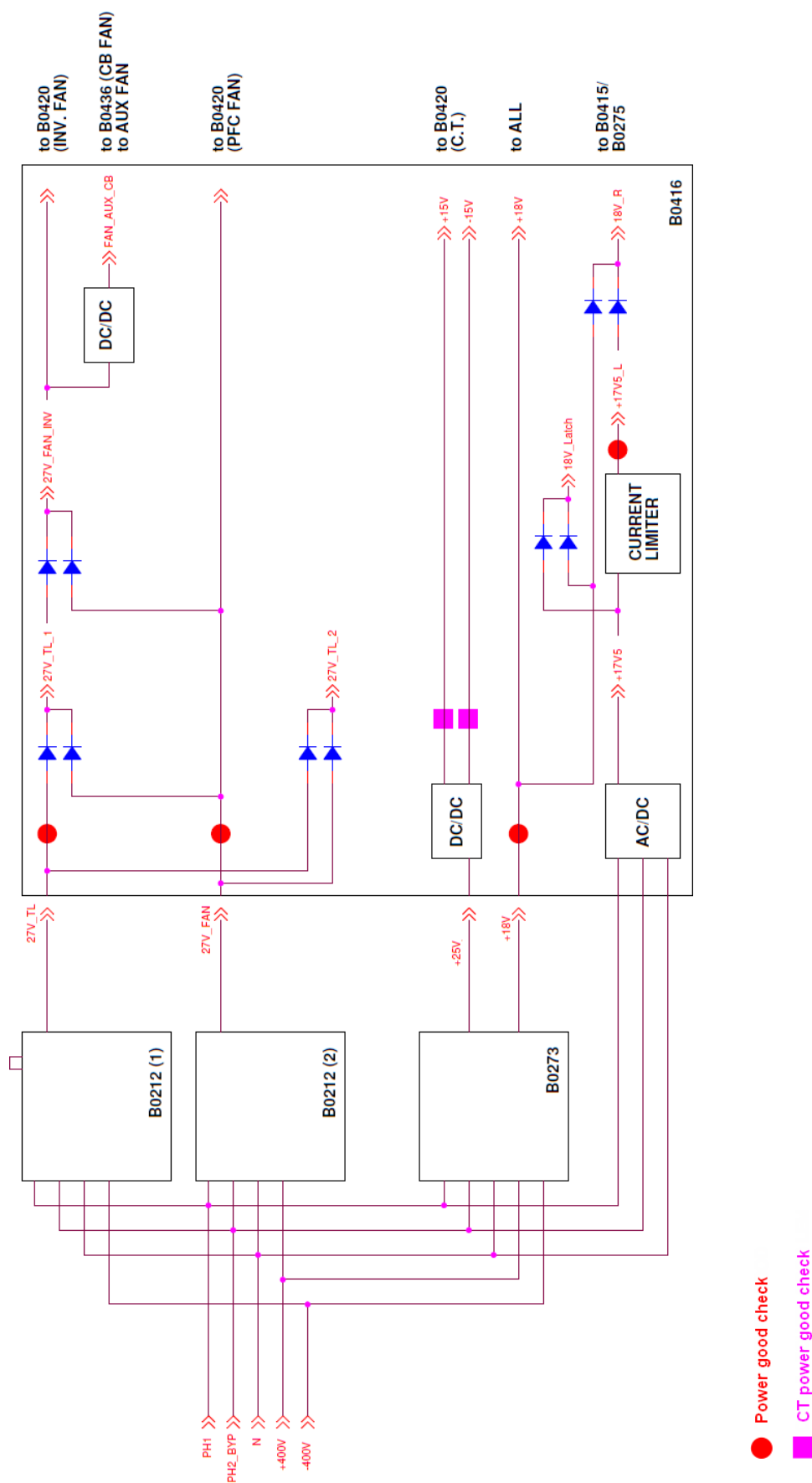
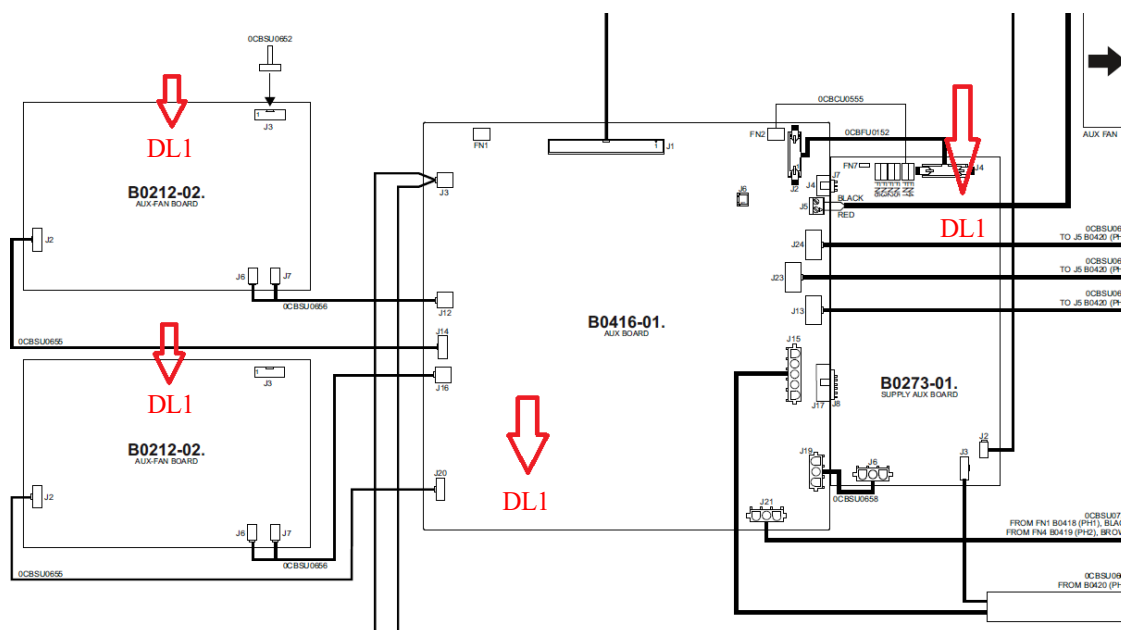


Fig. 48

7.2 LEDS TABLE

Below is the indication for the detection of the possible board involved in a power supply failure. It is possible to check the status of the LEDs even with the UPS in stand-by mode.



Tab. 26

BOARD	LED	POWER SUPPLY
B0212-02	DL1	27V
B0416-01	DL1	17V_5 (Redundant PS)
B0273-01	DL1	25V

Tab. 27

7.3 LATCH ON BYPASS

Every power supply failure involves some procedures to avoid losing the load, which differ in case of the UPS is stand-alone or in a parallel system operation.

7.3.1 STAND-ALONE UPS

In case of a 5V failure of the Control board (B0275), there is an *automatic latch on bypass*: the power section of the UPS is turned off, but the load is supplied. The communication DSP-Display is lost, the display turns grey, and it is not possible to do any procedures with the display. During the Power ON of the UPS the display still on “Starting.....”.

For the other power supplies failure, the logic is still alive (by the redundant flyback) and in this case the DSP can decide when do the latch on bypass. The UPS continues to communicate.

7.3.2 PARALLEL SYSTEM OF UPS

In case of a 5V failure of the Control board (B0275), the UPS involved isolated completely itself by avoiding the latch on bypass: communication stops with the other UPS, it is not possible to supply the load of the entire parallel with the UPS on bypass.

In the other case, the power section is turned off, but the communication on the CANBUS still operates for the bypass call request.

7.3.3 LATCH ON BYPASS CHECK

On board B0275, there are two signaling LEDs (DL1 and DL2) which give information about the latch bypass:

Synchronous flashing: the UPS has latched the load on bypass.

Alternating flashing: the code is running in FPGA and DSP (normal operation)

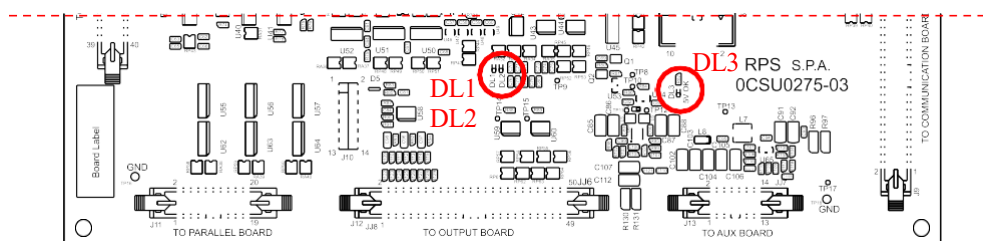


Fig. 49

Note: the 5V can be checked with the **DL3** status led (Led ON→+5V_OK / Led OFF→+5V_NOT_OK).

The 5V **not affect** the **L01** lock, but it is helpful for checking the 18V_R presence in case of this lock.

7.4 FANS SPEED

In normal operation, the fan speed is independent of the load level:

- $T^{\circ} < 50^{\circ}\text{C}$ min speed
- From 50°C onwards, the speed increases linearly
- $T^{\circ} > 70^{\circ}\text{C}$ max speed

Important: in case of UPS overload, more precisely **LOAD > 103%**, the fans reach the maximum speed regardless the temperature values. The fans return to normal speed when the load is less than 95%.

8 CABLE CONNECTION CHECK ON B0275-03 (L02 LINK FAIL)

The Control board (B0275) is provided by connectors with external pinout. This allows you to check the cable connections directly using the pins dedicated for the link signal.
In the picture below is reported all the tracks about the “Link Fail” indication:

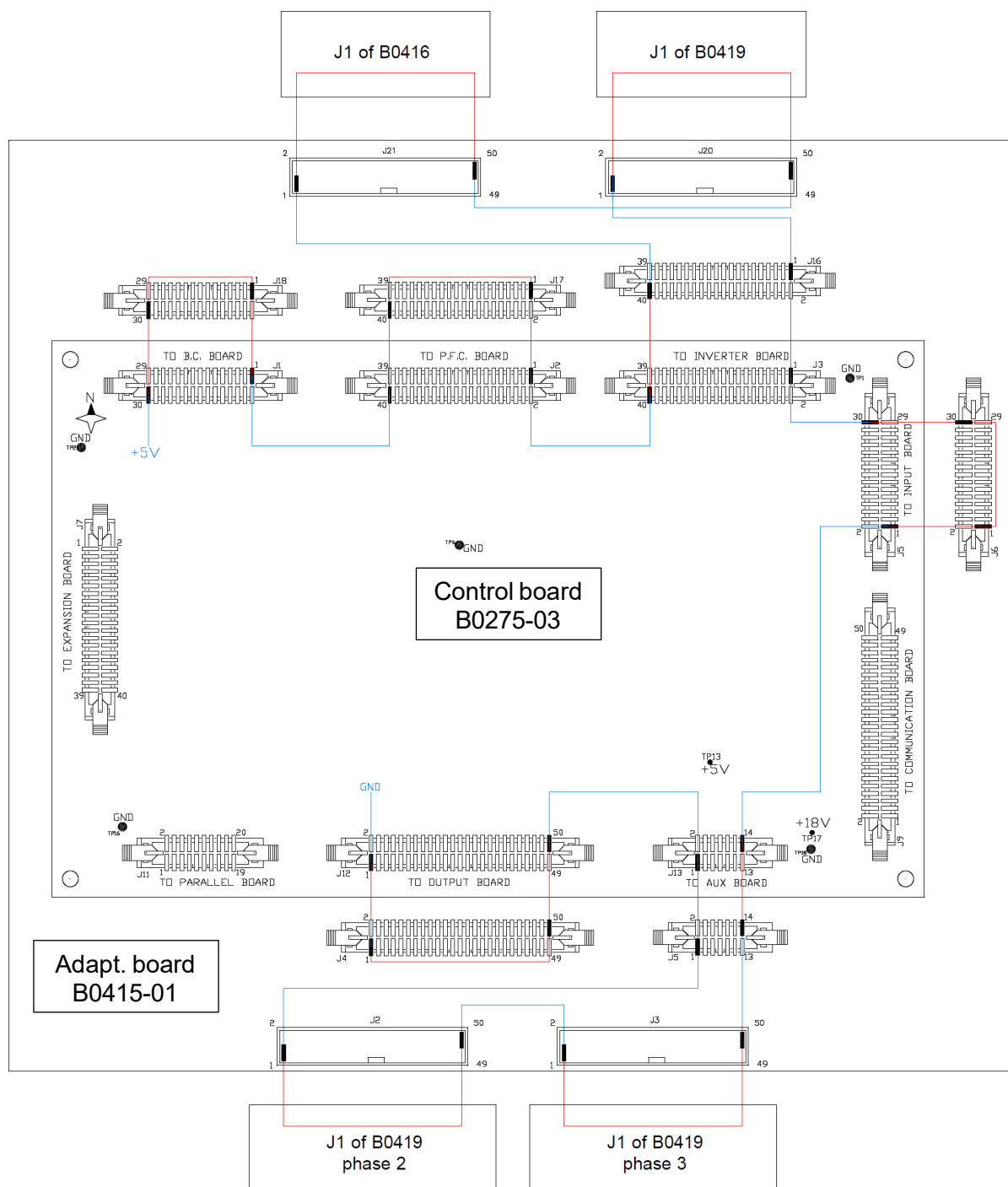


Fig. 50

In case of L02 alarm, the first step is to check the continuity signal on the Control board B0275-03 using a multimeter, with the probes between J1 – Pin30 → J12 – Pin1 (see Fig. 50).

