

AEG HE

UPS 10 kVA
UPS 15 kVA
UPS 20 kVA

EN





WARNING

This is a Class A-UPS Product. In a domestic environment, this product may cause radio interference, in which case, the user may be take additional measures.

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1. SCOPE

The instructions contained in this section of the manual apply to the UPS systems indicated below.

- AEG HE 10 kVA
- AEG HE 15 kVA
- AEG HE 20 kVA



STORING DOCUMENTATION

This manual and any other supporting technical documentation relating to the product must be stored and made accessible to personnel in the immediate vicinity of the UPS.



FURTHER INFORMATION

In the event that the information provided in this manual is not sufficiently exhaustive, please contact the manufacturer of the device, whose details are available in the “Contacts” section.

2. SAFETY RULES AND WARNINGS



INJURY HAZARD DUE TO ELECTRIC SHOCK!

Always respect all the safety instructions and, in particular:

- any work on the unit must be carried out by qualified personnel;
- internal components can only be accessed after disconnecting the device from supply sources;
- always use protective devices designed for each type of activity;
- the instructions contained in the manuals must be strictly followed.



INJURY HAZARD DUE TO DEVICE FAILURE

Potentially hazardous situations may arise in case of UPS failure.

- Do not use the device if visibly damaged.
- Maintain the device regularly to identify possible failure.



POSSIBLE DEVICE DAMAGE

Whenever work is carried out on the device, make sure all actions are taken in order to avoid electrostatic discharges which might damage the electronic components of the system.



READ THE TECHNICAL DOCUMENTATION

Before installing and using the device, make sure you have read and understood all the instructions contained in the present manual and in the technical supporting documentation.

3. GENERAL UPS DESCRIPTION

The UPS systems of the AEG HE line use IGBT technology with a high changeover frequency in order to allow a low distortion of the current re-injected into the supply line, as well as high quality and stability of the output voltage. The components used assure high reliability, very high efficiency and ease of maintenance.

3.1 TYPOLOGY

The UPS systems of the AEG HE line are on-line, double conversion; the inverter included in the UPS always supplies energy to the load, whether mains is available or not (according to the battery autonomy time). This configuration guarantees the best service to the user, as it supplies clean power uninterruptedly, ensuring voltage and frequency stabilization at nominal value. Thanks to the double conversion, it makes the load completely immune from micro-interruptions and from excessive mains variations, and prevents damage to critical loads (Computer - Instrumentation - Scientific equipment etc.).



OUTPUT VOLTAGE PRESENT

The line connected to the UPS output is energized even during mains failure, therefore in compliance with the prescriptions of IEC EN62040-1-2, the installer will have to identify the line or the plugs supplied by the UPS making the user aware of this fact.

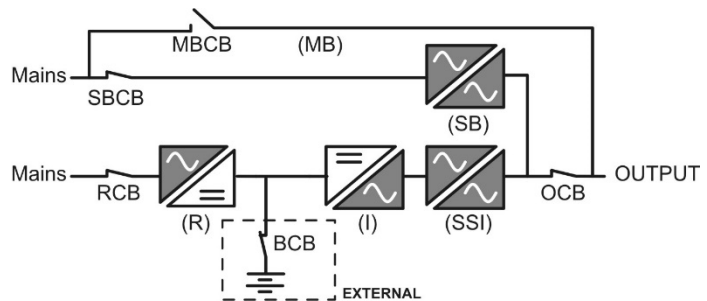


Figure 1: Block diagram

3.2 SYSTEM DESCRIPTION

3.2.1 RECTIFIER

It converts the three-phase voltage of the AC mains into continuous DC voltage. It uses a three-phase fully-controlled IGBT bridge with a low harmonic absorption.

The control electronics use a 32 bit μ P of latest generation that allows reduction of the distortion of the current absorbed by mains (THDi) to less than 5 %. This ensures that the rectifier does not distort the supply mains, with regard to the other loads. It also avoids cable overheating due to the harmonics circulation.

The rectifier is so sized as to supply the inverter at full load and the battery at the maximum charging current.

3.2.2 INVERTER

It converts the direct voltage coming from the rectifier or from the DC battery into alternating AC voltage stabilized in amplitude and frequency.

The inverter uses IGBT technology with a high changeover frequency of approximately 15 KHz.

The control electronics use a 32 Bit μ P of latest generation that, thanks to its processing capability, generates an excellent output sine-wave.

Moreover, the fully digital control of the output sine-wave allows you to achieve high performance, alongside a very low voltage distortion even in the presence of high-distorting loads.

3.2.3 BATTERY AND BATTERY CHARGER

The battery can be installed inside or outside the UPS. The battery charger logic is completely integrated in the rectifier's control electronics. The battery is charged, according to the DIN 41773 Standard, every time it has been partially or completely discharged. When its full capacity is restored, it is kept floating so as to compensate for any auto-discharge.

3.2.4 STATIC BYPASS

The Static Bypass allows for transfer of the load between Inverter and Emergency Mains, and vice-versa, in a very short time, and uses SCR's as power commutation elements.

3.2.5 MANUAL BYPASS

The Manual Bypass is used to cut off the UPS completely, supplying the load directly from the input mains in case of maintenance or serious failure.



FOLLOW THE PROCEDURES CONTAINED IN THE MANUAL

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damage arising from incorrect operation.

3.3 OPERATING STATUS

The UPS has four different operating modes, as described below:

- Normal operation
- Bypass operation
- Battery operation
- Manual bypass

3.3.1 NORMAL OPERATION

During normal operation all of the circuit breakers/isolators are closed, except for MBCB (maintenance bypass).

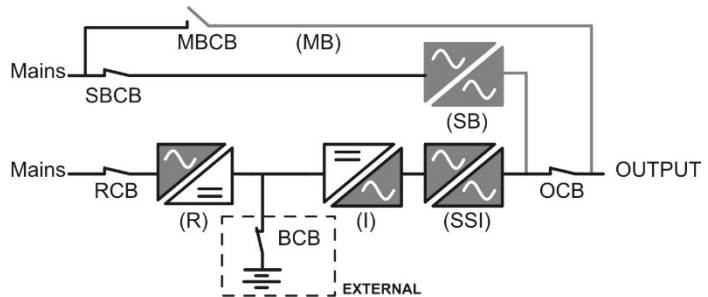


Figure 2: Normal operation

The rectifier is supplied by the AC three-phase input voltage which, in turn, feeds the inverter and compensates mains voltage as well as load variations, keeping the DC voltage constant. At the same time, it keeps the battery charged (floating or boost charge depending on the battery type). The inverter converts the DC voltage into an AC sine-wave with stabilized voltage and frequency, and also supplies the load via its static switch SSI.

3.3.2 BYPASS OPERATION

The load can be switched to bypass either automatically or manually. The manual changeover is due to the BYPASS SWITCH which forces the load to bypass. In case of failure of the bypass line, the load is switched back to inverter without interruption.

