SDMO

Instructions for use

SDMO

Kerys

Réf. constructeur : V 1.00 (03/06/04)

Réf. GPAO : 33502016501_1_1

1. MICS Kerys presentation

1.1. Aim and structure

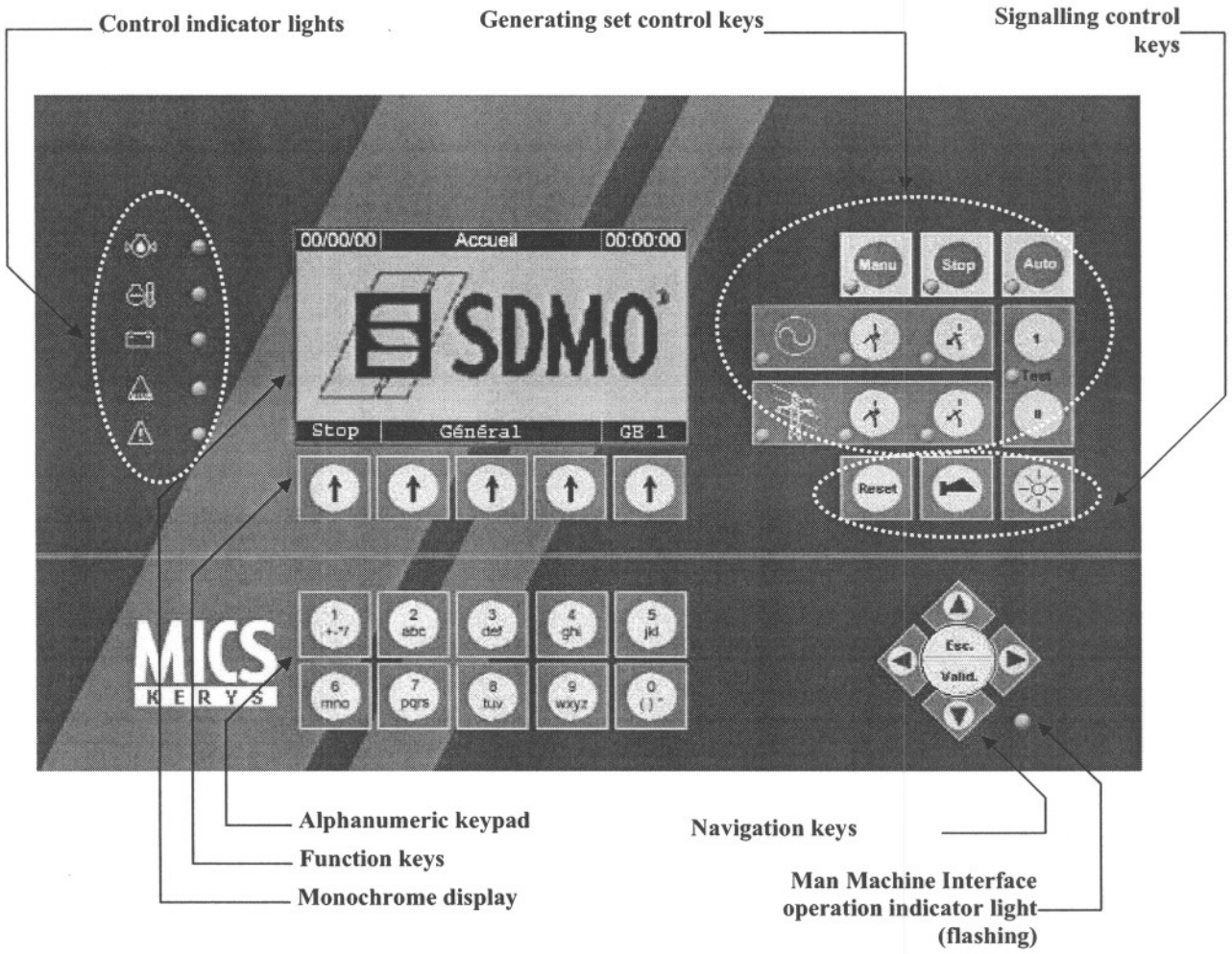
The **MICS KERYS** system includes a number of electronic modules designed for testing / controlling, setting and protecting the generating sets operating on their own or as part of a power plant.
The system consists of the following modules:

- industrial automated system module (I.A.S.)
- All or nothing input and output module
- Analog input and output module
- Temperature reading module
- electrical safety module
- Man-machine interface (M.M.I.) module.

The minimal system configuration consists of an I.A.S. module and a M.M.I. module.

2. Using the interface

2.1. Presentation of the keypad



2.1.1 The display

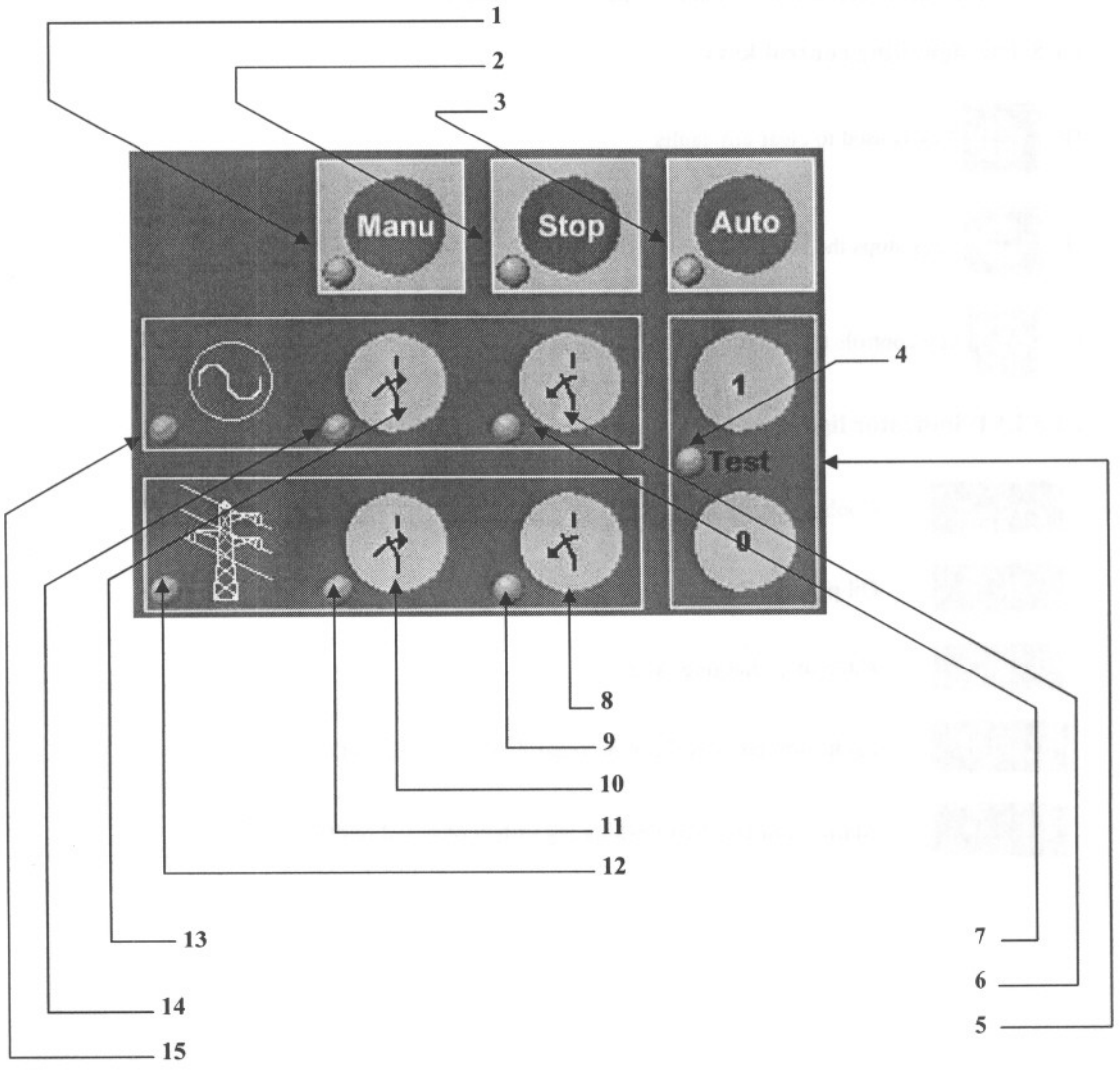
The specifications of the display are as follows:

- monochrome 240x128 pixel screen
- dimensions: 111 mm x 61 mm
- automatic contrast control

2.1.2 The alphanumeric keys

Pressing these keys successively allows the facial values to be entered. The characters entered appear in the order they were typed on the keypad.

2.1.3 The generating set operational keys



1 Manual mode selection. The illuminated led indicates that the mode is active
2 Selecting stop mode. The illuminated led indicates that the mode is active
3 Automatic mode selection The illuminated led indicates that the mode is active
4 Test in progress
5 In automatic mode: test sequence control
In manual mode: starting and stopping the motor
6 Generating set circuit breaker opening control
7 Open generating set circuit breaker
8 Grid circuit breaker opening control
9 Open grid circuit breaker
10 Grid circuit breaker closing control
11 Closed grid circuit breaker
12 Grid voltage status
13 Grid circuit breaker closing control
14 Closed generating set circuit breaker
15 Generating set voltage status

If test is requested a screen is brought up with the choice of a test under load or test off load.

2.1.4 The navigation keys

These keys are described in the section on "Interface Ergonomics".

2.1.5 The signalling control keys

The 

key is used to clear any faults

The  keys stops the buzzer

The  key controls the keypad indicator test.

2.1.6 LED indicator lights

 Coolant temperature fault

 Oil pressure fault

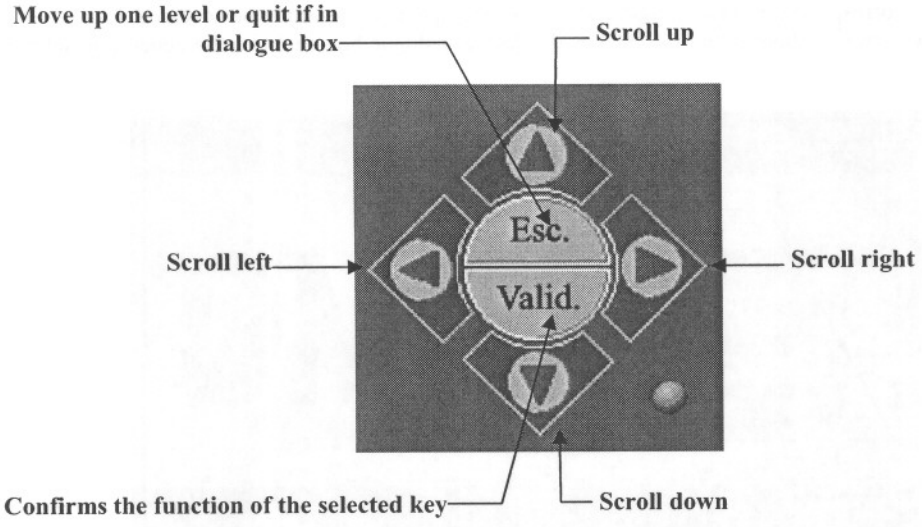
 Alternator charging fault

 Fault summary (led flashing regardless of stated fault)

 Alarm summary (led flashing regardless of stated fault)

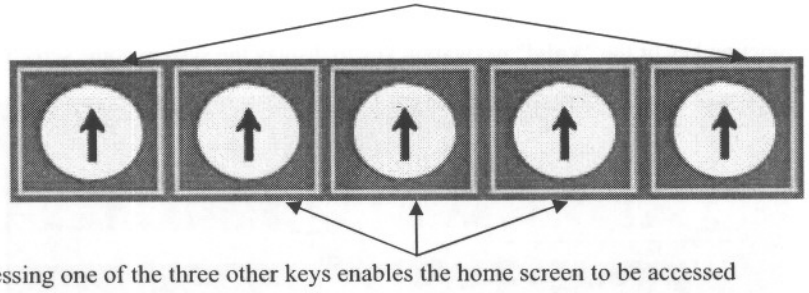
2.2. Interface ergonomics

It is also possible to navigate through the menus using the keypad.



From the home screen:

- pressing the first or last function key enables the "Regional Parameters" screen to be accessed
- pressing the first function key enables the operation screen to be accessed
- Pressing the last function key enables a dialogue box to be displayed allowing the generating set number to be selected.



- pressing one of the three other keys enables the home screen to be accessed

From the navigation screens, it is possible to access a sub-menu directly by pressing the corresponding numerical key or keys.

2.2.1 Description of the screens

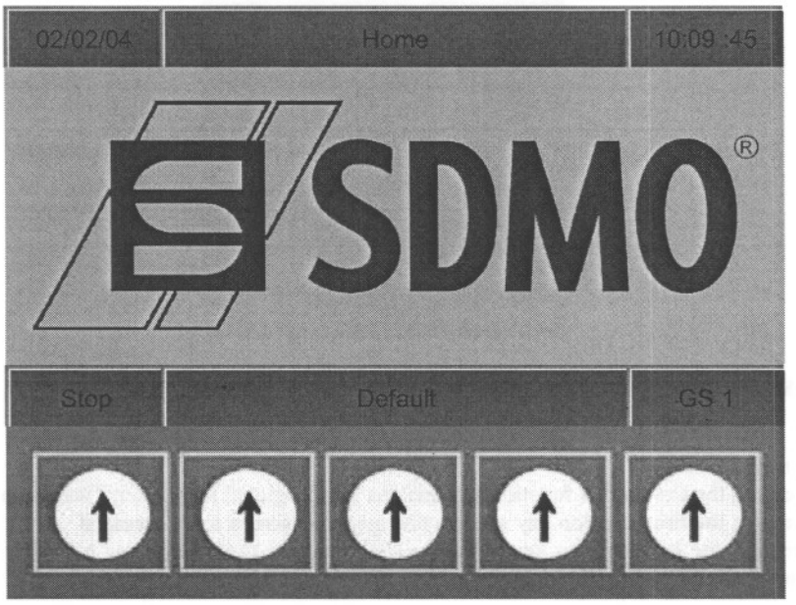
There are three types:

- the home screen,
- the navigation screens,
- the operation and configuration screens.

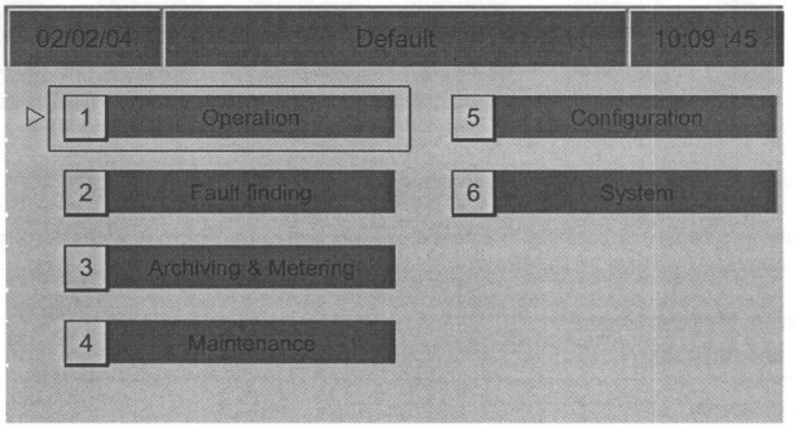
2.2.2 The home screen

This screen is the entry point to the system.

Pressing the arrow corresponding to the "Stop" key enables the operation screen to be accessed
Pressing the arrow corresponding to the "GS X" key displays a dialogue box enabling the generating set number to be selected.