If the test gives positive result, it means that the flat cables are connected correctly. Otherwise is necessary to check the contact of the connectors mounted on pcb, analyzing the link in several point.

The L02 alarm does not include the additional boards that can be provided for the Sentryum series and the Communication board (B0274) of the UPS.

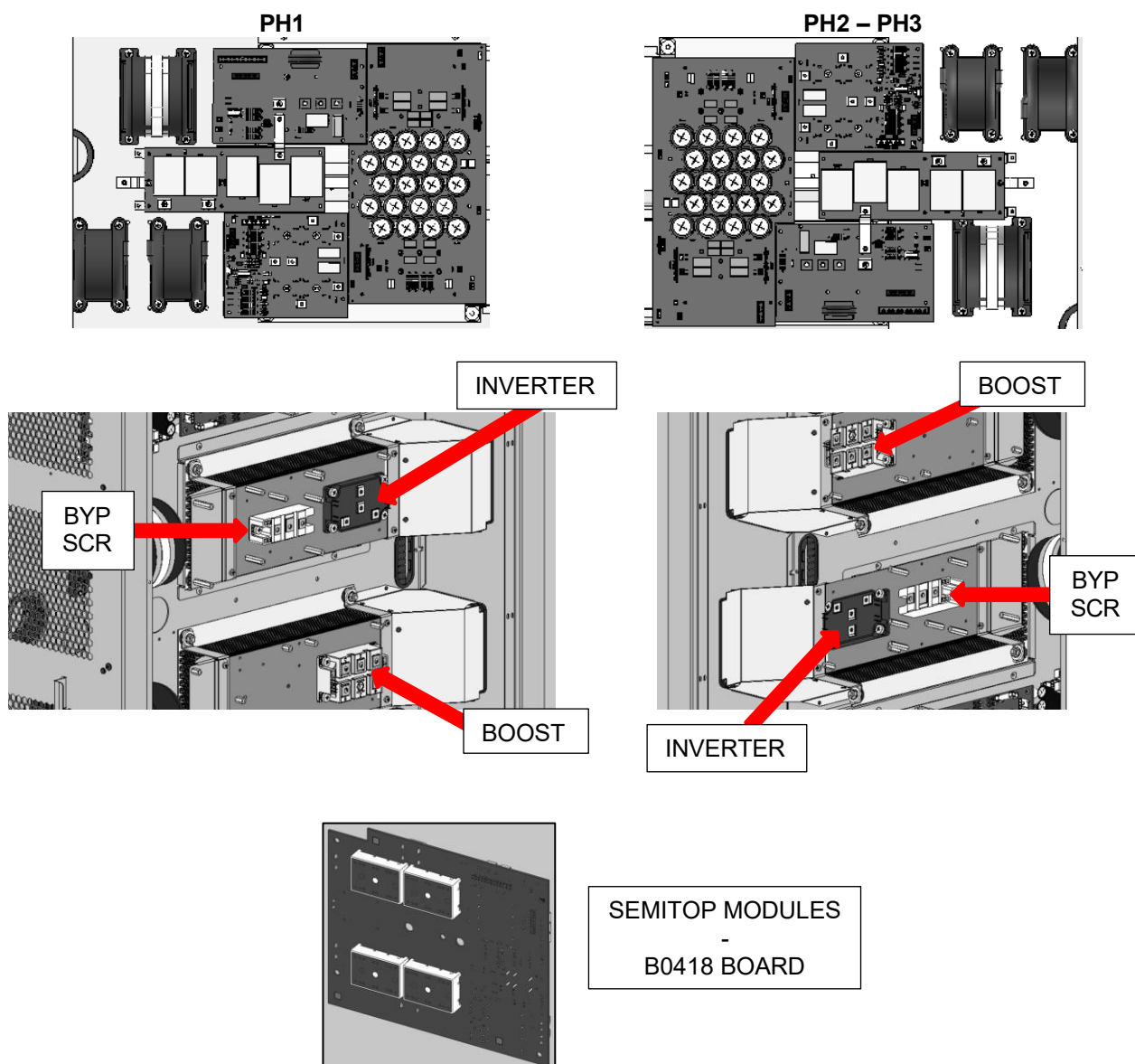
9 CHECK OF THE POWER COMPONENTS

Following visible damage inside the UPS that requires the replacement of a power section, it is also necessary to check the status of the other phases (even if they appear not damaged).

- 1) Open all disconnecting switches.
- 2) **IMPORTANT:** completely disconnect the UPS from any power supply, including any battery cabinets, other UPS in parallel or other power sources. Make sure there is no voltage present.
- 3) Discharge the DC capacitor bank and wait 10-15 minutes for the voltage in the bank to reach a level close to 0V.

9.1 POSITIONING OF POWER MODULES

The picture below shows the position of the three modules to check for a single phase. Use a multimeter to check the conditions of every module as explained below. To remove the boards, follow the chapter 11.3.



9.1.1 BOOST MODULE CHECK

Check all the diodes: they should not be in short circuit or completely open.

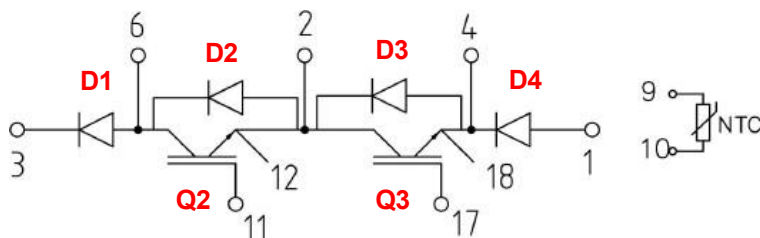


Fig. 51

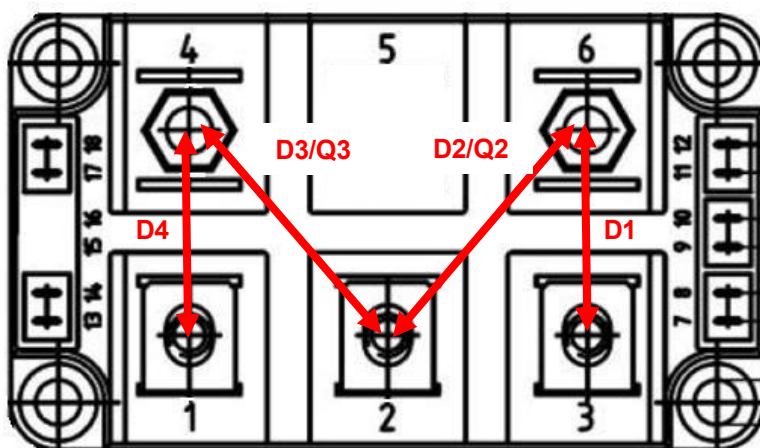


Fig. 52

If damage is found after checking the BOOST module, replace the module and the associated Power DC Cap board (B0420). Cables and air duct are included in the spare part *IGBT Boost Kit*, with all necessary to install the module. (board B0420 is not included in the kit).

Important: a Boost module failure can damage the fuses of the battery charger card B0436. In case of a short circuit in the Vdc BUS, the fast discharge of the Vdc can open the fuses. Please check the fuses (F1, F2, F7 and F8) and replace them if necessary. Refer to chapter 6.13 for further details.

9.1.2 INVERTER MODULE CHECK

Check all the diodes: they should not be in short circuit or completely open.

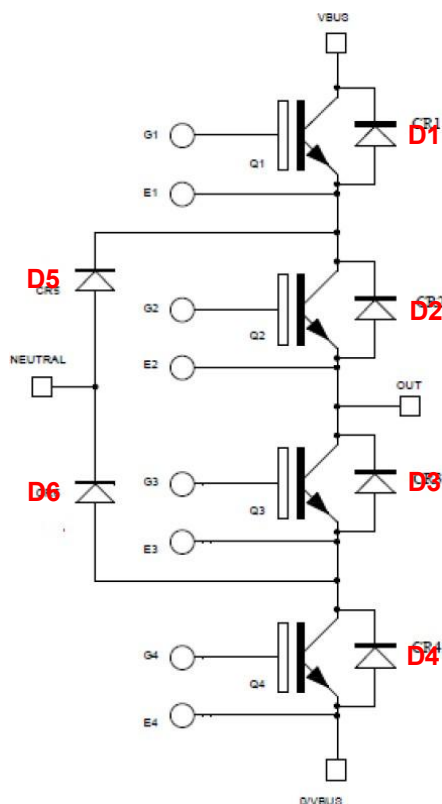


Fig. 53

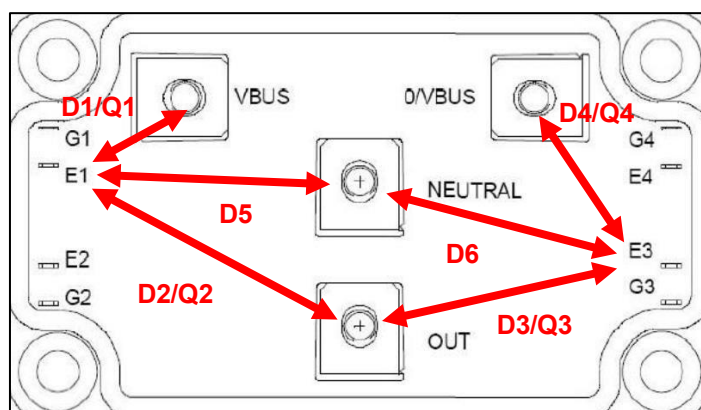


Fig. 54

If damage is found after checking the INVERTER module, replace the module and the associated Power DC Cap board (B0420). Cables and air duct are included in the spare part *IGBT Inverter Kit*, with all necessary to install the module. (board B0420 is not included in the kit).

Important: an Inverter module failure can damage the fuses of the battery charger card B0436. In case of a short circuit in the Vdc BUS, the fast discharge of the Vdc can open the fuses. Please check the fuses (F1, F2, F7 and F8) and replace them if necessary. Refer to chapter 6.13 for further details.

9.1.3 BYPASS SCR MODULE CHECK

Use the layout given below to check that the two SCRs are not short-circuited between anode and cathode.

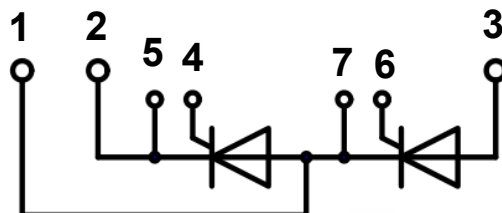


Fig. 55

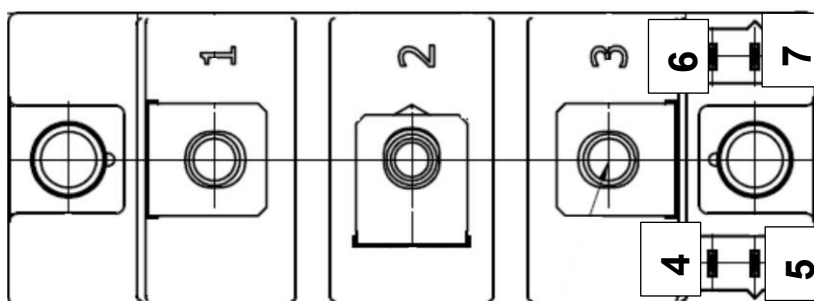


Fig. 56

In the event of damage detected following checks on BYPASS module, replace the module and the associated Output board (B0419). Thermal paste and output board are not included in the spare part kit.

9.1.4 SEMITOP MODULE CHECK

In the event of a failure of the PFC or INVERTER module, in addition to replacing the faulty components (IGBT modules, boards, etc.), the condition of the bypass SCRs should also be checked using a multimeter.

The component in question is the input stage with rectifier diodes and battery SCR in the Semitop module on board B0418 (4 modules on each board).

Specifically, use the layout and pin layout given below to check that the four SCRs are not short circuited between anode and cathode and that the four diodes are neither open nor short circuited, measuring the direct bias voltage.

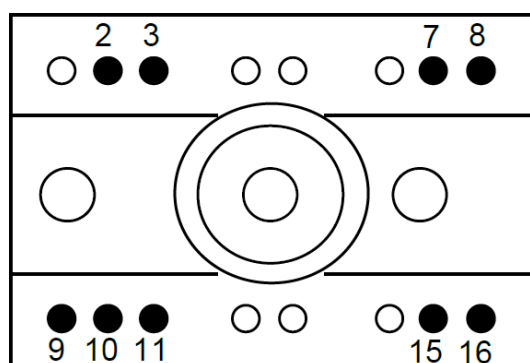


Fig. 57

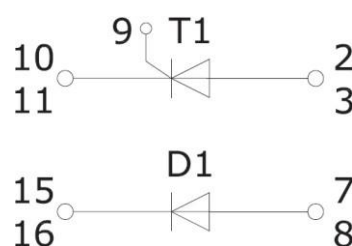


Fig. 58

If one of these components is faulty, the affected input board must be replaced.

10 MAP OF MAIN READINGS

The following section provides useful indications for a better understanding of reading path of the UPS and for troubleshooting. For best accuracy, measurements should be performed with the flat cables removed.

