

Uninterruptable Power Supply

AR3 10÷80

USER'S MANUAL



ENGLISH

Uninterruptible Power Supply (UPS) "UPS TREEPHASE" models, marked CE and used following the instructions listed below, have the essential requirements to comply with the EMC directive 89/336 e 92/31 a 93/68 ECC.

Usage instructions.

The "UPS TREEPHASE " are UPS dedicated to a professional usage in an industrial and commercial environment. The connection to "REMOTE" and "RS232" connectors must be done by means of a shielded cable.

WARNING: The " UPS TREEPHASE " standard are a Class A-UPS Products.

In a domestic environment, this product may cause radio interference, in which case, the user may be required to take additional measures.

For instance: in case of disturbances received by a radio or a television set, the "UPS TREEPHASE " shall be moved in order to increase the distance from above mentioned devices.

CAUTION

READ THIS MANUAL CAREFULLY UP TO THE CHAPTER 'MODES OF OPERATION' BEFORE INSTALLING THE EQUIPMENT.

SAFETY MEASURES

1. *THE UPS CANNOT OPERATE UNLESS CONNECTED TO GROUND*
- the first connection to make is the ground lead to be connected to the terminal marked PE.
2. *INSIDE THE EQUIPMENT THERE ARE VOLTAGES EVEN WITH THE INPUT AND BATTERY SWITCHES OPEN.*
- Removal by unqualified personnel of the doors of the UPS can cause damage both to the operator and the equipment.
3. *IF NECESSARY TO CHANGE FUSES USE ONLY FUSES OF THE SAME TYPE.*
4. *FOLLOW STRICTLY THE INSTRUCTIONS UNDER PARAGRAPH 'INSTALLATION'.*

THE BATTERY SHOULD BE CHANGED IF NECESSARY ONLY BY QUALIFIED PERSONNEL. TO ELIMINATE REPLACED PARTS IT IS OBLIGATORY TO DELIVER THEM TO ONE OF THE SPECIAL CONSORTIUMS FOR DISPOSAL BY RECYCLING. THE BATTERIES ARE CLASSIFIED TOXIC WASTE BY LAW.
--

The Company reserves the right to make changes to the product described in this manual at any time and without notice for reasons of improvement.

INDEX

STORAGE	5
INSTALLATION.....	5
INSTALLATION ROOM	5
PRELIMINARY OPERATIONS	5
POSITIONING	5
CONNECTIONS	6
DIFFERENTIAL SWITCH.....	6
MAINS AND LOAD CONNECTIONS.....	6
THREEPHASE OUTPUT 10 ÷ 80 kVA (INPUT THREE PHASE WITH NEUTRAL).....	6
DI BYPASS LINE SEPARATE CONNECTION.....	7
THREE PHASE OUTPUT 10 ÷ 40 kVA	7
THREE PHASE OUTPUT 60 ÷ 80kVA	8
BATTERY CONNECTION	8
FITTING BATTERY FUSES, internal battery version only:	8
CHECKING CONNECTIONS	8
STARTING PROCEDURE	9
OPERATIONAL CHECK.....	9
MODES OF OPERATION	9
NORMAL OPERATION	9
BATTERY OPERATION.....	10
RESERVE NETWORK OPERATION	10
BY-PASS FOR MAINTENANCE - SWMB.....	10
CUSTOMIZING (SEE APPENDIX).....	11
REMOTE CONTROL AND SIGNALS.....	11
REMOTE.....	11
RS232	12
BLOCK DIAGRAM COMPONENTS.....	12
BLOCK DIAGRAM.....	13
MAINTENANCE	14
SPECIFICATIONS	14
RECTIFIER INPUT	14
RECTIFIER OUTPUT	14
BATTERY	15
INVERTER OUTPUT	15
BYPASS LINE	16
SYSTEM	16
SIGNALLING PANEL FUNCTIONS	17
GENERAL DESCRIPTION	17
WARNING LIGHTS: LED	17
BASIC MENU, SIGNALLING MESSAGES, NORMAL	18
Alarm 1: DISTURBANCES ON BYPASS LINE	19
Alarm 2: MANUAL BYPASS, SWMB ON.....	19
Alarm 3: BYPASS VOLT. FAIL or SWBY, FSCR OFF	19
Alarm 4: MAIN LINE VOLTAGE FAIL or SWIN OFF.....	19
Alarm 5: PREALARM, LOW VOLTAGE ON BATTERY.....	19
Alarm 6: BATTERY DISCHARGED or SWB OPEN.....	19
Alarm 7: LOW INPUT VOLTAGE or OUTPUT OVERLOAD (W).....	19
Alarm 8: OUTPUT OVERLOAD	19
Alarm 9: BYPASS FOR OUTPUT VA < AUTO-OFF VALUE.....	20
Alarm 10: INTERNAL FAULT: number.....	20
Alarm 11: TEMPORARY BYPASS, WAIT.....	20
Alarm 12: BYPASS for OUTPUT OVERLOAD.....	20
Alarm 13: BYPASS COMMAND ACTIVE; 8=COMMAND OFF.....	21
Alarm 14: REMOTE BYPASS CONTROL: ACTIVE	21
Alarm 15: OVERTEMPERATURE or FAN FAILURE.....	21
Alarm 16: INPUT VOLTAGE SEQUENCE NOT OK.....	21

Alarm 17: OUTPUT OFF, CLOSE SWOUT OR SWMB..... 21

Alarm 18: SYSTEM OFF COMMAND ACTIVE; 8=COMMAND OFF..... 21

Alarm 19: REMOTE BYPASS COMMAND: ACTIVE 21

Alarm 20: MEMORY CHANGED: CODE= number 21

Alarm 21: AUTO-OFF Timer: T off= 0: 0', T on 0: 0' 22

Key menu 1, "?", HELP 22

Key menu 1, 1: LANGUAGES..... 23

Key menu 2 "voltmeter": VOLTAGE MEASUREMENT 23

Key menu 2, 6: TIME MEASUREMENT 23

Key menu 2,2: CURRENT MEASUREMENT 24

Key menu 2, 2, 2: 3-PHASE VOLTAGE MEASUREMENT 24

Key menu 3 "KEY", COMMANDS 25

Key menu 3, 2: BATTERY TEST..... 25

Key menu 3, 4: DISPLAY CONTRAST..... 26

Key menu 3, 5: CUSTOMIZING 26

Key menu 3, 5, 2: CUSTOMIZING RATED OUTPUT VOLTAGE 26

Key menu 3, 5, 3: BATTERY CUSTOMIZING 26

Key menu 3, 5, 4: PREALARM CUSTOMIZING..... 27

Key menu 3, 5, 6: AUTO-OFF CUSTOMIZING 27

Key menu 3, 5, 7, 2: BYPASS VOLTAGE RANGE CUSTOMIZING..... 28

Key menu 3, 5, 7, 3: BYPASS FREQUENCY RANGE CUSTOMIZING..... 28

Key menu 3, 5, 7, 4 : MODEM CUSTOMIZING..... 28

Key menu 3, 5, 7, 4, 5 (6) : Modem 'Dial /Send' CUSTOMIZING..... 29

Key menu 3, 5, 7, 5: RS232 CUSTOMIZING 29

Key menu 3, 5, 7, 6: ECHO CUSTOMIZING..... 29

Key menu 3, 5, 7, 7: IDENT. CUSTOMIZING 30

Key menu 3, 6: INVERTER-OFF/BYPASS 30

Key menu 3, 7: TOTAL SYSTEM SHUT-OFF COMMAND 30

Key menu 4: "RECORDER": HISTORY = RECORDED EVENTS..... 31

Key menu 4, 2 RECORDED VOLTAGES MEASUREMENT 31

Key menu 4, 2, 2: RECORDED CURRENT MEASUREMENT..... 31

Key menu 4, 2, 2, 2: RECORDED 3-PHASE VOLTAGE MEASUREMENT..... 31

Key menu 4, 6: RECORDED CODES 32

Key menu 5: Acoustic alarm exclusion..... 32

Key menu 6: "clock": DATE/TIME 32

Key menu 7 "arrow down": INTERNAL CODES 32

Key menu 8 "arrow up": NORMAL..... 33

Remote Panel With RS232 Terminal 33

Connection with Computer..... 34

APPENDIX 35

BATTERY PACK UPS COMPACT 35

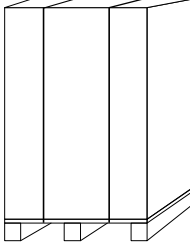
LAY-OUT..... 36

DIMENSION WEIGHT..... 39

INTERNAL PROTECTIONS 40

TABLE OF MEMORIZED INTERNAL CODE..... 41

STORAGE



The batteries contained in the UPS are subject to self-discharging.
For this reason the batteries should be recharged every 12 months of storage with surrounding temperature of approximately 20°C (68°F). If temperature is approximately 30°C (86°F) they should be recharged every 6 months.
 To recharge batteries just power up the UPS and leave it on NORMAL OPERATION for at least 24 hours.

INSTALLATION

INSTALLATION ROOM

Make sure the room chosen for the installation has the following characteristics:

- Dust free.
- Room temperature must be suitable 0 ÷ 40°C.
- Do not install it in places exposed to direct sunlight or hot air

The UPS can operate in surrounding temperature between 0°C and 40°C. Optimal operating temperature is 20°C. Battery life, when used at 20°C is approximately 4 years, battery life is halved if used at 40°C.

A system of elimination of dissipated heat must be provided in the installation room. The usable methods are the following:

- **Natural Ventilation**

Usable only for small dissipated power and very large installation environments.

- **Forced ventilation**

Usable when surrounding temperature to be cooled, t_a is higher than outside temperature t_e (otherwise an air conditioning plant is required). The closer the two temperatures, the greater must be the capacity (m^3 per h) of the blowers. To calculate the air flow rate the following formula can be used:

$$Q (m^3/h) = 3.1 + p_{diss}(kcal) / (t_a - t_e) (°C)$$

p_{diss} is the power dissipated expressed in kcal in the installation environment by all the installed equipment.

To allow for losses the value taken should be increased by 10%.

In the table in the appendix is shown an example of flowrate allowing a $(t_a - t_e)$ of 5°C.

PRELIMINARY OPERATIONS

After removing the UPS from the packing check to make sure it has not been damaged during transportation.

Open the front door and make sure all the switches behind the door are open (with the lever down).

The UPS is delivered with:

- Guarantee
- Technical Instruction Manual
- Battery fuse or fuses 30A-600A only for versions COMPACT.

POSITIONING

Make sure the following conditions are present:

A space of at least 40cm between the rear and the wall or any other obstacle, Nothing must be rested on top of the UPS. In front of and above the equipment there must be enough space left to allow maintenance, cable inlet must be from below.

CONNECTIONS

To ascertain the position of the components mentioned in this paragraph see FIG. of the Appendix.
 The following operations are to be performed with the UPS disconnected from the mains and all the equipment switches open (control lever down).
 Remove the panel covering the switches.

THE FIRST CONNECTION TO MAKE IS THE GROUNDING LEAD TO THE TERMINAL MARKED 'PE'.
 THE UPS CANNOT OPERATE WITHOUT CONNECTION TO THE GROUNDING SYSTEM.

DIFFERENTIAL SWITCH

INPUT NEUTRAL CONNECTED TO OUTPUT NEUTRAL

In both the single-phase and three-phase versions the output neutral of the UPS is connected to the neutral from the mains. With the SWBY Switch closed:

A DIFFERENTIAL SWITCH LOCATED UPSTREAM INTERVENES FOR A FAILURE OCCURRING
 DOWNSTREAM OF THE UPS

THE ELECTRICAL SYSTEMS LOCATED UPSTREAM AND DOWNSTREAM OF THE UPS ARE IDENTICAL

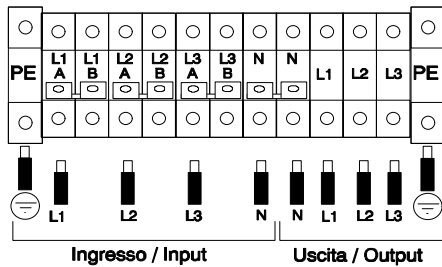
With mains present, the protection of the output line is always granted by the input differential breaker, as there is continuity between input and output circuit. With mains absent (battery feeding), the intervention of input breaker is granted only if this is able to switch in consequence of the leakage current without voltage at its poles. However it is always possible to install breakers on the output line, coordinate with the input protections.