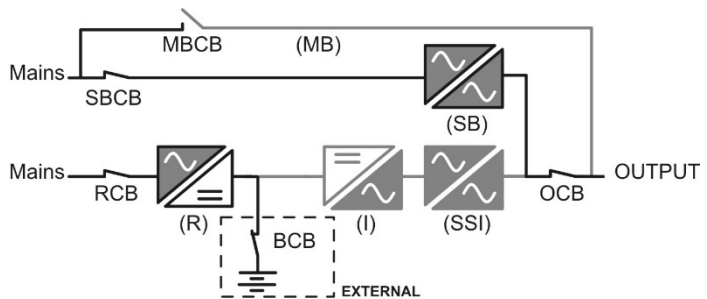


Figure 3: Load supplied by bypass

3.3.3 BATTERY OPERATION

In case of power failure or rectifier fault, the battery feeds the inverter without interruption. The battery voltage drops based on the amplitude of the discharging current. The voltage drop has no effect on the output voltage, which is kept constant by changing the PWM modulation. An alarm is activated when the battery is near the minimum discharge value.

In case the supply is restored before the battery is completely discharged, the system will be switched back to normal operation automatically. In the opposite case, the inverter shuts down and the load is switched to the bypass line (bypass operation). If the bypass line is not available or is out of tolerance, the load supply is interrupted as soon as the battery reaches the discharge limit threshold (*black-out*).

As soon as the supply is restored, the rectifier will recharge the battery. In the standard configuration, the loads are supplied again via static switch SSB when mains are available again. The inverter is restarted when the battery has partially restored its capacity.

The system restart from the *black-out* condition can be customized based on the requirements of the plant, in three different modes:

- Bypass: loads are supplied as soon as the bypass line is available (factory configuration).
- Inverter: loads are supplied by the inverter (even if the bypass line is available) when the battery voltage has reached a programmed threshold, after the rectifier restart.
- Man. Inverter: the output supply is NOT restored automatically. The system requires a confirmation to restart which can only be done manually by the user via the front panel.

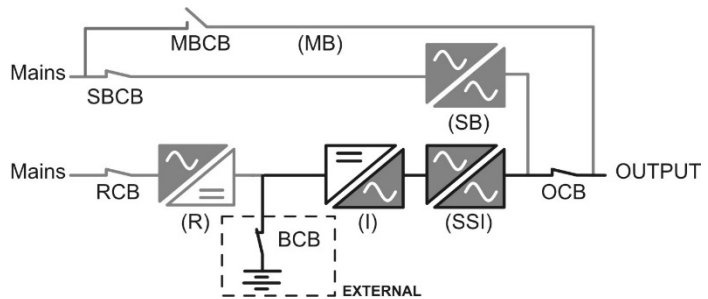


Figure 4: Battery operation

3.3.4 MANUAL BYPASS

The manual bypass operation is necessary whenever the UPS functionality is tested, or during maintenance or repair work.

During the manual bypass due to repair or maintenance, the UPS is completely shut down and the load is directly supplied by the bypass line.



FOLLOW THE PROCEDURES CONTAINED IN THE MANUAL

The sequence of manual bypass switching and return must be carried out with respect to the procedure indicated in the installation and start-up section. The manufacturer cannot accept responsibility for damage arising from incorrect operation.

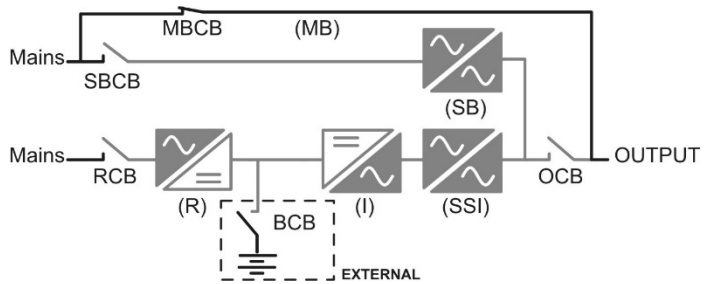


Figure 5: Manual bypass

3.4 CONTROL AND OPERATION DEVICES

The control and operation devices of the UPS are indicated below:

- AC isolator on rectifier input (RCB)
- AC isolator on bypass line input (SBCB)
- Isolator on UPS output (OCB)
- Manual bypass isolator (MBCB)
- Battery Isolator / Circuit breaker (BCB)
- Emergency power off button (EPO)
- Normal/Bypass selector
- LCD control panel



CHECK THE PERSONNEL TRAINING

The use of the operation and control devices of the UPS is intended for authorized personnel only. We recommend checking the training of the personnel responsible for the use and maintenance of the system.

3.4.1 ISOLATORS (DC INPUT AND AC OUTPUT)

The isolators provided on the UPS are used to isolate the power components of the device from the AC supply line, from the storage battery and from the loads.



VOLTAGE PRESENT ON TERMINALS

The isolators do not isolate the UPS completely, where the AC line and battery voltages are still present on the terminals. Before carrying out any maintenance on the unit:

- Isolate the device completely by operating the external circuit breakers;
- Wait at least 5 minutes in order to allow the capacitors to discharge.

3.4.2 EMERGENCY POWER OFF BUTTON (EPO)

The emergency power off command is used to disconnect the UPS output immediately, interrupting the load supply. It also shuts down the inverter.



OPERATE THE COMMAND ONLY IN CASE OF REAL EMERGENCY

The components of the system are subject to a high stress when the emergency power off command is pressed under load presence.

- Use the emergency power off button only in case of real emergency.



SUPPLY RESET

Reset the output supply only when the causes which led to the emergency shutdown have been eliminated and you are sure that there is no hazard to persons and objects.

3.4.3 NORMAL/BYPASS SELECTOR

The Normal/Bypass selector is installed externally, on the rear of UPS. It is generally used during the manual bypass procedure, when it is necessary to isolate the UPS for maintenance or repair.



FOLLOW THE PROCEDURES CONTAINED IN THE MANUAL

The Normal/Bypass selector shall only be operated in accordance with the procedures specified in the installation and start-up section. The manufacturer cannot accept responsibility for damage arising from incorrect operation.

3.4.4 LCD CONTROL PANEL

The control panel of the UPS is used in order to:

- Check the operating parameters of the device
- Check the alarms present
- Access the event log
- Display the information on the device
- Modify the operating parameters

The menu which allows changing of the parameters is password-protected in order to prevent access by unauthorized personnel.

4. FRONT PANEL

The front panel of the UPS, consisting of a four row alphanumeric display plus 5 function keys, allows the complete monitoring of the UPS status.

The mimic flow helps to understand the operating status of the UPS.

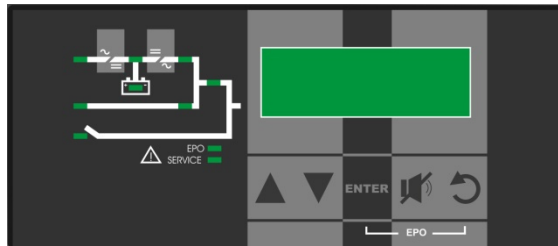







Figure 6: UPS front panel

4.1 FUNCTION BUTTONS

The front panel of the UPS is provided with 5 buttons whose functions are indicated in the following table:

Button	Assigned functions
	<ul style="list-style-type: none"> • Scrolls up the menus • Increases the values by one unit • Selects a value
	<ul style="list-style-type: none"> • Scrolls down the menus • Decreases the values by one unit • Selects a value
	<ul style="list-style-type: none"> • Selects a menu • Confirms changes
	<ul style="list-style-type: none"> • Silences the buzzer (activated due to an alarm or a failure)
	<ul style="list-style-type: none"> • Returns to the previous menu