10.1 INPUT VOLTAGES

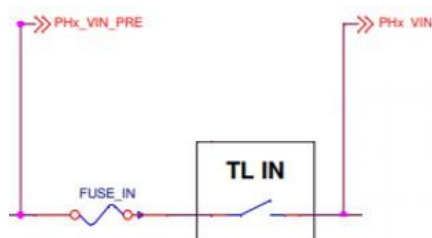


Fig. 59

Input voltages are measured by DSP in two points: the measurement points are upstream the input fuse and downstream the input contactor. The PHx_VIN_PRE reading is shown on display as PH-N and as PH-PH, the PHx_VIN is used for internal procedure whenever the UPS works in online or eco mode.



Test to check the continuity of the DSP signal (this test should be carried out with the UPS switched off, not supplied and with the battery disconnected).



With a multimeter set to ohmmeter mode, check the following resistances:

	PH1_VIN_PRE	PH2_VIN_PRE	PH3_VIN_PRE	Notes
Input fuse	Before	Before	Before	
B0418	R1	R1	R1	226 kOhm
B0418	R2	R2	R2	226 kOhm
B0418	J2-11	J2-11	J2-11	
Flat Cable				
B0419	J3-11	J3-11	J3-11	
B0419	J1-33	J1-33	J1-33	
Flat Cable				
B0415	J20-33	J2-33	J3-33	
B0415	J6-2	J6-4	J6-6	
Flat Cable				
B0275	J5-2	J5-4	J5-6	
B0275	R51	R46	R39	5,36 kOhm

Tab. 28

	PH1_VIN	PH2_VIN	PH3_VIN	Notes
Input contactor	After	After	After	
B0418	R6	R6	R6	226 kOhm
B0418	R8	R8	R8	226 kOhm
B0418	J2-12	J2-12	J2-12	
Flat Cable				
B0419	J3-12	J3-12	J3-1	
B0419	J1-34	J1-34	J1-34	
Flat Cable				
B0415	J20-34	J2-34	J3-34	
B0415	J6-3	J6-5	J6-7	
Flat Cable				
B0275	J5-3	J5-5	J5-7	
B0275	R49	R43	R32	5,36 kOhm

Tab. 29

10.2 BYPASS VOLTAGES

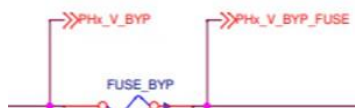


Fig. 60

Bypass voltage readings are measured on board B0419 (output board).

	PH1_V_BYP	PH2_V_BYP	PH3_V_BYP	Notes
Bypass Fuse	Before	Before	Before	
B0419	R32	R32	R32	226 kOhm
B0419	R14	R14	R14	226 kOhm
B0419	J1-16	J1-16	J1-16	
Flat Cable				
B0415	J20-16	J2-16	J3-16	
B0415	J4-8	J4-9	J4-10	
Flat Cable				
B0275	J12-8	J12-9	J12-10	
B0275	R125	R112	R126	5,36 kOhm

Tab. 30

	PH1_V_BYP_FUSE	PH2_V_BYP_FUSE	PH3_V_BYP_FUSE	Notes
Bypass Fuse	After	After	After	
B0419	R41	R41	R41	1 MOhm
B0419	R42	R42	R42	1 MOhm
B0419	R43	R43	R43	150 kOhm
B0419	J1-30	J1-30	J1-30	
Flat Cable				
B0415	J20-30	J2-30	J3-30	
B0415	R126	R131	R136	150 kOhm
B0415	R125	R130	R135	150 kOhm
B0415	R124	R129	R134	150 kOhm
B0415	R123	R128	R133	1 MOhm
B0415	R122	R127	R132	1 MOhm

10.3 BATTERY VOLTAGES

The battery readings are measured by DSP and taken from board B0436 (battery charger board).

- VBATT±: these readings are used for the battery present test, the wiring coherency test, the battery charge status and the “battery over voltage” alarm. The battery contacts only close if the battery voltage is within the acceptance range. If the battery polarity is reversed, the battery contacts do not close.
- VABATT± R: these readings are used for regulating the battery charger



Test to check the continuity of the DSP signal (this test should be carried out with the UPS switched off, not supplied and with the battery disconnected).



With a multimeter set to ohmmeter mode, check the following resistances:

10.3.1 VBATT± and VBATT±_R

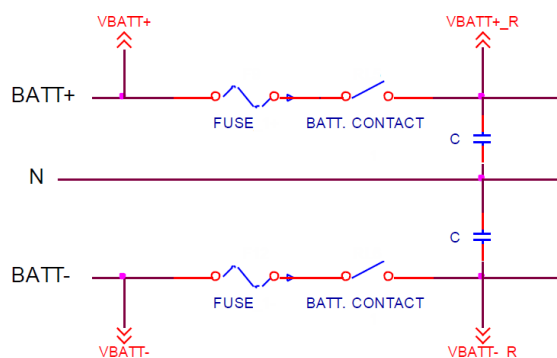


Fig. 61

• VBATT±

	VBATT+	VBATT-	Notes
B0436	R28	R33	618 kOhm
B0436	R27	R31	618 kOhm
B0436	R26	R29	442 kOhm
B0436	J3-21	J3-22	
Flat Cable			
B0415	J23-21	J23-22	
B0415	J6-8	J6-10	
Flat Cable			
B0275	J5-8	J5-10	
B0275	R29	R23	28,7 kOhm

Tab. 31

- VBATT±_R

	VBATT+_R	VBATT-_R	Notes
B0436	R10	R50	618 kOhm
B0436	R6	R49	618 kOhm
B0436	R9	R48	442 kOhm
B0436	J3-17	J3-18	
Flat Cable			
B0415	J23-17	J23-18	
B0415	J6-9	J6-11	
Flat Cable			
B0275	J5-9	J5-11	
B0275	R25	R21	28,7 kOhm

Tab. 32

10.4 VDC (BUS) VOLTAGES

- Phase 1:

	Vdc-	Vdc+	Notes
B0420 (L1)	R22	R21	120 kOhm
B0420 (L1)	R18	R15	120 kOhm
B0420 (L1)	R11	R13	120 kOhm
B0420 (L1)	R6	R5	120 kOhm
B0420 (L1)	J3-12	J3-11	
Flat Cable			
B0419 (L1)	J2-12	J2-11	
B0419 (L1)	J1-44	J1-43	
Flat Cable			
B0415	J20-44	J20-43	
B0415	R121	R120	0 Ohm
B0415	J16-3	J16-4	
Flat Cable			
B0275	J3-3	J3-4	

Tab. 33

- Phase 2 and 3: the Vdc Bus readings that come from B0419 of phase 2 and 3 are accumulated on the B0415 board:

	Vdc-	Vdc+	Notes
B0420 (L2-3)	R22	R21	120 kOhm
B0420 (L2-3)	R18	R15	120 kOhm
B0420 (L2-3)	R11	R13	120 kOhm
B0420 (L2-3)	R6	R5	120 kOhm
B0420 (L2-3)	J3-12	J3-11	
Flat Cable			
B0419 (L2-3)	J2-12	J2-11	
B0419 (L2-3)	J1-44	J1-43	
Flat Cable			
B0415	J2-44 (L2)	J2-43 (L2)	
B0415	J3-44 (L3)	J3-43 (L3)	
B0415	R3	R2	0 Ohm
B0415	R8	R5	0 Ohm
B0415	J17-3	J17-4	
Flat Cable			
B0275	J2-3	J2-4	

Tab. 34

10.5 INVERTER VOLTAGES

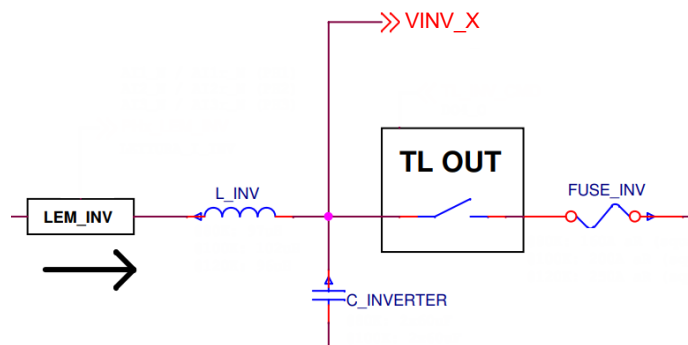


Fig. 62

The reading point of inverter voltage is exactly next to the inverter filter capacitors and the readings are taken on board B0419 (output board).

This reading is used to check the inverter and check the status of the output contactor and fuses (combined with the output voltage reading).

	VINV_1	VINV_2	VINV_3	Notes
B0419	R19	R19	R19	226 kOhm
B0419	R18	R18	R18	226 kOhm
B0419	J1-27	J1-27	J1-27	
Flat Cable				
B0415	J20-27	J2-27	J3-27	
B0415	J4-2	J4-3	J4-4	
Flat Cable				
B0275	J12-2	J12-3	J12-4	
B0275	R122	R109	R123	5,36 kOhm

Tab. 35

10.6 OUTPUT VOLTAGES

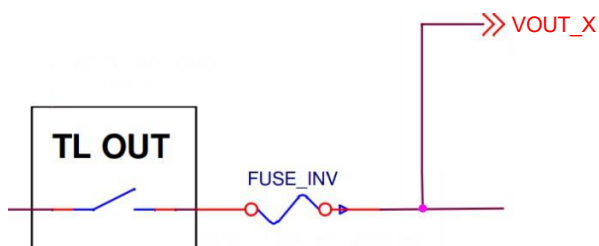


Fig. 63

The output voltage readings are taken at the output of board B0419. This reading is used to calculate the output power (combined with the I_{OUT} reading) and to check the status of the output contactors and fuses (combined with the inverter voltage reading).

	VOUT_1	VOUT_2	VOUT_3	Notes
B0419	R21	R21	R21	226 kOhm
B0419	R20	R20	R20	226 kOhm
B0419	J1-28	J1-28	J1-28	
Flat Cable				
B0415	J20-28	J2-28	J3-28	
B0415	J4-5	J4-6	J4-7	
Flat Cable				
B0275	R110	R124	R111	5,36 kOhm

Tab. 36

10.7 OUTPUT CURRENTS

10.7.1 BYPASS CURRENTS

Each bypass line has its TA. The TA is installed on the B0419 board (Output board). They have the primary function to measure current when load is supplied by bypass line, however it is involved in backfeed control.

10.7.2 INVERTER CURRENTS

Inverter current is measured by the current transducer (LEM). This reading is shown on display and it is used to calculate the output power (combined with the Vout reading).

10.8 VDC VOLTAGE



Attention! Dangerous voltages, use appropriate protective equipment before performing any operation.



The VDC voltage can be measured on each phase of the UPS with the help of the PFC connections, the measurements must therefore be the same for each phase:

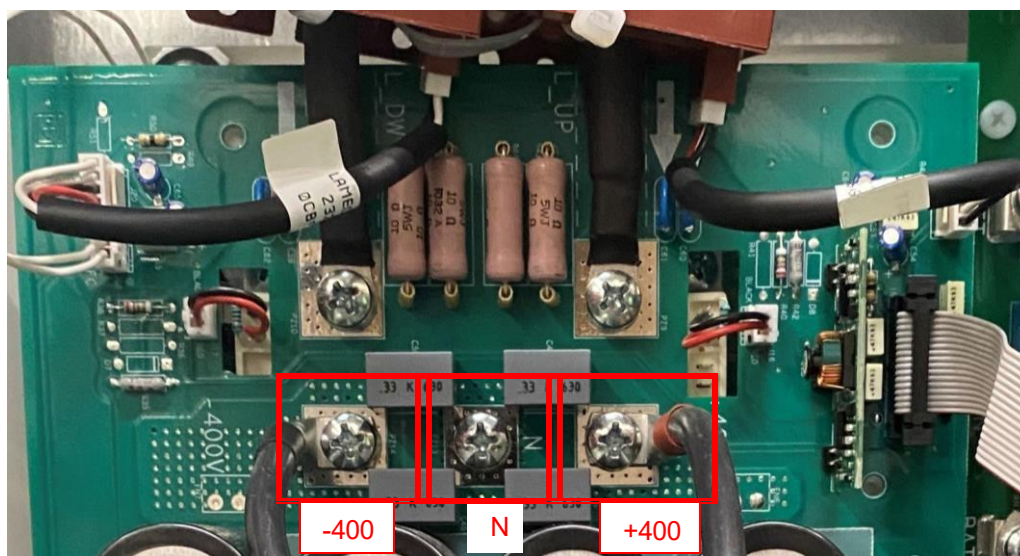


Fig. 64 – BOARD B0420

11 SERVICE OPERATIONS



Every operation can only be performed with the machine switched off and with the input/output and battery disconnection switches open.
Discharge the DC capacitor bank and wait 10-15 minutes for the voltage in the bank to reach a level close to 0V.



11.1 HOW TO OPEN THE UPS

11.1.1 DISPLAY REMOVAL

- Remove the n°4 screws from the metallic display support (Fig. 65). Remove n°4 screws from the cable cover (Fig. 66), then remove the RJ45 cable.