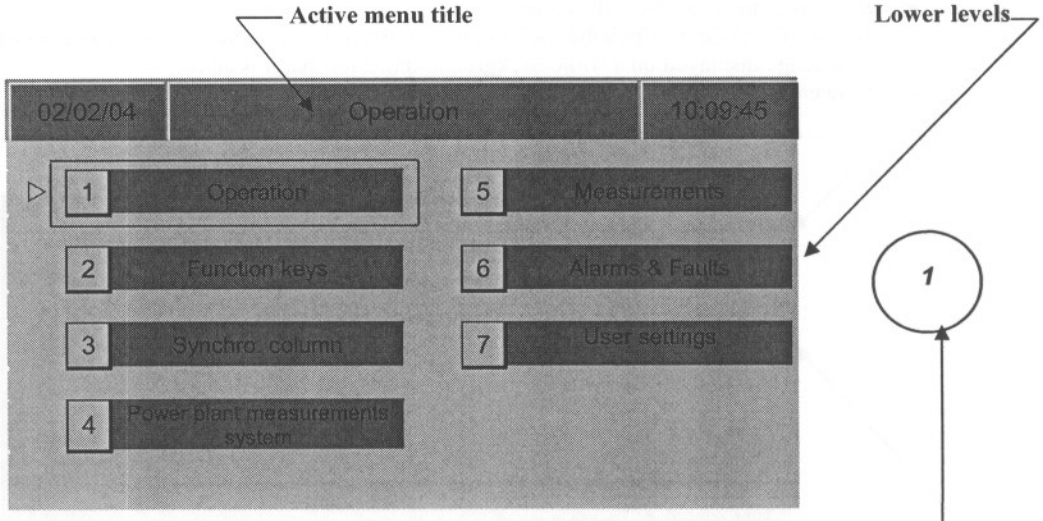


Press the middle function key or the "**Valid**" navigation key to display the system home screen.



2.2.3 Navigation screens

These screens enable the various sub-menus to be accessed.



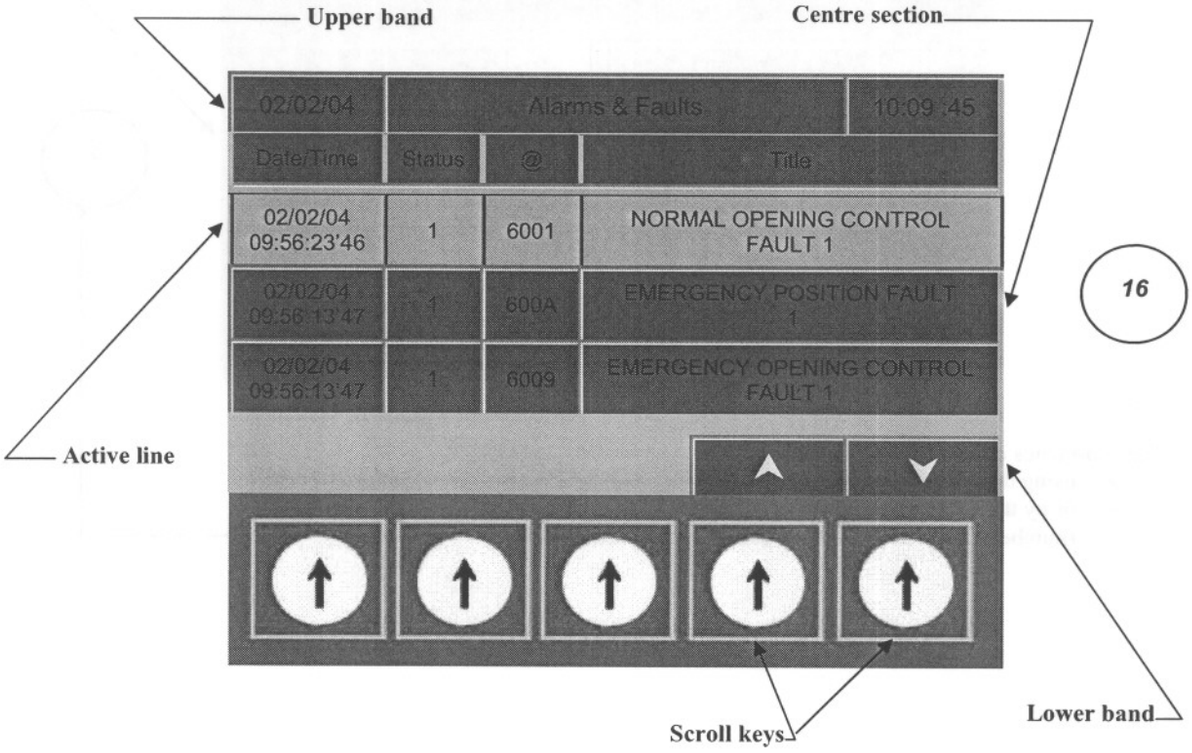
The sub-menus can be accessed either by:

- using the navigation keys,
- or by the corresponding numerical keys
  (number shown in the right of each screen in this manual).

2.2.4 Operating and configuration screens

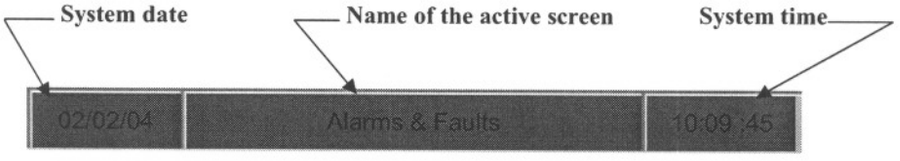
These screens bring up the information and commands relating to the active menu.
They are divided into three zones:

- an upper band present on all screens.
- the centre section in which the specific information relating to the selected menu appears. A message displayed on a white background indicates that it is active,
- a lower band.



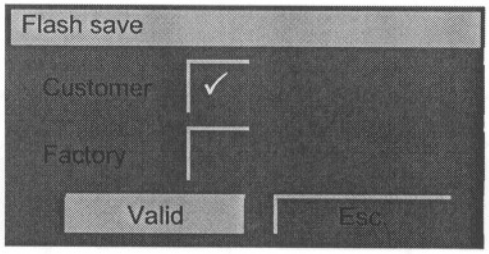
The function keys below the arrows are used to scroll through the information when the list is longer than the number of lines on the screen.

2.2.4.1. Upper band indicators



2.2.5 Saving modifications

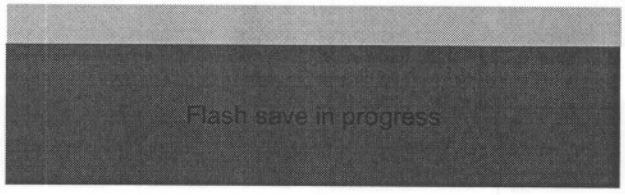
After modifying a parameter, the new data is stored in volatile memory, which means that if the power supply is lost any changes will be lost. It is also necessary to transfer these values to permanent memory. This is a "**Flash save**" operation



Pressing the "**Move upwards**" or "**Move downwards**" keys enables either "**Customer**" or "**Factory**" to be selected. The selection is confirmed by pressing the "**Valid**" navigation key.

Pressing the "**Valid**" navigation key confirms the operation, pressing "**Esc.**", cancels it.

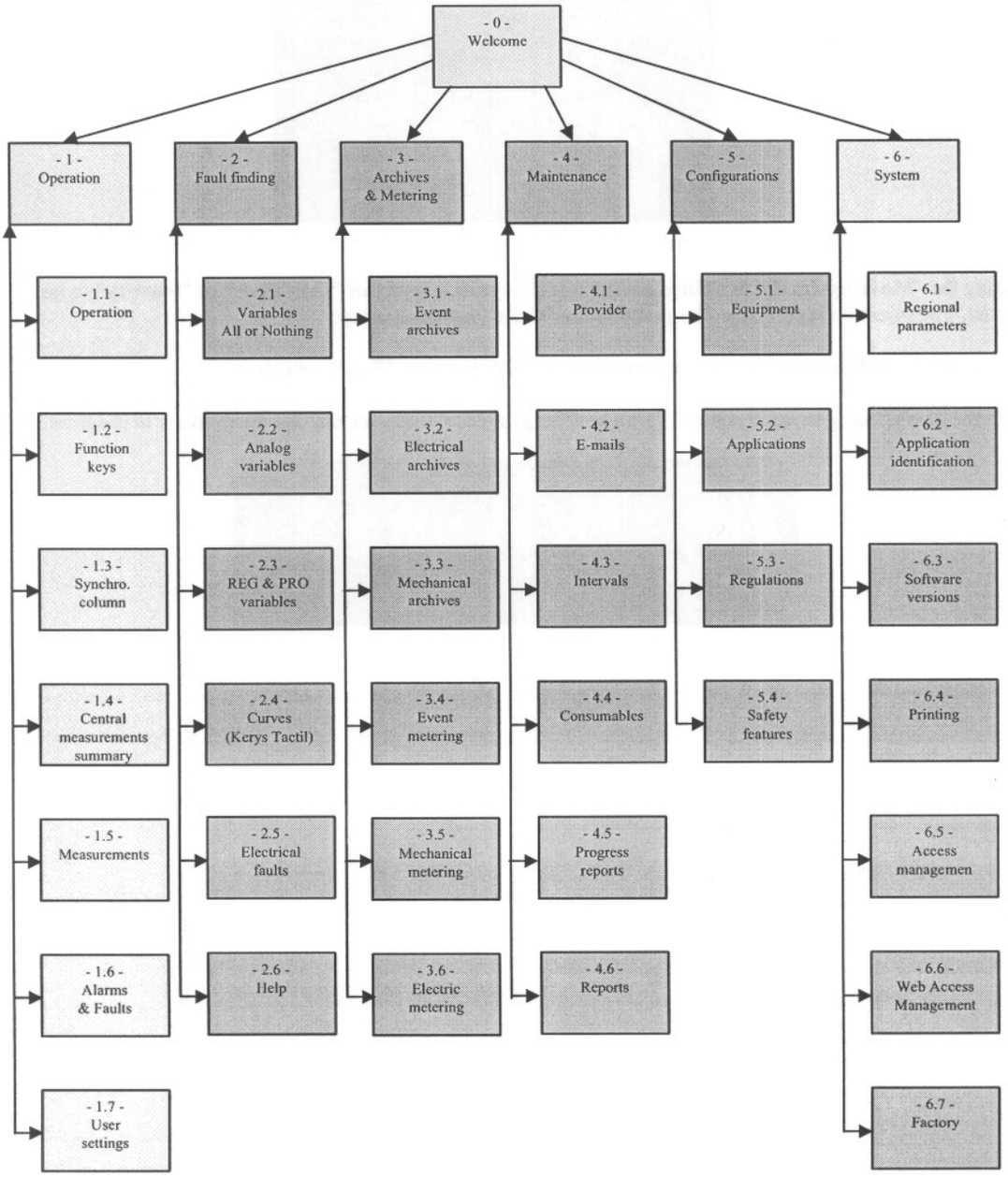
While the data is being saved, a screen "**Flash save in progress**" indicates that the operation is in progress.



3. Using menus

3.1. Layout of the menus

The diagram below shows the layout of the main menus.



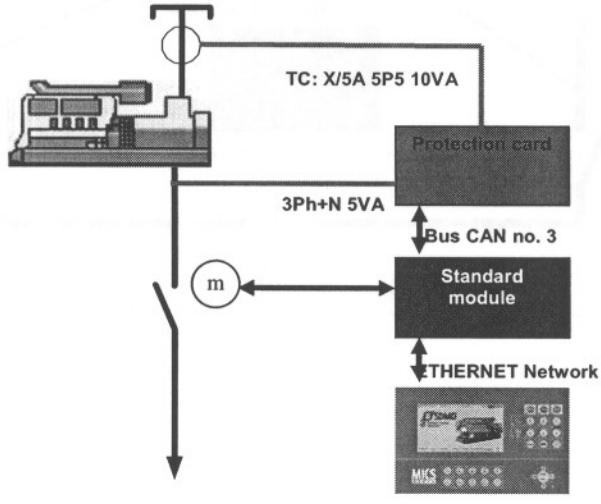
Warning	Only the menu functions on the white background are described in this manual.

3.1.1 Generating set operating modes

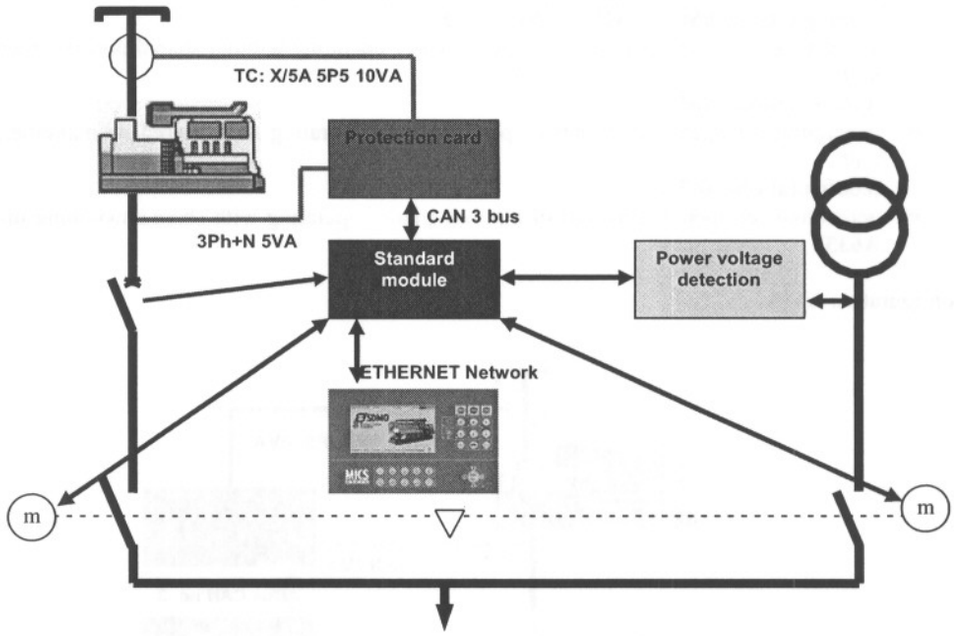
The operational modes are as follows:

- generating set operating alone / without normal / emergency inversion
  (configurations **A612**)
- generating set operating alone / with normal / emergency inversion and alternator circuit breaker
  (configurations **A622**)
- generating set operating alone / generating set coupled to the network
  (configurations **A641 / A642 / A651 / A661**)
- generating set operating as part of power plant / operating without shared normal/emergency switching unit.
  (configurations **A633**)
- generating set operating as part of power plant / operating with shared normal/emergency switching unit.
  (configurations **A634**)
- generating set operating as part of a power plant / operating with shared switching unit (configuration **A635**)