DIFFERENTIAL SWITCH LOCATED UPSTREAM characteristics:

- differential current not lower than 300mA
- class A, for alternating current and pulse unidirectional current

MAINS AND LOAD CONNECTIONS

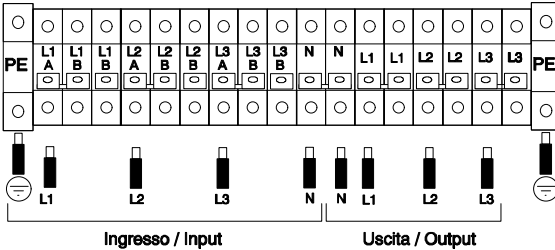
THREEPHASE OUTPUT 10 ÷ 80 kVA (INPUT THREE PHASE WITH NEUTRAL).
 INPUT/OUTPUT terminal board 10÷40kVA



The jumper shown in figure is already in place

For input and output wire size refer to the following table:

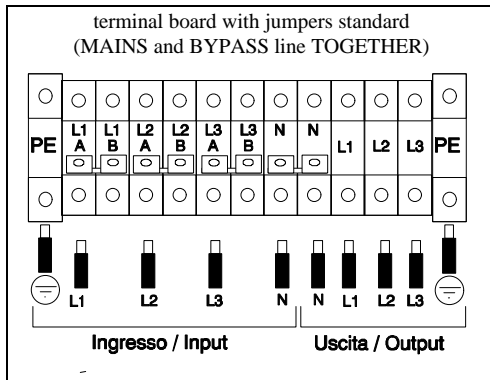
INPUT/OUTPUT TERMINAL BOARD 60÷80 kVA:



kVA	Sez. [mmq] (distance >10m)		
	INPUT	PE	OUTPUT
10	L1/L2/L3/N 6	6	L1/L2/L3/N 6(6)
15	L1/L2/L3/N 6	6	L1/L2/L3/N 6(10)
20	L1/L2/L3/N 10	10	L1/L2/L3/N 10(10)
30	L1/L2/L3/N 16	16	L1/L2/L3/N 16(16)
40	L1/L2/L3/N 25	16	L1/L2/L3/N 25(25)
60	L1/L2/L3/N 35	16	L1/L2/L3/N 35(50)
80	L1/L2/L3/N 35	16	L1/L2/L3/N 35(50)

DI BYPASS LINE SEPARATE CONNECTION

THREE PHASE OUTPUT 10 ÷ 40 kVA



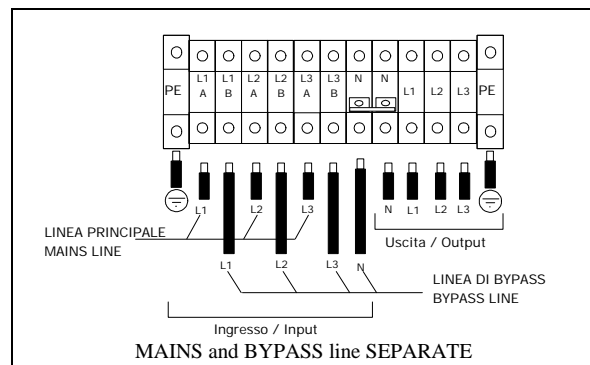
operations for new terminal board configuration:

- remove Nr.3 jumpers L1A-L1B, L2A-L2B, L3A-L3B

after that connect the mains and bypass line:

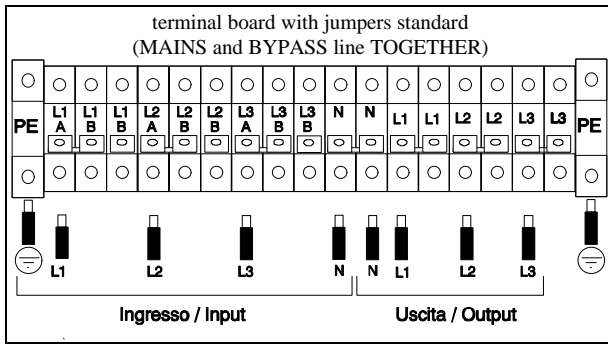
Mains line L1 terminal L1A
 L2 terminal L2A
 L3 terminal L3A

BYPASS line L1 terminal L1B
 L2 terminal L2B
 L3 terminal L3B
 N terminal N
 Neutral cable is indispensable.



	Sez. [mmq] (distance >10m)		
	INPUT L1-L2-L3/A/B/N	PE	OUTPUT L1/L2/L3/N
10kVA	6	6	6(6)
15kVA	6	6	6(10)
20 kVA	10	10	10(10)
30 kVA	16	16	16(16)
40 kVA	25	16	25(25)

THREE PHASE OUTPUT 60 ÷ 80kVA



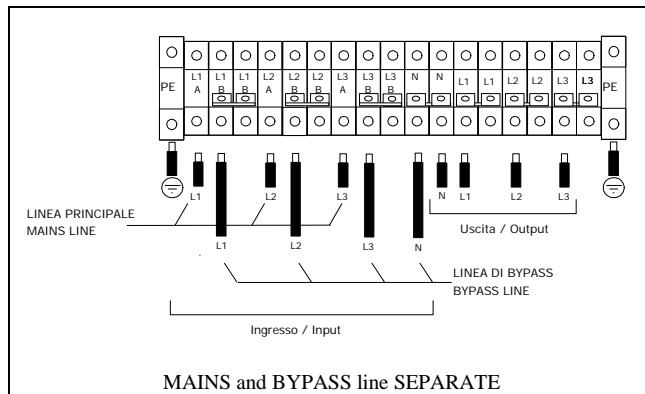
operations for new terminal board configuration:

- remove Nr.3 jumpers L1A-L1B, L2A-L2B, L3A-L3B
 - cut three positions jumpers (transform it in two positions jumpers)
- place two position jumper as following indicated

after that connect the mains and bypass line:

Mains line L1 terminal L1A
L2 terminal L2A
L3 terminal L3A

BYPASS line L1 terminal L1B
L2 terminal L2B
L3 terminal L3B
N terminal N
Neutral cable is indispensable.



For input and output wire size refer to the following table:

	Sez. [mmq] (distance >10m)		
	INPUT	PE	OUTPUT
	L1-L2-L3/A/B/N		L1/L2/L3/N
60 kVA	35	16	35(50)
80 kVA	35	16	35(50)

BATTERY CONNECTION

For models A 10-15kVA the batteries are already wired. It is only necessary to fit the fuses supplied (see following paragraph). For versions with Expanded supplementary cabinet, the batteries must be installed and connected by using the special kit supplied and following the diagram instructions (appendix)

Never make battery connections with UPS operating.

FITTING BATTERY FUSES, internal battery version only:

- Remove front panel of supplementary battery compartment.
 - Fit first supplied fuse, type 30A-600V (one or two for one or two exp. kit).
- With fuse or fuses fitted check total polarity opposite input fuses of the UPS .**

CHECKING CONNECTIONS

After connection of the INPUT/OUTPUT wires to the terminals of the UPS and before repositioning the switch cover, check to make sure that:

- All fuse holders have a fuse inserted are in closed position
- All eight white battery connectors are inserted
- The input/output wires and the protection wire (to ground) are fastened correctly to the equipment terminal strip
- Connection of the panel with the equipotential yellow/green cable from the ground bus on the bottom of the equipment.

STARTING PROCEDURE

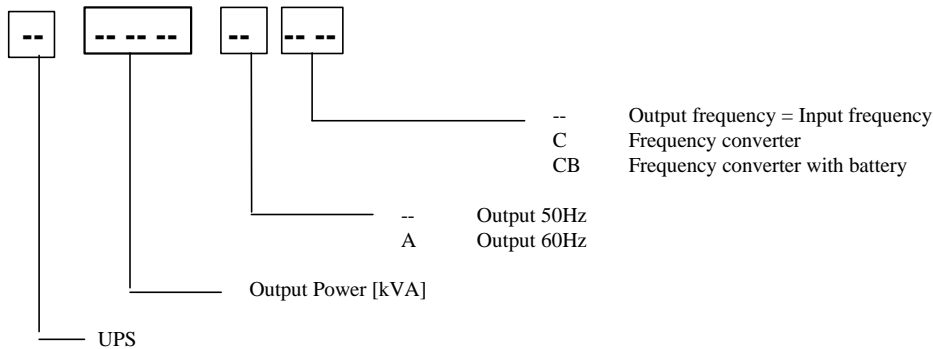
After completing the electrical connections as explained above and replacing the switch cover, proceed to start up the UPS as follows: Close the following switches:

- Input switch SWIN
- By-pass line switch SWBY
- Output switch SWOUT
- Battery switch (fuses) SWB

NOTE: The SWMB Switch must be left open with the lever down during normal operation. SWMB closes only to power the load directly from the mains with exclusion of the UPS, e.g. for maintenance (see OPERATION MODES).

After the above operations the blowers will be heard immediately. A buzzer will be heard for about one minute. Press Button 1 twice, select the language and then press Button 8 to return to the base menu. The message NORMAL OPERATION appears.

Make the battery test manually. On the display panel press Button 3, then Button 2 (BATTERY TEST). After the test and with UPS started correctly, on the SIGNAL AND CONTROL PANEL the green LED marked IN (INPUT) and the green LED marked OUT (OUTPUT) should be lit steady. On the first row of the panel should appear the message NORMAL OPERATION. On the second row in the left corner should appear the UPS model in accordance with the following coding:



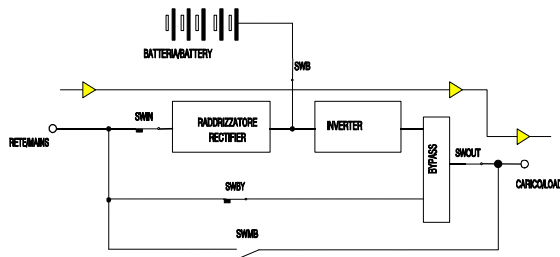
OPERATIONAL CHECK

When starting has been completed and after at least 4 hours of normal operation, to allow the batteries to charge, simulation of mains failure can be performed by opening SWIN (input switch). There will be heard immediately a buzzer while on the signalling and control panel the lights OUT (green) and BATT (yellow) are lit steadily while the LED IN (green) flashes. After a few minutes with load powered through batteries one can return to normal operating condition by closing the input switch. The CONTROL PANEL will again appear with the IN and OUT LEDS lit with a green light. The battery charger charges them automatically.

MODES OF OPERATION

NORMAL OPERATION

MAINS present, equipment powered. The switches SWIN, SWOUT, SWBY and SWB are closed.



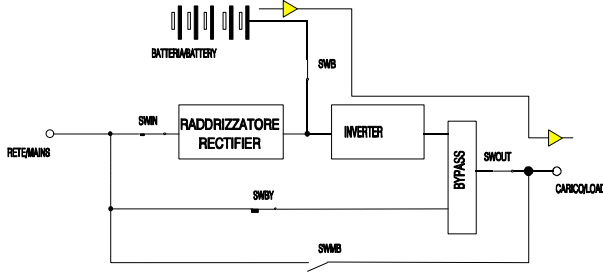
The connected equipment is powered by the inverter which receives the necessary energy from the mains through the rectifier.

The RECTIFIER charges the battery at the same time.

On the control panel the green LEDS MAINS and OUTPUT are lit.

BATTERY OPERATION

MAINS off, equipment powered. The switches SWIN, SWOUT, SWBY and SWB are closed.



The UPS is in this operating condition when MAINS power is lacking in a blackout or is no longer in an acceptable range (over or under voltage). In this phase of operation the energy required by the connected equipment is supplied by the battery, previously charged. On the alphanumeric PANEL on the front of the UPS is displayed the time provided for residual AUTONOMY, calculated on the basis of the power

delivered and the charge status of the batteries.

NOTE. The figure given is approximate since the power required can change during discharge and the battery can be less efficient for low temperatures, aging or defects.

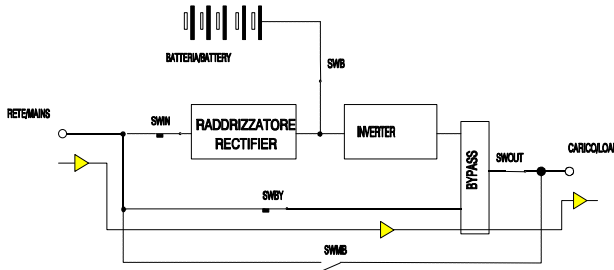
IT IS POSSIBLE TO INCREASE DURATION BY DISCONNECTING SOME OF THE CONNECTED EQUIPMENT.

The green LEDs for OUTPUT (steady light) are lit on the panel and the yellow LED for the battery (STEADY LIGHT) at the moment of mains failure sounds the buzzer intermittently.

When the remaining time drops below the preset value as END OF DURATION PREALARM, the buzzer increases in frequency while the yellow BATTERY LED goes to flashing. Under this condition it is wise to save any work under way.

When the mains failure continues and the battery exhausts its energy, the UPS cuts off power to the loads. Upon return of mains power, the UPS recharges the batteries automatically.

RESERVE NETWORK OPERATION



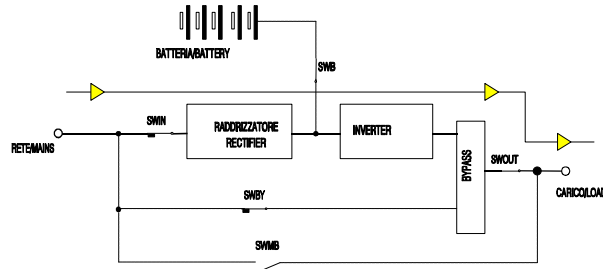
The UPS can be in this condition after one of the following events:

- by-pass command (manual or automatic)
- excessive output (overload)
- failure.

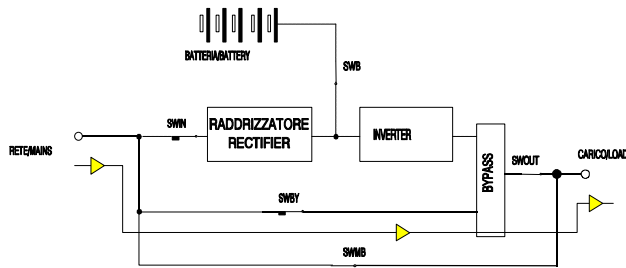
On the control panel under this operating condition the yellow by-pass LED lights steadily. The LED will flash only with overload conditions still at the output of the UPS).

BY-PASS FOR MAINTENANCE - SWMB

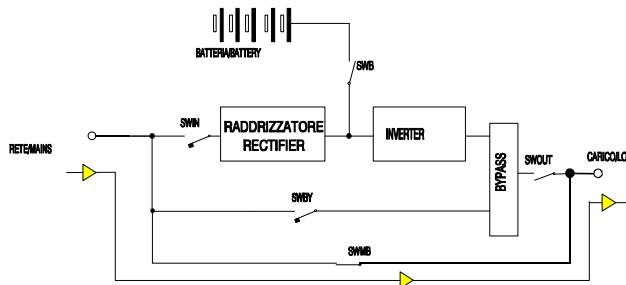
Operations for maintenance on equipment keeping load powered.



Status I
NORMAL OPERATION



Status II
SWMB switch closed (the control logic automatically disables the inverter).



Status III
All machine switches open. Only the SWMB switch is kept closed (by-pass maintenance line). The signal panel remains off. With the load powered through the maintenance line (during maintenance) any disturbance such as a blackout on the power line of the UPS would have repercussions on the powered equipment (under this condition the operation batteries are deactivated).

After operations for maintenance proceed to restart up the UPS as follow: close SWIN,SWBY,SWOUT,SWB, then open SWMB, the UPS restarts with NORMAL OPERATION.