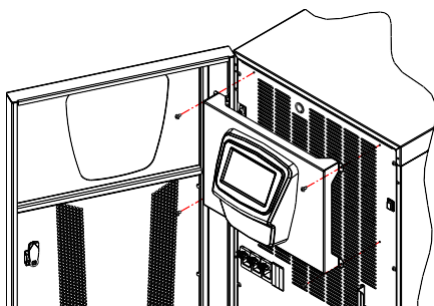


Fig. 65

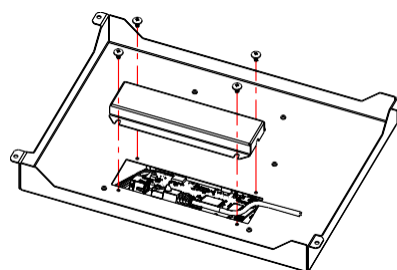


Fig. 66

11.1.2 PANELS

To access the **terminal area**, remove the lower front panel by removing all the screws:

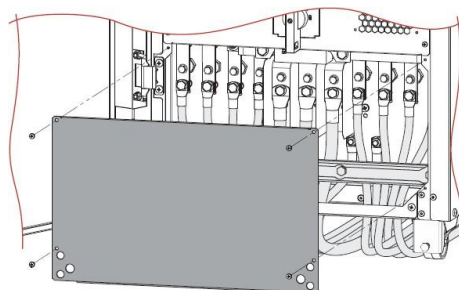


Fig. 67

To access the internal boards, remove the **side panels**: remove first the frontal door (refer to the Installation manual), then remove the screws, n° 8 for side panel. If necessary, repeat the operation for opposite side panel.

To remove the **top cover**, remove first the frontal door (refer to the Installation manual), then remove the n°10 screws from the top cover of the UPS.

To remove the **frontal protection panel**, remove first the frontal door (refer to the Installation manual) the switches handle and the display (11.1.1), then unscrew the n° 7 screws from the protection panel.

11.2 FAN REPLACEMENT

There are two types of fans on the rear of the UPS:

FAN 1 and 4: 120x120 2-wires

FAN 2-3-5-6-7-8: 120x120 4-wires

After removing the side panels, remove the wiring as shown below:

FAN 1 and 4: remove J8 from the B0436 (FAN4) and J5 from the B0416 (FAN1)

FAN 2-3-5-6-7-8: remove J2 and J15 from the B0420 board (for each phase)

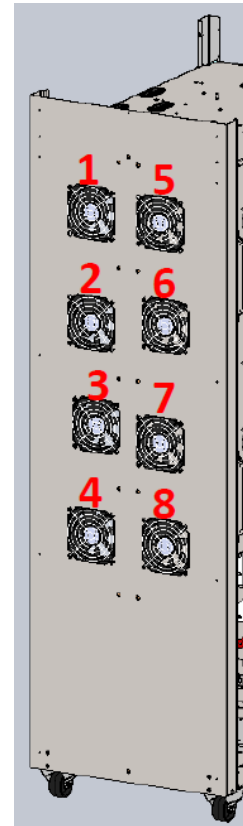


Fig. 68

Remove the protection grid. The fan can be removed.

Fan replacement: pay attention to install the fan with the label or the indicator facing outwards.

The fans all operate in air extraction.



Fig. 69

11.3 BOARDS REPLACING – POWER SECTION

Below the service operations (the removal and the replacing of the boards) for a single power section. The layout below is for reference only, the layout of phase 1 is reversed from phase 2 and 3. For more details for the positioning of the boards see the chapter 4.3.2.

Attention! This operation can only be performed with the machine switched off and with the input/output and battery disconnection switches open.
Discharge the DC capacitor bank and wait 10-15 minutes for the voltage in the bank to reach a level close to 0V.



11.3.1 INPUT BOARD REMOVAL (B0418-0x)

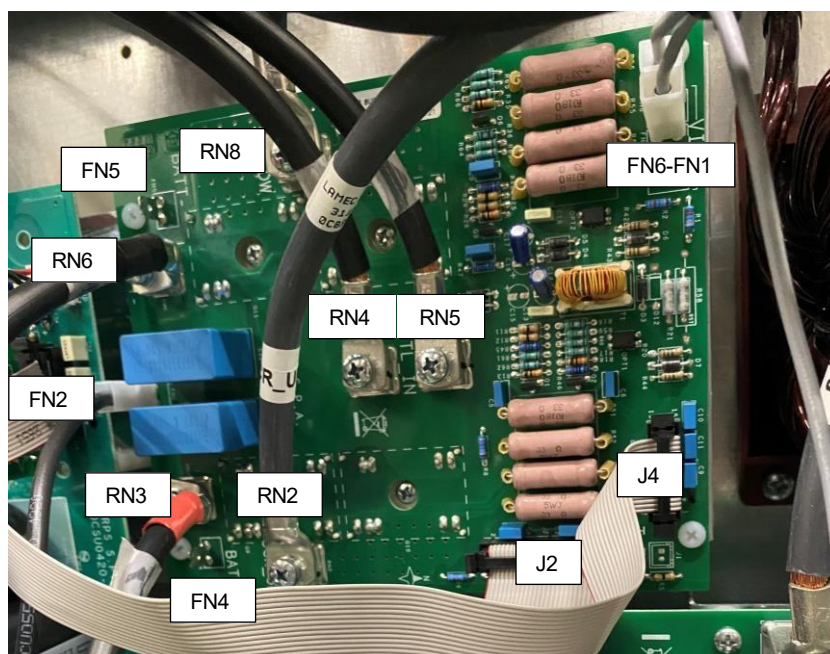


Fig. 70

- 1) Remove all the cables of the input board.
- 2) Remove the module's screws following the indication below:
 - S3T 80 → 2 screws per module
 - S3T 100-120 → 4 screws per module
- 3) Remove the 4 lateral screws and then remove the board (refer to Fig. 71)

11.3.2 INPUT BOARD INSTALLATION (B0418-0x)

For the installation of the Input board B0418:

1) Fix first the lateral screws.

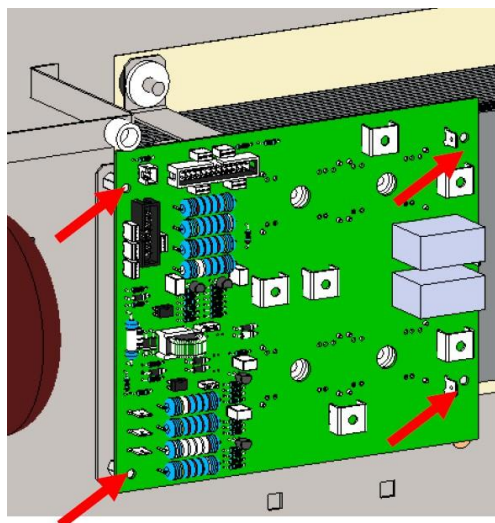


Fig. 71

2) Fix the module's screws following the indication below:

S3T 80 → 2 screws per module

S3T 100-120 → 4 screws per module

3) For the correct cables positioning:

PH1	PH2	PH3
RN4 from IN_T1	RN4 from IN_T2	RN4 from IN_T3
RN5 from IN_T1	RN5 from IN_T2	RN5 from IN_T3
RN2 from RN1 of B0440-01x	RN2 from RN1 of B0440-01x	RN2 from RN1 of B0440-01x
RN8 from RN2 of B0440-01x	RN8 from RN2 of B0440-01x	RN8 from RN2 of B0440-01x
RN3 from battery fuse 1+	RN3 from battery fuse 2+	RN3 from battery fuse 3+
RN6 from battery fuse 1-	RN6 from battery fuse 2-	RN6 from battery fuse 3-
FN4 (RED) from J3 of B0273	-	-
FN5 (BLACK) from J3 of B0273	-	-
FN2 from FN5 of B0420	FN2 from FN5 of B0420	FN2 from FN5 of B0420
FN1 from J21 of B0416	-	-
FN3 from FN6 of B0419 Only SI version	FN3 from FN6 of B0419 Only SI version	FN3 from FN6 of B0419 (only Only SI version
FN6 from input bars	FN6 from input bars	FN6 from input bars
J2 from J3 of B0419	J2 from J3 of B0419	J2 from J3 of B0419
J4 from J14 of B0420	J4 from J14 of B0420	J4 from J14 of B0420

Tab. 37

11.3.3 OUTPUT BOARD REMOVAL (B0419-02)

- 1) Remove all the cables of the output board.
- 2) Remove the screws of PZ1 and PZ2 and the metal bar.
- 3) Remove the RN5 metal bar.
- 4) Remove then the four lateral plastic screws in order to remove the board.

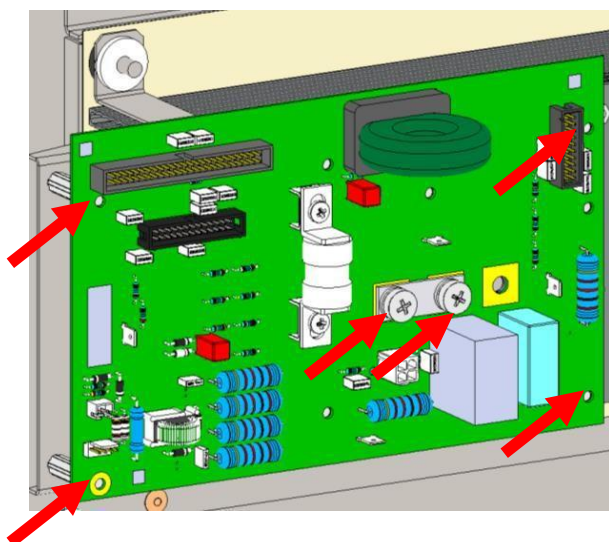


Fig. 72

11.3.4 OUTPUT BOARD INSTALLATION (B0419-02)

- 1) Fix the four lateral screws and the metal bar on PZ1 and PZ2.
- 2) for the correct cables positioning:

PH1	PH2	PH3
RN6 from Linv and TL_OUT1	RN6 from Linv and TL_OUT2	RN6 from Linv and TL_OUT3
PZ3 from rear input bar (SI)	PZ3 from rear input bar (SI)	PZ3 from rear input bar (SI)
PZ3 from Byp. fuse (DI)	PZ3 from Byp. fuse (DI)	PZ3 from Byp. fuse (DI)
PZ1 from out. cable with TA	PZ1 from out. cable with TA	PZ1 from out. cable with TA
RN5 metal bar from RN3 of B0440-0x	RN5 metal bar from RN3 of B0440-0x	RN5 metal bar from RN3 of B0440-0x
PH1 – PH2 – PH3: J5 to bypass module. Follow the colours indicated (Fig. 73):		
		
Fig. 73		
FN1 from FN4 of B0420-0x	FN1 from FN4 of B0420-0x	FN1 from FN4 of B0420-0x
J4 from J1 of B0440-0x	J4 from J1 of B0440-0x	-
-	-	J6 from J1 of B0419-02 and from J1 of B0441-01

FN6 from L1 bypass fuse (DI)	FN6 from L2 bypass fuse (DI)	FN6 from L3 bypass fuse (DI)
-	FN4 from J21 of B0416-01	-
J3 from J2 of B0418	J3 from J2 of B0418	J3 from J2 of B0418
J2 from J3 of B0420	J2 from J3 of B0420	J2 from J3 of B0420
J1 from J20 of B0415	J1 from J2 of B0415	J1 from J3 of B0415

Tab. 38

11.3.5 POWER DC CAPACITOR BOARD REMOVAL (B0420)

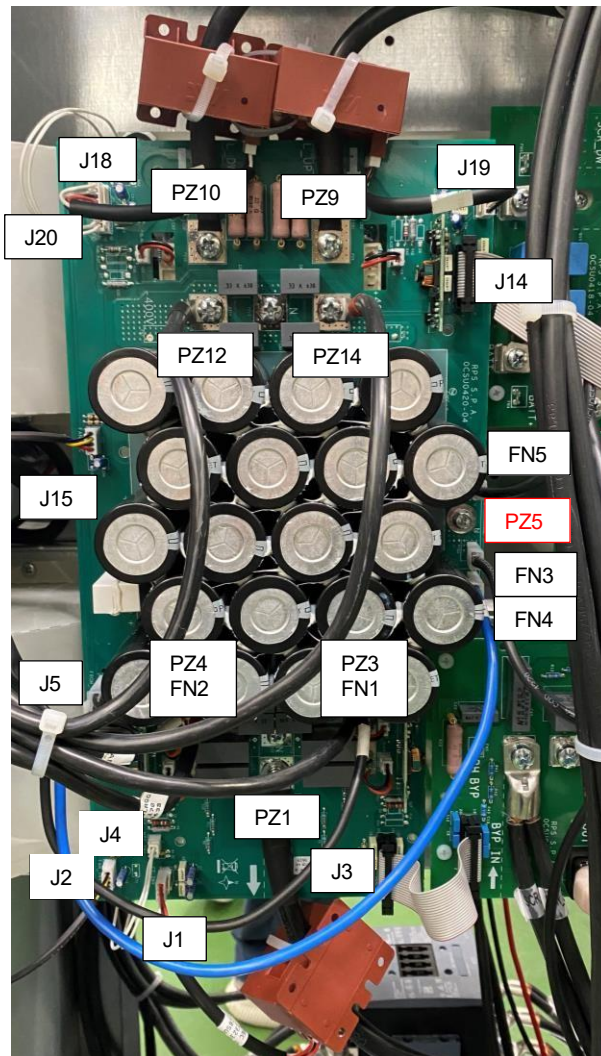


Fig. 74

- 1) Remove all the cables of the output board.
- 2) Remove the screw and washer of PZ5 related to the metal bar.
- 3) Remove the following two screws (PZ13 and PZ2):

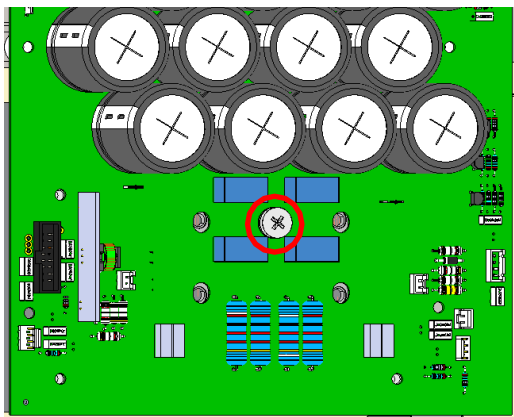


Fig. 75

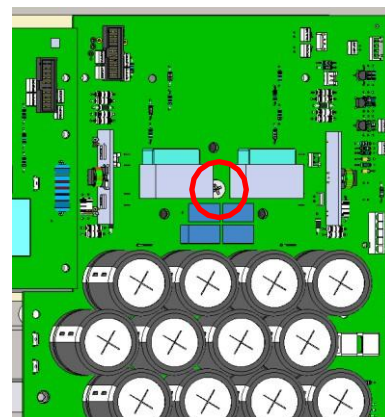


Fig. 76

- 4) Remove the lateral screws (refer to Fig. 77).