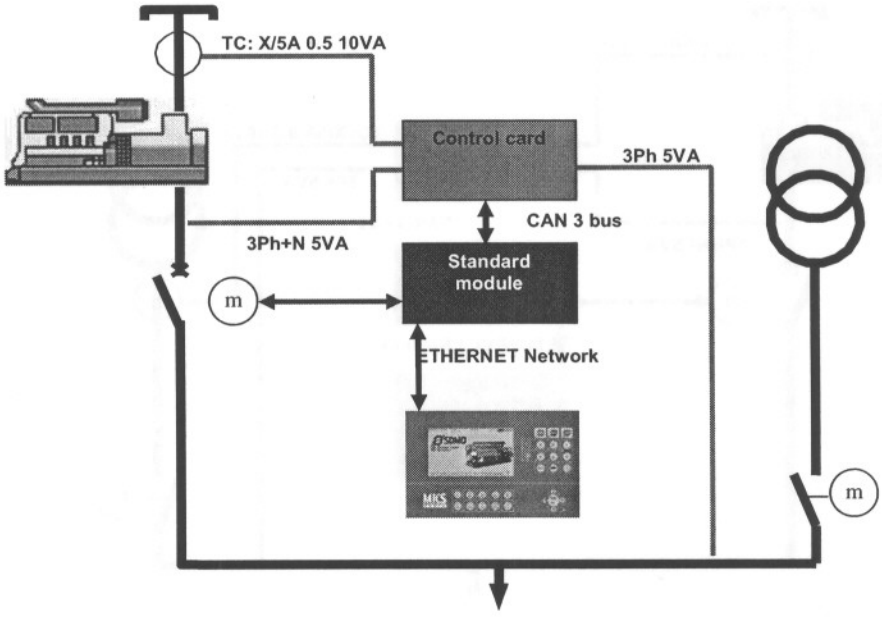
Configuration **A612**



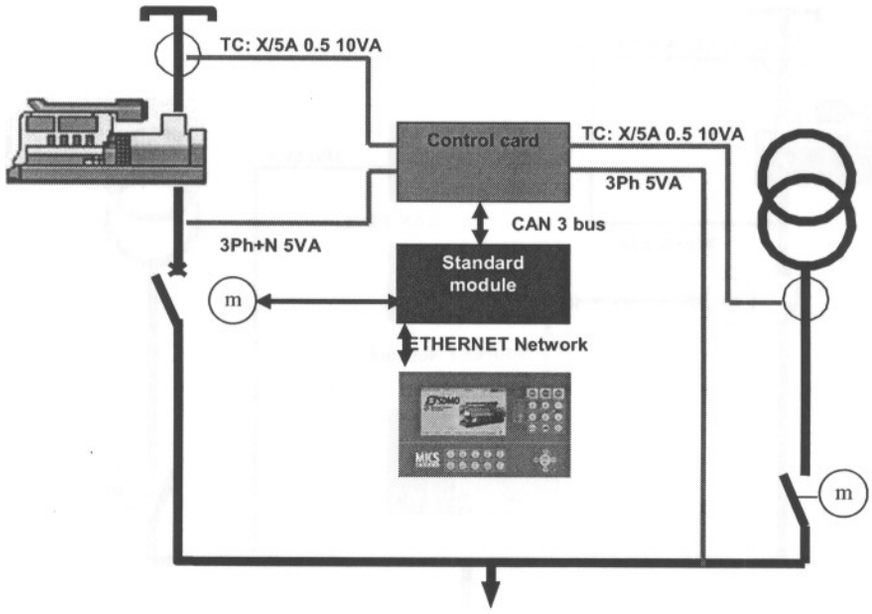
Configuration **A622**



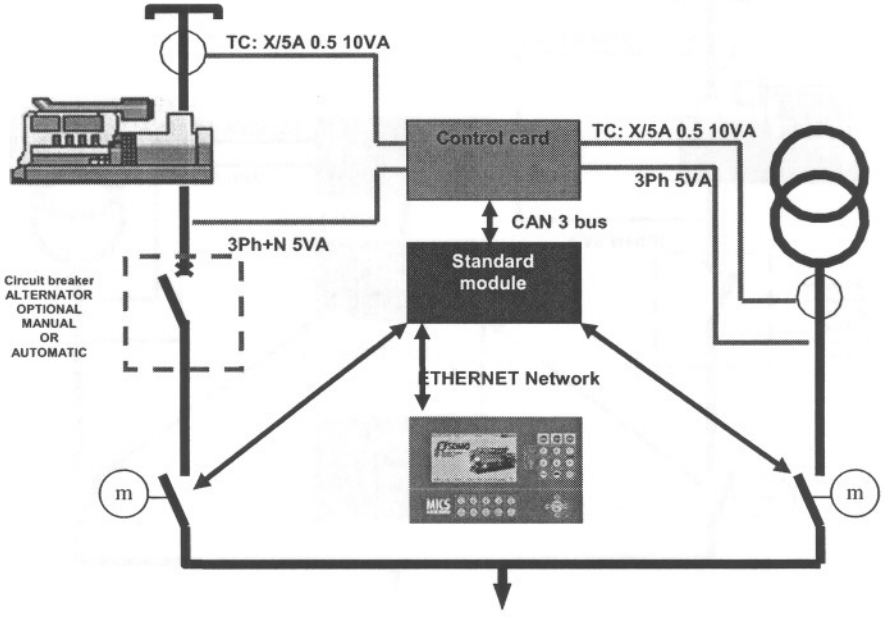
Configuration **A641**



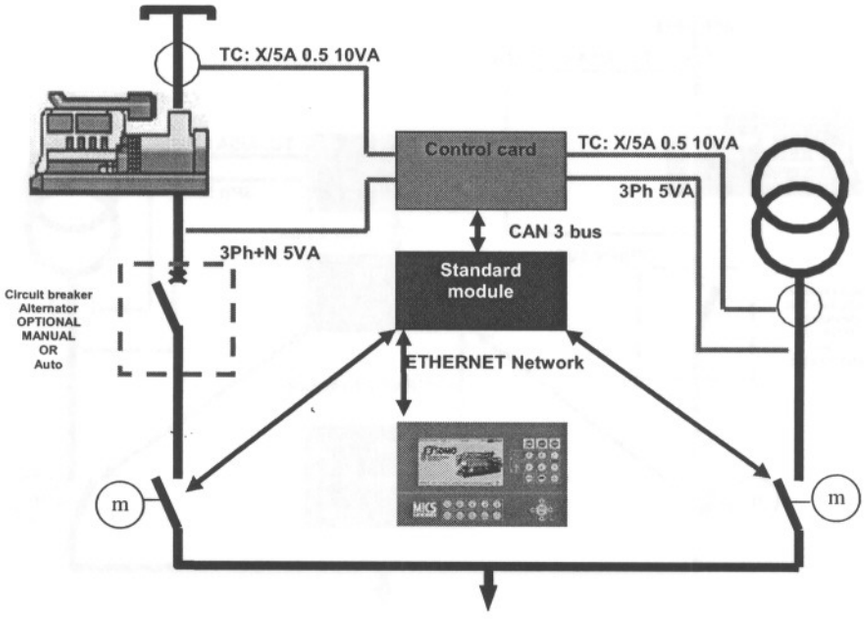
Configuration **A642**



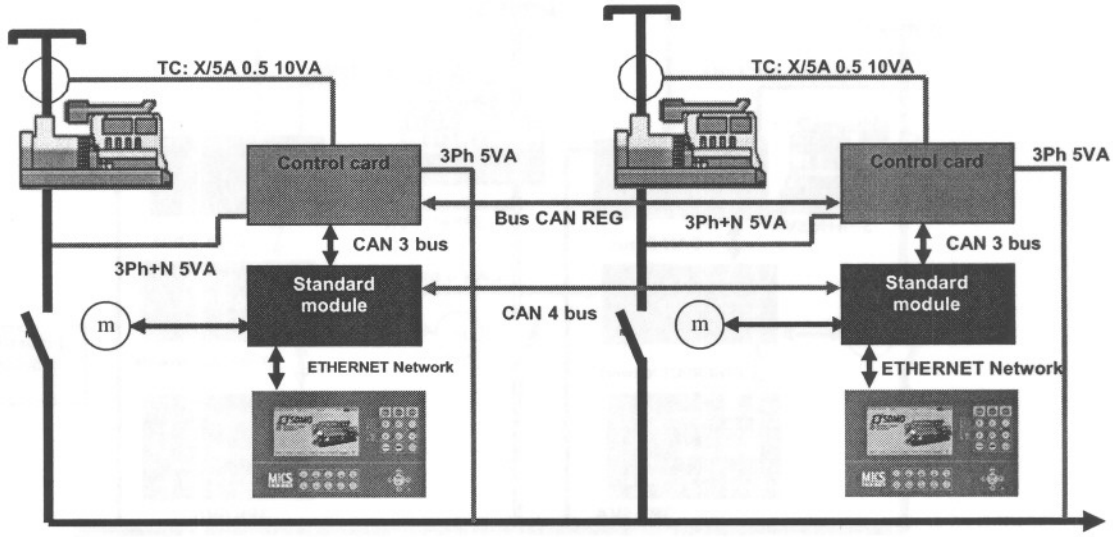
Configuration **A651**



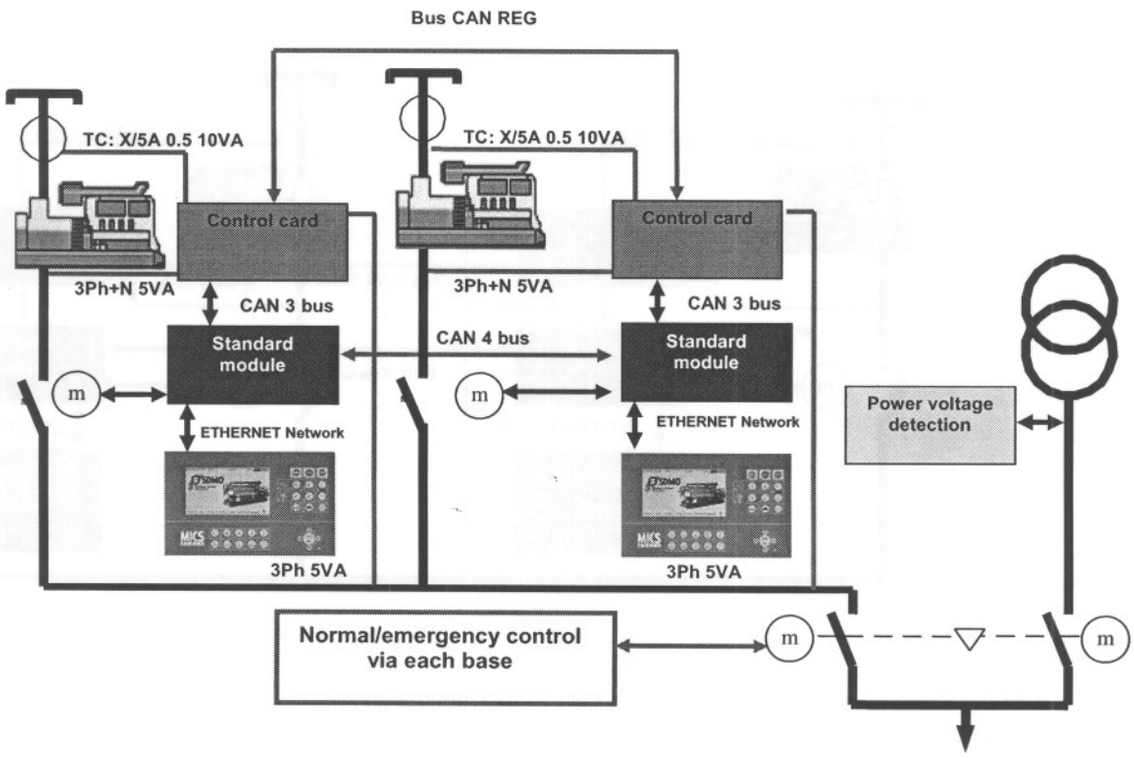
Configuration **A661**



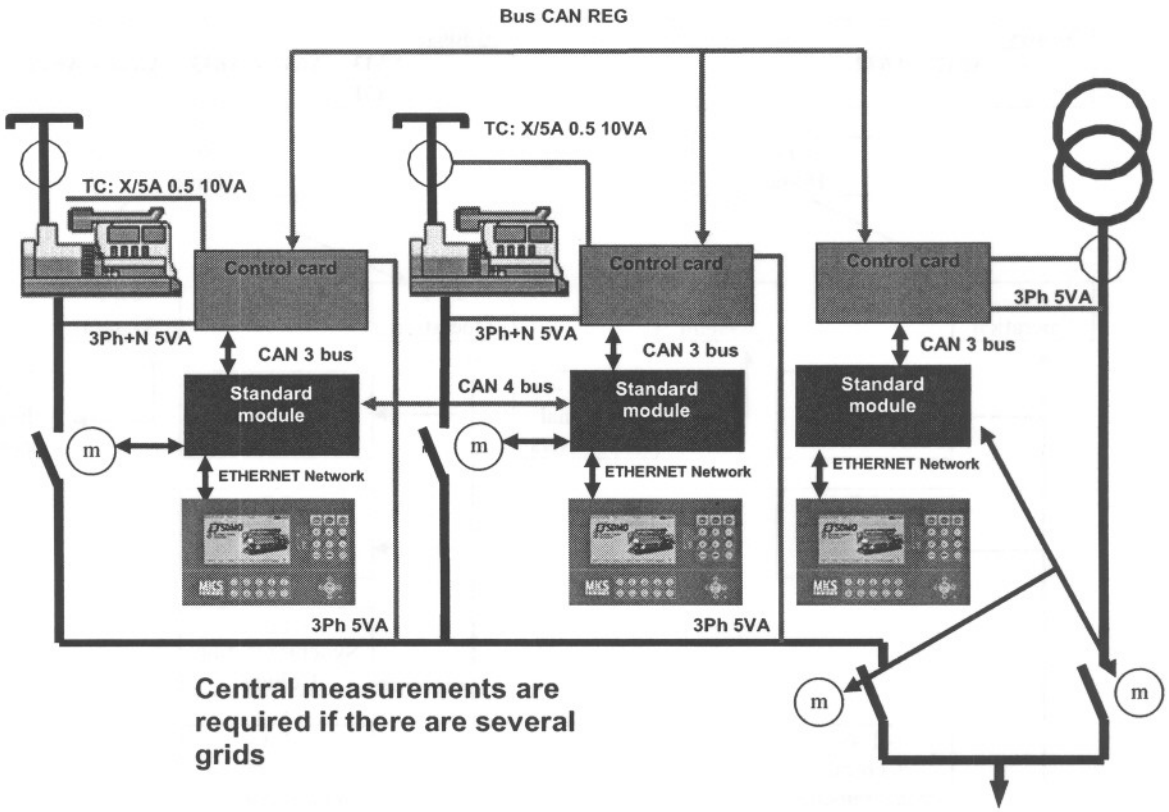
Configuration **A633**



Configuration **A634**



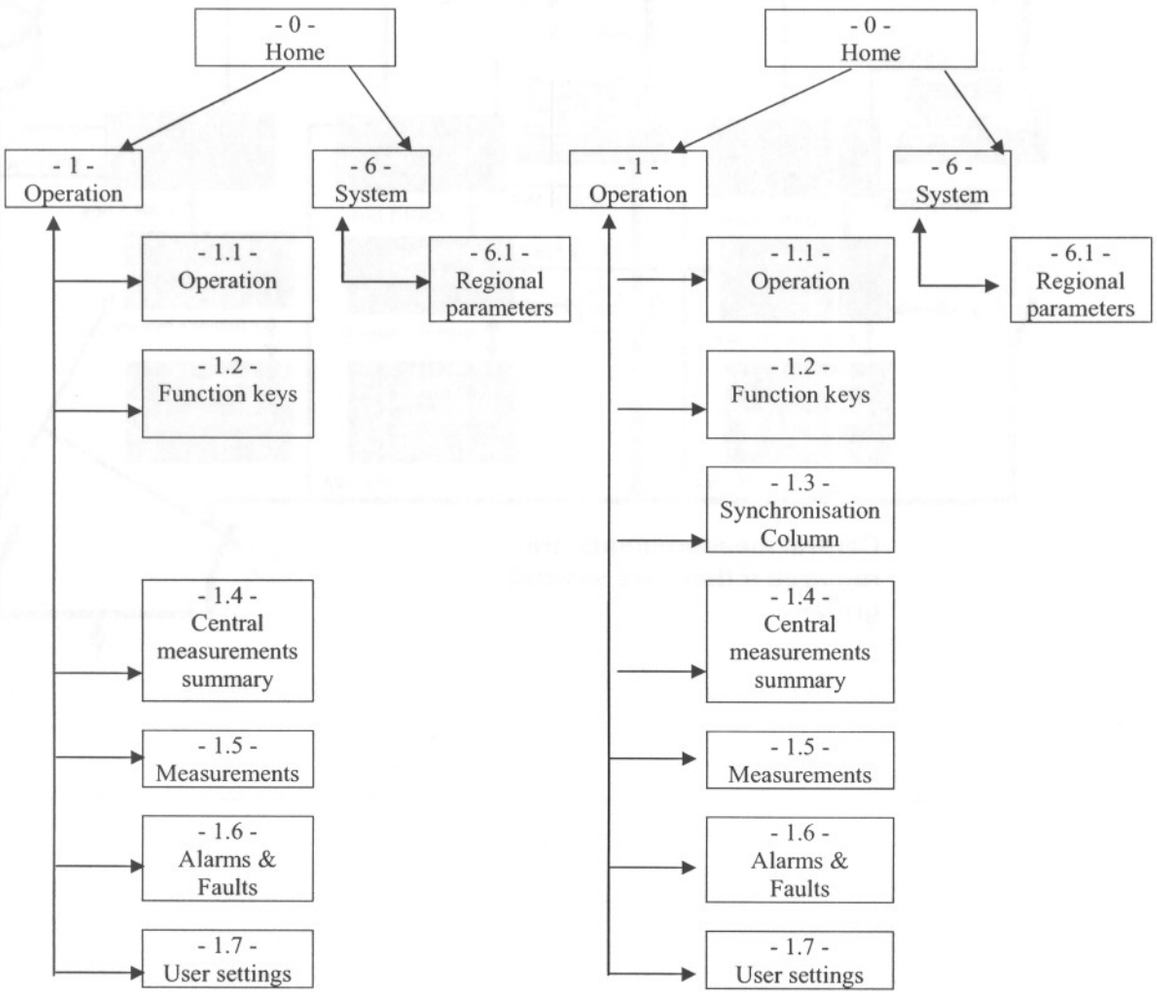
Configuration **A635**



3.1.2 Menu layout according to operating mode

The layout of the menus according to operation mode is as follows:

Modes: ➢ **A612 - A622**	**Modes:** ➢ **A633 - A634 - A635 - A641 - A642 - A651 - A661**



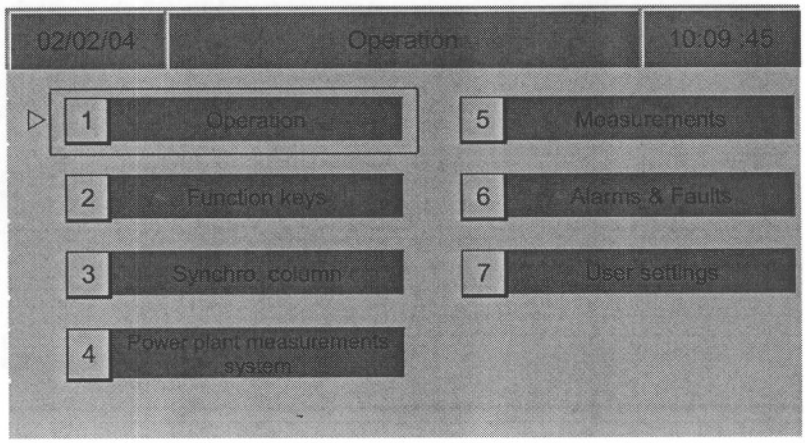
Warning	The description of menus and associated screens refers to the above-mentioned operating modes. If there is no particular information, the menus are considered as being general and applicable to all operating modes defined above.

3.2. Operating menus

The operating menus combine all the menus required for operating the generating set.

Operating modes:

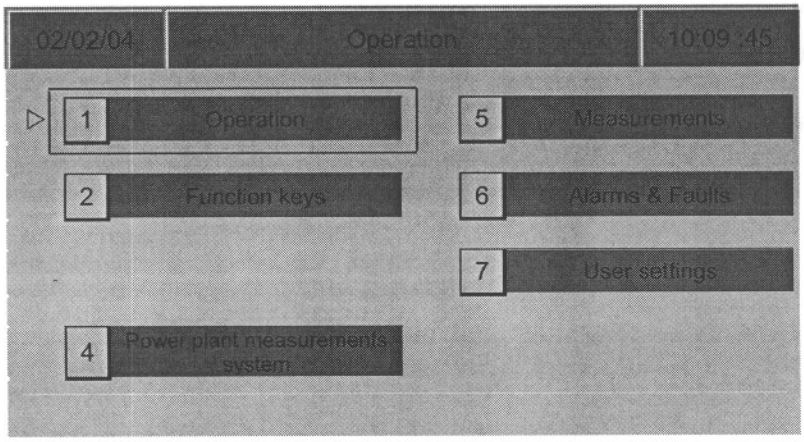
- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



1

Operating modes:

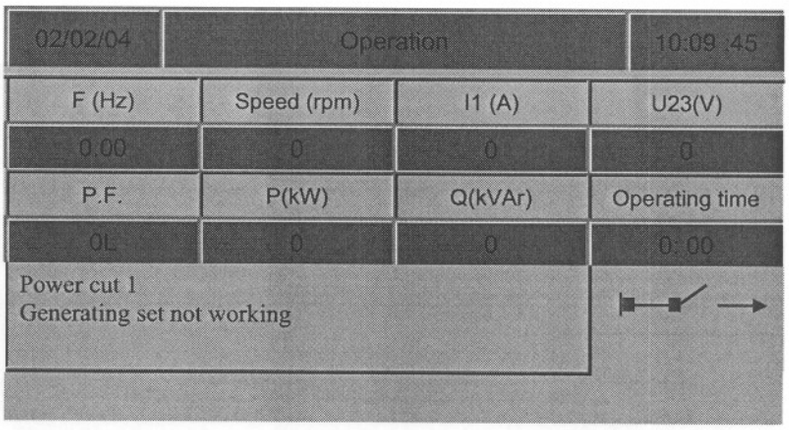
- **A612 – A622**



1

3.2.1 Operation

This general screen displays all the main electrical parameters of the generating set.
It is the general operating and monitoring screen for the generating set.



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Warning	The speed and voltage adjustment buttons are only present on coupled applications in manual mode.

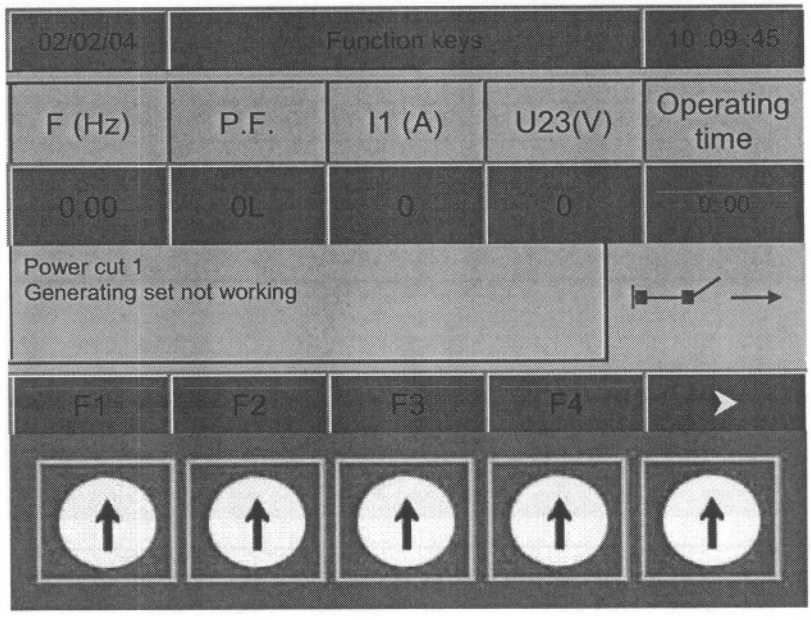
In manual mode, a synchro column short-cut is displayed on screen.

If the circuit breaker is faulty, the symbol is displayed below.

3.2.2 Function keys

Pressing one of these keys, activates a particular function programmed in production, according to the generating set user configuration selected by the user.
The most frequently used commands are:

➢ Restore mains in EJP	➢ Confirm mains return	➢ Normal maintenance
➢ Forced global operation	➢ Inhibit safety features	➢ Open emergency circuit breaker
➢ Close emergency circuit breaker	➢ Open normal circuit breaker	➢ Close normal circuit breaker



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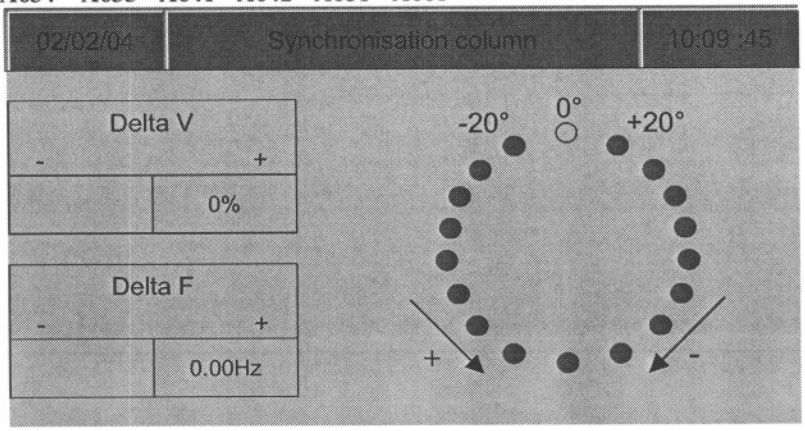
If the circuit breaker is faulty, the symbol  is displayed below.

3.2.3 Synchronisation column

This screen enables synchronisation in progress from two supplies to be displayed.

AUTOMATIC operating modes :

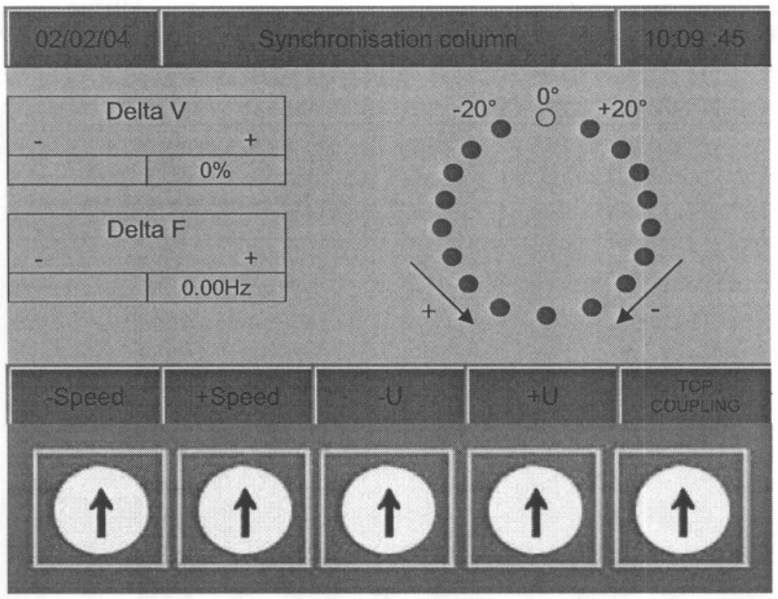
- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



MANUAL operating modes :

- **A633 – A634 – A635 - A641 - A642 - A651 - A661**

The "synchronisation in progress" appears inside the synchronisation column if the generating set is involved in the synchronisation procedure.
The "network X synchronisation in progress" message appears inside the synchronisation column if network X is being synchronised



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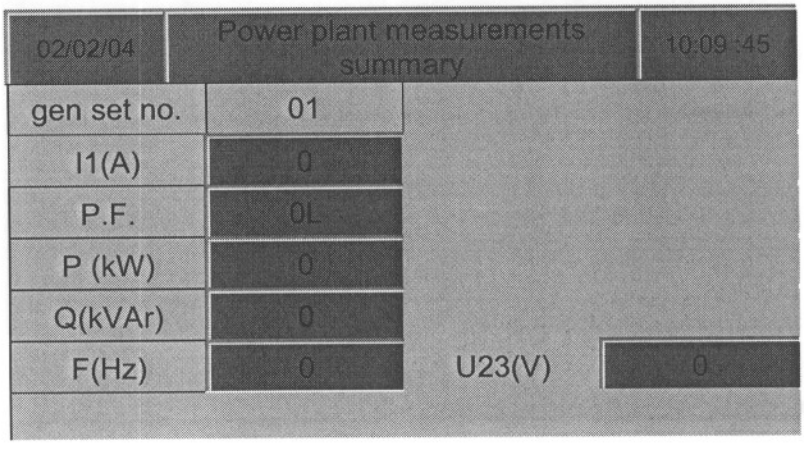
Warning	The **"TOP COUPLING"**, key, the **"+ Speed, "– Speed"** and **"+U, –U"** controls are only displayed in MANUAL mode

3.2.4 Power plant measurements summary

This screen enables the electric parameter values to be displayed.

Operating modes:

- **A633 – A634 – A635**



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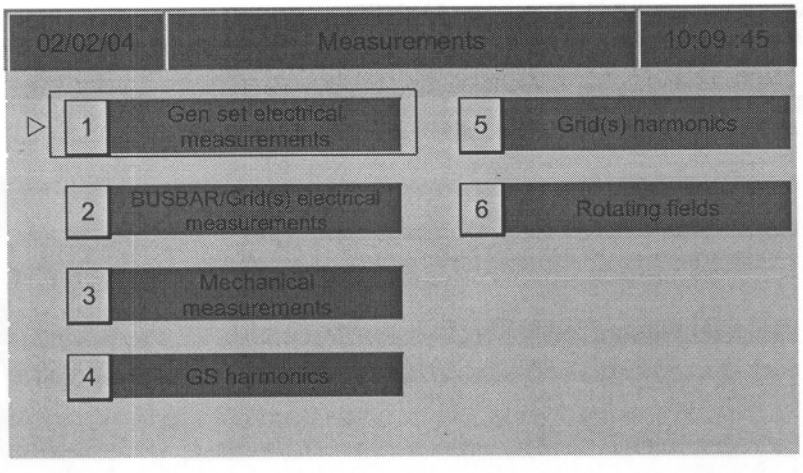
3.2.5 Measurements

This command brings up a sub-menu which enables the following measurements to be performed:

Operating modes:

- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



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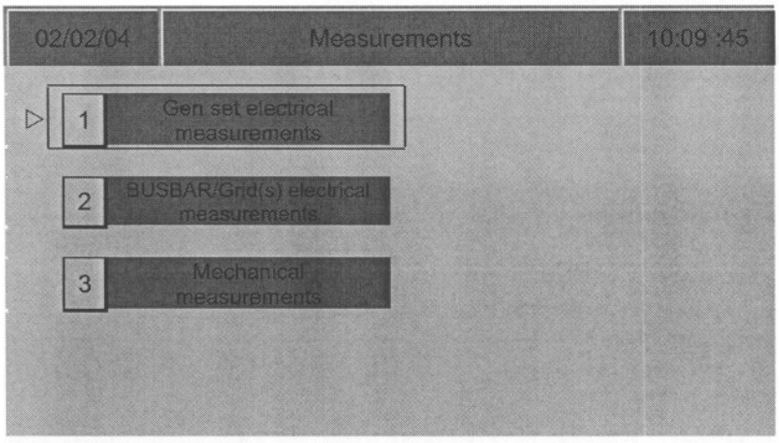
Operating modes:

- **A612 - A622**



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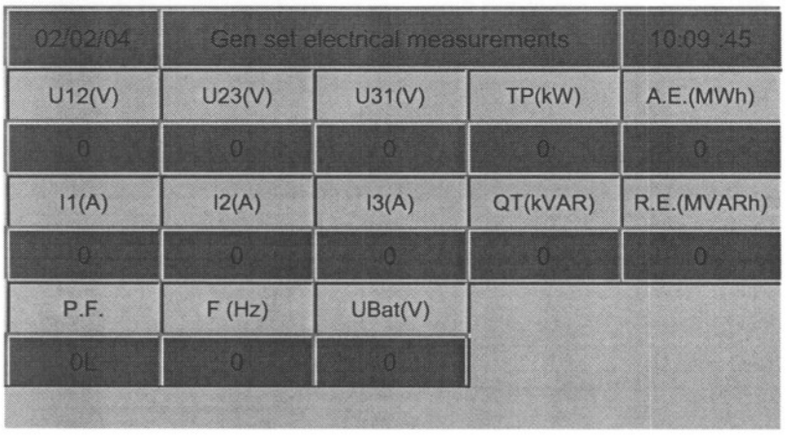
3.2.5.1. Generating set electrical measurements

This is used to display all the generating set electrical measurements:

- the starter battery voltage (Ubat)
- the voltages between phases expressed in (U12, U23 and U31)
- the phase currents expressed in Amps (I12, I23 and I3)
- the power factor (P.F.)
- the frequency expressed in Hertz
- the total active power (PT1) expressed in kW
- the total reactive power (QT) expressed in kW
- the active energy supplied (A.E.) expressed in MWh
- the reactive energy supplied (R.E.) expressed in MVAr

Operating modes:

- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



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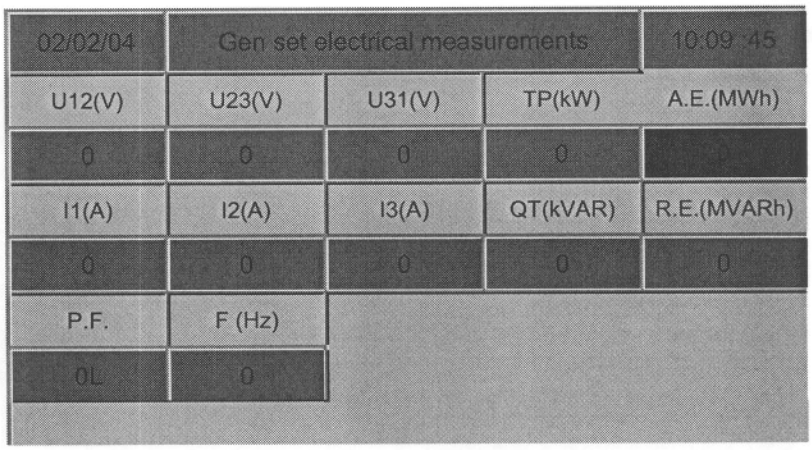
Operating mode:

- **A612 - A622**



151

If there is no control card, the battery voltage is hidden.

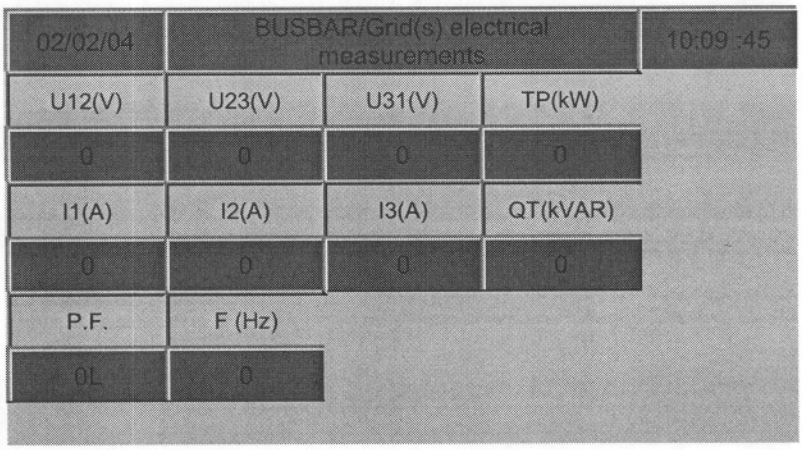
3.2.5.2. BUSBAR/grid(s) electrical measurements

This screen is used to display all the grid electrical measurements:

- the voltages between phases expressed in (U12, U23 and U31)
- the phase currents expressed in Amps (I12, I23 and I3)
- the power factor (P.F.)
- the frequency expressed in Hertz
- the total active power (PT1) expressed in kW
- the total reactive power (QT) expressed in kW

Operating modes:

- **A612 – A622 - A633 – A634 – A635 - A641 - A642 - A651 - A661**



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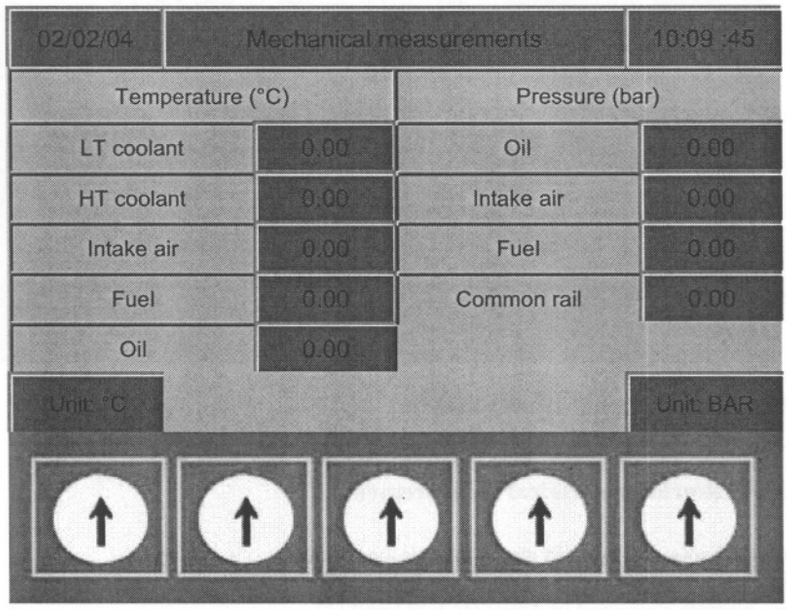
3.2.5.3. Mechanical measurements

This screen is used to display enables the main motor parameter values



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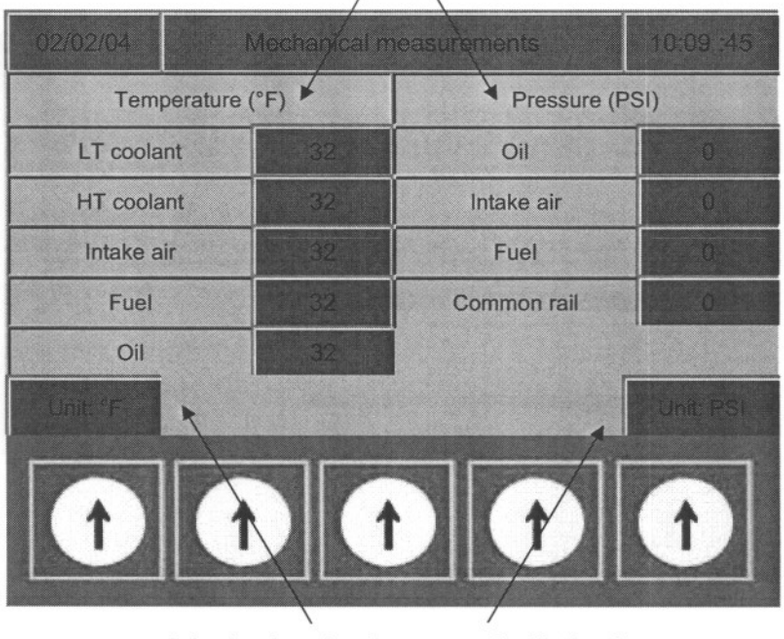
Pressing the function key changes the unit of measurement

- to degrees Celsius or degrees Fahrenheit to measure temperature,
- in BAR or PSI to measure pressure.

Units of measure displayed



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Selecting the units of measure to be displayed

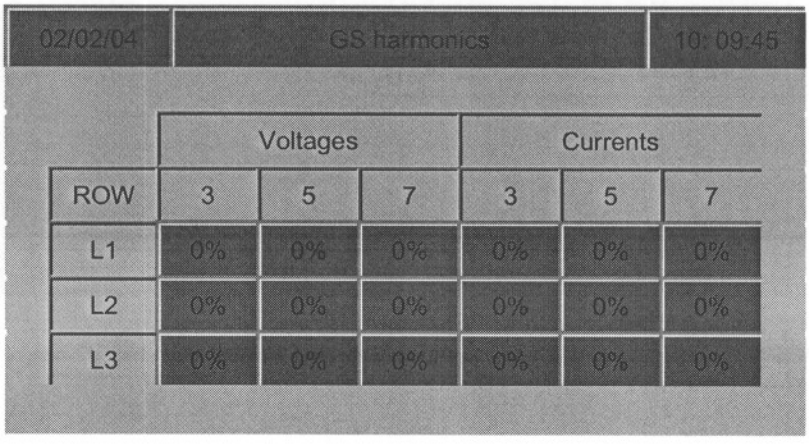
⚠ Warning	The type of values displayed varies according to the type of motor selected.

3.2.5.4. Generating set harmonic measurements

This screen enables the harmonic rate of row 3, 5 and 7 on the generating set voltages and currents.

Operating modes:

- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



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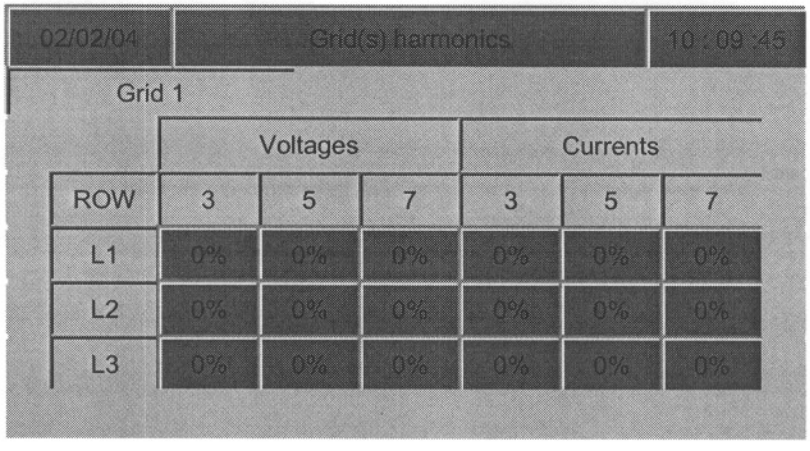
3.2.5.5. BUSBAR/grid(S) harmonic measurements

This screen displays the emergency Bus bars or grid harmonics.

Operating modes:

- **A633 – A634 – A635 - A641 - A642 - A651 - A661**



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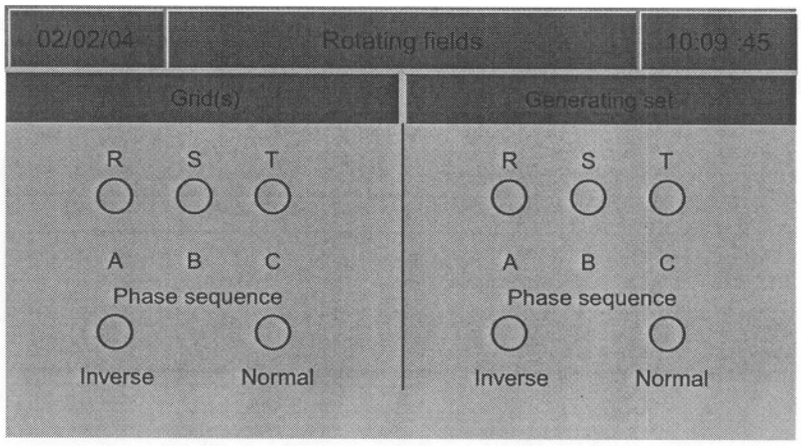
There is no "Grid 1"control display if there is only one network.

3.2.5.6. Rotating field measurements

This screen allows a comparison of the direction of rotation of the field in each power supply.

Operating modes:

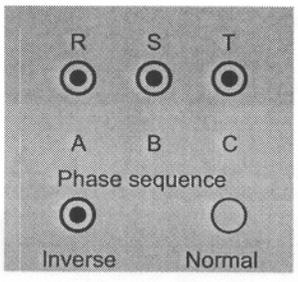
- **A633 - A634 - A635 - A641 - A642 - A651 - A661**



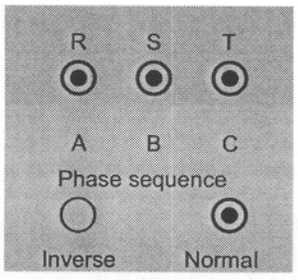
If voltage or frequency is presented is present it is represented by a black circle "◉".

Examples:

Voltage present / Inverse field



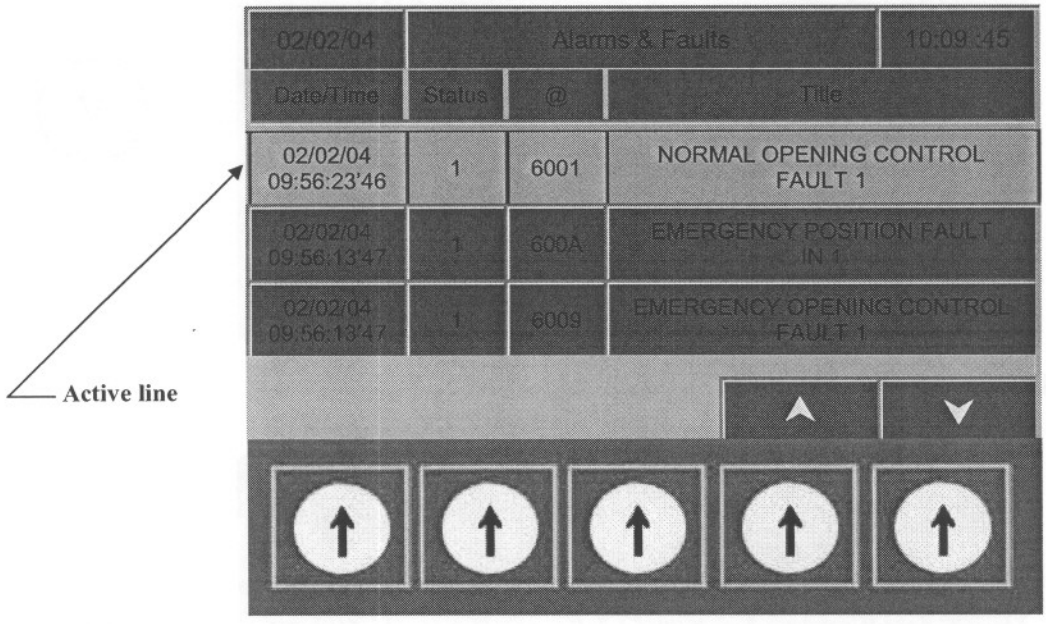
Voltage present / Normal field



⚠ Warning	The data supplied is directly linked to the correct voltage connections on the I.A.S. inputs **The user must always check that the indication is correct.**

3.2.6 Alarms and faults

This screen allows you to display the list of faults found on the installation.
The first column show the date and time the event occurred.
The "**Status**" column indicates if the fault is still present "**1** " or no longer present "**0** ".
The "**@**" column displays the address of the variable associated with the fault.
The "**Title**" column identifies the type of fault.
Access the screen using the **RESET** key.



To clear a fault, it is necessary to:

- check the fault is no longer present (status **0**) and if necessary eliminate the cause of the fault
- select the line concerned; the line text is white
- press the "**Reset**" button on the keypad; the line is cleared.