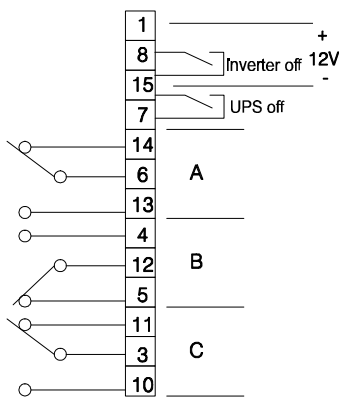
CUSTOMIZING (see appendix)

Available customizing: RATED OUTPUT VOLTAGE, BATTERY, PREALARM, AUTO-OFF, BY-PASS VOLTAGE FIELD, BY-PASS FREQUENCY FIELD, RS232, ECHO, IDENT. CUSTOMIZING

REMOTE CONTROL AND SIGNALS

In the front under the input terminal strip there are two tank connectors:
 Cannon 15-pin female marked REMOTE.
 Cannon 25-pin male marked RS232.

REMOTE



On the connector there are:

- Nr. 1 aux power 12Vdc 80mA(max)
- Nr. 3 Voltage free exchange contacts for alarms
- Nr. 2 Controls for turning off INVERTER and UPS.

The pin arrangement of the connector is as follows (see figure opposite):

- A DISCHARGE END PREALARM
- B BATTERY DISCHARGING
- C BY-PASS/FAILURE

The contact positions shown is without alarm (NORMAL OPERATION).

The relay contacts can carry a current of 0.5A-42V.

REMOTE COMMANDS

Two commands are available as follows:

BY-PASS with STOP INVERTER command. Connecting pin 8 to pin 15 (after at least 10 seconds).

UPS LOCKUP command. Connecting pin 7 to pin 15 (after at least 10 seconds).

BY-PASS with STOP INVERTER.

In NORMAL OPERATION, if the UPS receives the STOP INVERTER command it switches powering of the load onto the by-pass line. If the mains fail, the load remains without power.

In EMERGENCY, if the UPS receives the command STOP INVERTER it turns off (load without power). Upon return of the mains power, without a jumper, the UPS restarts with NORMAL OPERATION.

UPS LOCK UP

If the UPS receives the command STOP UPS, it opens the mains input (SWIN) and by-pass line (SWBY) switches and the battery telebreaker (TLBAT). The load is without power and the UPS is completely off. There is voltage only on the input terminal strip. To restart the UPS it is necessary to open the front door and close the switches SWIN and SWBY.

RS232

25-pin Cannon male Connector.

The transmission protocol pre-set at the UPS factory is as follows: 9600 baud, -no parity, -8bit, -1 bit of stop
Transmission speed can be changed from 1200 to 9600 baud on the CUSTOMISE menu on the panel. Recommended transmission speeds for various distances are as follows: 9600(baud)-50m, 4800baud-100m, 2400baud-200m, 1200baud-300m

Cable to connect UPS and computer: (use shielded cable, connect the shield only to the housing of the P2 connector):

Side UPS		Side computer
P1, 25 pole female		P2, 9 pole female(computer)
pin 2	to	pin 2
Pin 3	to	pin 3
Pin 7	to	pin 5

BLOCK DIAGRAM COMPONENTS

The UPS consists of the following subassemblies:

RECTIFIER

Represents the input stage and transforms the alternating voltage of the power line in continuous voltage. The functions carried out by the rectifier are the following:

Powering the inverter with direct current.

Charging the battery automatically. Battery charging is done in two phases: the first phase supplies 80% of power with limited current (recharging current) and growing voltage. The second supplies the remaining 20% of the charge with steady voltage (holding). Recharging current is automatically limited to 15% of the capacity in Ah contained in the memory. This recharging current imposed applies only when the total power delivered to the battery and the load does not exceed maximum 110% of Pn and in any case the maximum recharging current is 6A.

MICROPROCESSOR

Controls the entire system.

BATTERY

Provides the reserve energy for powering the load when there is no power input to the UPS. For different versions it may be housed inside the UPS in a compartment at the side or in a supplementary cabinet.

INVERTER

This is the output stage. Converts direct voltage from the RECTIFIER or BATTERY into stabilized sinusoidal alternating voltage. It is always in operation and the load connected to the output of the UPS is always powered by the INVERTER.

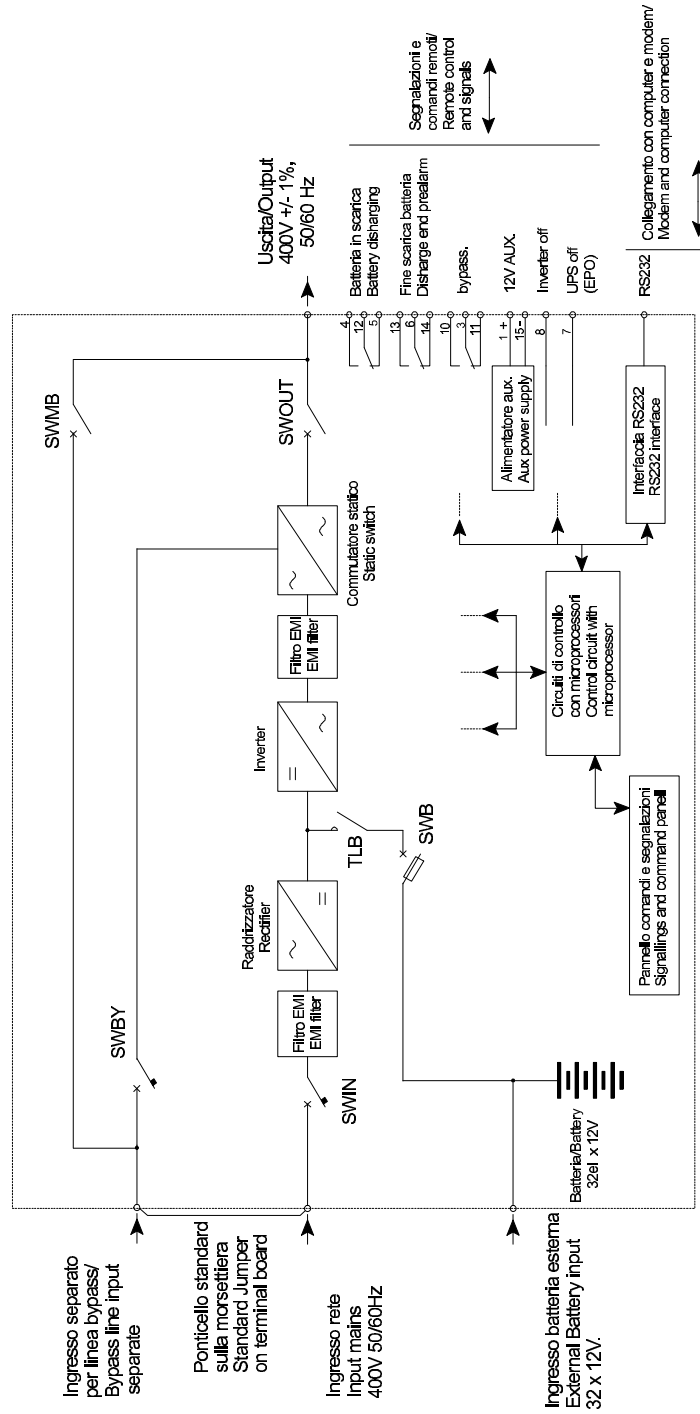
BY-PASS

The by-pass device allows synchronized, automatic or manual passage in zero time of the power of the protected line load (inverter output) to unprotected line (by-pass line) or vice versa.

SWMB

Non-automatic switch for MAINTENANCE. Closing SWMB and opening all the other switches allows maintenance operations inside the unit safely while keeping the load powered. There is not power inside the equipment. Power is present only in the terminal strip and switch areas.

BLOCK DIAGRAM



MAINTENANCE

CAUTION Maintenance inside the UPS should only be done by qualified personnel. Inside the equipment there are voltages even with the input and battery switches open. Removal of the side panels of the UPS by unqualified personnel can cause harm to the operator and damage the equipment.

Preventive Maintenance

The only components of the UPS which require periodic checking are the blowers and batteries.

- **Blowers** should be checked for correct operation periodically.

- **Batteries.** **CAUTION** Any battery replacement should be done by qualified personnel. For disposal of the replaced parts it is obligatory to deliver them to one of the special consortiums for disposal by recycling. Batteries are classified 'toxic waste' by law. The system automatically checks battery efficiency every 24 hours and gives an alarm when it finds efficiency very much lower than that calculated on the basis of memorized capacity (see key menu 3.2 BATTERY TEST). Battery life depends on operating temperature and the number of charging and discharging cycles performed. Battery life when used at 20°C is approximately 3 to 5 years while duration is halved if operating temperature goes to 30°C. Capacity is not constant but increases after a few charging and discharging cycles, then remains constant for several hundred cycles and finally decreases.

Battery maintenance should include:

- Holding operating temperature in the range 20-25°C.
- During the first month of use carry out two or three charge/discharge cycles.
- After the first month of use perform this operation every six months.

SPECIFICATIONS

RECTIFIER INPUT

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
rated power (kVA)	10	15	20	30	40	60	80
rated voltage	400V 3 Phase						
voltage tolerance	± 20 %						
rated frequency	50 / 60 Hz auto learning						
frequency tolerance	45 ÷ 65						
max input current[A]	18	28	37	55	72	108	125
current distortion	30 %						
power factor	0,8						
soft start	0 - 100% 10sec						

RECTIFIER OUTPUT

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
battery rated voltage	384V						
maintenance voltage (20°C)	battery type 1 and 2 : V =435Vdc (2,26 x el.) type 3: V =424Vdc (2,2 x el.) type 0: to default the values are equal to type 1 and 2. Value adjustable V =400÷460Vdc						
charge voltage	battery type 1 and 2 : V (%recharge <95%)=445Vdc (2,3 x el.) type 3: V (%recharge <95%)=460Vdc (2,4 x el.) type 0: to default the values are equal to type 1 and 2. Value adjustable V =400÷460Vdc						
ripple voltage	< 1%						
max charge voltage	445Vdc						
rated current (battery in fully charged state)	20	30	40	60	80	120	160
max current	24	36	48	72	96	140	180

BATTERY

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
standard battery type	lead sealed						
element number	192						
end of discharge voltage	battery type 1,2 and 3: Vmin=346 0A output battery current Vmin=316 out. battery current=Ah capacity of the battery Vmin=306 “ “ “ > “ “ “ type 0 : default Vmin=320Vdc; sectable Vmin=300÷360V						
recharge current micro setting	0,2A x C10						
max recharge current with output nominal load [A]	2	3	4	6	8	12	16
max recharge current/with load at. [A] / %	9 / 60%	9 / 70%	19 / 60%	19 / 70%	35 / 60	35 / 70%	35 / 80%

INVERTER OUTPUT

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
rated power (kVA), cos fi 0,8	10	15	20	30	40	60	80
number of phases	3 + N						
rated voltage V	400						
rated current [A]	14	22	29	43	58	87	115
voltage setting	200 ÷ 244 V (control panel)						
load crest factor at rated power (Ipeak/Irms)	3 : 1						
wave form	sinusoidal						
distortion with linear load	3 %						
voltage phase shift, with balanced load (degree)	± 1						
voltage phase shift, with unbalanced load (degree)	± 2						
phase voltage dissimetry with balanced load	± 1%						
line voltage dissimetry with 100% unbalanced load	± 3 %						
distortion with non-linear load (peak factor 3:1)	8 %						
stability voltage at steady state	± 1 %						
stability voltage at transient state	± 5 % into 10 ms						
rated frequency	the same of the input						
frequency stability:							
with sincronization	± 0,05 %						
without sincronization	±2 % (settable ± 1 % on the control panel)						
overload	110 /125 /150 % rated current 300' /10' / 1 '						
short circuit current for 0,1s	2 In						
inv. efficiency % load 100%	91	91	92	92	93	93	93

BYPASS LINE

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
rated power [kVA]	10	15	20	30	40	60	80
rated output current [A]	14	22	29	43	58	87	115
rated voltage	400V						
number of phases	3 + N						
input voltage tolerance	±15 % (settable ± 10 % , ± 15 % from control panel)						
rated frequency	50 / 60 Hz (auto learning)						
input frequency tolerance	±2 % (settable ± 5 % from control panel)						
inverter/bypass transfer switch time (overload)	0 ms						
inverter/bypass transfer switch time (fault inverter)	1 ms						
overload capacity x In							
1h	1,5	1,6	1,5	1,6	1,5	1,3	1,2
10min.	1,7	1,8	1,7	1,7	1,7	1,4	1,3
1min	2,4	2,5	2,4	2,5	2,4	2	1,8
1s÷20ms	10	10	10	10	10	8	8
10ms	14	15	14	15	14	12	11
standard	BACKFEED PROTECTION						
	bypass line separability						
optional	insulation transformer on bypass line (external)						

SYSTEM

	AR3 10	AR3 15	AR3 20	AR3 30	AR3 40	AR3 60	AR3 80
efficiency full load	90	90	91	91	92	92	92
half load	88	88	89	89	90	90	91
loss power with nominal load and battery charge [kW/kcal]	0,89	1,33	1,58	2,37	2,78	4,17	5,57
800	800	1100	1400	2000	2400	3600	4800
flow rate allowing a ta-te=5°C (for room installation)	496	682	868	1240	1488	2232	2976
remote signalling	three tension free exchange contacts (mains power failure,bypass,prealarm end discharge.battery), output 12Vdc 80mA						
remote command	EPO and bypass						
computer interface	RS232/C						
operating temperature	0 ± 40 °C						
relative umidity max. witout condensate	95 %						
maximum operating altitude	1000 m at rated power An (-1% An for each 100m over 1000m) max 4000m						
cooling	forced ventilation (fan speed function of the load)						
acoustic noise, as measured at 1m from front of equipment (depend on load and temperature) dBA	48 ÷ 54		53 ÷ 60			53 ÷ 62	
degree of protection	IP20						
cabinet colour	RAL 7035 Grey light						
cable input	bottom / rear						
accessibility	front/upper/right left side						
Applicable Standards	Safety EN 50091-1,Electromagnetic Compatibility EMC EN 50091-2 Liv.A						

SIGNALLING PANEL FUNCTIONS

General Description



Signalling of operational status of the UPS is supplied by:

- a liquid crystal display (LCD) with two lines of 40 characters
- four warning lights:
 - IN. Power & bypass input lines
 - OUT. Bypass line output
 - BY. Bypass line output
 - BATT. Battery input.
- an audible signal.