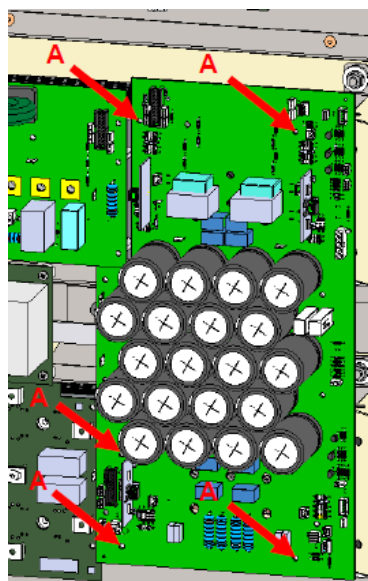


Fig. 77

11.3.6 POWER DC CAPACITOR BOARD INSTALLATION (B0420)

- 1) Place the board paying attention to insert the IGBT modules cables through the slots on the board, then fix the board with n.5 plastic screws (refer to Fig. 77).
- 2) Fix the board to the PFC module with n.1 screw (PZ13 - Refer to Fig. 75).
- 3) Fix the board to the INVERTER module with n.1 screws (PZ2 - Refer to Fig. 76).
- 4) Fix the neutral bar to the board with n.1 screw and n.1 washer (PZ5 - Refer to Fig. 74).

For the correct cable positioning:

PH1	PH2	PH3
PZ4 from PZ12 of B0420 (PH2)	PZ4 from PZ12 of B0420 (PH3)	PZ4 from PZ12 of B0420 (PH1)
PZ3 from PZ14 of B0420 (PH2)	PZ3 from PZ14 of B0420 (PH3)	PZ3 from PZ14 of B0420 (PH1)
PZ1 from L_INV	PZ1 from L_INV	PZ1 from L_INV
PZ9 from L_UP	PZ9 from L_UP	PZ9 from L_UP
PZ10 from L_DW	PZ10 from L_DW	PZ10 from L_DW
J5 from J13 of B0416	J5 from J23 of B0416	J5 from J24 of B0416
FN2 from J15 of B0416	-	FN2 from RN1 of B0436
FN3 from J15 of B0416	-	FN3 from RN5 of B0436
FN1 from J15 of B0416	-	FN1 from RN8 of B0436
J16 from PFC module terminals	J16 from PFC module terminals	J16 from PFC module terminals
J17 from PFC module terminals	J17 from PFC module terminals	J17 from PFC module terminals
J6 from INVERTER module terminals	J6 from INVERTER module terminals	J6 from INVERTER module terminals
J7 from INVERTER module terminals	J7 from INVERTER module terminals	J7 from INVERTER module terminals
J11 from INVERTER module terminals	J11 from INVERTER module terminals	J11 from INVERTER module terminals
J12 from INVERTER module terminals	J12 from INVERTER module terminals	J12 from INVERTER module terminals

J1 from inverter CT	J1 from inverter CT	J1 from inverter CT
J4 from inverter NTC	J4 from inverter NTC	J4 from inverter NTC
J18 from PFC NTC	J18 from PFC NTC	J18 from PFC NTC
J19 from PFC CT_UP	J19 from PFC CT_UP	J19 from PFC CT_UP
J20 from PFC CT_DW	J20 from PFC CT_DW	J20 from PFC CT_DW
FN5 from FN2 of B0418	FN5 from FN2 of B0418	FN5 from FN2 of B0418
FN4 from FN1 of B0419	FN4 from FN1 of B0419	FN4 from FN1 of B0419
J3 from J2 of B0419	J3 from J2 of B0419	J3 from J2 of B0419
J14 from J4 of B0418	J14 from J4 of B0418	J14 from J4 of B0418
J2 from inverter FAN	J2 from inverter FAN	J2 from inverter FAN
J15 from PFC FAN	J15 from PFC FAN	J15 from PFC FAN

Tab. 39

After the board replacement, check the tightening of the screws for a correct measurement.

Close all the disconnection switches, restart the UPS and check the VDC measurement. This measure determine the **actual VDC voltage**; any errors due to the measurement system can be detected by the UcomS3 Status Analyzer software.

11.4 BOARDS REPLACEMENT – POWER SUPPLY SECTION

Below the service operations (the removal and the replacing of the boards) for the power supply section. For more details for the positioning of the boards see the chapter 4.3.3.

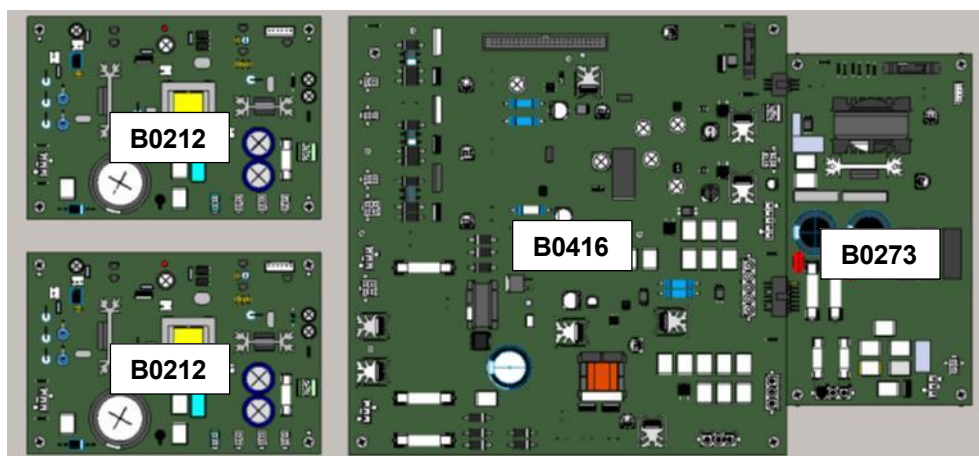


Fig. 78

11.4.1 FAN PS BOARD REMOVAL (B0212)

Both power FAN PS boards are identical, for simplification a single board is shown below.

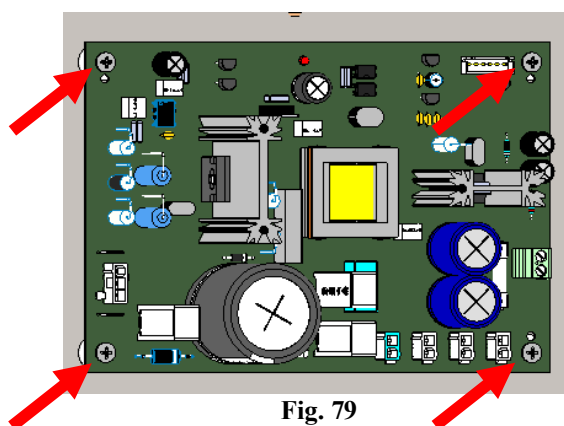


Fig. 79

- 1) Remove all the cables from the board.
- 2) Remove the 4 plastic screws that fix the board.

Attention: only the upper board has a jumper on J3 connector, keep the jumper aside to put it back on the new board later.

For the board installation, refer to the table below for the correct cable positioning:

Upper card	Lower card
J2 from J14 of the B0416 board	J2 from J20 of the B0416 board
J6 and J7 from J12 of the B0416 board	J6 and J7 from J16 of the B0416 board
Jumper connected on J3	J3 not used

Tab. 40

11.4.2 ADAPTER AUX PS BOARD REMOVAL (B0416)

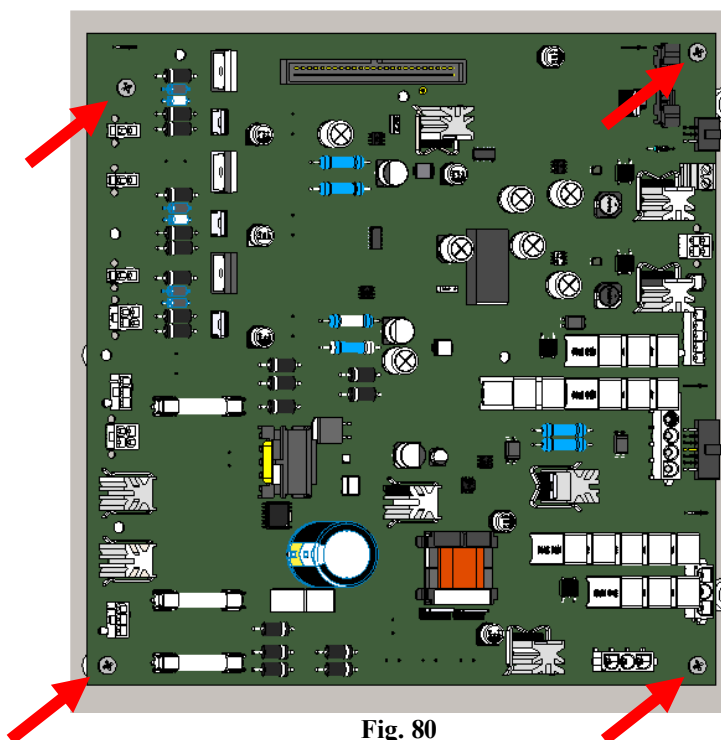


Fig. 80

- 1) Remove first the B0273 board. Please refer to chapter 11.4.3.
- 2) Remove all the cables from the board B0416.
- 3) Remove the 4 plastic screws that fix the board.

For the board installation, refer to the list below for the correct cable positioning:

J14 from J2 of the B0212 (upper board)
 J20 from J2 of the B0212 (lower board)
 J12 from J6 and J7 of the B0212 (upper board)
 J16 from J6 and J7 of the B0212 (lower board)
 J19 from J6 of the B0273 board
 FN2 from FN1 of the B0273 board
 J3 from TL_IN (grey cable) and TL_OUT (black cable)
 J13 from J5 of the B0420 (PH1)
 J23 from J5 of the B0420 (PH2)
 J24 from J5 of the B0420 (PH3)
 J15 from of the B0420 (PH1)
 J21 from FN1 of the B0418 (PH1) and from FN4 of the B0419 (PH2)
 J5 from FAN
 J2 from J4 of the B0273 board
 J1 from J21 of the B0415 board

11.4.3 AUXILIARY POWER SUPPLY BOARD REMOVAL (B0273)

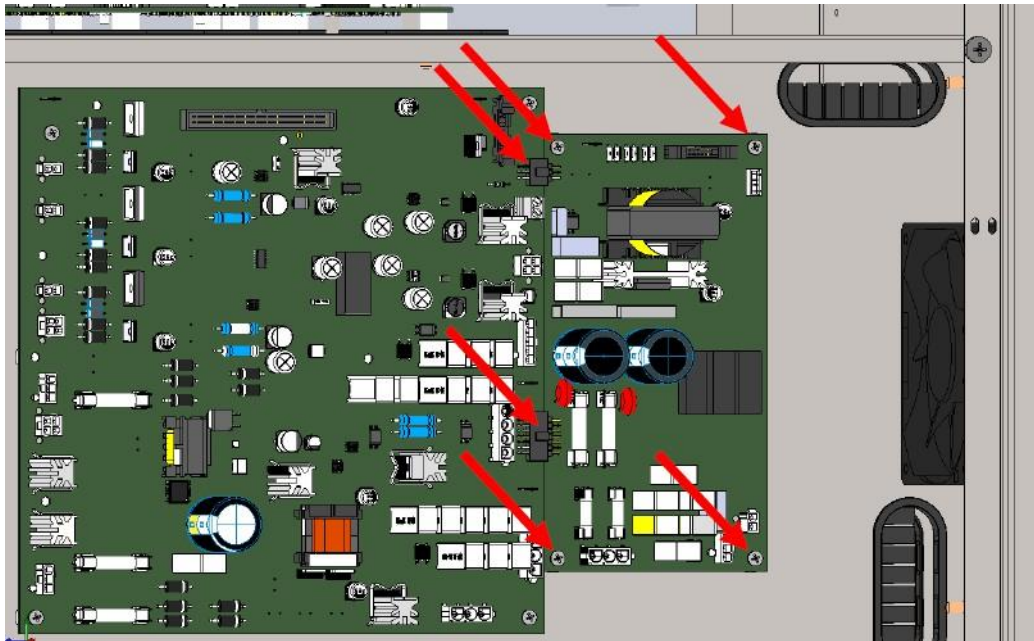


Fig. 81

- 1) Remove all the cables from the board B0273.
- 2) Remove the 4 plastic screws that fix the board.
- 3) Remove the board pulling from left to right so as not to damage the connectors to board B0416.