4.2 FUNCTION OF MIMIC PANEL LED'S

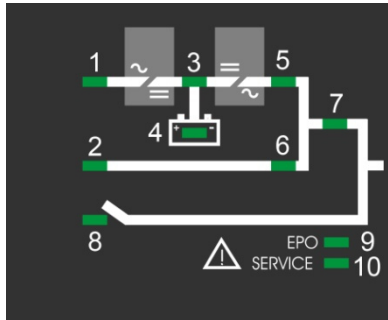






















Figure 7: UPS mimic panel

		GREEN	AC line on rectifier input within tolerance
LED 1		GREEN	Wrong phase rotation
		OFF	AC mains failure on rectifier input
		GREEN	AC bypass line within tolerance
LED 2		GREEN	Wrong phase rotation
		OFF	AC bypass line out of tolerance AC bypass line failure
		GREEN	Rectifier off or faulty
LED 3		RED	DC voltage out of tolerance
		GREEN	Rectifier on and DC voltage within tolerance

		GREEN	Circuit breaker BCB closed and battery charging
LED 4		GREEN	Battery discharging or under TEST
		ORANGE	Circuit breaker BCB open
		RED	Battery fault (following a battery
		OFF	Battery not available
		GREEN	Inverter voltage within tolerance and static switch closed
LED 5		GREEN	Inverter overload or short-circuit
		OFF	Inverter off or voltage out of
LED 6		ORANGE	Re-transfer blocked
		ORANGE	Static bypass switch closed
		OFF	Static bypass switch open
LED 7		GREEN	Output circuit breaker OCB closed
		OFF	Output circuit breaker OCB open
LED 8		ORANGE	Manual bypass switch MBCB closed
		OFF	Manual bypass switch MBCB open
LED 9		RED	Emergency power off (EPO) activated
		OFF	Normal operation

		ORANGE	Maintenance request (slow flashing)
LED 10		ORANGE	Critical alarm (fast flashing)
		OFF	Normal operation

5. HANDLING THE LCD PANEL

5.1 MAIN MENUS

UPS NAME xxx kVA	Main screen (nominal power of the UPS)
UPS NAME MEASURES	UPS measures regarding basic parameters (voltage, current, etc.)
UPS NAME ALARMS	UPS operating status, possible alarms present and alarms history
UPS NAME SPECIAL	Setting of parameters and special functions
UPS NAME INFO	General information regarding the UPS

5.2 MEASURE DISPLAY

The MEASURES menu is structured as follows:

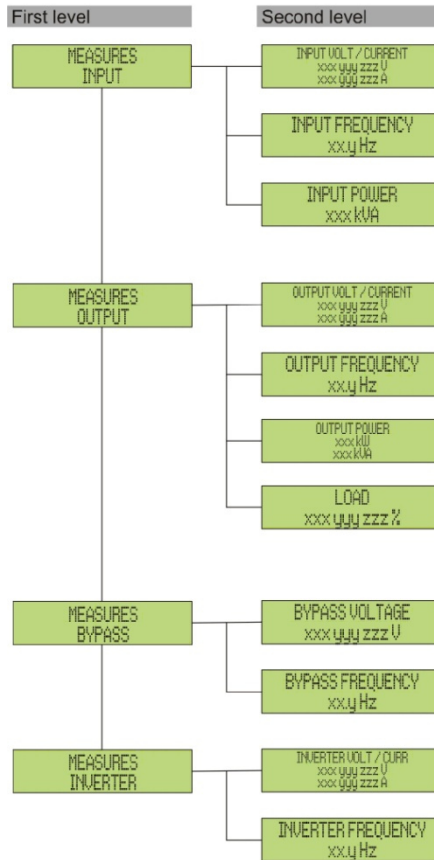


Figure 8: Structure of MEASURES menu (1 of 2)

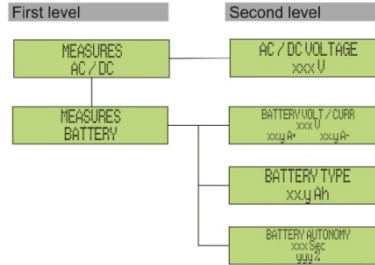


Figure 9: Structure of MEASURES menu (2 of 2)

Sub-menu	Displayed data	Accuracy
INPUT	Rectifier input voltage ⁽¹⁾ ⁽²⁾	1 V
	Rectifier input current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Input power	1 kVA
OUTPUT	Voltage ⁽¹⁾ ⁽²⁾	1 V
	Current ⁽³⁾	1 A
	Frequency	0.1 Hz
	Active power	1 kW
	Apparent power	1 kVA
	Load percentage	1 %
BYPASS	Voltage ⁽¹⁾ ⁽²⁾	1 V
	Frequency	0.1 Hz
INVERTER	Voltage ⁽¹⁾ ⁽²⁾	1 V
	Frequency	0.1 Hz
AC/DC	Rectifier output voltage	1 V
BATTERY	Voltage and current	1 V / 1 A
	Nominal capacity	1 Ah
	Residual autonomy	1 min / 1 %

(1) The voltage measures are always referred to the phase-to-neutral value

(2) The three voltages are displayed in one screen as "xxx yyy zzz V"

(3) The three line currents are displayed in one screen as "xxx yyy zzz A"

5.3 BASIC DIAGNOSTICS

The ALARMS menu allows to display the current operating status of the device and to access the event log, based on the following structure.

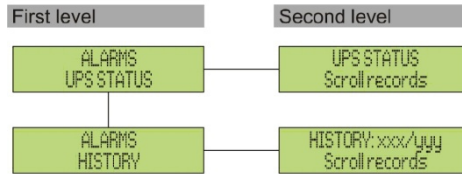




Figure 10: Structure of ALARMS menu

Sub-menu	Displayed data
UPS STATUS	Alarms present and operating statuses
HISTORY	Event log

The LCD panel displays the ALARMS menu automatically whenever an alarm occurs. The audible indicator, if enabled, is activated to show the occurred failure. The audible alarm is silenced pressing the key  (BUZZER).

UPS STATUS	Display of the first alarm present (if no alarm is present, the operating status is displayed)
UPS STATUS	Press the key  to browse the menu and to go to the next alarm/status (in alphabetical order)
Last alarm/status	

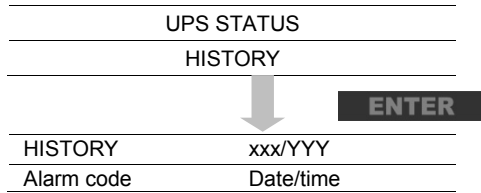


AUTOMATIC ERASURE OF ALARMS

Should an alarm occur and then the conditions that originated it no longer exist, the alarm will be automatically cancelled and the system restarted.

5.3.1 DISPLAY OF ALARMS HISTORY

All the events are recorded in the alarms history.



The first event shown is the latest one in order of time; a new event makes all the other events automatically shift one position, clearing the oldest event.

The quantity of stored events is displayed on the first line (xxx/YYY), which contains the data currently displayed (position in the list) and the total number of stored data (maximum number equal to **250**) respectively. An asterisk indicates the automatic reset of the alarm.