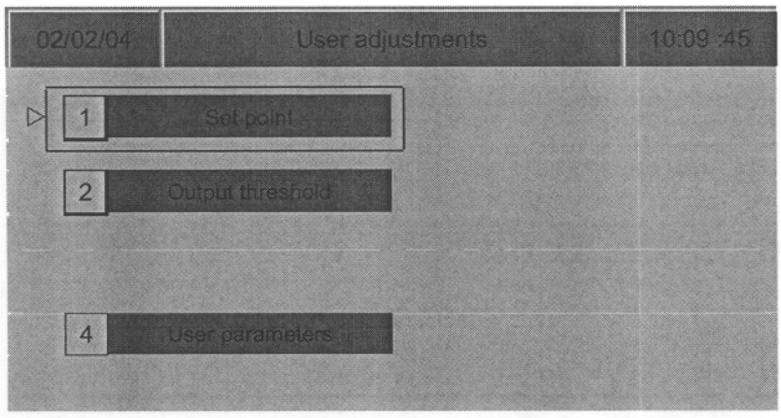
Warning	When a fault is displayed, its effect on operation remains active even if the cause of the fault has disappeared.

3.2.7 User settings

This command has the following options:

Operating modes:

- **A612 - A622 - A635 - A641 - A642 - A651 - A661**



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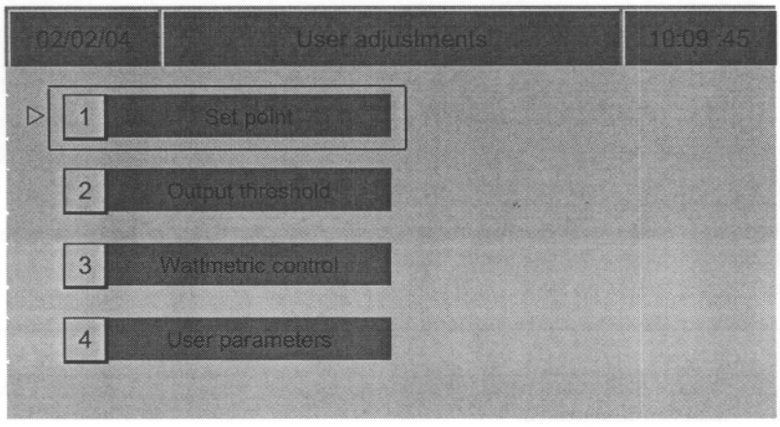
Operating mode:

- **A633 - A634**



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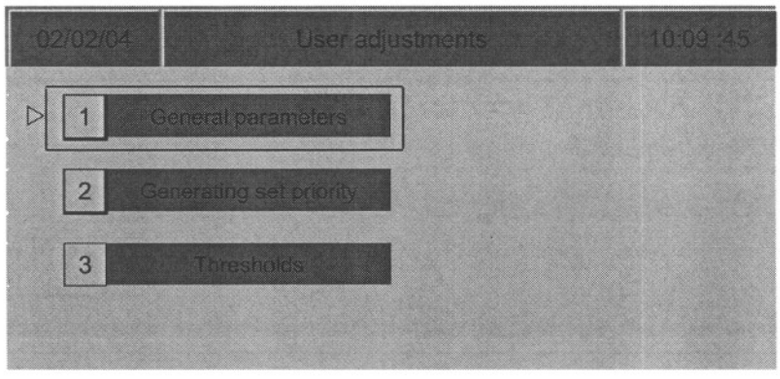
If you have selected "With" wattmetric control, this selection allows you to access the following screen:



3.2.7.1. Set points

This menu is used for defining set point values for adjusting the generating set.
Designed for multi-voltage applications, this menu enables the required value for each set point to be defined.
These values relate to the following parameters:

Generating set	Grid
Voltage	Active power
Active power	Power factor
Power factor	

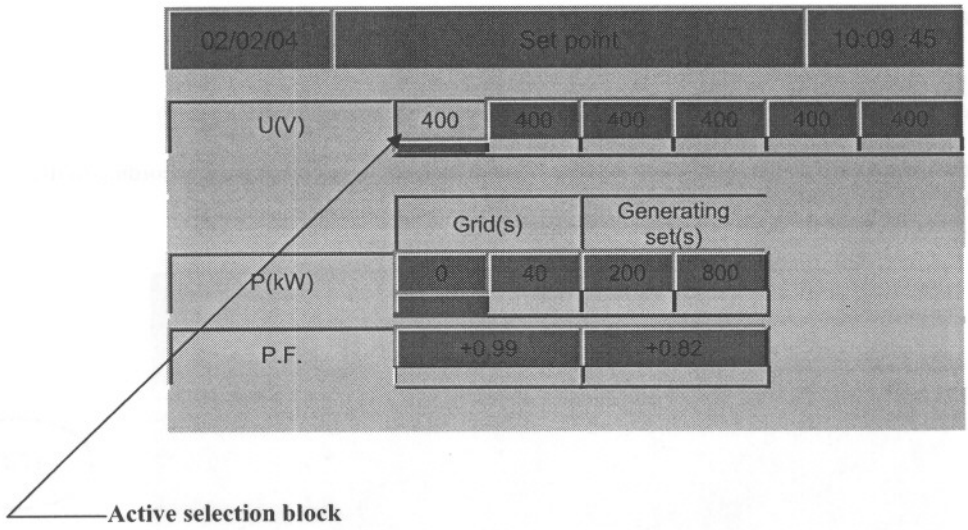
A light green background indicates the active set point

Operating modes:

- **A612 - A622 – A633 – A634 - A641 - A642 - A651 - A661**

Voltage setting
Designed for multi-voltage applications, enabling the required value for each set point to be defined.
Power setting
Enables the power and power factor values to be assigned for periods of operation coupled to the grid.

- Grid set point: the grid supplies a fixed output and the generating set control unit provides any additional power.
- Generating set set point: the generating set supplies a fixed output and the generating set control unit provides any additional power.



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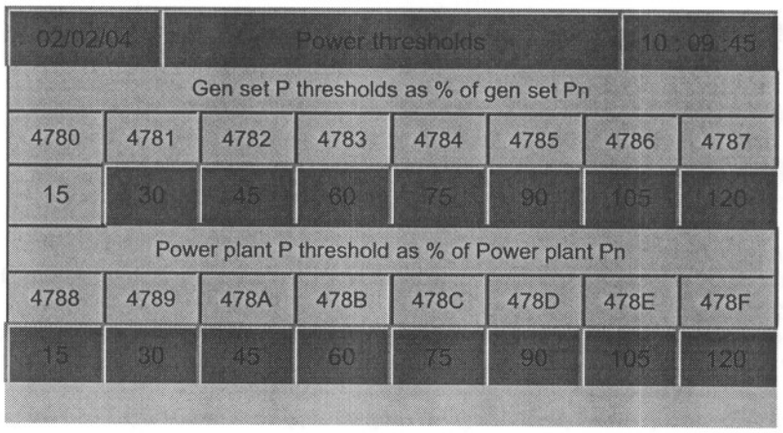
3.2.7.2. Power thresholds

In this menu the threshold values are defined, which, with the digital variables, authorise the creation of additional functions linked to the generating set or grid power.

Operating modes:

- **A612 – A622 - A633 – A634 – A635 - A641 - A642 - A651 - A661**

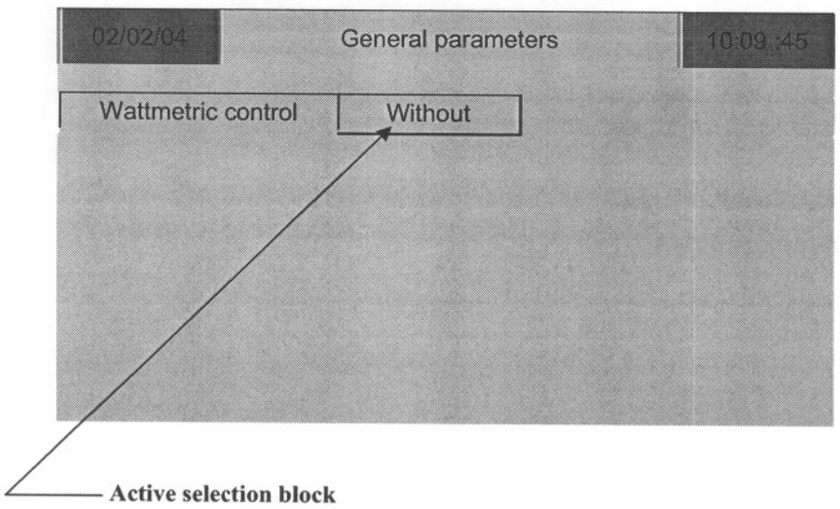


3.2.7.3. Wattmetric control / General parameters

Operating mode:

- generating set operating as part of power plant. (with or without shared switching unit)

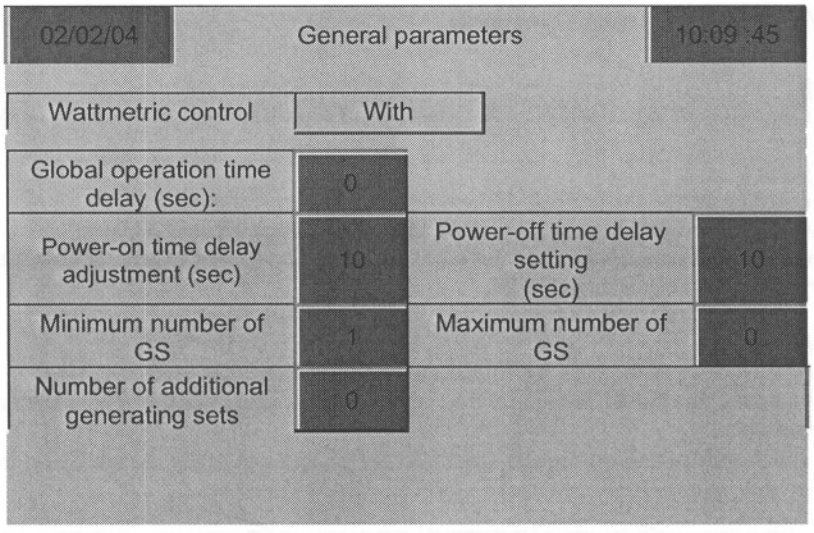
This section allows you to define the installation criteria of generating sets in a power plant according to the power requirements of the installation.
If there is no Wattmetric control, there is no priority management.



1731

To modify the selection, the selection block must be highlighted using the arrow buttons (cf. subclause 2.2). Then press "Valid", make your selection using the arrow buttons and then confirm the selection using the "Valid" button.

The setting entry fields only appear if the "**With**" Wattmetric control selection is confirmed.



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Global operation time delay:
Period during which wattmetric management is inhibited and that the "**maximum number of generating sets**" are operating.
Power-on time delay:
Time required to confirm the start request for an additional generating set when a power-on threshold is selected.
Power-off time delay:
Time required to confirm the switching off request for an additional generating set when a power-off threshold is selected.
Minimum number of generating sets:
Determines the minimum number of generating sets needed to start in order that the power plant can authorise the switching on of the installation.
Maximum number of generating sets:
If emergency mode is selected all the generating sets start; wattmetric control only starts operating after the generating sets have been operating long enough after power has been restored for the load to be stabilised.
This adjustment enables the number of generating sets starting during this sequence to be limited.
Number of additional generating sets:
Defines the number of additional generating sets required above the number determined by wattmetric control before starting.

3.2.7.4. Wattmetric control / Thresholds

Operating mode:

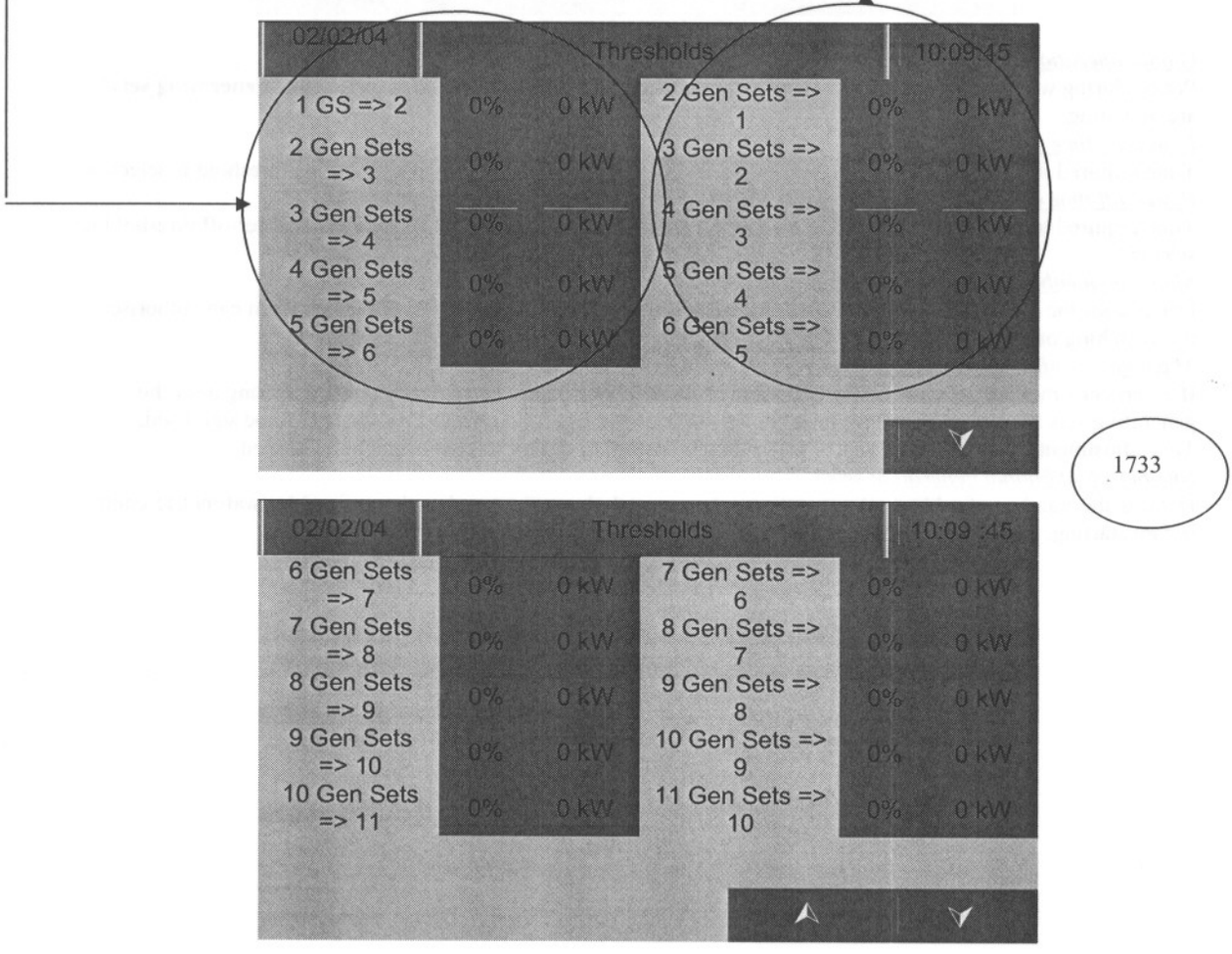
- generating set operating as part of power plant. (with or without shared switching unit)

Power-on thresholds

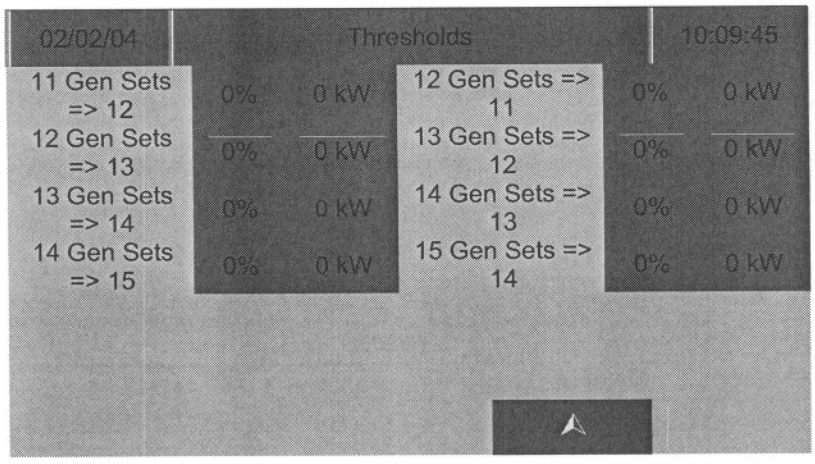
These parameters are located in the left half of the on-screen configuration field.
Defines the active power threshold leading to the additional generating set start request.
The switching on request is delayed for the duration of the time delay period to prevent installation being started with a temporary overload, i.e. starting a motor,

Power-off thresholds

These parameters are located in the right half of the on-screen configuration zone.
Defines the active power threshold leading to the power-off request when the power consumption of an installation is reduced.
If the threshold appears,the power-off request is delayed for the duration of the time delay period.