For the board installation, refer to the list below for the correct cable positioning:

FN1 from FN2 of the B0416 board
 J2 from the Cold Start SW
 J3 from FN4 and FN5 of the B0418 board (PH1)
 J4 from J2 of the B0416 board
 J6 from J19 of the B0416 board

11.5 BOARDS REPLACEMENT – BATTERY CHARGER BOARD (B0436)

Below the service operations (the removal and the replacing of the board) for the battery charger section. For more details for the positioning of the board see the chapter 4.3.4.

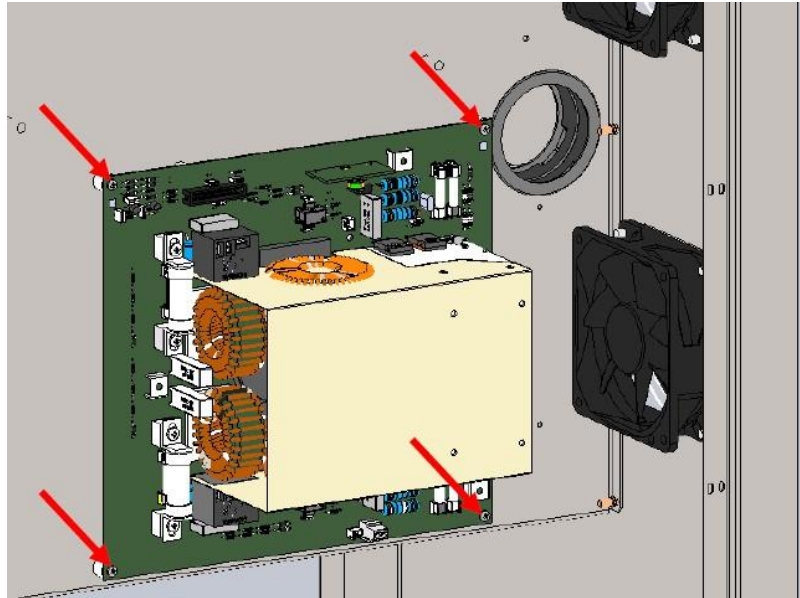


Fig. 82

- 1) Remove all the cables from the board B0436.
- 2) Remove the 4 plastic screws from the board.

For the board installation, refer to the list below for the correct cable positioning:

RN1 (+400V) red cable from FN2 of the B0420 (PH3)
 RN8 (-400V) black cable from FN1 of the B0420 (PH3)
 RN5 (N) blue cable from FN3 of the B0420 (PH3)
 RN2 (+BATT) from battery fuse BATT2+
 RN7 (-BATT) from battery fuse BATT2-
 J8 from battery charger fan
 J3 from J23 of the B0415

12 SERVICE PROCEDURES

12.1 DISPLAY CALIBRATION

The display calibration procedure can be performed when the display is not calibrated or when the display is not reactive. For the display calibration follow the procedure below.

12.1.1 DISPLAY CALIBRATION WITH THE UPS ON (THE LOAD IS STILL FED BY THE UNIT)

- a) Disconnect the display and remove the RJ45 cable (refer to 11.1.1).
- b) Reconnect the RJ45 cable holding at the same time a finger press in a point on the display panel.
- c) Follow the "12.1.3 CALIBRATION SCREEN SEQUENCE".
- d) At the end of the calibration, reinstall the display.

12.1.2 DISPLAY CALIBRATION WITH THE RESTART OF THE UPS

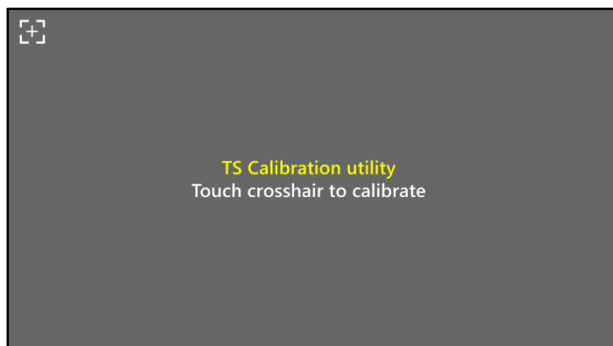
Note: if you need to feed the load close SWMB during the calibration procedure.

WARNING! While SWMB is closed, any disturbance on mains or blackout will affect the load.

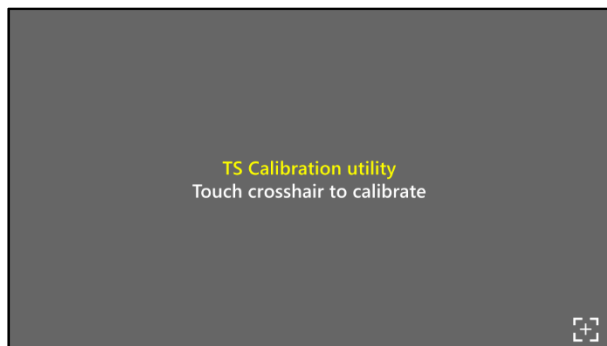
- a) With the UPS switched off, close the SWIN in order to turn on the UPS, holding at the same time a finger press in a point on the display panel.
- b) Follow the "12.1.3 CALIBRATION SCREEN SEQUENCE".
- c) At the end of the calibration, if previously closed, open the SWMB with unit in working condition (no stand-by status to avoid losing the load).

12.1.3 CALIBRATION SCREEN SEQUENCE

The Calibration Utility will start with these steps:

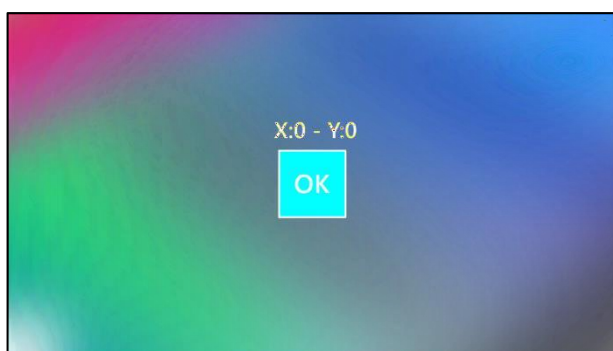


STEP 1



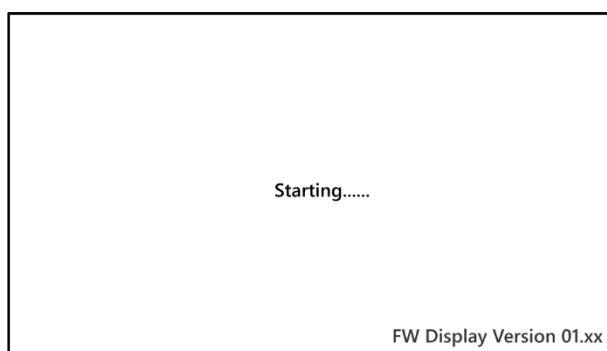
STEP 2

Press the correct points indicated on the display



STEP 3

X and Y must both be "0"



STEP 4

End of a correct calibration procedure

12.2 UPS CONFIGURATION AFTER THE CONTROL BOARD REPLACING (B0275)

This paragraph ensures the correct configuration of the UPS after the Control board (B0275-03x) replacing.

Before replacing the control board, it is recommended to download the .scd file in order to restore the UPS configuration settings at a later time.

The Control board is installed in a generic version on each Sentryum model and is then configured with the appropriate factory settings.

The related spare part (**6R_SUB0275-03x**) contains the generic Control board (without factory settings) and must it be correctly configured by the user via software (included in the UcomS3 package), according the nominal power of the UPS, the output configuration and the personalisation (/Neutral personalisation can be defined using the software).

12.2.1 REQUIREMENTS

- S3setModel software

Note: this software is provided already inside the file 0SWU02903. (UCOM S3 x.x_xx Service Software) and it can run only with full license activation.



- USB cable (A to B)

Note: the cable is provided with the UPS



The S3setModel software works only when the B0275-03 is a **spare part:**
6R_SU0275-03.



Only this code will allow the program to recognize the spare part and establish the connection



12.2.2 PROCEDURE TO CONFIGURE THE UPS

The **SWMB** must remain closed if it is necessary to keep the load powered by the manual bypass line. For additional information please refer to the Operative Procedures written in the User Manual.



Attention! In case of blackout the load will be lost



- a) Switches status (to start the procedure):

SWIN → closed
 SWBYP → open (if present)
 SWOUT → open
 SWBAT → open (of external Battery Cabinet)

Important: make sure the UPS remains in “**Stand-by**” during the procedure: when the SWIN is closed, the UPS will automatically go into stand-by (with the battery charger off). If the “Auto system on” is enabled, disabled it first by S3Config service software of UcomS3. No further action is required.

If the Control board (B0275) is not properly configured, the UPS will not work correctly.

- b) Connect the PC to the UPS trough a USB cable as picture below:

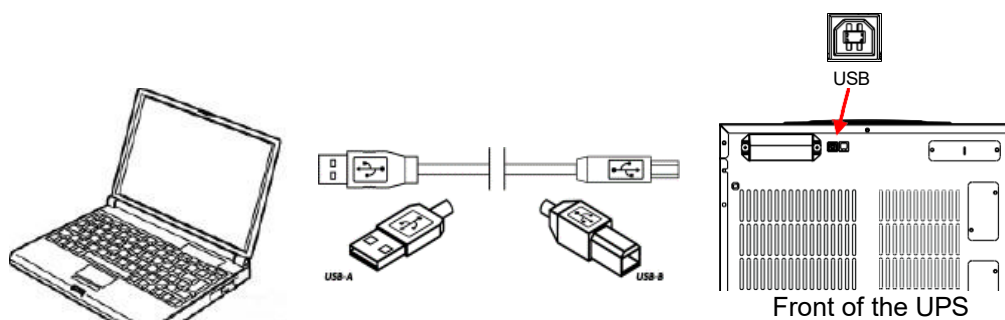


Fig. 83

- c) Run S3setModel.exe

- d) In order to run the program, a password is required.

Service level password: **6R_model**.

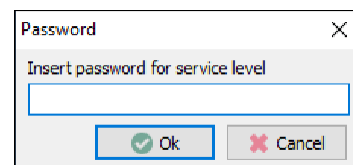


Fig. 84

- e) Select the correct COM port.
Note: this setting is mandatory also for the USB connection.
 Select the correct virtual COM associated the USB port.

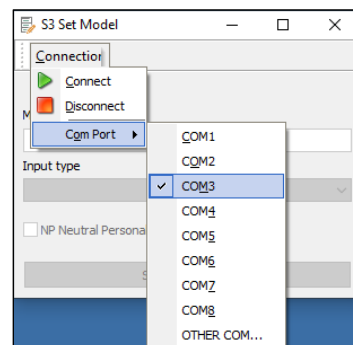


Fig. 85

- f) Click the "Connect" icon to establish the connection.

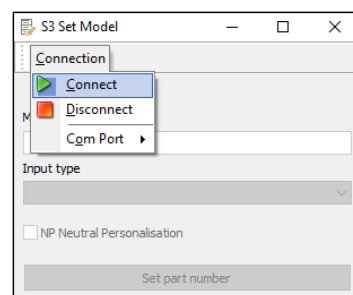


Fig. 86

- g) Type the P/N found on the UPS label in the "Model (part number)" field.

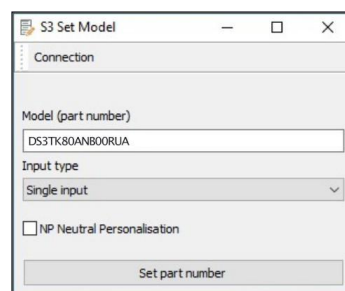


Fig. 87

- h) Select the appropriate Input type (Single-Input or Dual-Input).

Note: "NP Neutral Personalisation" can be selected for the UPS neutral display.

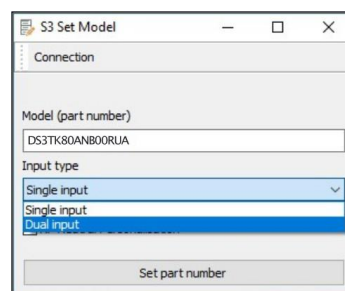


Fig. 88

- i) Click "Set part number" to end the procedure.

A message will inform you of the success of the operation.