HISTORY	001/015		Latest event stored (in order of time)
A3 *	26-10-10	20:05	<ul style="list-style-type: none"> • E.g. automatic reset of alarm "A3 – BOOSTER STOPPED"
↓			
	002/015		Immediately prior event
A3	26-10-10	19:45	<ul style="list-style-type: none"> • E.g.: alarm "A3 – BOOSTER STOPPED"
↓			
HISTORY	015/015		First event stored (in order of time)
A18	15-10-10	12:49	

5.3.2 ALARMS AND OPERATING STATUS

ALARMS			
A1	MAINS FAULT	A27	EEPROM ERROR
A2	INPUT WRONG SEQ	A28	CRITICAL FAULT
A3	BOOSTER STOPPED	A29	MAINTENANCE REQ
A4	BOOSTER FAULT	A30	COMMON ALARM
A5	DC VOLTAGE FAULT	A31	MBCB BUS CLOSED
A6	BATTERY IN TEST	A32	EPO BUS CLOSED
A7	BCB OPEN	A33	ASYMMETRIC LOAD
A8	BATTERY DISCHARGE	A34	SERVICE REQUIRED
A9	BATTERY AUT END	A35	DIESEL MODE
A10	BATTERY FAULT	A36	DC FASTSHUTDOWN
A11	SHORT CIRCUIT	A38	INV --> LOAD
A12	STOP TIMEOUT SC	A39	INV ERROR LOOP
A13	INV OUT OF TOL	A40	SSI FAULT
A14	BYPASS WR SEQ	A41	RECT ERROR LOOP
A15	BYPASS FAULT	A43	CURR ERROR LOOP
A16	BYPASS --> LOAD	A46	PAR LOST REDUND
A17	RETRANSFER BLOCK	A47	SEND PARAM ERROR
A18	MBCB CLOSED	A48	RCV PARAM ERROR
A19	OCB OPEN	A49	TEST MODE ERROR
A20	OVERLOAD	A50	SSW BLOCKED
A21	THERMAL IMAGE	A51	BATT TEMPERATURE
A22	BYPASS SWITCH	A53	FIRMWARE ERROR
A23	EPO PRESSED	A54	CAN ERROR
A24	HIGH TEMPERATURE	A55	PAR CABLE DISC
A25	INVERTER OFF	A56	MAINS UNBALANCE
A26	COMMUNIC ERROR	A63	START SEQ BLOCK

STATUSES

S1	BOOSTER OK
S2	BATTERY OK
S3	INVERTER OK
S4	INVERTER --> LOAD
S5	INV BYPASS SYNC
S6	BYPASS OK
S7	BYPASS --> LOAD
S9	INV MASTER SYNC


DISPLAY AND RECORDING MODE OF ALARMS

- The statuses are always displayed in ascending order when the ALARMS – STATUSES menu is entered.
- The alarms are shown when they are present and must be silenced with the buzzer.
- The alarms remain displayed whilst they are present and they are automatically stored in the event log with date and time.


DESCRIPTION OF ALARMS AND STATUSES

For a more detailed description of the alarms and statuses, see the “Faults and alarms” section of the present manual.

6. SETTINGS AND ADVANCED OPERATIONS

Some operating parameters of the UPS can be set via the SPECIAL menu, which is structured as follows:

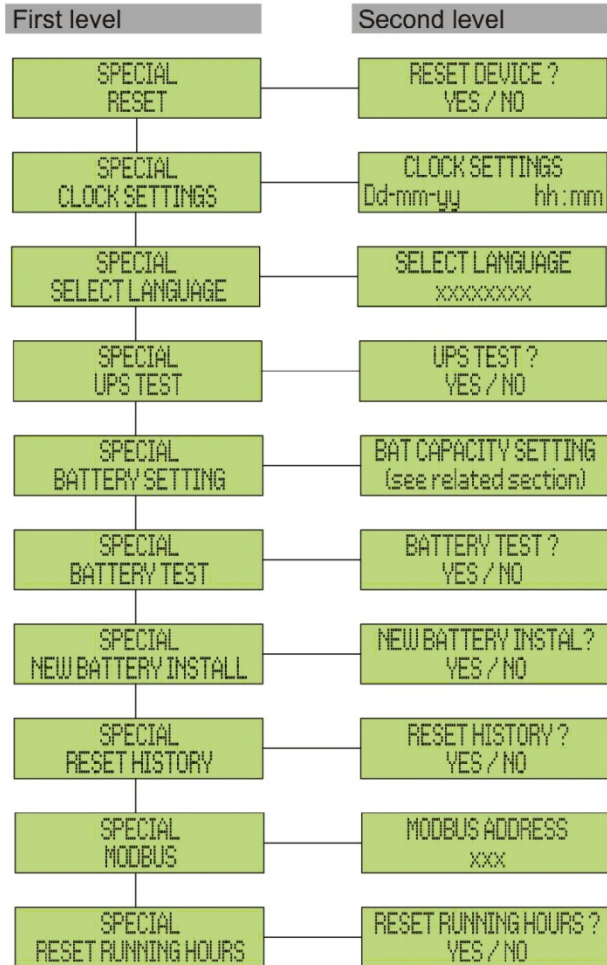


Figure 11: Structure of SPECIAL menu

Sub-menu	Programmable data
RESET	Reset of failure conditions
CLOCK SETTING	System date and time
SELECT LANGUAGE	Display language setting
UPS TEST	Performs a commutation test
BATTERY SETTING	Battery parameter setting
BATTERY TEST	Performs a battery test
NEW BATTERY INSTALL	Sets autonomy to 100%
RESET HISTORY	Event log reset
MODBUS	MODBUS address of device
RESET RUNNING HOURS	Reset the hour counter related to the UPS running time



PASSWORD-PROTECTED ACCESS

The SETTINGS menu is protected by a password set by the factory in order to prevent access to unauthorized personnel.

- We recommend minimum disclosure of the access password.
- Changes to the operating parameters and starting operations on the UPS may be potentially dangerous for the device and for persons.

6.1 SETTING DATE AND TIME

Date and time may be set via the CLOCK menu.

CLOCK SETTING	The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ◀ (ENTER).
DD-MM-YY hh : mm	



SETTING THE CURRENT DATE AND TIME CORRECTLY

The correct setting of the date and time is essential for the recording of the event log.

6.2 DISPLAY LANGUAGE SETTING

The table below shows the languages which can be set for the display.

Parameter	Standard	Range
LANGUAGE	ITALIAN	ITALIAN GERMAN FRENCH ENGLISH PORTUGUESE SPANISH POLISH TURKISH

The parameters are changed via the arrow buttons (▲ / ▼) to increase the digits, and the ◀ button is used to confirm the entry.

6.3 NEW BATTERY INSTALLATION


The NEW BATTERY INSTALLATION menu is used in case the battery circuit breaker BCB is not closed, when requested, in the start-up phase. In this case the system will start considering the battery completely discharged and activating the alarm "A10 – BATTERY FAULT".




To set the battery autonomy to 100% it is necessary to access the menu and press the ◀ button to confirm.

6.4 BATTERY CONFIGURATION

In case the UPS has been tested without knowing the characteristic data of the storage battery, the BATTERY CONFIGURATION menu allows for the setting of such data. In particular, the following data can be set:

- Battery capacity in Ampere-hours (Ah)
- Recharging current in Amperes (A)
- Nominal autonomy in minutes

Access the menu by pressing the  button (ENTER).