Warning Lights: LED

The signals supply quick information directly on the synoptic diagram of the system when they are lit, flashing or extinguished.

LED IN (green): input lines

The luminous LED signal IN means:

- lit when the input power and bypass voltages are present and correct
- flashing when one of the two voltages is not correct
- extinguished when both the voltages are neither present nor correct.

LED OUT (green): inverter output line

The luminous LED signal IN means:

- lit when the system output is switched to the inverter, the output power is correct because less than 100% VA and only the output switch SWOUT is closed
- flashing when the system output is switched to inverter the output power is greater than 100% VA, or SWMB is closed also
- extinguished when the system output is switched to automatic bypass line or SWOUT is open

LED BY. (yellow): automatic inverter output line

The luminous LED signal BY. is:

- lit when the system output is switched to the automatic bypass line
- flashing when the system output is switched to the automatic bypass line with output power greater than 100% VA, or the manual bypass switch SWMB is closed
- extinguished when the system output is switched to inverter or the output is switched to the bypass line and both switches SWOUT and SWMB are open.

LED BATT (yellow): battery line

The luminous LED signal BATT is:

- lit when the battery is delivering
- flashing when the alarm PREALARM, LOW BATTERY VOLTAGE is active or the alarm BATTERY DISCHARGED OR SWB OPEN is active
- extinguished when the battery is not delivering and its voltage is correct.

Acoustic Signal

The acoustic signal sounds intermittently and pauses for about 2 seconds under all conditions different from normal operation, i.e. different from the condition in which only the two green LED signals IN and OUT are lit.

The sound is intermittent without break when the LED BATT is flashing.

The acoustic signal never operates if it has been excluded with key 5, also it does not operate when the system was stopped by the AUTO-OFF function.

Its enablement status is visible in the basic menu: 5=ON indicates enablement and 5=OFF indicates exclusion.

Exclusion with key 5 is possible in all menus where the same key is not used for other functions.

Enablement is possible only in the basic menu.

Under normal operating conditions, without special requests for information or entry of commands with the keys or from the RS232 remote line, the LCD viewer shows basic messages referred to even with the basic menu or menu 0 or NORMAL menu names. It is possible to obtain other information or enter commands, acceding to submenus by pressing keys from 1 to 8 with appropriate sequences. With each key pressed there is a brief sound while the change of messages takes place only when an enabled key is pressed. Key functions in the menu 0 are suggested by the symbols associated while in other submenus they are indicated explicitly by the message. For some particular functions it is necessary to refer to the manual. Return to menu 0, in addition to being possible by pressing keys, takes place automatically also two minutes after the last pressing of a key.

Basic menu, signalling messages, NORMAL

NORMAL OPERATION			
__10,	OUT=100%VA	BATT=100%Ah	5=ON

In the basic menu the upper line presents a signalling message to describe the present status while the lower line indicates model, apparent power measurement by percentage output by the inverter or bypass line, charging status of the battery or time expected for duration of battery.

The viewer permits display of a single phrase at a time, hence a priority is established according to which the most important message is displayed, while other information is entrusted to the interpretation of the internal codes.

Under all operating conditions, after two minutes from the last command with the keys, the viewer returns to BASIC MENU in which are presented the signalling messages for operating status.

NORMAL OPERATION:

signalling message to indicate that all parts of the unit are operating correctly.

__10:

Example of identifying initials of the type of unit with 10kVA rated power.

OUT = 100% VA:

Example of indication of the percentage of power absorbed by the load at output when the inverter is operating.

The initials OUT change to BY when the load is not powered by the inverter but by the mains through the bypass line.

All the indication OUT=100%VA changes to OUT=SWMB when load is powered through line of maintenance bypass switch, hence it is not possible to supply measurement of the output load current.

The value 100% VA supplied in the example is taken from the measurement of the output current. The number indicates the output current with the value relative to the absolute rated value and the value indicated is the greater of effective current or peak current.

BATT=100%Ah:

Example of indication of present status of battery recharge percentage. The value 100%Ah is taken from measurement of the charging current and the time elapsed in recharging.

The number indicates the percentage of recharge based on the information of the capacity of the connected battery and the amount of charge used during battery operation. The system remains automatically on quick charge for the entire time necessary to supply the battery with the quantity of charge lost during discharge.

The indication %Ah changes to min. during operation in absence of mains power supply or with battery discharged.

In this case the numerical value refers to the remaining minutes of operation calculated on the basis of the current delivered by the battery and the charge status thereof.

5=0N:

Example of the indication for sound alarm enablement status; in case of exclusion, the indication changes to 5=OFF.

Alarm 1: DISTURBANCES ON BYPASS LINE

Alarm present when there are disturbances on the bypass line of the voltage peaks or harmonic distortions type, while voltage and frequency are correct. CAUTION. In this case the inverter is not synchronised with the bypass line, hence if the bypass is forced with the switch SWMB or the remote controls or panel there could be wrong switching between voltages in counterphase.

Alarm 2: MANUAL BYPASS, SWMB ON

The manual bypass switch SWMB is on and prevents return to normal operation. The load is powered by the bypass line input hence not protected by the UPS.

Alarm 3: BYPASS VOLT. FAIL or SWBY, FSCR OFF

Alarm is present if:

- bypass line input voltage is wrong,
- bypass line turn-on switch SWBY is open,
- SCR fuse of the bypass line is open or burnt out following output short circuit.

Alarm 4: MAIN LINE VOLTAGE FAIL or SWIN OFF

Input voltage is wrong and battery is discharging.

The alarm appears if:

- input voltage is not in range 60-120% of 230VIn,
- input voltage frequency is not in range 45-65Hz,
- SWIN power switch is open,
- one of the three sections of the rectifier does not recognize the voltage due to internal anomaly; see measures menu to identify section.

NOTE

The autonomy indicated is calculated on the basis of measurement of the discharge current at that moment, the value memorized for the capacity of the connected battery and the value memorized for the percentage of charge preceding the discharge. The autonomy value shown is always approximate because of the large number of factors involved. If large differences are noted between the expected value and the real time of a discharge with steady load, check the memorized battery data and its status.

Alarm 5: PREALARM, LOW VOLTAGE ON BATTERY

The alarm is present if:

- the battery voltage is lower than calculated to supply approximately 5 minutes duration or the residual ;
- autonomy time is lower than the time set for the prealarm.

Alarm 6: BATTERY DISCHARGED or SWB OPEN

During presence of mains power, battery voltage is lower than that calculated during battery testing, performed automatically:

- 60 seconds after each system starting,
- every 60 seconds when the battery discharged alarm is active and the rectifier is on,
- every 24 hours of continuous operation of the rectifier,
- on manual command.
- or, the battery voltage evaluated every 60 seconds is less than calculated during operation without input power,
- or, battery switch open has caused alarm during testing or evaluation of the battery,
- or, internal battery remote switch is open because of anomaly.

The expected battery voltage and residual autonomy voltage is calculated on the basis of:

- memorized battery capacity,
- type of battery, 1=normal, 2=high discharge intensity,
- percentage charging current stored in battery,
- discharge current,
- system temperature.

Alarm 7: LOW INPUT VOLTAGE or OUTPUT OVERLOAD (W)

When power supply voltage at input is insufficient to supply the load, e.g. lower than 80% of 230VIn with rated load or less than 50% of 230VIn with 50% output load or the output load with active power (W) is greater than rated, e.g. when the load is resistive with $\cos \phi = 1$, power factor =1, hence admitted power in VA is maximum of 80% VA.

Alarm 8: OUTPUT OVERLOAD

Indicates that the power absorbed by the load at the output is greater than allowed rated power, hence the indicated value expressed in %VA exceeds 100%. The same alarm is activated also when the peak absorbed current of the load exceeds the maximum admitted. When this alarm is on it is necessary to reduce the load, otherwise the system automatically goes on bypass within a time period inversely proportional to the amount of the overload.

Alarm 9: BYPASS FOR OUTPUT VA < AUTO-OFF VALUE

The alarm appears when:

- power in %VA absorbed by the load is less than the value of AUTO-OFF memorized and previously selected from the customization menu; (the value memorized at the factory is zero);

When the alarm is present, if the input main line voltage is present and the battery charge is lower than 60% there is only the display of:

```
BYPASS FOR OUTPUT VA < AUTO-OFF VALUE
__10, OUT=100%VA  BATT= 50%Ah    5=ON
```

The system does not start the "off procedure" because it waits to charge the battery over 60%.

When the alarm is present, if the input main line voltage is present and the battery charge is higher than 60%, or if the system is in battery operation, there is the display of:

```
BYPASS FOR OUTPUT VA < AUTO-OFF VALUE
__10, OUT=100%VA  OFF: 4 min,    5=ON
```

Moreover the "prealarm low battery" remote alarm contact switches on alarm position.

In the case of status displayed above, the system continue to operate for the next 4 minutes, after those it switches on bypass.

The interval of time between the arise of alarm and the switching on bypass is by default 5 minutes or it is equal to the value fixed when customizing PREALARM.

After the prealarm time, if the input bypass line voltage were present before, the system switches on bypass and it remains in standby status waiting for increasing of output load over the AUTO-OFF value.

If the input bypass line voltage is NOT present when the prealarm time is finished, the system switches off.

After that, when the input bypass line voltage will come back, the system will start again remaining on bypass in standby status waiting for increasing of output load over the AUTO-OFF value to perform automatic return to normal operation.

The AUTO-OFF function is more useful for turning off the system during battery operation by merely turning off the output load. In case of normal operation, the AUTO-OFF function is still useful for zeroing consumption since the power circuits are deactivated, the battery is isolated and only the control circuits with consumption equivalent to a light bulb remain active.

Alarm 10: INTERNAL FAULT: number

The number indicates the different causes of fault:

1. indicates that the configuration circuit is defective or absent.
2. Inverter fault.
3. Inverter output or bypass line contactor fault.
4. Rectifier fault.
5. Fault of an SCR on bypass line.
6. Main internal power supply fault or short circuit into one control card.
7. A voltage feeding the system control card is not correct.
8. Fault of one of the three sections of the rectifier because One of them does not absorb current or absorbs 30% less than the other.
9. Battery contactor fault.
10. Communication line between inverter and system not correct, fault on one of the two cards.
11. Fault of a power connections in SCR or bypass circuit.

Alarm 11: TEMPORARY BYPASS, WAIT

Indicates that the load is powered by the bypass line and the system is in the previous phase of automatic return to normal operation powered from the inverter. This transitory operation occurs e.g. during the starting phase of waiting for return on inverter after bypass for overload.

Alarm 12: BYPASS for OUTPUT OVERLOAD.

Load has exceeded 100%VA for a long time, e.g. 125% for 8 minutes or 150% for 60 seconds, etc., hence the load remains powered by the bypass line unit it falls below 100% for a time sufficient to allow cooling. For example, the time for return to normal operation is 60 seconds if the load falls to 50% and 8 minutes if it falls to 75%.

Alarm 13: BYPASS COMMAND ACTIVE; 8=COMMAND OFF

The system has been deactivated and switched to bypass by a special command entered with the keyboard. The command does not remain in the memory after a shutdown due the end of battery discharging. In that case, upon return of power the system returns to normal operation also if the intentional lockup were not deactivated.

Alarm 14: REMOTE BYPASS CONTROL: ACTIVE

The system has been deactivated and switched to bypass by special command applied to the connector 'remote controls and signals'. The command is not memorized and the system returns to normal operation when the command is cancelled provided power voltage is present.

Alarm 15: OVERTEMPERATURE or FAN FAILURE

Internal temperature on the system card, power modules of the inverter or on the power modules of the rectifier **or on** the output transformer have exceeded the maximum allowed as a result of operation in an environment with excessive heat or failure of the blowers (fans).

Alarm 16: INPUT VOLTAGE SEQUENCE NOT OK

Input phase sequences of the bypass line is not correct. Normally it is sufficient to reverse two phase to obtain normal operation.

Alarm 17: OUTPUT OFF, CLOSE SWOUT OR SWMB.

Output voltage is absent because both switches SWOUT and SWMB are open.

Alarm 18: SYSTEM OFF COMMAND ACTIVE; 8=COMMAND OFF.

A total shutdown command has been activated.

The system executes the shutdown command with a few seconds of delay to allow a possible cancellation.

The signal is not memorized but produces disconnection of the input switches, hence return to normal operation requires manual reset of the switches.

Alarm 19: REMOTE BYPASS COMMAND: ACTIVE

The total shutdown command has been turned on through connection of the 'remote command signal'. The system executes the shutdown command with a few seconds delay to allow possible cancellation. The signal is not memorized but produces disconnection of the input switches, hence return to normal operation requires manual reset of the switches.

Alarm 20: MEMORY CHANGED: CODE= number

Number:

1. Permanent alarm. The internal memory is changed .

It is necessary to verify all the customization values:

- capacity of connected battery;
- type of battery, only if high intensity discharge type used (type 2);
- output voltage during normal operation only if different from 220V;
- range of acceptance of the voltage on bypass line only if different from range 15% of the voltage selected for normal operation;
- pre alarm time only if different from 5 minutes;
- charge value in %VA for AUTO-OFF only if value required is different from zero;

- values of T off and T on for AUTO-OFF Timer, only if value required is different from zero;
- RS232 transmission speed only if different from 9600 baud;
- setting of Modem control values, only if a connected modem will be used,
- activation of ECHO function only if required;

It is sufficient to change one of the above values to deactivate the alarm.

If changes are not necessary execute a variation followed by cancellation to deactivate the alarm.

Disactivation occurs also with turnoff and restart of the machine without verification of customization values.

After this alarm the events memory, time counters and activation date are zeroed.