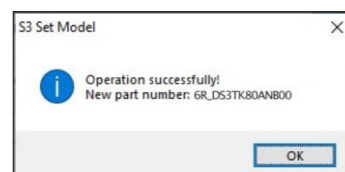


Fig. 89

12.2.3 PART NUMBER (P/N) CHECK AND RESTORING OF THE UPS OPERATION

- Turn OFF and ON the UPS to check the change made.
- Check that not anomalies are present on the status bar (except for the anomalies due to the SWs opened).
- Check on the UPS info page  of the display panel the changes made on chap. 12.2.2.
The **Model** on the UPS Identification must contain the new part number set previously (see Fig. 92). The nominal power of the UPS must be compatible with the Model.
- If the Model is correct according with the changes made, it is possible to restore the UPS operation. Refer to the “Operative Procedures” written in the User Manual to restore the UPS normal operation without losing the load.
- Remember to enable the “Auto system on” ONLY if previously disabled.

12.2.4 SERIAL NUMBER (S/N) SETTING

When the Control board (B0275-03x) is replaced, the serial number displayed on the info page will be different from the serial number of the UPS label.

The “new” serial number displayed is related to the replaced Control board and in case of necessity, it must not be confused with the serial number of the UPS.

For this reason, **it is recommended to restore the UPS S/N. This operation is possible with the S3Config** of UcomS3 Service software.

Procedure with S3Config:

- [Connection → Com Port] select the COM for both USB and Serial Port
-  or [Connection → Connect] to establish the connection laptop-UPS
-  or [File → Download] to get the configuration file from the UPS
- Commands → Set serial number → **enter the S/N of the UPS into the field**

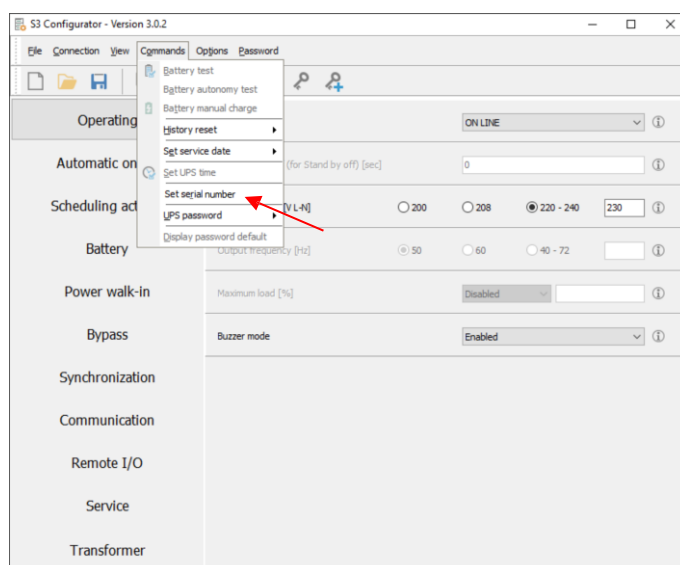


Fig. 90

- Wait about 20 seconds after making the change and download the configuration file again
- Check that the correct **Serial number** is shown on the “Settings” of S3Config (Fig. 91) and on the UPS Info page of the display (Fig. 92):

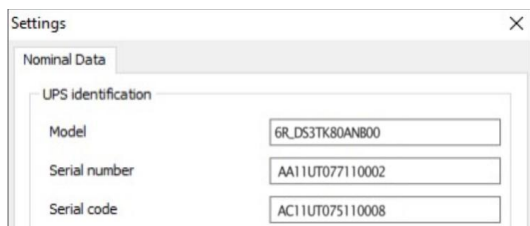


Fig. 91

(View → Settings from S3Config)

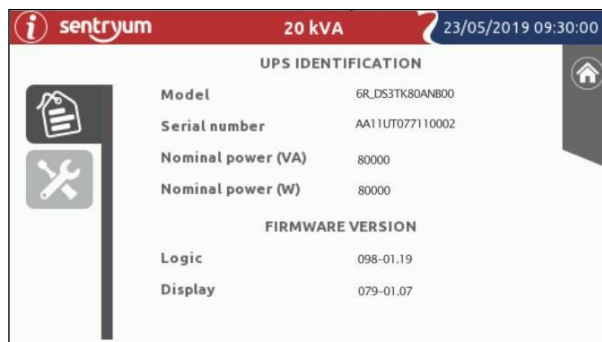


Fig. 92

(Wait for the timeout of the display to check the change made)

Note: the new Serial code indicates the spare part serial code. It cannot be changed.

- At this point it is possible to upload the .scd file which already contains the correct settings or to set manually the necessary parameters/configurations.
-  or [Connection → Disconnect] to exit the connection.

13 STATUS / ALARM CODES

For information on the meanings of status/alarm codes refer to the document: code RM110 Rev.-xx "ALARM CODES".

14 TROUBLESHOOTING TABLES

The UPS is able to check and display its status and any faults and/or failures that may occur during operation on the display panel. In the event of a problem, the UPS reports the event by displaying the type of alarm and alarm code on the display panel.

14.1 TROUBLESHOOTING 'FAULT' TYPE PROBLEMS

The tables below provide useful information for troubleshooting problems connected with 'fault' type alarm codes. The table does not cover all possible UPS failure causes, the information contained here should be considered as a suggestion of the possible causes of problems and how they might be resolved.

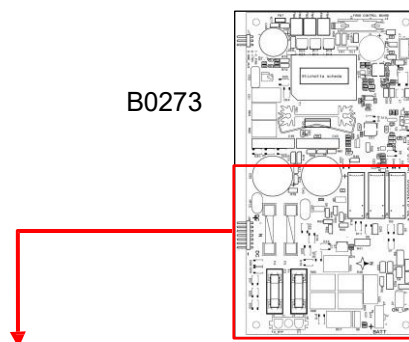
Alarm code	Description	Possible cause	Boards affected	Corrective actions
F01	Internal communication error	Communication error between DSP and FPGA	B0275	Replace the board
F02	Incorrect cycle of the input phases	Input phases connection error		Check input phases connection
F03	Phase 1 input fuse blown or input contact does not open	Input fuses blown or contactor blocked		Check for blown fuses and contactor
F04	Phase 2 input fuse blown or input contact does not open	Short-circuit on Bus (Vdc) from PFC/inverter fault	B0420 B0419	Verify the modules state shown in chapter 9. If necessary, replace the board involved
F05	Phase 3 input fuse blown or input contact does not open	Control logic faulty	B0275 B0415 B0416	If all 3 alarms appear, the fault may be due to the control circuit. Replace the involved board

F06	Phase 1 input contactor does not open	Input contactor blocked	-	Check contactor. Replace the involved part.
F07	Phase 2 input contactor does not open	Short-circuit on Bus (Vdc) from PFC/inverter fault	B0420 B0418 B0419	Verify the modules state shown in chapter 9. If necessary, replace the board
F08	Phase 3 input contactor does not open			
F09	Pre charge of the positive capacitor branch failed	Precharge resistor opened	B0273	Check the precharge resistors (*) If necessary, replace the board
F10	Pre charge of the negative capacitor branch failed	Short circuit on Vdc BUS	B0418 B0420	Verify the modules state shown in chapter 9. If necessary, replace the board involved

(*)

With the UPS completely disconnected from any power supply (make sure there is no voltage present), check R49 and R66, then check R50 and R65 (approximately 44Ω for each series of resistors).

B0273



F11	Boost stage anomaly	The boost stage doesn't complete the "Power on" procedure	B0420	Check the bus (Vdc) voltages (ch. 10.8)
		Boost stage faulty		Verify the modules state as shown in chapter 9. If necessary, replace the board
		Open inductances	-	Check the PFC inductances. If necessary, replace them.
		Control logic faulty	B0275 B0415	Check the flats connections. If necessary, replace the involved board
F12	Incorrect cyclic direction of bypass phases	Connection error in bypass power supply		Check bypass power supply connection
F13	Temporary overvoltage boost	Any unidirectional or regenerative loads connected at output		Check for the presence of unidirectional loads at the output

F14	Phase 1 sinusoid inverter deformed			Check if there is a regenerative load opening output switch of the UPS
F15	Phase 2 sinusoid inverter deformed	Type of applied load strongly distorting or regenerative		Check if the type of load does not absorb more inrush current. In this case is necessary a UPS with more power
F16	Phase 3 sinusoid inverter deformed			Load type very distorting
F19	Overvoltage of the positive battery branch	Battery charger error or Battery readings faulty	B0436	If necessary, replace the board
F20	Overvoltage of the negative battery branch	Control logic faulty	B0275 B0415	Replace the board
F21	Undervoltage/fault of the positive battery branch (battery/fuse)	Battery circuit opened or battery fuses blown		Check for fuses blown
F22	Undervoltage/fault of the negative battery branch (battery/fuse)			Replace the batteries
F23	Output overload	Excessive load		Reduce the load
		Output power reading faulty	B0419 B0415 B0275	Follow chapter 10.6. Replace the affected board
F25	Inverter takes power from output	Power return from the applied load		Check the presence of a regenerative load
- Check the presence of L10, then solve this lock before F25 fault				

F26	Phase 1 output contact does not open			
F27	Phase 2 output contact does not open	Output contactor blocked	B0416 B0275 B0415	Check the output contactor. If necessary, replace the involved board
F28	Phase 3 output contact does not open			
F29	Phase 1 output fuse blown or output contact fault			
F30	Phase 2 output fuse blown or output contact fault	Output fuses blown or the contactor does not close	B0416 B0275 B0415	Check for blown fuses and contactor. If necessary, replace the involved board
F31	Phase 2 output fuse blown or output contact fault			
F32	Battery charger stage fault	Saturated controller or module faulty	B0436	If necessary, replace the board
		BC control and feedback signals faulty	B0275 B0415	Check the flat connection (*) If necessary, replace the boards.
(*) Check the connection between the following boards: J3 of the B0436 and J23 of the B0415 board J18 of the B0415 board and J1 of the B0275 board				
F33	Failure of the system to measure the battery voltage	Battery readings faulty	B0436 B0275 B0415	Follow chapter 10.3. If necessary, replace the board involved

F34	Power module heatsink over temperature	Cooling fans faulty		Check for connection and short circuit at fans (*)→replace fans
		Temperature readings faulty	B0416 B0420	Check the interconnections between the affected boards. If necessary, replace the boards
		Temperature sensor faulty		
		Cooling fans power supply fault	B0212	If necessary, replace the board
(*) With the UPS ON, check the V_FAN (27V) on connectors J2-J15 (between terminals 1-4) of B0420-0x boards				
F36	Fans failure	Fan backfeed is missing	B0416 B0420	Check the fans connections, and the resistors (*)
(*) check the R81 and R82 of each B0420 board are correctly soldered. Measure the resistor with a tester, the value must be 0 Ohm (continuity). Check also the cable 0CBSU0657 and, with the UPS on, check the frequency between pin 3-4 of J2 and pin 3-4 of J15 → 0Hz = faulty fan.				
F39	Failure of the system to measure the DC bench voltage	DC bench readings faulty	B0420 B0275 B0415	Check the Bus (Vdc) readings by software “S3RealTime” (Status Analyzer). If necessary, replace the board involved

The BUS Vdc readings are located on board B0420 of phase 1 and 2. To check the reading resistors, remove the flat cable on this board and measure between:

R21 and R5 (Vdc-) = $480k \pm 1\%$

R22 and R6 (Vdc+) = $480k \pm 1\%$

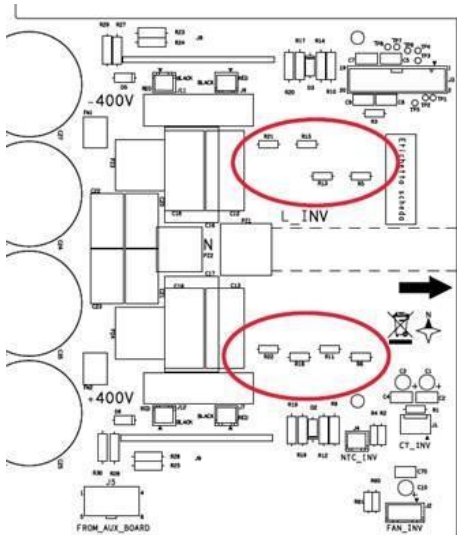


Fig. 95

F45	Communication bus open in a parallel system (one point)	Single point parallel link failure	B0229	Check the interconnections between the affected boards, if necessary, replace the board
F46	Anomaly of bypass request in a parallel system	Bypass call request not confirmed in HW		
F47	Anomaly of synchronization line in a parallel system	Frequency message different to the HW frequency		
F48	Wrong position of neutral battery cable	Battery connection error		Check the position of neutral battery cable
F53	Fault on the redundant auxiliary power supply for bypass line	Redundant auxiliary power supply faulty	B0416	Check for blown fuse and the state of the redundant auxiliary power supplies led. (*)

(*)

For the position of the fuse (F2) and the led (DL1) see the image below:

Fig. 96

F54	Memory access error A	EEPROM faulty	B0275	Replace the board
F55	Memory access error B			
F56	Calibration error PFC	Error in zeroing of LEM offsets	B0420 B0275 B0415	Replace the board involved
F57	Calibration error INV			
F58	Calibration error BAT			
F59	Output board communication error	Microcontroller on B0415 doesn't work or flats not connected	B0415 B0290	Check that the flats are correctly connected If necessary, replace the board involved
F60	Comm. Board link fault	The flat from the Control Board to the Communication Board is not connected or Control Board faulty	B0274	Check that the flat of the B0274 is correctly connected
			B0275	Replace the board
F61	Calibration error BYP	Error in zeroing of bypass reading offsets	B0419 B0275 B0415	Replace the board involved

Tab. 41

14.2 TROUBLESHOOTING 'LOCK' TYPE PROBLEMS

The tables below provide useful information for troubleshooting problems connected with 'lock' type alarm codes. This table does not cover all possible UPS failure causes, the information contained here should be considered as a suggestion of the possible causes of problems and how they might be resolved.