BAT CAPACITY SETTING 0120	The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).
------------------------------	---






ENTER

CONFIRM BATT CAP.? YES	Confirmation screen of the parameter set
---------------------------	--



ENTER

BAT RECHAR CURR SET 18	The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).
---------------------------	---






ENTER

CONFIRM RECHAR CURR? YES	Confirmation screen of the parameter set
-----------------------------	--



ENTER

AUTONOMY BAT SETTING 0020	The single digits can be modified via the arrow keys ( / ) and confirmed by pressing  (ENTER).
------------------------------	---



ENTER

CONFIRM AUTON BATT? YES	Confirmation screen of the parameter set
----------------------------	--



ENTER

SAVE BATT SETTINGS? YES	Confirmation screen for the configuration
----------------------------	---



ENTER

BATT SETTINGS SAVED PRESS "ENTER"



SETTING ALL THE PARAMETERS

To save all the parameters it is necessary to reach the end of the guided procedure until the last screen previously shown. If the procedure is interrupted earlier, none of the parameters previously set will be saved.

6.5 SETTING THE MODBUS PARAMETERS

The parameters regarding the communication via RS485 interface can be set in the MODBUS menu.

- Modbus address

MODBUS ADDRESS: 202	The single digits can be modified via the arrow keys (▲ / ▼) and confirmed by pressing ◀ (ENTER).
------------------------	---

Parameter	Standard	Range
MODBUS ADDRESS	1	1 247

6.6 UPS TEST

The UPS TEST menu allows for the carrying out of a switching test of the inverter. The inverter is switched off and the load is transferred to the bypass supply. The inverter supply is automatically restored after a few seconds.

UPS TEST NO	The value on the second line is ready to be changed
↓ ▾ (1x)	
UPS TEST YES	The parameter is changed. The change is confirmed by pressing ◀ (ENTER)
↓ ENTER	
SPECIAL UPS TEST	The system performs a test and returns to the previous screen






POSSIBLE LOSS OF SUPPLY

In case of power failure while the test is being performed, the immediate operation of the inverter is not guaranteed.

6.7 BATTERY TEST

The BATTERY TEST menu allows you to carry out a short discharge test of the battery. In case the battery is not efficient, the alarm “A10 – Battery fault” is generated at the end of the test.

BATTERY TEST? NO	The value on the second line is ready to be changed
↓  (1x)	
BATTERY TEST? YEAS	The parameter is changed. The change is confirmed by pressing  (ENTER)
↓ 	
SPECIAL BATTERY TEST	The value on the second line is ready to be changed






POSSIBLE LOSS OF SUPPLY

This test can affect the continuity of supply to the loads if the battery is not fully charged.

6.8 SYSTEM RESET

The UPS is equipped with internal protection which will block the system or some of its sections. The alarm can be cleared and normal operation can be resumed via the RESET menu. In case the failure persists, the UPS will return to the previous failure condition. In some cases a RESET is necessary to simply reset a failure signal, then the UPS will resume operation.

RESET DEVICE? NO	The value on the second line is ready to be changed
↓  (1x)	
RESET DEVICE? YES	The parameter is changed. The change is confirmed by pressing  (ENTER)
↓ 	
SPECIAL RESET	The system performs a reset and returns to the previous screen






The failure conditions which impose a manual reset are:

- Static switch re-transfer block (alarm A17)
- Inverter shutdown due to the operation of the IGBT desaturation sensor (alarm A44)
- Inverter shutdown due to short-circuit timeout (alarm 12)
- Inverter shutdown due to thermal image protection (alarm 21)
- Inverter shutdown due to the operation of the quick disconnect sensor (alarm A36)
- Inverter shutdown due to voltage control loop error (alarm A39)
- Booster shutdown due to voltage control loop error (alarm A41)
- Booster shutdown due to current control loop error (alarm A43)
- Static switch blocked (alarm A50)
- Booster shutdown due to the operation of the load symmetry sensor (alarm A33)
- Activation of the battery fault alarm (alarm A10)
- Scheduled maintenance request (alarm A29).

For a description of the UPS status in each of the failure conditions listed above, please refer to the “Faults and alarms” section.

6.9 ALARMS HISTORY RESET

Access the RESET HISTORY menu.

RESET HISTORY? NO	The value on the second line is ready to be changed
  (1x)	
RESET HISTORY? NO	The parameter is changed. The change is confirmed by pressing  (ENTER)
 	
SPECIAL RESET HISTORY	The system performs a reset of the alarms history and returns to the previous screen



LOSS OF DATA

The alarms history contains very important data to monitor the device behavior over time. We recommend saving the data before deleting it.

7. SYSTEM INFORMATION

The INFO menu provides general information regarding the UPS based on the structure indicated below.

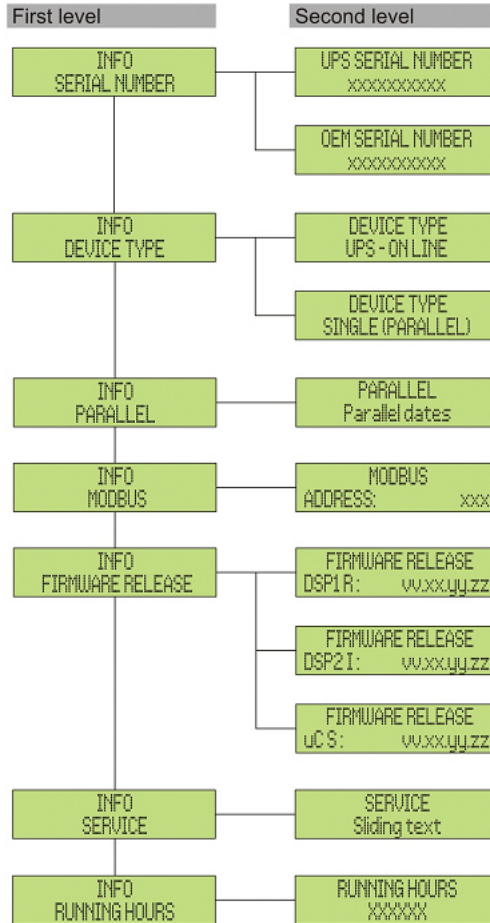


Figure 12: Structure of INFO menu

All data shown in the various sections are set by the factory via special interface software and cannot be altered, except by personnel authorized by the manufacturer.

The only adjustable parameters are the MODBUS settings (see SPECIAL menu).

Sub-menu	Displayed data
SERIAL NUMBER	Device serial number given by the manufacturer and by an OEM distributor, if any
DEVICE TYPE	The device type can be: ON LINE - UPS FREQUENCY CONVERTER ECO MODE - UPS SINGLE UPS PARALLEL
PARALLEL ⁽¹⁾	Data regarding the parallel configuration
MODBUS	MODBUS address of device
FIRMWARE RELEASE	Firmware versions installed on the system
SERVICE	Scrolling text string with information regarding technical service
RUNNING HOUR	Dates related to hours number of UPS running time

(1) the menu is only active if the UPS belongs to a Parallel or Load Sync system

7.1 PARALLEL OPERATION INFORMATION

The PARALLEL menu is only active if the UPS belongs to a parallel or load-sync system.

7.1.1 UPS POSITION

PARALLEL
2 / 6

The first number on the second line identifies the *position* of that specific UPS within the parallel system. The second number represents the total number of UPS units.

7.1.2 MASTER / SLAVE PRIORITY

PARALLEL
MASTER

The string on the second line may have two values, “MASTER” or “SLAVE”. Only one *MASTER UPS* can be present in the system; if not there will be a conflict on the data communication bus.