2. Battery capacity has changed (**temporary alarm**).
3. Output voltage in normal operation has changed (**temporary alarm**).
4. Time for indication of low battery voltage pre alarm has changed (**temporary alarm**).
5. Charge power for AUTO-OFF function has changed (**temporary alarm**).
6. Battery type value has changed (**temporary alarm**).
7. Range of acceptance of the voltage on the bypass line has changed (**temporary alarm**).
8. Range of acceptance of the frequency on the bypass line has changed (**temporary alarm**).
9. Transmission speed 'baud rate' has changed (**temporary alarm**).
10. The value for activation of the ECHO function has changed (**temporary alarm**).
11. **Permanent alarm.** It is necessary to execute the procedure of Case 1 above limited to the requirements for zeroing the message.
12. The identification no. IDENT has changed (**temporary alarm**).
13. The Modem control value has changed (**temporary alarm**).
14. The Send/Dial values have changed (**temporary alarm**).
15. The Toff, Ton values have changed (**temporary alarm**).

Alarm 21: AUTO-OFF Timer: T off= 0: 0', T on 0: 0'

The alarm appears when the internal daily timer is operating for a daily cycle of system self-starting and self-stopping.

This timer cycle is inhibited if Toff and Ton value are equal.

The T off value indicates the instant of time (hour and minute) in which the AUTO-OFF Timer procedure is started.

When the internal clock reaches the time value equal to T off (time = 20:00', in the example) the alarm 22 starts.

When the alarm 22 is present, if the input main line voltage is present and the battery charge is lower than 60% there is only the display of:

<p>AUTO-OFF Timer: Toff=20:00', Ton= 7:00' __10, OUT=100%VA BATT= 50%Ah 5=ON</p>

The system does not start the "off procedure" because it waits to charge the battery over 60%.

When the alarm 22 is present, if the input main line voltage is present and the battery charge is higher than 60%, or if the system is in battery operation, there is the display of:

<p>AUTO-OFF Timer: Toff=20:00', Ton= 7:00' __10, OUT=100%VA OFF: 4 min, 5=ON</p>

Moreover the "prealarm low battery" remote alarm contact switches on alarm position.

In the case of status displayed above, the system continue to operate for the next 4 minutes, after those it switches on bypass. The interval of time between the arise of alarm and the switching on bypass is by default 5 minutes or it is equal to the value fixed when customizing PREALARM.

After the prealarm time, if the input bypass line voltage were present before, the system switches on bypass and it remains in standby status waiting for time equal to Ton (7:00') to return in normal operation.

If the input bypass line voltage is NOT present when the prealarm time is finished, the system switches off.

After that, when the input bypass line voltage will come back, the system will start again remaining on bypass in standby status waiting for time equal to Ton (7:00') to return in normal operation.

Key menu 1, "?", HELP

<p>1=?, 2=MEASURES, 3=COMMANDS, 4=HISTORY 6= DATE/TIME, 7= CODES, 8=NORMAL</p>

Access to the HELP menu is by pressing key 1 from the basic menu and indicating the menu to which to accede by pressing the other keys form the basic menu.

When many other menus are active push-button 1 returns to basic menu.

- 1=? indicates button 1 for access to language change menu
- 2=MEASURES indicates button 2 for access to measurements menu
- 3=COMMANDS indicates button 3 for access to command entry menu or selection or customizing of operating values.
- 4=HISTORY indicates button 4 for access to menu for viewing events recorded in internal memory.
- 6=DATE/TIME indicates button 6 for access to menu for viewing and management of internal clock and calendar.
- 7=CODES indicates button 7 for access to menu for viewing internal codes corresponding to operating status of all the internal subassemblies.
- 8=NORMAL indicates button 8 for immediate return to basic menu NORMAL which also takes place automatically after two minutes from the last pressing of key.

Key menu 1, 1: LANGUAGES

2=ITALIANO	3=ENGLISH	4=FRANCAIS
5=DEUTSCH	6=ESPANOL	

Access to the LANGUAGES menu is by key 1 only from HELP menu 1.

Pressing the key corresponding to the desired language selects the language with which the system supplies all the following messages.

Language selection remains memorized even after turning off and restarting the system.

To change current language always use LANGUAGES menu.

Key menu 2 "voltmeter": VOLTAGE MEASUREMENT

IN=100,100,100%V,50.0Hz;	BATT=430V,+100A
BY=230V,50.0Hz	OUT=230V,50.0Hz,100%

Access to the menu VOLTAGE MEASUREMENTS is by key 2 only from basic menu. Pressing key 1 returns immediately to the basic menu. The contents of the measurements menu is different for single-phase and 3-phase units. The measurements indicated have the following meanings.

IN=100,100,100%v, 50.0Hz Examples of measurements of the three voltages measured at the power input seen by the three sections making up the input rectifier.

The voltage is expressed in percentage of rated value; the value 100%V indicates a voltage of 230V_{ln} (ln = voltage between phase and neutral).

BATT.=430V Example of voltage measured at the output of the rectifier to the battery.

+ 100A Example of discharge current issuing from battery, the sign (-) indicates the value of the charging current entering the battery.

BY=230V, 60.0Hz Example of measurement of frequency and voltage at the input of the bypass line.

NOTE:

In 3-phase systems the voltage indicated is the average of the three concatenated output voltages.

OUT= 230V,50.0Hz, 100%

Example of measurement of voltage, frequency and percentage power for rated power at the system output.

The mark OUT changes to BY when the load is fed from the bypass line.

The entire measurement changes from OUT=230v,50.0Hz,100% to OUT=SWMB when the maintenance bypass switch SWMB is closed because the internal system is excluded, hence not able to measure the load current.

Key menu 2, 6: TIME MEASUREMENT

OUT= 10000h; BY= 10000h; BATT= 10000h
nBATT= 1000; n0%Ah= 100; 1993-01-12

Access to the menu TIME MEASUREMENT is by key 6 only from the SYSTEM MEASUREMENT menu.

Pressing key 1 causes return to the basic menu.

The values indicated have the following meanings:

OUT = 10000h Example of indication of hours elapsed in operation with load on inverter.

OUT=100,100,100Apk

Example of measurement of the three peak current percentages for the three output phases during operation on the inverter.
 During operation on bypass the sign OUT changes to BY.
 During operation with the switch SWMB for the maintenance bypass current measurements are not possible, hence only the voltage measurements remain and the indication changes to OUT=SWMB.

Key menu 3 "KEY", COMMANDS

2=BATTERY TEST	4=DISPLAY CONTRAST
5=CUSTOMIZING	6=BYPASS 7=SYSTEM OFF

Access to the menu COMMANDS is given by key 3 from the basic menu or from the other menus in which key 3 is not used for other functions.

In this case the viewer proposes the choice for the subsequent submenus.

Key menu 3, 2: BATTERY TEST

BATTERY TESTING FOR 6 sec.
BATT= 400V + 10A; Vbc= 430V; 999 min

Access to the BATTERY TEST menu is by key 2 from menu 3 COMMANDS.

In this case there is activated the cycle of efficiency status checks of the battery, which last 6 seconds.

Pressing key 8 interrupts the test and returns to the basic menu before the end of the period.

The values indicated are:

BATT= 400V + 10A	Example of indication of battery voltage and current measurement.
Vbc= 390V	Example of indication of calculated battery voltage
100 min.	Example of indication of calculated autonomy time.

The battery test cycle with rectifier output voltage drop permits evaluation of the battery with the true delivery on the load even during the presence of the power supply voltage. In any case, lowering of the output voltage of the rectifier takes place only if there is voltage on the bypass line so as to avoid any ANOMALY with output load without the bypass reserve.

At the end of the test cycle a comparison is made of the voltage supplied by the battery and a 'Vbc' voltage calculated on the basis of the measured delivered current at the capacity values of the battery and half the percentage of recharge contained in the memory.

If the voltage measured on the battery is less than calculated voltage:

- the alarm BATTERY DISCHARGE or SWB OPEN is activated;
- the memorized recharge percentage is halved;
- the next test cycle is prepared and will be activated automatically after 60 seconds.

The battery test cycle is activated:

- manually;
- automatically every 60 seconds after each failed test or each system starting;
- automatically every 24 hours starting from return of power;
- automatically and invisibly during operation without mains power supply.

At the end of each test, if the measured voltage is less than that calculated the alarm is activated followed by halving of the memorized charge and of the indicated autonomy time.

When 60 seconds have elapsed after activation of the alarm a new test is performed and if the result is negative the alarm is reactivated for another 60 seconds. The alarms continues to halve the memorized charge value until the value for which the battery voltage calculated is less than actually measured.

In practice, this battery check system produces an alarm each time the battery has less than the design charge.

The PERMANENT presence of this alarm indicates that the battery is inefficient or the battery circuit is broken or the battery knife switch SWB is open or one of the protective fuses has blown.

TEMPORARY presence indicates a loss of battery efficiency proportionate to the alarm frequency.

To disable battery test, key sequence 3, 5 "CUSTOMIZING", then insert code: 323232.

To enable battery test insert code 323232.

In the basic menu the lower line indicates:

battery test enable:	BATT=XXX%
battery test disable	BAT. =XXX%

If operating on battery the system shuts down and starts again automatically on return of mains power. With correct mains voltage, when output load increase and again exceeds 10%, the systems automatically returns to NORMAL OPERATION condition.

The AUTO-OFF function remains excluded and zeroes the customization value.

Key menu 3, 5, 6, 5 (6): AUTO-OFF Timer CUSTOMIZING (Option.)

AUTO-OFF Timer: Toff >0: 0', Ton= 0: 0'
ADJUSTMENT: (5=Toff, 6=Ton) 7=-, 8=+

Access to the AUTO-OFF Timer CUSTOMIZING menu begins with key sequence 3, 5, **requires the optional code** and then keys 6 and 5 or 6. To have the option, code make a request complete of machine serial number.

The code is not required for 2 minutes after its first previous entry.

To leave the menu press any key other than 7, 8, 5, 6.

After sequence 3565, the Keys 7 and 8 are used to reduce or increase of value Toff with steps of 12', the char > remember that the value under control is Toff.

The sequence 3566 or only with 6 from menu 3565, it is possible to adjust Ton.

The Toff and Ton values fix the clock time in which operates the daily cycle for self-stopping and self-starting, look also at Alarm 22.

Key menu 3, 5, 7, 2: BYPASS VOLTAGE RANGE CUSTOMIZING

BY. VOLTAGE RANGE = +/- 10%
ADJUSTMENT: 7=-, 8=+

Access to the menu BYPASS VOLTAGE RANGE CUSTOMIZING begins with the key sequence 3, 5, requires the code 436215 and the keys 7 and 2. The code is not required for 2 minutes after its first previous entry.

To leave the menu press a key different from 7 or 8. Keys 7 and 8 are used to reduce or increase the percentage of the range of acceptance of the voltage at the bypass line input. The choice is between the values: 10%, 15% or 20% of the value set for RATED OUTPUT VOLTAGE.

Key menu 3, 5, 7, 3: BYPASS FREQUENCY RANGE CUSTOMIZING

BY. FREQUENCY RANGE = +/- 10%
ADJUSTMENT: 7=-, 8=+

Access to the BYPASS FREQUENCY RANGE CUSTOMIZING menu begins with key sequence 3, 5, requires the code 436215 and then keys 7 and 3. The code is not required for 2 minutes after its first previous entry.

To leave the menu press any key other than 7 and 8. Keys 7 and 8 are used to reduce or increase the percentage of the range of acceptance of voltage at the bypass line input. The choice is between 1% and ±5% for rated value of the system of 50Hz or 60Hz. Rated frequency of the system can only be selected inside the unit.

Key menu 3, 5, 7, 4 : MODEM CUSTOMIZING

PREALARM BEFORE STOPPING = 100min..
ADJUSTMENT: 7=-, 8=+

Access to the menu MODEM CUSTOMIZING begins with the key sequence 3, 5, requires the code 436215 and then keys 7 and 4. The code is not required for 2 minutes after its first previous entry.

To leave the menu press a key different from 7, 8, 5, 6.

Keys 7 and 8 are used to reduce or increase the control value for modem operation, the range is from 0 to 5 and 0 is default value.

Value 0 = the pin n. 20 (DTR) of RS232 connector is set to low level (-12V) to inhibit the operation of a connected modem.

NOTE: when a remote control panel is connected to the RS232 connector, instead of a modem, the value **MUST BE SET** to 0 otherwise the remote panel does not operate.

Value 1= the pin n. 20 (DTR) of RS232 connector is set to high level (+12V) to enable the operation of answer for a connected modem. (Remember that with this value a connected remote panel does not operate).

Value 2= the pin n. 20 (DTR) of RS232 connector is set to high level (+12V) to enable the operation of answer and automatic calling for a connected modem.

When the automatic calling is set, 30 seconds after all "INTERNAL FAULT n" alarm the system gives to the modem the command "ATD" followed by the memorized "Dial" number.

The modem must be previously set to recognize the "HAYES" command and to dial numbers with pulses or tones as required by the used telephone line.

After the ATD and Dial number, the system send to the modem the memorized "Send" number and a copy of the panel display with a=.... code and date/time.

For example, if Dial = 123456, Send = 456789, 30 seconds after starting of alarm "Internal Fault 5" the system sends to modem:

```
ATD123456.
```

The system, after receiving the message "CONNECT" from modem, sends to the modem the message:

```
UPS 456789
```

```
INTERNAL FAULT
```

```
M100, OUT=100%VA, BATT= 78%Ah, 5=On a=00200300 1994-12-21, 13:24:28
```

The system sends also the sequence to close connection:

```
+++ ATH
```

As last the system put on low level the DTR signal for 0.5 sec.

In case of busy line or modem not giving the response "CONNECT", the system wait 5 minute than repeats again the commands ATD..... in order to try another phone call. The system continues to try calling every 5 minutes until it receives the response "CONNECT" from modem or the alarm condition disappears.

Value 3= like value 2 with the automatic calling for any kind of alarm.

Value 4= like value 2 with the automatic calling only with alarm 10 (Internal Fault) but with sending of display message only after received the character "}".

This operation can be used for avoiding the loss of a message, because the system sends its message only after receiving the special character "}" that can send only by a computer.

Value 5= like value 4 with the automatic calling for any kind of alarm.