Alarm code	Description	Possible cause	Boards affected	Corrective actions
L01	Auxiliary power supply incorrect	Aux power supplies missing	-	Detailed description of L01 in ch. 7
L02	Disconnection of one or more internal connection cable of the boards	Flat cables not connected or partially connected	All boards with flat cables except B0274	Check the connections of the UPS flat cables. Refer to chap. 8
L03	Phase 1 input fuse blown or input contact fault	Input fuses blown or the contactor does not close		Check for blown fuses and contactor
L04	Phase 2 input fuse blown or input contact fault	Control logic faulty	B0275 B0415 B0416	Replace the board
L05	Phase 3 input fuse blown or input contact fault	Short-circuit on Bus (Vdc) from PFC/inverter fault	B0420	Verify the modules condition shown in chapter 9. If necessary, replace the board involved

L06	Boost positive stage overvoltage	Any unidirectional or regenerative loads connected at output		Check for the presence of unidirectional loads at the output (*)
		Short-circuit on bypass line	B0419	Check the bypass module as shown on chapter 9.1.3. If necessary, replace the board
L07	Boost negative stage overvoltage	Resistance opened in the Control Board	B0275	Replace the board
Check if the neutral cable is connected. (*) - Check if there is not regenerative load opening output switch of UPS. If present, try to dissect the loads (if it is possible) to find the regenerative load. - Check on UcomS3 the voltages on capacitors bank must not be different between them. If they are very different, turn on the UPS and open the output switch and recheck the voltages on capacitors bank: correct readings indicate that the load type is not suitable for UPS. NOTE FOR PARALLEL SYSTEM: The whole parallel system can generate L06/L07 if also only one UPS has a failure.				
L08	Boost positive stage undervoltage	Inverter stage fault	B0420	Verify the modules state shown in chapter 9. If necessary, replace the board involved
		Boost stage fault		
L09	Boost negative stage undervoltage	Fuses blown		Check for blown fuses
L10	Bypass static switch fault (Back Feed Protection)	Bypass SCR blown	B0419	Check the bypass module as shown on chapter 9.1.3. If necessary, replace the board
L11	L1 bypass output unavailable for contact fault	Bypass command circuit faulty	B0419 B0415 B0275	If the problem is on all three phases together, there is a failure on the command circuit. Replace the affected board.
L12	L2 bypass output unavailable for contact fault			
L13	L3 bypass output unavailable for contact fault	Bypass contact faulty		Replace the board involved

L14	Phase 1 inverter overvoltage	Presence of high peaks	B0420	Replace the board involved
L15	Phase 2 inverter overvoltage	Feedback readings faulty	B0440 B0415 B0275	Check the capacitance measurement of the AC capacitors. If necessary, replace the board involved
L16	Phase 3 inverter overvoltage			
L17	Phase 1 inverter undervoltage	Inverter reading faulty	B0420 B0419 B0415 B0275	Check the good position of the flat cables between these boards
L18	Phase 2 inverter undervoltage			
L19	Phase 3 inverter undervoltage			
L20	Direct voltage on inverter output or deformed inverter sinusoid of phase 1	Inverter faulty	B0420	Replace the board involved
L21	Direct voltage on inverter output or deformed inverter sinusoid of phase 2	Control board faulty	B0275 B0415	
L22	Direct voltage on inverter output or deformed inverter sinusoid of phase 3	Inverter capacitor faulty for capacity loss	B0440	Check the capacitance measurement of the AC capacitors. If necessary, replace the board
L23	Overload on phase 1 output	Excessive load or Power Reduction mode activated		Reduce the load or disable the Power reduction via Ucoms3 Configurator
L24	Overload on phase 2 output			
L25	Overload on phase 3 output	Output power reading faulty	B0419 B0415 B0275	Replace the affected board

L26	Short-circuit on phase 1 output			Check for the presence of short-circuit between the phases and neutral (and between phase-phase) at the output
L27	Short-circuit on phase 2 output	Short circuit at output		
L28	Short-circuit on phase 3 output			Check the good position of the cables to the UPS terminals.
L29	Phase 1 output fuse blown or output contactor fault			Check for blown fuses and contactor.
L30	Phase 2 output fuse blown or output contactor fault	Output fuse blown or output contactor does not close	B0416 B0415 B0275	If the problem is on all three phases together, replace the involved board
L31	Phase 3 output fuse blown or output contactor fault			
L32	Synchronisation error in parallel system	HW Sync. Frequency differ from message for 5 cycles	B0229	Occurs only on Slave. Replace the board
L33	Synchronisation signal anomaly in a parallel system	Physical Loss of HW sync. signal	B0229	Occurs only on Slave. Replace the board
L34	PFC/Boost over temperature	Cooling fans faulty		Check for connection and short circuit at fans →replace fans
L35	Inverter stage over temperature	Temperature readings faulty	B0420 B0419 B0415 B0275	Check the interconnections between the affected boards, if necessary replace the boards
		Temperature sensor faulty		Check temperature sensors and replace them if necessary
L38	Temperature sensor of the boost stage fault	Short-circuit or open circuit of the temperature sensor	B0420	Verify the modules state shown in chapter 9. If necessary, replace the module/board involved.

L39	Temperature sensor of the inverter stage fault			
		Temperature readings faulty		Check temperature sensors
L42	Battery fuse blown	Short-circuit/fault on input/PFC module	B0418 B0420	Check for blown fuses. Verify the modules state shown in chapter 9. If necessary, replace the board involved
L44	Phase 1 input contactor locked shorted (does not open)	Phase 1 input contactor blocked		Check the input contactor. Verify the modules state shown in chapter 9. If necessary, replace the board involved.
L45	Communication bus interrupted in a parallel system (two points)	Two point parallel link open	B0229	Check the interconnections between the affected boards. If necessary, replace the board
L46	Communication bus anomaly in a parallel system	Parallel communication faulty		
L47	Parallel board anomaly	Parallel board faulty		
L49	Output AC capacitor fault	Thermal fuse open on AC capacitors	B0440 B0441	Check for blown fuses by checking continuity on J1 connector. If necessary, replace the board
L51	Short-circuit on battery charger output	Battery charger blocked for short circuit detected	B0436	Replace the board
L52	Active power error for phase 1	No output connection or active power out of range		Check the output connections and for output fuses blown. If necessary, an in-dept analysis is required.
L53	Active power error for phase 2			
L54	Active power error for phase 3			

L55	Reactive power error for phase 1			
L56	Reactive power error for phase 2	Reactive power out of range		Internal anomaly for multiple causes. An in-dept analysis is required
L57	Reactive power error for phase 3			

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15 APPENDIX

15.1 LIST OF USEFUL DOCUMENTS

- User Manual 0MNS3TK80RUxxUx (MAN S3T 80-120 xx)
- Installation Manual 0MNS3TK80RUxxIx (MAN S3T 80-120 DRW xx)
- Wiring diagram SBS3T_80-120_... (Wiring Diagram S3T 80-120)
SBS3T_80-120_... (Wiring Diagram S3T 80-120 DI)
- Firmware Upgrade Manual RM034 Rev04-... (S3T-S3U Firmware Upgrade) (*)
- Alarm Code Manual RM110 Rev0x-... (Alarm codes Sentryum S3T and S3U)
- Spare Part List SPLa20xx_BB_S3T_xx_rev0x

(*) Or later version

15.2 BOARDS LIST

15.2.1 S3T THREE-PHASE 80-120

BOARD			DESCRIPTION	QUANTITY FOR UPS
S3T 80	S3T 100	S3T 120		
B0212-02	B0212-02	B0212-02	S3T Fan PS Card 80-120	2
B0273-01	B0273-01	B0273-01	S3T Aux Power Supply Card	1
B0274-01	B0274-01	B0274-01	S3T Communication Card	1
B0275-03	B0275-03	B0275-03	S3T Control Card 80-120	1
B0305-01	B0305-01	B0305-01	S3T Led Logo Card	1
B0306-01	B0306-01	B0306-01	S3T Display Card	1
B0415-01	B0415-01	B0415-01	S3T Signal Adapter Card 80-120	1
B0416-01	B0416-01	B0416-01	S3T Adapter Aux PS card 80-120	1
B0418-01	B0418-02	B0418-02	S3T Input Card	3
B0419-02	B0419-02	B0419-02	S3T Output Card 80-120	3
B0420-01	B0420-02	B0420-03	S3T Power DC Cap Card	3
B0436-03	B0436-03	B0436-03	S3T Batt Charger Card 80-120	1
B0440-01	B0440-01	B0440-02	S3T Out AC Cap Card	3
FILTER CY BOARD				
B0441-01	B0441-01	B0441-01	S3T In AC Cap Card 80-120	1
B0442-01	B0442-01	B0442-01	S3T Filter Cy Card 80-120	1

15.3 6R_S3T80CB00 – S3T FLAT AND SIGNAL CABLES 80-120

Below the list and quantities of flat and signal cables included in the 6R_S3T80CB00-A spare part:

Cod.	Description	Qty	Boards
0CBCU0555A	S3T Cable for Neutral	7	B0416↔B0273 B0419↔B0420 B0418↔B0420
0CBFU0114B	S3T Flat cable for Parallel Board	1	B0229↔B0275
0CBFU0140A	S3T Flat Cable	3	B0418↔B0420
0CBFU0141A	S3T Flat Cable	3	B0418↔B0419
0CBFU0142A	S3T Flat Cable	3	B0419↔B0420
0CBFU0143A	S3T Flat Cable Output PH1	1	B0419↔B0415
0CBFU0144A	S3T Flat Cable Output PH2	1	B0419↔B0415
0CBFU0145A	S3T Flat Cable Output PH3	1	B0419↔B0415
0CBFU0146A	S3T Flat Cable for Control section	1	B0415↔B0275
0CBFU0147A	S3T Flat Cable for Control section	2	B0415↔B0275
0CBFU0148A	S3T Flat Cable for Control section	2	B0415↔B0275
0CBFU0149A	S3T Flat Cable for Control section	1	B0415↔B0275
0CBFU0151A	S3T Flat Cable for Battery charger	1	B0436↔B0415
0CBFU0152A	S3T Flat Cable for Aux. power supply	1	B0416↔B0273
0CBFU0153A	S3T Flat Cable for Aux. power supply	1	B0416↔B0415
0CBFU0171A	S3T Flat Cable for Communication SLOT	2	B0274
0CBFU0172A	S3T Flat Cable for Communication	1	B0274↔B0275
0CBPU0463B	S3T Power Cable	3	B0420
0CBSU0086A	S3T Cable for Output Board	3	B0419
0CBSU0269B	S3T Cable for RJ45 Display	1	B0274↔B0306
0CBSU0394B	S3T Cable for Cap. Thermal Fuses	2	B0440↔B0419
0CBSU0473A	S3T Cable for Cold Start Button	1	B0273
0CBSU0652A	S3T Jumper for B0212 upper Card	1	B0212
0CBSU0654B	S3T Cable for Contactor	1	B0416↔TL_IN / TL_OUT
0CBSU0655A	S3T Cable for Aux. power supply	2	B0212↔B0416
0CBSU0656A	S3T Cable for Aux. power supply	2	B0212↔B0416
0CBSU0657B	S3T Cable for Aux. power supply	1	B0416↔B0420
0CBSU0658A	S3T Cable for Aux. power supply	1	B0416↔B0273
0CBSU0659B	S3T Cable for driver	18	B0420
0CBSU0660B	S3T Cable for Aux. Contact	1	SWMB/SWOUT↔B0415
0CBSU0661B	S3T Cable for VAC current transducer	9	B0420
0CBSU0662A	S3T Cable for Battery charger	1	B0420↔B0436
0CBSU0663A	S3T Cable for Battery charger	1	B0436↔BATT FUSES
0CBSU0665B	S3T Power Cable	1	B0418, B0418↔B0419
0CBSU0666B	S3T Cable for In AC capacitor card 120	9	B0441↔TL_IN
0CBSU0668B	S3T Cable PH1 for Aux. Power section	1	B0420↔B0416
0CBSU0674A	S3T NTC Cable	6	B0420
0CBSU0684B	S3T Cable for In AC capacitor card 80-100	9	B0441↔TL_IN
0CBSU0686A	S3T Cable for Cap. Thermal Fuses	1	B0419↔B0441
0CBSU0701A	S3T Cable for SWBYP aux. contact	1	B0442↔SWBYP

0CBSU0702A	S3T Power Cable for SW_IN and SW_OUT	2	B0442↔SW_IN / SW_OUT
0CBSU0703A	S3T Neutral Cable for SW_IN and SW_OUT	2	B0442↔SW_IN / SW_OUT
0CBSU0704A	S3T Ground Cable	1	B0442
0CBSU0706B	S3T Bypass Cable	1	B0419↔BYP FUSES
0CBSU0724A	S3T Cable for Aux. Power Supply	1	B0416↔B0418 (PH1) B0416↔B0419 (PH2)
0CBSU0725A	S3T Neutral Cable	1	B0415 B0441

(*) The revision of the codes refers to the date: 04/2025