7.1.3 COMMUNICATION BUS MONITORING

PARALLEL			
1-[M]	2- S	3- S	4- S

The second line of this menu gives a general indication regarding the communication between the UPS units composing the system.

- The numbers represent the single UPS units.
- The letters M and S stand for MASTER and SLAVE respectively.
- The brackets [] around a letter indicate that we are working on that specific UPS unit.
- A question mark next to a number indicates that that UPS unit is not communicating on the data bus.

Let us assume that we have the following situation:

- system composed of 4 UPS units;
- UPS2 is currently the MASTER UPS;
- we are checking the data communication on UPS3;
- UPS4 is not communicating.

The menu will be as shown below.

PARALLEL			
1- S	2- M	3- [S]	4- ?

In case there are more than four paralleled devices, the menu will be as follows.

PARALLEL			
1- S	2- M	3- [S]	...

The dots indicate the presence of a further menu which shows the status of the other UPS units in the system.

7.1.4 PARALLEL TYPE

PARALLEL
REDUNDANT+x

The string on the second line may have two values, "POWER" or "REDUNDANT+x".

- POWER means that the parallel system is set so as to require the presence of all the UPS units in order to feed the load.
- REDUNDANT+x means that the system is redundant and the redundancy index is indicated by number "X". For example, in a system composed of 3 UPS units, "REDUNDANT+2 means that only one of the UPS units is sufficient to feed the load.

7.1.5 MESSAGE STATISTICS

The statistics section regarding the messages exchanged on the communication buses consists of three different menus.

STATIST CAN SSW	
MSG RX: 32564	100.0%

Number of messages received and percentage of reception accuracy regarding the status of the static switches. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

STATIST CAN INV	
SYNC RX: 15849	100.0%

Number of messages received and percentage of reception accuracy regarding the synchronism signals. The messages are sent by the MASTER UPS, therefore the number will only increase on the SLAVE UPS units.

STATIST CAN INV	
MSG RX: 9277	99.9%

Number of messages received and percentage of reception accuracy regarding the status of the system. The messages are exchanged between all the UPS units, therefore the number will increase on all of them.

7.2 SERVICE INFORMATION

The SERVICE menu provides important information regarding the technical service on the UPS.



The information is displayed via a text string of max. 60 characters which scrolls on the second display line.

However, please also see the addresses and contact numbers indicated in the present manual.

8. FAULTS AND ALARMS

As indicated in the previous chapters, the system is provided with basic diagnostics which allow immediate visualization of the operating conditions.

The LCD panel displays the alarms screen immediately, and an audible indicator is activated (if enabled). Each screen displays the alphanumeric alarm code and a short description of the alarm.

UPS STATUS A15 BYPASS FAULT	The display shows the first alarm in chronological order
	
UPS STATUS A30 COMMON ALARM	The other alarms present are displayed by scrolling the menu
	
UPS STATUS S1 BOOSTER OK	After the last alarm present, the operating statuses are displayed



INJURY HAZARD DUE TO ELECTRIC SHOCK!

Before carrying out any operation on the UPS, make sure that all the safety precautions are adhered to:

- Any work on the unit must be carried out by qualified personnel;
- Internal components can only be accessed after disconnecting the device from supply sources;
- Always use protective devices designed for each type of activity;
- The instructions contained in the manuals must be strictly followed;
- In case of doubt or impossibility of solving the problem, please contact AEG Power Solutions immediately.

8.1 OPERATING STATUS DEFINITION

Status	S1 BOOSTER OK
Description	The rectifier section is working properly.
Operating condition	The rectifier supplies the inverter and keeps the battery charged.

Status	S2 BATTERY OK
Description	The battery is connected to the UPS.
Operating condition	The battery is kept charged by the rectifier and is ready to feed the inverter.
Status	S3 INVERTER OK
Description	The inverter voltage and frequency are within the allowed range.
Operating condition	The inverter is ready to feed the load.
Status	S4 INVERTER LOAD
Description	The inverter feeds the load.
Operating condition	The load is fed via the static inverter switch.
Status	S5 INV BYPASS SYNC
Description	The inverter is synchronized with the bypass.
Operating condition	The synchronization between the inverter and the bypass is locked, and the static switch can change over from one source to the other.
Status	S6 BYPASS OK
Description	The bypass voltage and frequency are within the allowed range.
Operating condition	The bypass line is ready for changeover in case of inverter failure.
Status	S7 BYPASS LOAD
Description	Load fed by the bypass line.
Operating condition	The load is fed by the bypass via the static switch, waiting for the inverter to restart.
Status	S9 INV MASTER SYNC
Description	The inverter is synchronized with the MASTER UPS.
Operating condition	This status is only present on the SLAVE UPS units, and shows that the inverter is synchronized with the signal sent by the MASTER UPS.

8.2 TROUBLESHOOTING

Alarm	A1 MAINS FAULT
Description	The voltage or frequency of the input line is out of tolerance.
Possible causes	<ul style="list-style-type: none">• Mains instability or failure.• Wrong phase rotation
Solutions	<ol style="list-style-type: none">1) Check the connections to the mains.2) Check the stability of mains voltage.3) If the alarm persists, contact our Technical Support Service.

Alarm	A2 INPUT WRONG SEQ
Description	The phase rotation on the rectifier input line is wrong.
Possible causes	<ul style="list-style-type: none">• Wrong connection of power cables.
Solutions	<ol style="list-style-type: none">1) Check the phase rotation.2) If the alarm persists, contact our Technical Support Service.

Alarm	A3 BOOSTER STOPPED
Description	The rectifier has been temporarily disconnected and the inverter is fed by the battery.
Possible causes	<ul style="list-style-type: none">• Instability of the AC line voltage or frequency.• Possible fault in the rectifier control circuit.
Solutions	<ol style="list-style-type: none">1) Check the parameters of the AC line voltage.2) Restart the device.3) If the alarm persists, contact our Technical Support Service.

Alarm	A4 BOOSTER FAULT
Description	The rectifier has been disconnected due to an internal fault.
Possible causes	<ul style="list-style-type: none">• Possible fault in the rectifier control circuit.
Solutions	<ol style="list-style-type: none">1) Check which alarms are present and carry out the indicated procedures.2) Restart the device.3) If the alarm persists, contact our Technical Support Service.

Alarm	A5 DC VOLTAGE FAULT
Description	The measured DC voltage is out of tolerance.
Possible causes	<ul style="list-style-type: none"> • The battery has reached the discharge voltage due to a power failure. • Measuring circuit failure.
Solutions	<ol style="list-style-type: none"> 1) Check the actual value of the measured DC voltage. 2) In case of mains failure, wait for the AC voltage to be restored. 3) Check which alarms are present and carry out the indicated procedures. 4) Restart the device. 5) If the alarm persists, contact our Technical Support Service.
Alarm	A6 BATTERY IN TEST
Description	The rectifier voltage is reduced to start a short controlled discharge of the battery.
Possible causes	<ul style="list-style-type: none"> • A battery test has been started automatically (if set), or manually by the user.
Solutions	<ol style="list-style-type: none"> 1) Wait for the test to end, and check possible battery faults.
Alarm	A7 BCB OPEN
Description	The battery isolator is open.
Possible causes	<ul style="list-style-type: none"> • Battery isolator open.
Solutions	<ol style="list-style-type: none"> 1) Check the status of the battery isolator. 2) Check the functionality of the auxiliary contact of the isolator. 3) Check the connection between the auxiliary contact of the isolator and the auxiliary terminals of the UPS (if provided). 4) If the alarm persists, contact our Technical Support Service.