Key menu 3, 5, 7, 4, 5 (6) : Modem 'Dial /Send' CUSTOMIZING.

```
MODEM dial n.=6543210//////// <=2..3=>
ADJUSTEMENT: (5=dial, 6=send) 7=-, 8=+
```

Access to the menu "MODEM 'Dial /Send' CUSTOMIZING" begins with the key sequence 3, 5, requires the code 436215 and the keys 7, 4, 5, or 6. To have the optional code make a request complete of machine serial number. The code is not required for 2 minutes after its first previous entry.

To leave the menu press a key different from 7, 8, 5, 6, 2, 3.

Keys 7 and 8 are used to reduce or increase the digit on which the cursor points.

The cursor position is shown in the first time by the simbol "_", its position can be moved left with key 2 and right with key 3. The digits can be set in the range 0, 1, 2 ... 9, /. The simbol / indicates a digit inhibited.

The correct setting requires only number starting from left. All number inserted after a "/" are ignored.

A setting of "0123/45" will be recognized only as number 0123

Selecting the 35746 menu or pushing the key 6 when the 35745 menu is active, it is possible to adjust the "send" number.

Key menu 3, 5, 7, 5: RS232 CUSTOMIZING

```
RS232: 8bit,no parity,1b.stop, baud=9600
ADJUSTMENT: 7=-, 8=+
```

Access to the RS232 CUSTOMIZING menu begins with key sequence 3, 5, requires the code 436215 and then keys 7 and 5. The code is not required for 2 minutes after its first previous entry. To leave the menu press any key other than 7 and 8. Keys 7 and 8 are used to reduce or increase baud transmission speed. The choice is among 1200, 2400, 4800 and 9600.

Key menu 3, 5, 7, 6: ECHO CUSTOMIZING

```
ECHO ON RS232: = 1
```

ADJUSTMENT:

7=-, 8=+

Access to the ECHO CUSTOMIZING menu begins with key sequence 3, 5, requires the code 436215 and then keys 7 and 5. The code is not required for 2 minutes after its first previous entry. To leave the menu press any key other than 7 and 8. Keys 7 and 8 are used to reduce or increase the check value of the ECHO function. The choice is between 0 and 1. 0 is starting value. When 1 is selected the ECHO function is activated. The ECHO function is useful for automatically sending to the serial outlet RS232 the same message as appears on the panel viewer.

Automatic sending occurs for each alarm or change in viewer content.

Using this function it is possible to automatically print all messages through a printer connected to the RS232 outlet.

The message includes:

- copying the characters on the viewer
- copying the internal code a=FFFF-FFFF
- date and hour of activation of the message.

NOTE: the ECHO must be set to 0 when using some special software to receive information from UPS by a computer, because in that case the message must be sent only under computer control.

Key menu 3, 5, 7, 7: IDENT. CUSTOMIZING

IDENT. = 0
ADJUSTMENT: 7=-, 8=+

Access to the IDENT. CUSTOMIZING menu begins with key sequence 3, 5, requires the code 436215 and then keys 7 and 8. The code is not required for 2 minutes after its first previous entry. To leave the menu press any key other than 7 and 8. Keys 7 and 8 are used to reduce or increase the identification number of a single unit in case of systems using several UPS units connected to a single RS232 serial line.

The basic number is 0 and can be changed among values from 0 to 7.

Key menu 3, 6: INVERTER-OFF/BYPASS

INVERTER OFF AND BYPASS COMMAND = 47263
IT SHUTS OFF, IF BYPASS LINE IS NOT OK

Access to the INVERTER OFF AND BYPASS COMMAND menu begins with key sequence 3, 6 of the basic menu. To leave the menu press key 8 or any key with a sequence other than that indicated.

Pressing keys 1, 7, 2, 6 and 3 in succession as shown on the viewer activates the bypass command and shuts off the inverter.

This command is mostly useful if sent through an RS232 remote connection if it is desired to deactivate only the power circuits while keeping the control circuit alive.

The action following the command is executed with a few minutes of delay to allow for cancellations.

When this command is active the viewer shows the alarm BYPASS COMMAND ACTIVE; 8=DISACTIVATION.

To return to normal operation even after shutting off the system it is necessary to cancel the command with key 8 or sending the key code through the RS232.

To keep secret BYPASS COMMAND codes on the panel display :

- 1- Access to the CUSTOMIZING menu begins with key 5 from menu 3 COMMANDS
- 2 - pressing keys 436213.

Repeat operation to see the code

Key menu 3, 7: TOTAL SYSTEM SHUT-OFF COMMAND.

TOTAL SYSTEM SHUT-OFF COMMAND = 47263
WARNING, THE OUTPUT VOLTAGE WILL BE OFF

Access to the TOTAL SYSTEM SHUT-OFF menu is only by remote signals through the RS232 with codes equivalent to the keys 3, 7 of the basic menu. To leave the menu press key 8 or any key with a sequence other than that indicated.

Pressing in succession the keys 1, 7, 2, 6 and 3 as shown on the viewer activates the total lockup command of the system. When this command is active the viewer shows the Alarm:

SYSTEM OFF COMMAND ACTIVE; 8= COMMAND OFF.

The action following the command is executed with a few minutes of delay to allow for cancellations.

This command is useful in case of emergency to secure complete disactivation with release of the power and bypass line switches and opening of the battery remote switch, operating from a distance through the RS232 line.

Reactivation of the system requires manual reclosing of the unit switches.

To keep secret TOTAL SYSTEM SHUT-OFF codes on the panel display :

- 1- Access to the CUSTOMIZING menu begins with key 5 from menu 3 COMMANDS
- 2 - pressing keys 436213.

Repeat operation to see the code

Key menu 4: "RECORDER": HISTORY = RECORDED EVENTS

alarm message recorded
a=FFFF-FFFF; n=100, 1992,12,31/14:45:50

Access to the RECORDED EVENTS menu is with key 4 of the basic menu.

Press key 1 to return to the basic menu.

Key 2 activates the sub menu MEASUREMENT OF RECORDED VOLTAGES.

Keys 3, 4 and 5 remain with normal functions.

Key 6 activates the sub menu 4, 6 RECORDED CODES and permits exchange of the alarm message memorized with display of the status codes corresponding to the moment of the memorized event and vice versa.

The status codes permit thorough analysis of the event. For interpretation see the menu of the key 7 INTERNAL CODES and the table of memorized codes.

Keys 7 and 8 secure display of the events preceding and following the event displayed. For example by pressing 7 the indication n=100 changes to n=99 and the 'memorized alarm message' of the previous event is shown.

The parts of the menu are:
 memorized alarm message

Indicates one of the alarm messages corresponding to that displayed during the last event and contained in the memory of the events. The memory can contain up to 120 events. When the memory is full each new event is memorized and cancels the last one.
 Indicates the memorized code for the other alarms present at the same time together with that indicated by the 'memorized alarm message'.
 Indicates the number of events contained in the memory.
 Indicates the date and hour of the moment when the displayed event occurred.
 It is expressed in year, month, day / hour, minute, second

a=FFFF-FFFF

n=100
 1992,12,31/14:45:50

Key menu 4, 2 RECORDED VOLTAGES MEASUREMENT

IN=100,100,100%V,50.0Hz; BATT=430V,+100A
BY=230V,50.0Hz; n35 OUT=220V,50.0Hz,100%

Access to the menu RECORDED VOLTAGES MEASUREMENT is with key 2 only from menu 4 RECORDED EVENTS or menu 4,6 RECORDED CODES.

Press key 1 to return immediately to the basic menu.

In the example, n35 (flashing) indicates that the measurements shown are for the status of recorded event 35. The meaning of the measurements is identical to those of menu 2.

Key menu 4, 2, 2: RECORDED CURRENT MEASUREMENT

Menu 4.2.2.

IN=100,100,100%A;Ts=25°C,Tr=45°C,Ti=45°C
i=230Vln,430Vb;n 35 OUT=100,100,100%Arms

Access to the menu RECORDED CURRENT MEASUREMENT is with key 2 only from menu 4, 2.

Press key 2 to return to menu 4,2; key 1 to return to basic menu.

In the example, n35 (flashing)

indicates that the measurements shown are for the status of recorded event 35.

The meaning of the measurements is identical to those of menu 2.

Key menu 4, 2, 2, 2: RECORDED 3-PHASE VOLTAGE MEASUREMENT

BY=230,230,230Vln; OUT=230,230,230Vln
n 35 OUT=100,100,100Apk

Access to the menu 3-PHASE VOLTAGE MEASUREMENT is with key 2 from menu 4,2,2.

Press key 2 to return to menu 4,2,2; key 1 to return to basic menu.

In the example, n35 (flashing) indicates that the measurements shown are for the status of recorded event 35. The meaning of the measurements is identical to those of menu 2.

Key menu 4, 6: RECORDED CODES

```
s=FFFF c=FFFF b=FFFF r=FFFF-FF i=FFFF-FF
a=FFFF-FFFF; n=100, 1992,12,31/14:45:50
```

Access to the menu RECORDED CODES is with key 6 from menu 4 RECORDED EVENTS and menus 4,2; 4,2,2; 4,2,2,2, i.e. those of recorded measurements. Press key 1 to return to basic menu.

The other keys except 6 and the indications of the bottom line have the same functions as those of menu 4.

The top line: s=FFFF c=FFFF b=FFFF r=FFFF-FF i=FFFF-FF,

shows the internal codes, explained in menu 7, recorded at the same time as the event.

Press key 6 to return to menu 4 keeping the event current, then it is possible to go several times from the description of the event with the 'memorized alarm message' to that with the internal codes.

Key menu 5: Acoustic alarm exclusion

During operation with the presence of the basic menu the operator can exclude or again enable permanently the audible alarm by pressing key 5.

In the basic menu 5=ON appears when the audible alarm is enabled and 5=OFF appears when the audible alarm is excluded.

In other menus, when other functions are not provided, key 5 can be used only for sound exclusion.

Key menu 6: "clock": DATE/TIME

```
DATE/TIME= ymd/h = 1993 12 31/24:60'60
TYPE CODE ....
```

Access to the DATE/TIME menu is with key 6 from the basic menu.

The viewer shows the present contents of the internal calendar and clock in the format:

DATE/TIME = ymd/h=year,month,day/hour,minute,second

It is possible to change the contents by recalling the related menu by entry of the customizing code 436215.

The code is not required for 2 minutes after the first previous entry thereof.

Only entering the correct code secures access to the next menu, otherwise one returns to the basic menu.

```
DATE/TIME= ymd/h = 1993 12 31/24:60'60
Adj.: 2=ye. 3=mo. 4=day. 5=hours 7=min..
```

The number to be changed is selected with one of the keys 2, 3, 4, 5 or 7.

```
DATE/TIME= Xmd/h = 1993 12 31/24:60'60
ADJUSTMENT: 7=-, 8=+
```

In this case it was decided to change the year, the flashing symbol X superimposed on the letter a recalls the field selected. Pressing key 7 or 8 increases or decreases by one unit the value selected. Pressing one of the other keys exits from menu.

Key menu 7 "arrow down": INTERNAL CODES

```
s=FFFF c=FFFF b=FFFF r=FFFF-FF i=FFFF-FF
a=FFFF-FFFF; INTERNAL CODES; ver.10001
```

(memorized internal codes)

Access to the INTERNAL CODES menu is with key 7 from the basic menu.

Press key 7 again to accede to the second menu of internal codes. Press any other key to exit.

```
e=FFFF g=FFFF u=FFFF y=FFFF j=FFFF-FFFF
k=FFFF v=FFFF p=FFFF l=FFFF m=FFFF-FFFF
```

(UNmemorized internal codes)

In the first menu, ver. 10001 is an example of an identifying number of the system programme version.

In both menus appear letters associated with groups of hexadecimal figures, e.g. s=FFFF indicates that with the letter s, prefixed to group system variables, is associated the hexadecimal number FFFF.

It is recalled that hexadecimal enumeration can use the following symbols for each single figure: 1,2,3,4,5,6,7,8,9,A,B,C,D,E,F.

The figures of the 6 groups of the first menu are memorized upon each event, hence are useful for having information on the internal status present and past. The other figures of the other groups are not memorized.

The first 6 groups contain variables related to:

s=system c=output load, b=bypass, r=rectifier and battery, i=inverter, a)alarms.

The next 10 groups are related to:

e=input, g=general, u=output, y=bypass, j=inverter, k=load, v=voltages, p=peripherals, l=LED, m=memory.

Each figure of the various groups supplies the status of 4 or information or variables, e.g. to the first figure of the group s=... correspond:

- (with 1 if true, 0 if false) high system temperature
- (with 2 if true, 0 if false) initialization error
- (with 4 if true, 0 if false) remote shut-down command active
- (with 8 if true, 0 if false) auxiliary input on system card active.

When s=F... is read, hence the first figure of the group s is F. Since in the hexadecimal system $F = 1 + 2 + 4 + 8$, it is inferred that:

1=system temperature is high	=TRUE, i.e. there is high temperature in the system
2=initialization correct	=TRUE, i.e. system initialization is correct
4=remote shutoff command active	=TRUE, the command is active
8=auxiliary input on system card active	= TRUE, the input is active.

If s=A... is read, since $A = 2 + 8$, it is inferred that:

1=system temperature is high	=FALSE, i.e. there is NO high temperature in the system
2=initialization correct	=TRUE, i.e. system initialization is NOT correct
4=remote shutoff command active	=FALSE, the command is NOT active
8=auxiliary input on system card active	= TRUE, the input is active.

In practice the information supplied is:

system temperature high =TRUE, when the first figure is 1 or 3 or 5 or 7 or 9 or B or D or F.

Use the table of memorized internal codes for complete interpretation.

Key menu 8 "arrow up": NORMAL

NORMAL OPERATION			
M100,	OUT=100%VA	BATT.=100%Ah	5=ON

Access to the menu NORMAL is with key 8 from menu 1 HELP and from all the other menus in which no other function is provided. In addition, the system returns AUTOMATICALLY to the menu NORMAL, i.e. the basic menu, always after two minutes after last pressing a key. All functions are those explained for the basic menu.