1733



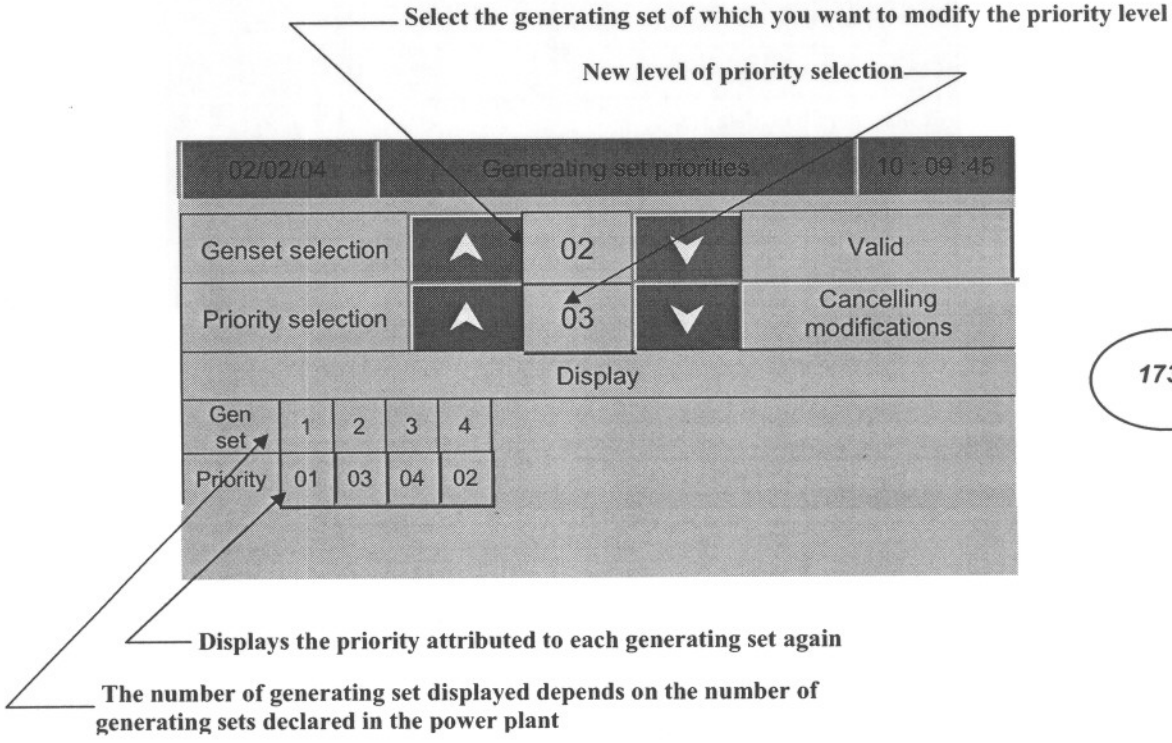
On each threshold screen, only generating sets which do not exceed the maximum number of generating sets are monitored on screen.

3.2.7.5. Generating set priorities

Operating mode:

- **A633 – A634**

This function enables the order in which the generating sets are controlled by the Wattmetric control.



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To modify the priority level assigned to a generating set:

- Select the generating set (number)
- Select the new priority
- Confirm.

The old priority of the modified generating set is assigned to the generating set affected by this change.

Gen set	1	2	3	4
Before				
Priority	01	02	03	04
After				
Modified priority	01	03	04	02

The **"Return to previous parameters"** key allows the initial setting to be restored.
This command is confirmed until it is saved in flash.

3.2.7.6. User parameters

This menu enables the user to modify certain settings in order to adapt operation to his requirements.

02/02/04	User parameters	10:09 :45
Power return confirmation request		None
No load test time delay (sec):	600	Mains 1
Power cut time delay (sec):		600
Power return time delay (sec):		30
Inversion on non-connection in emergency		Without
Inversion in non-coupling in normal		Without

Mains return confirmation request
If the choice is "**With** ", when the grid voltage reappears, the mains return sequence is conditioned by additional signal.

⚠ Warning	Before confirming this selection, ensure that the equipment has been designed for this and that the command is present.

Power cut time delay
Defines the time between the actual loss of the grid voltage and the beginning of the starting sequence.

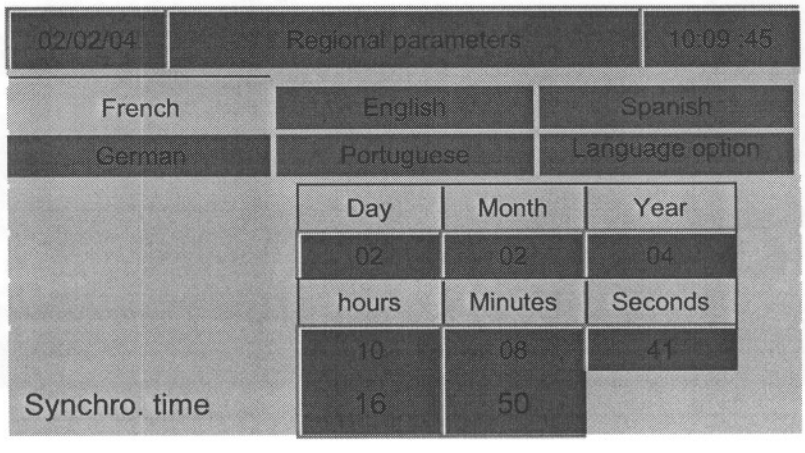
Mains return time delay
Defines the time between the actual loss of the grid voltage and the start of the switching off sequence.
If the "**with mains return**" selection is operational, this triggers the switching off sequence.

Inversion on non-connection in emergency
Enables a program to be selected in the event of the grid synchronisation failing. If the "**Without**" selection is active, the installation remains supplied by the grid, if not, the installation cuts-off the replacement power supply.

Inversion in non-coupling in normal
Enables a program to be selected in the event of the grid synchronisation failing. If the "**Without**" selection is active, the installation remains supplied by the replacement power supply, if not, the installation cuts-off the supply.

3.3. Regional parameters

The various display parameters can be selected from this menu:
- language selection for display
- setting the date and time



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To change the language, highlight the selection block corresponding to the chosen language (outline) using the arrow buttons (cf. subclause 2.2). Then press "Valid".

To modify the date and the time, highlight the corresponding selection block using the arrow buttons (cf. subclause 2.2). Then press "Valid", carry out the desired change and confirm this by pressing "Valid".

4. Generating set starting modes

4.1. Notes

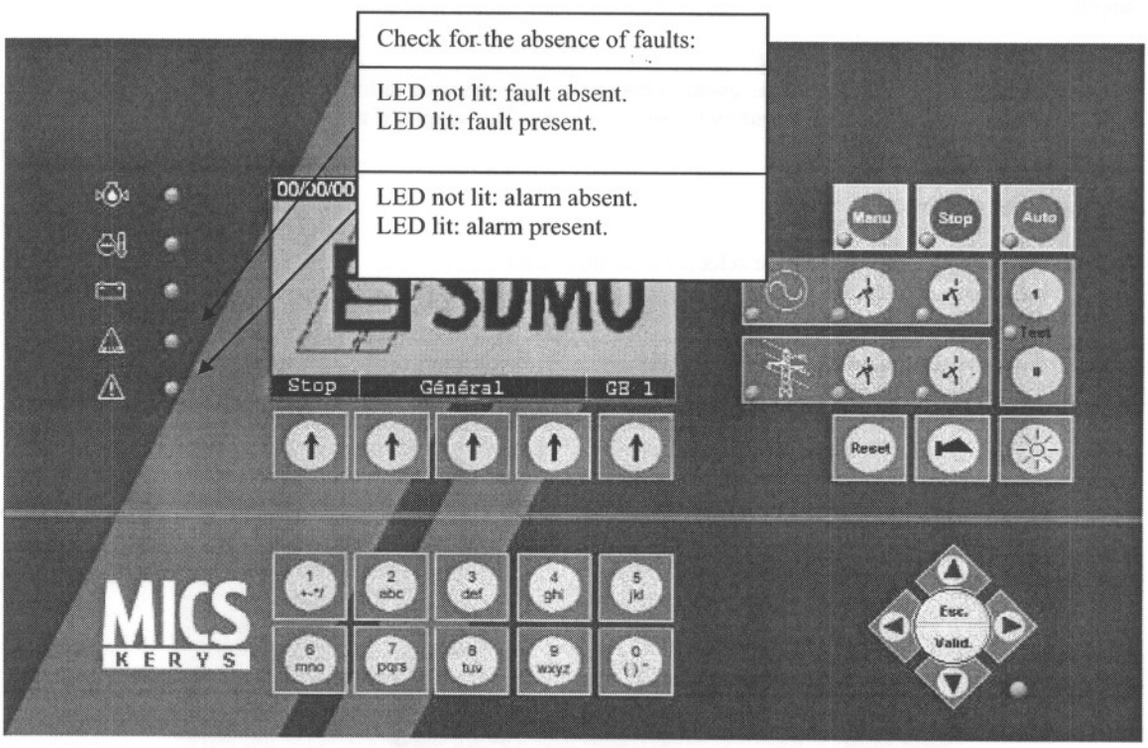
The aim of this section is to describe the actions to be carried out for starting a generating set in the various possible modes:

- starting in manual mode
- starting using the no load test function
- starting using the load test function
- starting in automatic mode.

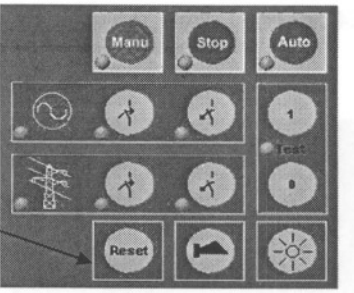
4.2. Prerequisites

Make sure that you use an operational installation which includes a standard module and a KERYS IHM.

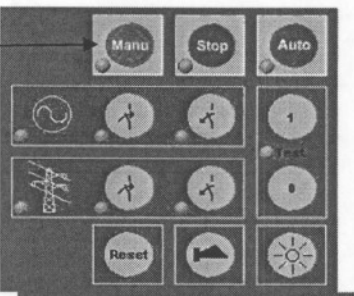
4.3. Manual starting



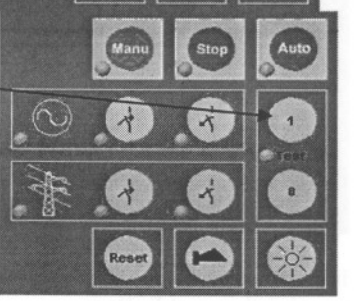
If faults are present, the fault management screen can be accessed by pressing the **reset button**.



If no faults are present, manual mode can be activated by pressing the **Manu button**.

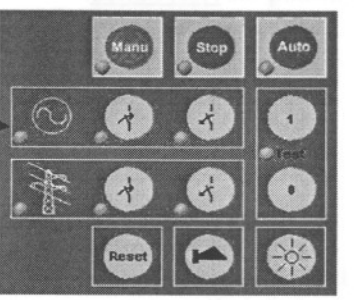


The manual starting phase will begin once **button 1** in the test block is pressed.



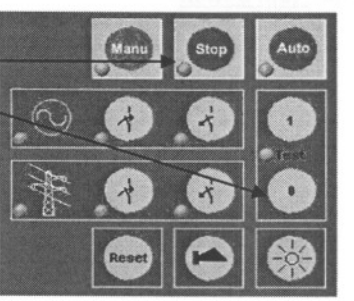
The starting request is maintained until the generating set group starts. This method may not under any circumstances be used to turn the motor over.

During the starting phase and until the alternator voltage stabilises, the green LED underneath the generating set symbol flashes, and then lights up permanently once the phase is complete.

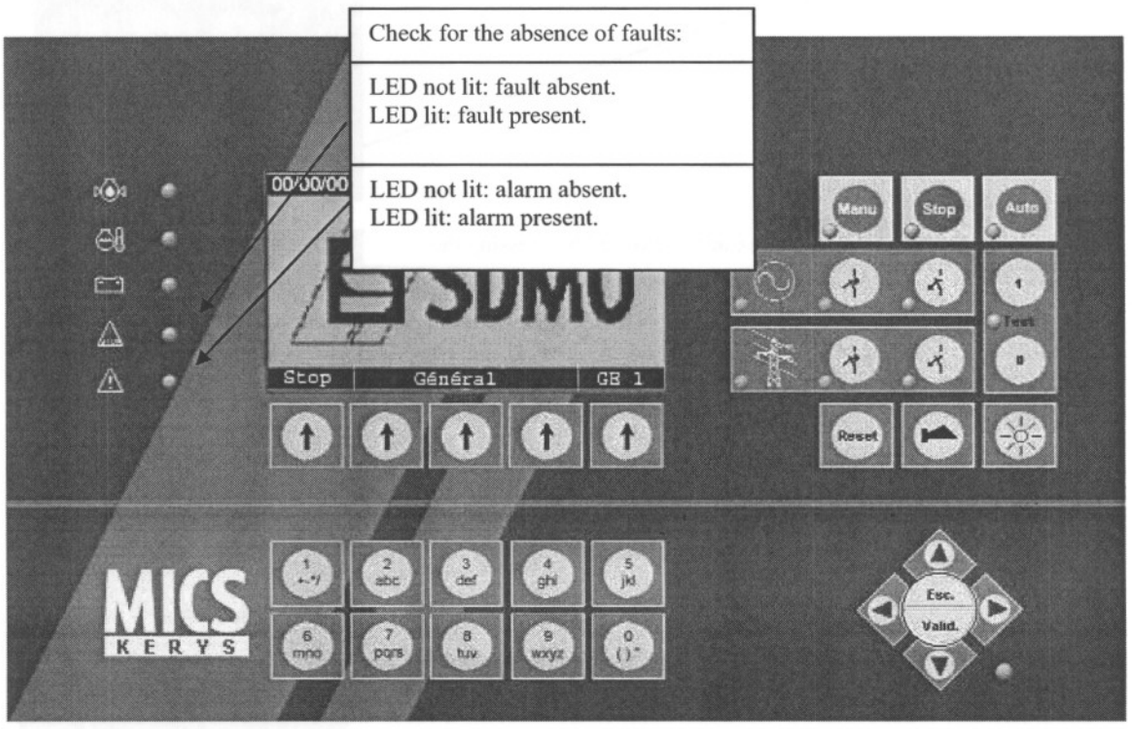


The generating set may be stopped at any time by pressing the **stop button** or the **0 button** in the test block.

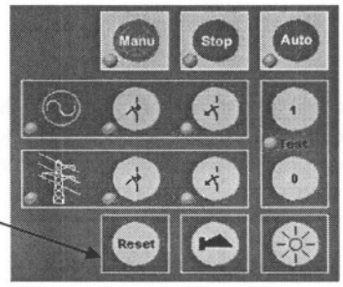
The green LED underneath the generating set symbol goes out to indicate that the generating set has stopped.