Alarm	A8 BATTERY DISCHARGE
Description	The battery is discharging.
Possible causes	<ul style="list-style-type: none">• The battery is discharging due to a mains failure.• Rectifier failure.
Solutions	<ol style="list-style-type: none">1) Check which alarms are present and carry out the indicated procedures.2) If the alarm persists, contact our Technical Support Service.
Alarm	A9 BATTERY AUT END
Description	The battery has reached the pre-alarm discharge level.
Possible causes	<ul style="list-style-type: none">• The battery is discharging due to a mains failure.• Rectifier failure.
Solutions	<ol style="list-style-type: none">1) Check which alarms are present and carry out the indicated procedures.2) If the alarm persists, contact our Technical Support Service.
Alarm	A10 BATTERY FAULT
Description	Fault following a battery test.
Possible causes	<ul style="list-style-type: none">• Battery fault.
Solutions	<ol style="list-style-type: none">1) Check the battery.2) Reset the system.3) If the alarm persists, contact our Technical Support Service.
Alarm	A11 SHORT CIRCUIT
Description	The current sensor has detected a short-circuit at the output.
Possible causes	<ul style="list-style-type: none">• Load problem.• Measuring circuit failure.
Solutions	<ol style="list-style-type: none">1) Check the loads connected to the UPS output.2) If the alarm persists, contact our Technical Support Service.

Alarm	A12 STOP TIMEOUT SC
Description	Inverter shutdown due to an extended short-circuit during a power failure, or due to an overcurrent on the inverter bridge input.
Possible causes	<ul style="list-style-type: none"> • Short-circuit on the loads during a power failure. • Inverter bridge fault. • Temporary current peak.
Solutions	<ol style="list-style-type: none"> 1) Reset the system. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A13 INV OUT OF TOL
Description	The inverter voltage or frequency is out of tolerance.
Possible causes	<ul style="list-style-type: none"> • Inverter shutdown due to an alarm. • Inverter failure.
Solutions	<ol style="list-style-type: none"> 1) Check which alarms are present and carry out the indicated procedures. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A14 BYPASS WR SEQ
Description	The phase rotation of the bypass line is wrong.
Possible causes	<ul style="list-style-type: none"> • Wrong connection of power cables.
Solutions	<ol style="list-style-type: none"> 1) Check the phase rotation. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A15 BYPASS FAULT
Description	The voltage or frequency of the bypass line is out of tolerance.
Possible causes	<ul style="list-style-type: none"> • Bypass line instability or failure. • Wrong phase rotation.
Solutions	<ol style="list-style-type: none"> 1) Check the connections to the mains. 2) Check the stability of mains voltage. 3) If the alarm persists, contact our Technical Support Service.

Alarm A16 BYPASS LOAD

Description The load is fed by the bypass line.

Possible causes

- Temporary changeover due to inverter failure.

Solutions

- 1) Verify the inverter status and check whether other alarms are present.
- 2) If the alarm persists, contact our Technical Support Service.

Alarm A17 RETRANSFER BLOCK

Description The load is blocked on the bypass line.

Possible causes

- Very frequent changeovers due to load in-rush currents.
- Static switch problems.

Solutions

- 1) Reset the system.
- 2) Check the in-rush currents of the loads.
- 3) If the alarm persists, contact our Technical Support Service.

Alarm A18 MBCB CLOSED

Description The manual bypass isolator is closed.

Possible causes

- Manual bypass isolator closed.

Solutions

- 1) Check the status of the manual bypass isolator.
- 2) Check the functionality of the auxiliary contact of the isolator.
- 3) If the alarm persists, contact our Technical Support Service.

Alarm A19 OCB OPEN

Description The output isolator is open.

Possible causes

- Output isolator open.

Solutions

- 1) Check the status of the output isolator.
- 2) Check the functionality of the auxiliary contact of the isolator.
- 3) If the alarm persists, contact our Technical Support Service.

Alarm	A20 OVERLOAD
Description	The current sensor has detected an overload at the output. If the alarm persists, the thermal image protection will be activated (alarm A21).
Possible causes	<ul style="list-style-type: none"> • Output overload. • Measuring circuit failure.
Solutions	<ol style="list-style-type: none"> 1) Check the loads connected to the UPS output. 2) Contact our Technical Support Service.

Alarm	A21 THERMAL IMAGE
Description	The thermal image protection has been activated after an extended inverter overload. The inverter is shut down for 30 minutes and then restarted.
Possible causes	<ul style="list-style-type: none"> • Output overload. • Measuring circuit failure.
Solutions	<ol style="list-style-type: none"> 1) Check the loads connected to the UPS output. 2) Should you need to restore the inverter supply immediately, reset the system. 3) If the alarm persists, contact our Technical Support Service.

Alarm	A22 BYPASS SWITCH
Description	The "Normal/Bypass" selector has been operated.
Possible causes	<ul style="list-style-type: none"> • Maintenance operation.
Solutions	<ol style="list-style-type: none"> 1) Check the selector position. 2) If the alarm persists, contact our Technical Support Service.

Alarm	A23 EPO PRESSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	<ul style="list-style-type: none"> • Activation of the (local or remote) emergency power-off button.
Solutions	<ol style="list-style-type: none"> 1) Release the emergency power off button and reset the alarm. 2) If the alarm persists, contact our Technical Support Service.

Alarm	A24 HITMP INV/DC FUS
Description	High temperature of the heat sink on the inverter bridge or tripping of the DC fuses which protect the inverter bridge.
Possible causes	<ul style="list-style-type: none">• Fault of the heat sink cooling fans.• The room temperature or cooling air temperature is too high.• Tripping of the DC protection fuses.
Solutions	<ol style="list-style-type: none">1) Check the fans operation.2) Clean the ventilation grids and the air filters, if any.3) Check the air conditioning system (if present).4) Check the status of the DC fuses on the inverter bridge input.5) If the alarm persists, contact our Technical Support Service.

Alarm	A25 INVERTER OFF
Description	The inverter is blocked due an operation failure.
Possible causes	<ul style="list-style-type: none">• Various.
Solutions	<ol style="list-style-type: none">1) Reset the system.2) If the alarm persists, contact our Technical Support Service.

Alarm	A26 COMMUNIC ERROR
Description	Internal error.
Possible causes	<ul style="list-style-type: none">• Micro-controller communication problems.
Solutions	<ol style="list-style-type: none">1) If the alarm persists, contact our Technical Support Service.

Alarm	A27 EEPROM ERROR
Description	The controller has detected an error in the parameters stored in E ² PROM.
Possible causes	<ul style="list-style-type: none">• Wrong parameters entered during programming.
Solutions	<ol style="list-style-type: none">1) Contact our Technical Support Service.