Remote Panel With RS232 Terminal

Connecting a serial terminal to the RS232 line is an easy way to provide a remote panel.

The connection requires:

- a connecting lead with only three conductors for the signals TX, RX and GND equipped with standard 25-pole RS232 connectors.

- a terminal with baud rate and protocol the same as that of the UPS (see also RS232 customization) capable of displaying ASCII characters received from the UPS and transmitting ASCII numbers from 0 to 9.

An ordinary personal computer in which one of the application programs for terminal emulation has been activated can be used as the terminal. For example the terminal included in Microsoft WINDOWS software can be used.

Communication with the terminal is achieved by activating the function ECHO on the UPS or on command by the terminal.

For ECHO communication:

- the terminal always receives the characters sent automatically by the UPS upon each alarm or change of messages on the panel display;
- the terminal can transmit the ASCII characters corresponding to the numerical keys from 0 to 8 to achieve execution of the commands on the UPS:

For communication on command:

- the terminal must open the communication by sending in sequence two ASCII characters corresponding to the numerical keys 9 and 0 spaced with an interval between 0.5 and 2 seconds.
If the UPS is customized with a new identification number, the second character to send changes from 0 to the one which is the same as the new identification number.

-After opening of the new communication, the terminal can transmit the ASCII characters corresponding to the numerical keys from 0 to 8 to achieve execution of the commands on the UPS and reception of the copy of the characters of the display complete with internal code a=.. and date/time,

- while the communication is opened, transmitting the character 9 it is possible to receive the same message without execute any command,

- The terminal can close the communication by sending any character other than those given above.

Connection with Computer

It is possible to connect any kind of computer to the UPS in order to have the automatic saving of computer data before a UPS shutoff caused by a blackout longer than battery autonomy.

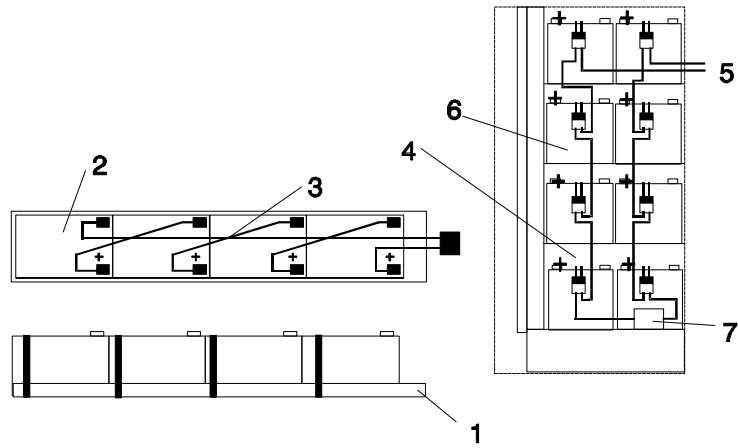
To have this performance it needs also to ask for some special software.

When asking for this software it needs to specify which operating system has the computer.

It is possible also, to have some special software in order to receive all UPS information into a computer.

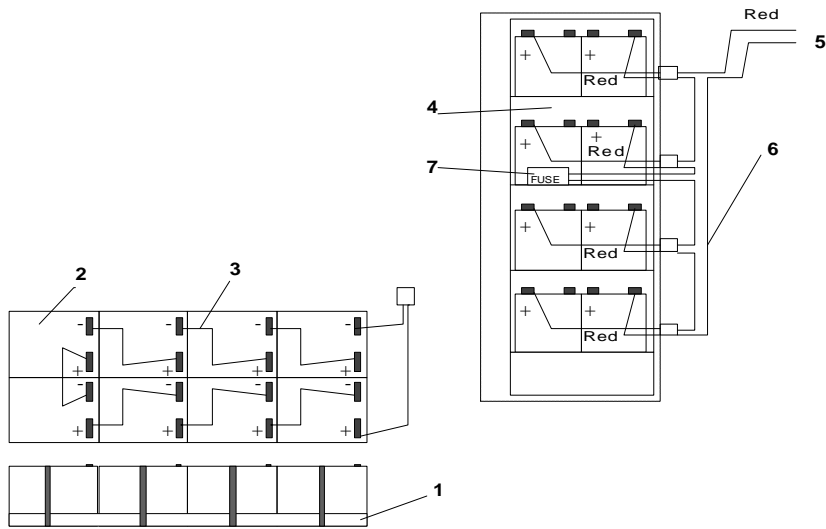
APPENDIX

BATTERY PACK UPS COMPACT



Nr. 4 Batteries tray version

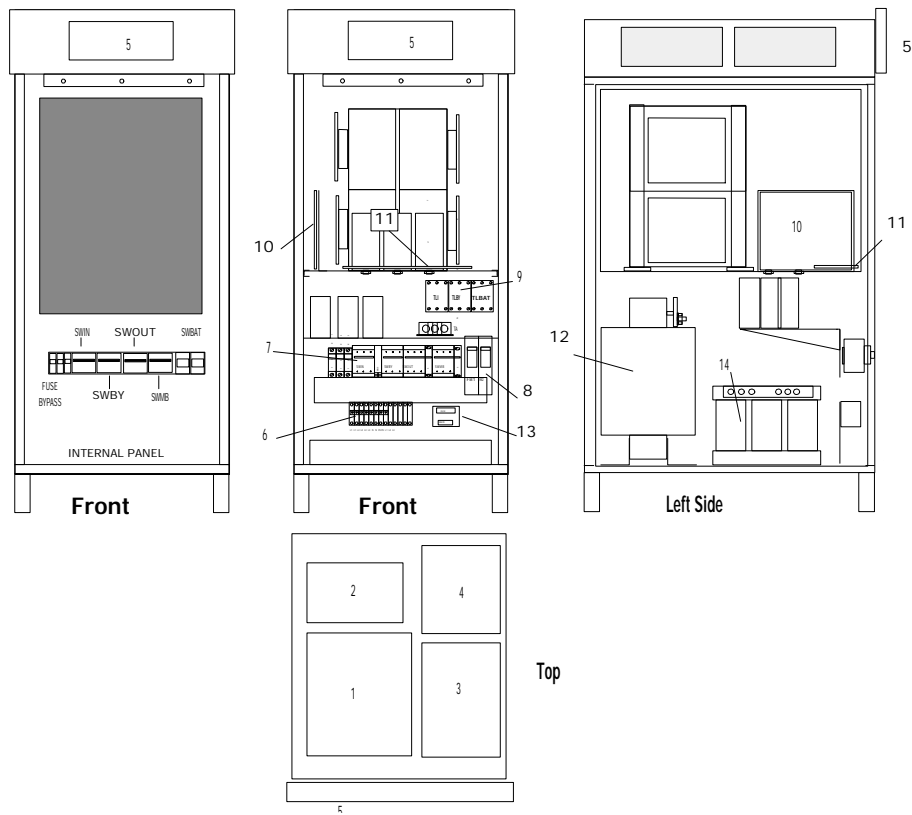
- 1 BATTERY PACK
- 2 Battery
- 3 Battery Cable Connection
- 4 Battery Box
- 5 To UPS fuses
- 6 Battery Pack Cable Connections
- 7 Switch Battery fuse



Nr. 8 Batteries tray version

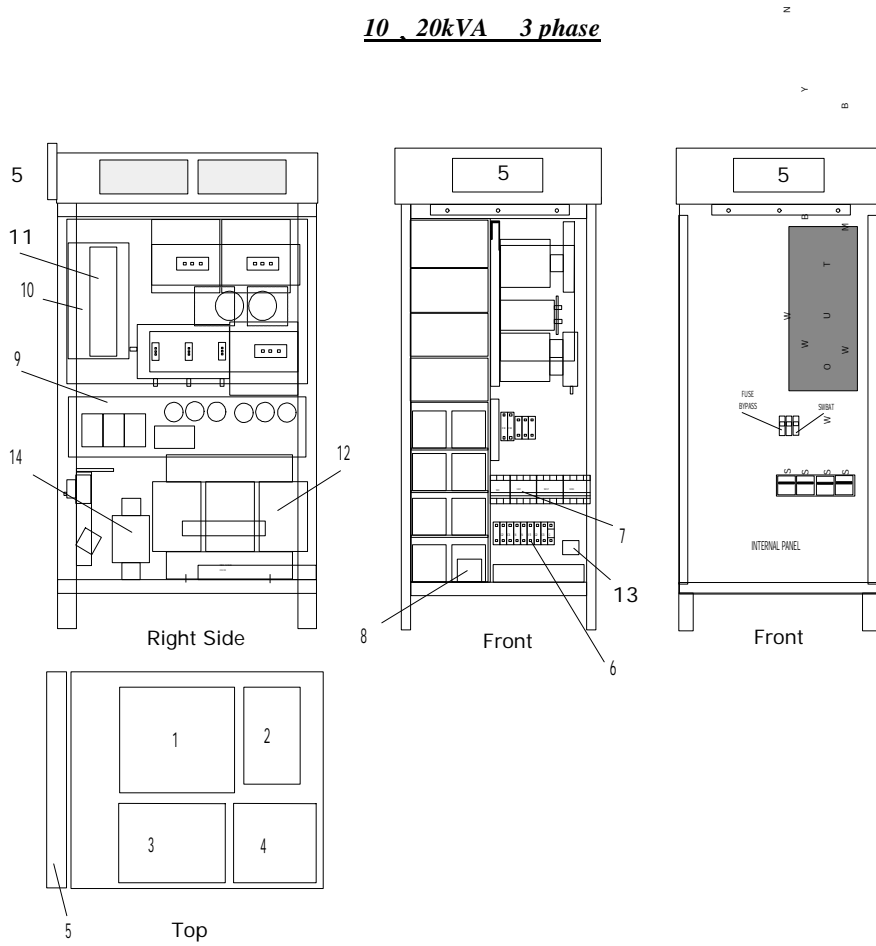
LAY-OUT

30 - 40kVA 3phase



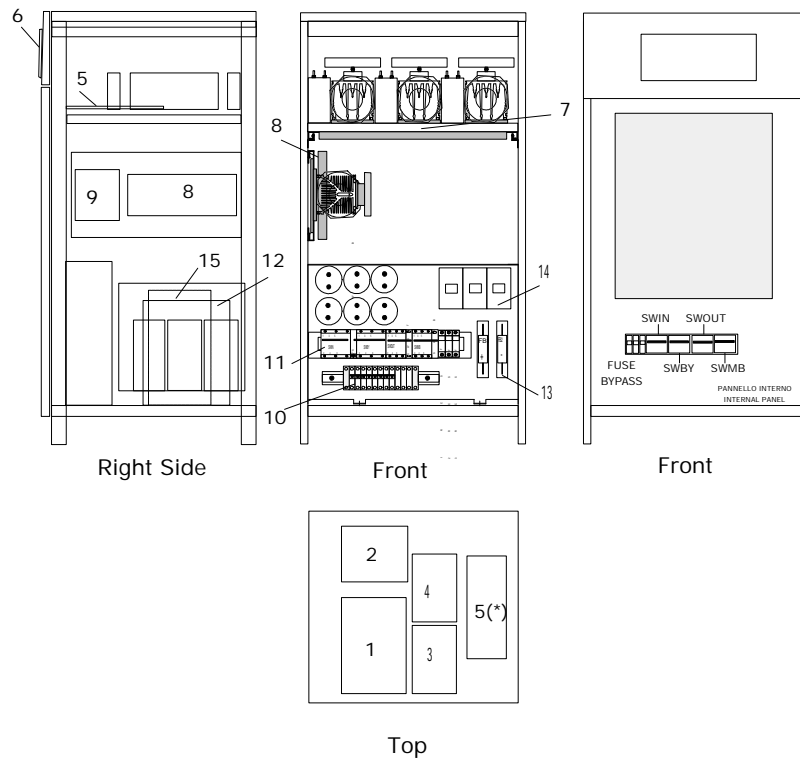
- | | | | |
|---|----------------------|----|-----------------------------|
| 1 | Sistem card | 8 | Battery fuse |
| 2 | Power supply card | 9 | Contactora assembly |
| 3 | Interface card | 10 | Inverter control card |
| 4 | Bypass card | 11 | Rectifier control card |
| 5 | Command panel | 12 | Transformer |
| 6 | Input terminal board | 13 | REMOTE and RS232 connectors |
| 7 | Breakers | 14 | Inductor |

10 , 20kVA 3 phase



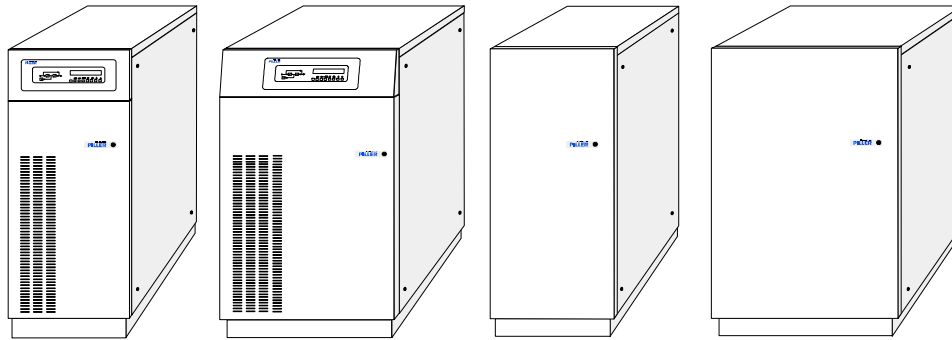
- | | | | |
|---|----------------------|----|-----------------------------|
| 1 | System card | 8 | Battery fuse |
| 2 | Power supply card | 9 | Contactor assembly |
| 3 | Interface card | 10 | Inverter control card |
| 4 | Bypass card | 11 | Rectifier control card |
| 5 | Command panel | 12 | Transformer |
| 6 | Input terminal board | 13 | REMOTE and RS232 connectors |
| 7 | Breakers | 14 | Inductor |