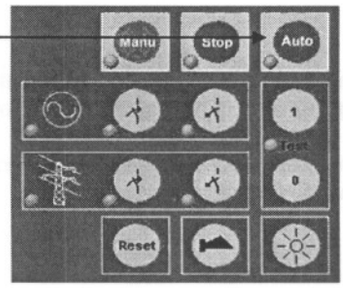
4.4. Starting using the no load test function



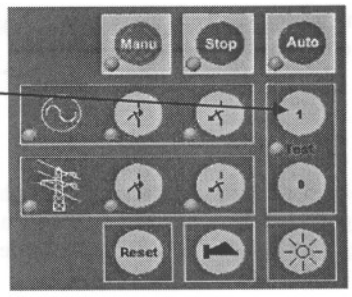
If faults are present, the fault management screen can be accessed by pressing the **reset button**.



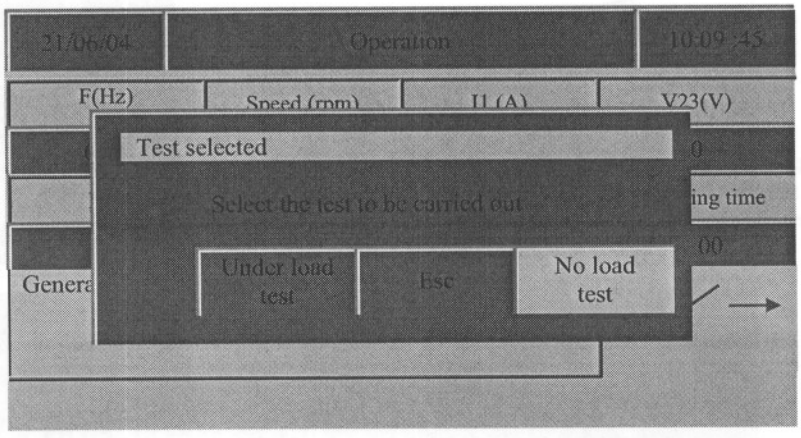
If no faults are present, automatic mode can be activated by pressing the **Auto button**.



The test starting phase will then begin once **button 1** of the test block is pressed.

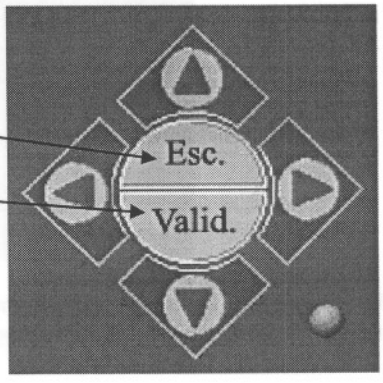


If you press **button 1** in the test block, the following window will appear in which the type of test can be selected.

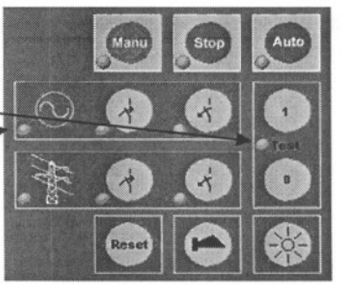


With the introduction of the KERYS IHM, the no load test is now initiated when this function is selected (highlighted) using the arrow buttons shown here.
The ESC button can be used to cancel this function.

The **Valid button** can be used to confirm this function.

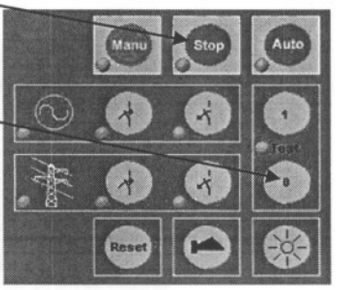


The **orange LED** in the test block lights up permanently once the test is confirmed



During the starting phase and until the alternator voltage stabilises, the **green LED** underneath the generating set symbol flashes, and then lights up permanently once the phase is complete.

The generating set may be stopped at any time by pressing the **stop button** or the **0 button** in the test block.



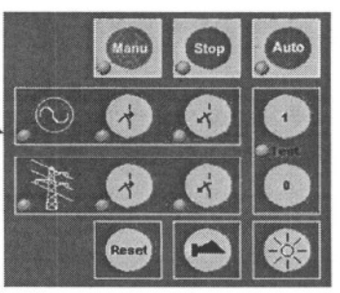
The generating set will stop automatically once the no load test is complete (600 seconds by default).
Example: screen below.

21/06/04	Operation		10:09:45
F (Hz)	Speed (rpm)	I1 (A)	V23(V)
50.00	1500	1	401
P.F.	P(kW)	Q(kVAr)	Operating time
0L	0	0	4:39

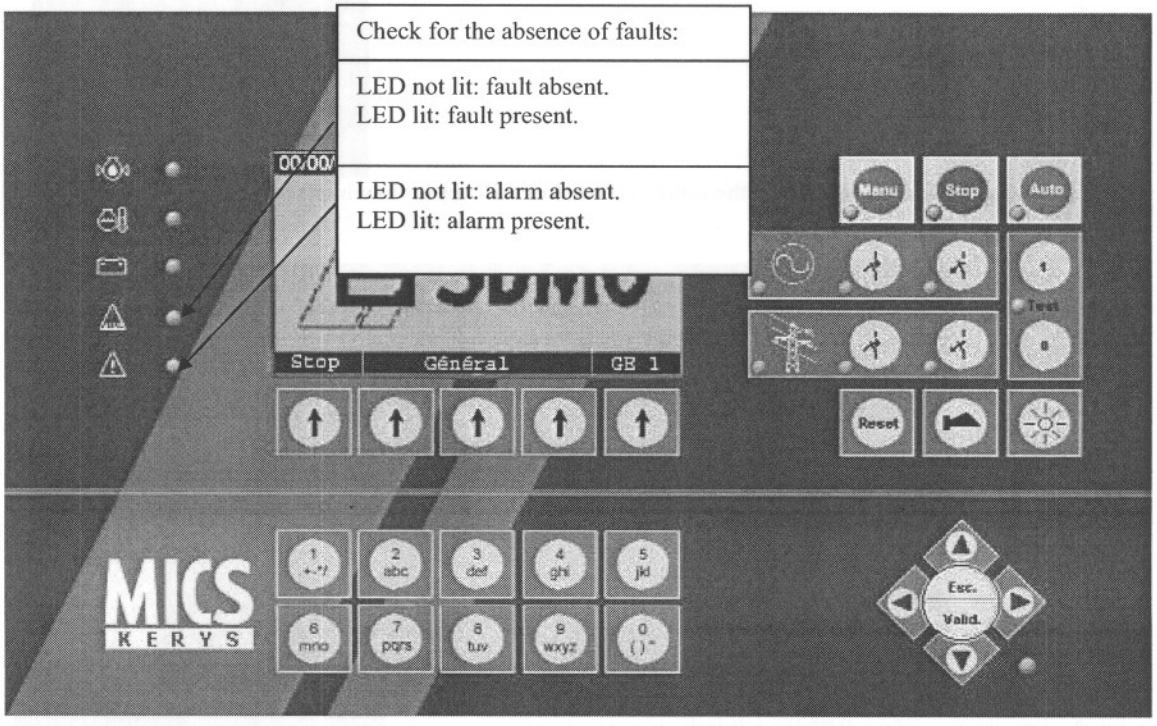
Central no load test

End test in: 594 seconds

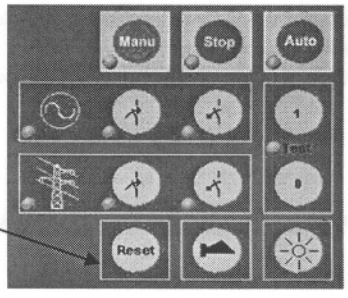
The **green LED** underneath the generating set symbol goes out to indicate that the generating set has stopped.



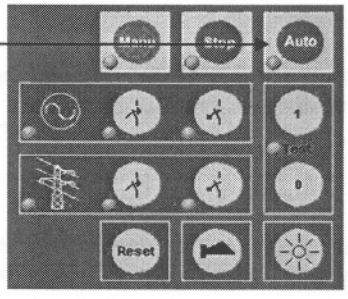
4.5. Starting using the load test function



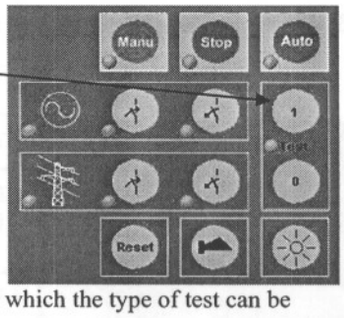
If faults are present, the fault management screen can be accessed by pressing the **reset button**.



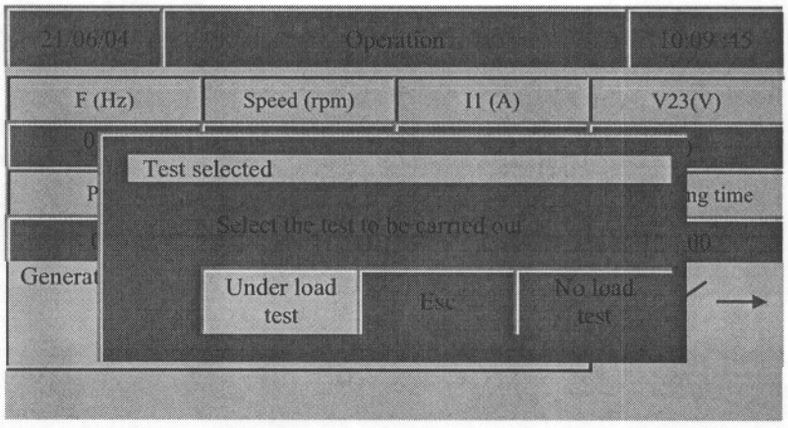
If no faults are present, automatic mode can be activated by pressing the **Auto button**.



The test starting phase will then begin once **button 1** of the test block is pressed.

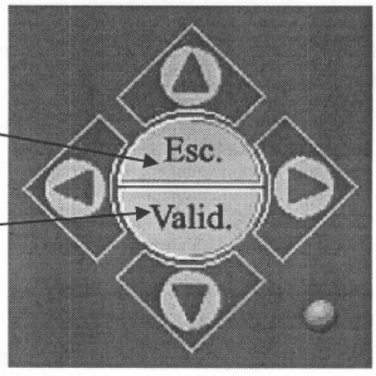


If you press **button 1** in the test block, the following window will appear in which the type of test can be selected.



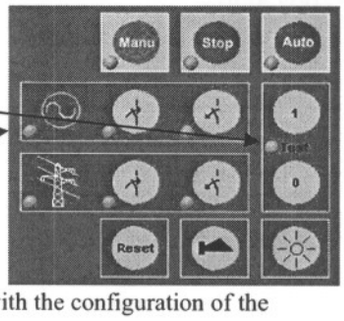
With the introduction of the KERYS IHM, the load test is now initiated when this function is selected (highlighted) using the arrow buttons shown here.
The **ESC button** can be used to cancel this function.

The **Valid button** can be used to confirm this function.



The **orange LED** in the test block lights up permanently once the test is confirmed

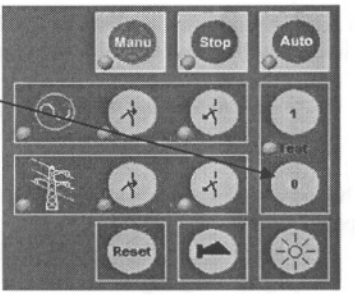
During the starting phase and until the alternator voltage stabilises, the **green LED** underneath the generating set symbol flashes, and then lights up permanently once the phase is complete.



The installation is then controlled via the automatic feature in accordance with the configuration of the application:

- inversion of normal/emergency source
- grid coupling
- etc.

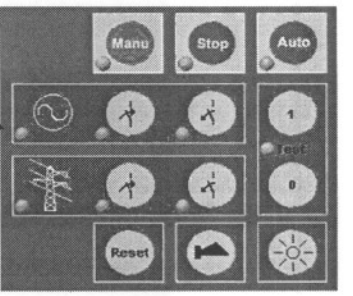
The generating set may be stopped at any time by pressing the **0 button** in the test block.



Important:
Pressing the **stop button** may cause an interruption in the power supply depending on its status when the button is pressed (e.g. isolated grid operation)
The generating set will stop after a cooling delay (180 seconds by default).
Example: screen below.

21/06/04	Operation		10:00:11
F (Hz)	Speed (rpm)	I1 (A)	V23(V)
50.00	1501	1	400
P.F.	P(kW)	Q(kVAr)	Operating time
0L	0	0	4:39
Generating set cooling, stop in: 170 seconds			

The **green LED** underneath the generating set symbol goes out to indicate that the generating set has stopped.



4.6. Starting in automatic mode

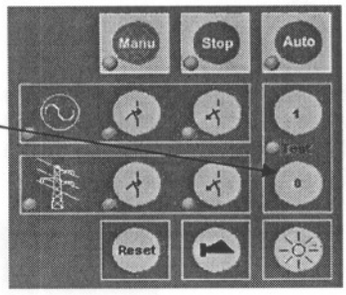
In AUTO mode, except for during the test functions, the generating set starts as a result of an external command which may be triggered by various sources:

- power loss
- EJP command (only for France)
- customer command.

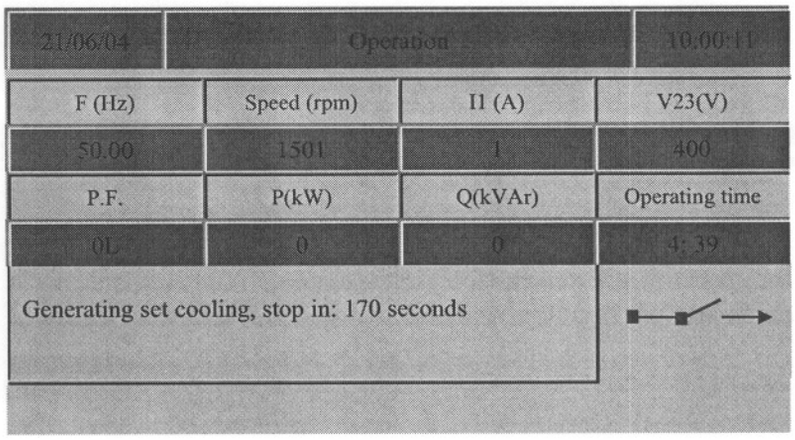
The installation is then controlled via the automatic systems in accordance with the configuration of the application:

- inversion of normal/emergency source
- grid coupling
- etc.

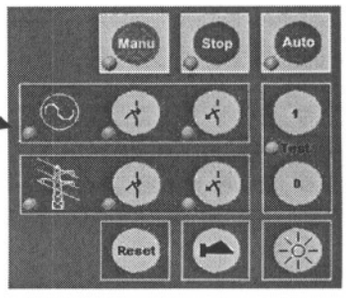
The generating set may be stopped at any time by pressing the **0 button** in the test block.



Important:
Pressing the **stop button** may cause an interruption in the power supply depending on its status when the button is pressed (e.g. isolated grid operation)
The generating set will stop after a cooling delay (180 seconds by default).
Example: screen below.



The **green LED** underneath the generating set symbol goes out to indicate that the generating set has stopped.



5. Definitions

5.1. Glossary

I.A.S.	Industrial Automated System
Coupling	Grouping together of more than one power supply on the same distribution grid
I.H.M.	Man Machine Interface. Tool enabling data to be exchanged between the user and the machine.
I.N.S.	Emergency/Normal Switching. Describes the device (switch) which enables the installation to be supplied by the grid (normal) or by the replacement power supply (emergency) or the operation (switching) from one power-supply to the other with a cut-off in supply to the installation
Led	Light-emitting diode.
Synchronisation	Continuous operation to equalise the voltage and frequency of several electrical supplies before linking them to the same Bus bars