Alarm	A28 CRITICAL FAULT
Description	An alarm has been activated which causes the shutdown of part of the UPS (rectifier, inverter, static switch).
Possible causes	<ul style="list-style-type: none"> • System failure.
Solutions	<ol style="list-style-type: none"> 1) Check which alarms are present and carry out the indicated procedures. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A29 MAINTENANCE REQ
Description	It is necessary to carry out maintenance work.
Possible causes	<ul style="list-style-type: none"> • The time limit since the last maintenance work has elapsed.
Solutions	<ol style="list-style-type: none"> 1) Contact our Technical Support Service.
Alarm	A30 COMMON ALARM
Description	Common alarm.
Possible causes	<ul style="list-style-type: none"> • At least one alarm is present.
Solutions	<ol style="list-style-type: none"> 1) Check which alarms are present and carry out the indicated procedures.
Alarm	A31 MBCB BUS CLOSED
Description	The manual bypass isolator is closed.
Possible causes	<ul style="list-style-type: none"> • Manual bypass isolator closed.
Solutions	<ol style="list-style-type: none"> 1) Check the status of the manual bypass isolator. 2) Check the functionality of the auxiliary contact of the isolator. 3) If the alarm persists, contact our Technical Support Service.

Alarm	A32 EPO BUS CLOSED
Description	The system is blocked due to the activation of the emergency power off button.
Possible causes	<ul style="list-style-type: none">• Activation of the (local or remote) emergency power off button.
Solutions	<ol style="list-style-type: none">1) Release the emergency power off button and reset the alarm.2) If the alarm persists, contact our Technical Support Service.

Alarm	A33 ASYMMETRIC LOAD
Description	The positive and negative voltages measured on the DC capacitors towards the middle point are different.
Possible causes	<ul style="list-style-type: none">• Possible failure on the measuring circuit.• Possible fault of DC capacitors.
Solutions	<ol style="list-style-type: none">1) Reset the system.2) If the alarm persists, contact our Technical Support Service.

Alarm	A34 SERVICE REQUIRED
Description	A UPS check is necessary.
Possible causes	<ul style="list-style-type: none">• Possible UPS fault.
Solutions	<ol style="list-style-type: none">1) If the alarm persists, contact our Technical Support Service.

Alarm	A35 DIESEL MODE
Description	The UPS is supplied by the diesel generator.
Possible causes	<ul style="list-style-type: none">• The auxiliary contact which activates the diesel generator connected to the UPS is closed, and imposes this operating mode.
Solutions	<ol style="list-style-type: none">1) Wait for the diesel generator to stop as soon as the mains voltage is restored.2) Check the connection of the auxiliary contact which signals the diesel generator start, to terminals XD1/XD2.3) If the alarm persists, contact our Technical Support Service.

Alarm	A36 DC FASTSHUTDOWN
Description	Inverter shutdown due to the operation of the protection sensor as a result of sudden DC voltage variations.
Possible causes	<ul style="list-style-type: none"> • Battery fault.
Solutions	<ol style="list-style-type: none"> 1) Check the battery. 2) Reset the system. 3) If the alarm persists, contact our Technical Support Service.
Alarm	A38 INV LOAD
Description	The load is fed by the inverter. This alarm is active for UPS systems in "ECO" mode, where the preferential supply is from the bypass line.
Possible causes	<ul style="list-style-type: none"> • Temporary changeover due to bypass line failure.
Solutions	<ol style="list-style-type: none"> 1) Verify the status of the bypass line and check whether other alarms are present. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A39 INV ERROR LOOP
Description	The control is not able to regulate the inverter voltage precisely.
Possible causes	<ul style="list-style-type: none"> • Regulation system failure.
Solutions	<ol style="list-style-type: none"> 1) Reset the system. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A40 SSI FAULT
Description	The system has detected a failure in the static inverter switch.
Possible causes	<ul style="list-style-type: none"> • Possible problems on the loads. • Static switch fault.
Solutions	<ol style="list-style-type: none"> 1) Check the absorption of the loads and the presence of DC components, if any, on AC current. 2) If the alarm persists, contact our Technical Support Service.

Alarm	A41 RECT ERROR LOOP
Description	The control is not able to regulate the rectifier output voltage precisely.
Possible causes	<ul style="list-style-type: none">• Regulation system failure.
Solutions	<ol style="list-style-type: none">1) Reset the system.2) If the alarm persists, contact our Technical Support Service.

Alarm	A43 CURR ERROR LOOP
Description	The control is not able to regulate the rectifier output current precisely.
Possible causes	<ul style="list-style-type: none">• Regulation system failure.
Solutions	<ol style="list-style-type: none">1) Reset the system.2) If the alarm persists, contact our Technical Support Service.

Alarm	A46 PAR LOST REDUND
Description	This alarm is only active on PARALLEL systems. Continuity is not ensured in the event of a fault on one of the UPS units.
Possible causes	<ul style="list-style-type: none">• The total load is higher than the maximum expected value.• Possible failure on the measuring circuit.
Solutions	<ol style="list-style-type: none">1) Check the load fed by the system.2) If the alarm persists, contact our Technical Support Service.

Alarm	A47 SEND PARAM ERROR
Description	Internal error
Possible causes	<ul style="list-style-type: none">• Micro-controller communication problems.
Solutions	<ol style="list-style-type: none">1) Contact our Technical Support Service.

Alarm	A48 RCV PARAM ERROR
Description	Internal error
Possible causes	<ul style="list-style-type: none"> • Micro-controller communication problems.
Solutions	1) Contact our Technical Support Service.
Alarm	A49 TEST MODE ERROR
Description	Internal error.
Possible causes	<ul style="list-style-type: none"> • Micro-controller communication problems.
Solutions	1) Contact our Technical Support Service.
Alarm	A50 SSW BLOCKED
Description	The static switch is blocked. The load is no longer supplied.
Possible causes	<ul style="list-style-type: none"> • Loads failure. • Possible UPS fault.
Solutions	<ol style="list-style-type: none"> 1) Check the loads for possible failures. 2) Reset the system. 3) If the alarm persists, contact our Technical Support Service.
Alarm	A51 BATT TEMPERATURE
Description	The battery temperature is out of tolerance. This alarm is only active when the temperature probe is installed and enabled on the battery.
Possible causes	<ul style="list-style-type: none"> • Anomalous temperature in the battery cabinet. • Possible failure on the measuring circuit.
Solutions	<ol style="list-style-type: none"> 1) Check the temperature on the batteries and remove the cause of the alarm, if any. 2) If the alarm persists, contact our Technical Support Service.
Alarm	A53 FIRMWARE ERROR
Description	The controller has detected an incompatibility in the control software.
Possible causes	<ul style="list-style-type: none"> • The software update was not performed properly.
Solutions	1) Contact our Technical Support Service.

Alarm A54 CAN ERROR

Description Internal error.

Possible causes

- Micro-controller communication problems.

Solutions

- 1) Contact our Technical Support Service.

Alarm A55 PAR CABLE DISC

Description Parallel cable doesn't communicate.

Possible causes

- Parallel cable disconnected or damaged.

Solutions

- 1) Check the connection of cable
- 2) Contact our Technical Support Service.

Alarm A56 MAINS UNBALANCE

Description The rectifier input voltage is unbalanced.

Possible causes

- Problems on the LV or MV distribution network
- Defect of the measuring circuit.

Solutions

- 1) Check the input voltage
- 2) Contact our Technical Support Service.

Alarm A63 START SEQ BLOCK

Description During the UPS start-up a failure prevented the proper execution of the sequence.

Possible causes

- Control devices in wrong position or operated improperly.
- Possible internal fault.

Solutions

- 1) Make sure the position of the control devices (isolators, selectors) is as specified in the procedures (see "Installation and start-up" section).
- 2) If the alarm persists, contact our Technical Support Service.