60-80kVA 3 phase



- | | | | |
|------|-----------------------------|----|------------------------|
| 1 | Sistem card | 8 | Rectifier assembly |
| 2 | Power supply card | 9 | Rectifier control card |
| 3 | Interface card | 10 | Input terminal board |
| 4 | Bypass card | 11 | Breakers |
| 5 | Inverter control card 60Kva | 12 | Transformer |
| 5(*) | Inverter control card 80Kva | 13 | Battery fuse |
| 6 | Command panel | 14 | Contactor |
| 7 | Inverter assembly | 15 | Inductor |

DIMENSION WEIGHT



A

B

EXP. 1

EXP. 2

A AR3 10 ÷40
EXP 1 555x740x1400 battery cabinet

B AR3 60-80
EXP 2 860x740x1400 battery cabinet

THREEPHASE OUTPUT H1400

P p.f.0.8 [kVA]	phases		cabinet	Nr. batt.12V	batt. cap. Ah	dimensions			weight [kg]
	inp	out				L/W [mm]	P/D [mm]	H [mm]	
10	3+N	3+N	A	0	0	555	720	1400	210
10	3+N	3+N	A	32	12	555	720	1400	345
10	3+N	3+N	A	32+32	12+12	555	720	1400	480
10	3+N	3+N	A	32+32	12+7	555	720	1400	442
15	3+N	3+N	A	0	0	555	720	1400	220
15	3+N	3+N	A	32	12	555	720	1400	355
15	3+N	3+N	A	32+12	12+7	555	720	1400	452
15	3+N	3+N	A	32+32	12+12	555	720	1400	490
20	3+N	3+N	A	0	0	555	720	1400	230
20	3+N	3+N	A	32+12	12+7	555	720	1400	462
20	3+N	3+N	A	32+32	12+12	555	720	1400	500
30	3+N	3+N	A	0	0	555	720	1400	282
40	3+N	3+N	A	0	0	555	720	1400	330
60	3+N	3+N	B	0	0	800	740	1400	450
80	3+N	3+N	B	0	0	800	740	1400	550

BATTERY CABINET H1400

type	cabinet	Nr. batt.12V	batt. cap. Ah	/dimensions			weight [kg]
				W [mm]	D [mm]	H [mm]	
WITHOUT BATT.	EXP 1	-	-	555	740	1400	120
WITH BATT.	EXP 1	32	18/26/38/42	555	740	1400	335/450/578/578
WITHOUT BATT	EXP 2	-	-	860	740	1400	150
WITH BATT.	EXP 2	32	65	860	740	1400	890

INTERNAL PROTECTIONS

Type [kVA]	Ingresso/Input		Battery	SCR
	Automatic breaker	Non-automatic breaker	Fuses	Fuses

THREEPHASE

	SWIN	SWBY	SWOUT	SWMB	FB1/2	FSCR
10	20A(3P) Type C		20A(3P)		30A(10x38)	3x16A(gG) (10x38)
15	32A(3P) Type C		32A(3P)		50A(14x51)	3x16A(gG) (10x38)
20	40A(3P) Type C		40A(3P)		80A(22x58)	3x16A(gG) (10x38)
30	63A(3P) Type C		63A(3P)		80A(22x58)	3x32A(gG) (10x38)
40	80A(3P) Type C		80A(3P)		100A(22x58)	3x32A(gG) (10x38)
60	100A(3P) Type C		100A(3P)		160A(NH0)	3x32A(gG) (10x38)
80	125A(3P) Type C		125A(3P)		160A(NH0)	3x32A(gG) (10x38)

TABLE OF MEMORIZED INTERNAL CODE

For decode the internal microprocessor memorized code refer to the following table:

[s =sistem, c=load, b=bypass, r= rectifier, i=inverter, a=alarm]

(* only in parallel version)

(1)	s=X...										1	3	5	7	9	B	D	F	High system temperature
		2	3		6	7		A	B		E	F	Initialisation error						
			4	5	6	7				C	D	E	F	System off command active.					
							8	9	A	B	C	D	E	F	Auxiliary input on system card.				
(2)	s=X..										1	3	5	7	9	B	D	F	System card power supply error.
		2	3		6	7		A	B		E	F	Temporary anomaly in power supply card.						
			4	5	6	7				C	D	E	F	Synchronism error on system card.					
							8	9	A	B	C	D	E	F	Output frequency measurement error on system card.				
(3)	s=..X.										1	3	5	7	9	B	D	F	Low voltage from battery or rectifier.
		2	3		6	7		A	B		E	F	Low voltage pre alarm from battery or rectifier.						
			4	5	6	7				C	D	E	F	Battery contactor open.					
							8	9	A	B	C	D	E	F	Permanent anomaly in battery contactor.				
(4)	s=...X										1	3	5	7	9	B	D	F	Power supply card anomaly. (only ver.<=152)
		2	3		6	7		A	B		E	F	Presence of the signal RS232 DSR_ON..						
			4	5	6	7				C	D	E	F	Configuration circuit not present.					
							8	9	A	B	C	D	E	F	Jumper CONFIG2 not present.				
(1)	c=X...										1	3	5	7	9	B	D	F	Output overload, line 2
		2	3		6	7		A	B		E	F	Output overload, line 3						
			4	5	6	7				C	D	E	F	Permanent overload.					
							8	9	A	B	C	D	E	F	TA DIFF. signal present				
(2)	c=X..										1	3	5	7	9	B	D	F	High peak output current, line 1
		2	3		6	7		A	B		E	F	High peak output current, line2						
			4	5	6	7				C	D	E	F	High peak output current, line3					
							8	9	A	B	C	D	E	F	Output overload, line 1				
(3)	c=..X.										1	3	5	7	9	B	D	F	Instantaneous output voltage error, line 2
		2	3		6	7		A	B		E	F	Instantaneous output voltage error, line 3						
			4	5	6	7				C	D	E	F	Average output voltage error, line 1.					
							8	9	A	B	C	D	E	F	Average output voltage error, line 2.				
(4)	c=...X										1	3	5	7	9	B	D	F	-
		2	3		6	7		A	B		E	F	Output switch SWOUT open						
			4	5	6	7				C	D	E	F	Average out. voltage error, line 3.					
							8	9	A	B	C	D	E	F	Instantaneous output voltage error, line 1				
(1)	b=X...										1	3	5	7	9	B	D	F	Bypass line no. 3 input voltage error
		2	3		6	7		A	B		E	F	Bypass line frequency error						
			4	5	6	7				C	D	E	F	Sequence error in phases 1 and 2 at bypass line input					
							8	9	A	B	C	D	E	F	Manual bypass switch SWMB closed.				
(2)	b=X..										1	3	5	7	9	B	D	F	Active remote command bypass (inverter OFF).
		2	3		6	7		A	B		E	F	Static switch anomaly (SCR) for bypass						
			4	5	6	7				C	D	E	F	Bypass line no. 1 input voltage error					
							8	9	A	B	C	D	E	F	Bypass line no. 2 input voltage error				
(3)	b=..X.										1	3	5	7	9	B	D	F	SCR bypass line permanently closed
		2	3		6	7		A	B		E	F	Bypass line disabled.						
			4	5	6	7				C	D	E	F	Permanent anomaly closing inverter output contactor					
							8	9	A	B	C	D	E	F	Bypass command active				
(4)	b=...X										1	3	5	7	9	B	D	F	Anomaly in inverter output contactor
		2	3		6	7		A	B		E	F	Inverter output contactor open						
			4	5	6	7				C	D	E	F	Bypass line contactor closed.					
							8	9	A	B	C	D	E	F	Anomaly in bypass line contactor.				

r=X...-..	1	3	5	7	9	B	D	F	Low input voltage, line 2
	2	3		6	7	A	B	E	Low input voltage, line 3.
			4	5	6	7		C	No input current, line 1.
							8	9	No input current, line 2
(1)									
r=-X...-..	1	3	5	7	9	B	D	F	High input voltage, line 1
	2	3		6	7	A	B	E	High input voltage, line 2
			4	5	6	7		C	High input voltage, line 3.
							8	9	Low input voltage, line 1.
(2)									
r=-.X...-..	1	3	5	7	9	B	D	F	High rectifier temperature
	2	3		6	7	A	B	E	High rectifier output voltage
			4	5	6	7		C	Power supply error on rectifier control.
							8	9	Rectifier disablement
(3)									
r=...X...-	1	3	5	7	9	B	D	F	No input current, line 3
	2	3		6	7	A	B	E	Power limitation in rectifier.
			4	5	6	7		C	Adjustment error in rectifier
							8	9	Rectifier input line frequency error.
(4)									
r=....X..	1	3	5	7	9	B	D	F	Permanent anomaly rectifier (only ver.<=152)
	2	3		6	7	A	B	E	Error in voltage DRV1 in rectifier
			4	5	6	7		C	Error in voltage DRV2 in rectifier
							8	9	Error in voltage DRV3 in rectifier
(5)									
r=....-X	1	3	5	7	9	B	D	F	Anomaly in one section of rectifier. (only ver.<=152)
	2	3		6	7	A	B	E	-(SGP power fail *)
			4	5	6	7		C	(Parallel cable fail or SWMB close-*)
							8	9	-
(6)									
i=X...-..	1	3	5	7	9	B	D	F	Error in inverter connections
	2	3		6	7	A	B	E	Error in inverter power supply.
			4	5	6	7		C	(parallel syncro fail *)
							8	9	(parallel UPS Master *)
(1)									
i=-X...-..	1	3	5	7	9	B	D	F	Cables reversed on pilot (only ver.<=152)
	2	3		6	7	A	B	E	Lockup by card or module 3 in inverter
			4	5	6	7		C	Lockup by card or module 2 in inverter.
							8	9	Istantaneous overcurrent
(2)									
i=...X...-	1	3	5	7	9	B	D	F	High voltage at inverter output
	2	3		6	7	A	B	E	High continuous voltage at inverter input (Vdc)
			4	5	6	7		C	High temperature on sensor 1 in inverter
							8	9	High temperature on sensor 2 in inverter
(3)									
i=....X..	1	3	5	7	9	B	D	F	Anomalia inverter/ Inverter anomaly
	2	3		6	7	A	B	E	Absence of synchronism between inverter and by pass line
			4	5	6	7		C	Auto reset of inverter control
							8	9	Auxiliary feeder error for IGBT modules
(4)									
i=....-X.	1	3	5	7	9	B	D	F	Low alternating voltage at inverter output
	2	3		6	7	A	B	E	Low continuous voltage at inverter output
			4	5	6	7		C	Manual reset of inverter control.
							8	9	Permanent inverter anomaly (only ver.<=152), reverse cable on pilot (only ver. >153)
(5)									
i=....-X	1	3	5	7	9	B	D	F	High temperature on sensor 3 in inverter
	2	3		6	7	A	B	E	Lockup by card or module 1 in inverter
			4	5	6	7		C	(parallel serial data fail *)
							8	9	Inverter disablement.
(6)									

a=X...-.... (1)	1		3		5		7		9		B		D		F	LOW BATTERY VOLTAGE	
		2	3			6	7				A	B			E	F	LOW INPUT VOLTAGE OR OVERLOAD [W].
				4	5	6	7						C	D	E	F	BATTERY DISCHARGED OR SWB OPEN
								8	9	A	B	C	D	E	F	OUTPUT OVERLOAD.	
a=X...-.... (2)	1		3		5		7		9		B		D		F	DISTURBANCE ON BYPASS LINE	
		2	3			6	7				A	B			E	F	MANUAL BY PASS, SWBM ON
				4	5	6	7						C	D	E	F	BY PASS LINE VOLTAGE FAIL or SWBY, FSCR OFF
								8	9	A	B	C	D	E	F	MAINS LINE VOLTAGE FAIL or SWIN OFF	
a=X...-.... (3)	1		3		5		7		9		B		D		F	INTERNAL FAULT: 3 output contactor	
		2	3			6	7				A	B			E	F	INTERNAL FAULT: 4 rectifier lockup
				4	5	6	7						C	D	E	F	INTERNAL FAULT: 5 SCR bypass line.
								8	9	A	B	C	D	E	F	INTERNAL FAULT: 6 power supply.	
a=X...-.... (4)	1		3		5		7		9		B		D		F	TEMPORARY or PERMANENT BYPASS	
		2	3			6	7				A	B			E	F	BYPASS FOR OUTPUT VA < AUTO_OFF
				4	5	6	7						C	D	E	F	INTERNAL FAULT: 1 no circ configuration.
								8	9	A	B	C	D	E	F	INTERNAL FAULT: 2 inverter lockup	
a=X...-.... (5)	1		3		5		7		9		B		D		F	BYPASS FOR OUTPUT OVERLOAD	
		2	3			6	7				A	B			E	F	ACTIVE BYPASS COMMAND; 8-COMMAND OFF
				4	5	6	7						C	D	E	F	REMOTE BYPASS COMMAND: ACTIVE.
								8	9	A	B	C	D	E	F		
a=X...-.... (6)	1		3		5		7		9		B		D		F	INTERNAL FAULT: 7 system card power supply.	
		2	3			6	7				A	B			E	F	INTERNAL FAULT: 8 one rectifier section
				4	5	6	7						C	D	E	F	INTERNAL FAULT: 9 battery contactor.
								8	9	A	B	C	D	E	F	INTERNAL FAULT: 10 inverter - converter comunicat	
a=X...-.... (7)	1		3		5		7		9		B		D		F	REMOTE SYSTEM OFF COMMAND: ACTIVE.	
		2	3			6	7				A	B			E	F	memory changed: CODE=....
				4	5	6	7						C	D	E	F	- INTERNAL FAULT: 11, inverter output connection or bypass
								8	9	A	B	C	D	E	F	- stop for internal timer	
a=X...-.... (8)	1		3		5		7		9		B		D		F	OVERTEMPERATURE OR FAN FAILURE.	
		2	3			6	7				A	B			E	F	ERRONEOUS INPUT PHASE SEQUENCE.
				4	5	6	7						C	D	E	F	OUTPUT OFF CLOSE SWOUT OR SWMB
								8	9	A	B	C	D	E	F	SYSTEM OFF COMMAND ACTIVE; 8=DISACTIVATION.	

Piller GmbH
Postfach 18 51
D-37508 Osterode am Harz
Telefon (0 55 22) 31 10
Telefax (05522) 311 562

A Lahmeyer Company
PILLER