



POWER FROM WITHIN

# GC600 CONTROLLER

**SMARTTECH**<sup>+</sup>  
A DIVISION OF MECC ALTE

USER MANUAL



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## INTRODUCTION

The manual must always be kept in a safe place where it is readily available for quick reference. The manual should be read carefully, and every paragraph understood by the operators and technicians doing routine and periodic maintenance. If the manual is lost or damaged, ask the installer/manufacturer for a copy, quoting the model, code, serial number and year of manufacture.

## 1 Safety information

Many accidents are caused by poor knowledge and the non-observance of safety regulations, which must be observed when operating and/or servicing the machine.

To prevent accidents, before using or servicing the machine you should read, understand and observe the precautions and warnings in this manual.

The following indications have been used to identify the safety messages in this manual:

 **WARNING!** This indication is used in the safety messages for risks which, unless avoided, can cause malfunction or damage to property or persons.

 **INFORMATION!** This term implies the message provides information useful for performing the current operation, or explanations or clarifications for procedures.

## 2 Maintenance and cleaning

The maintenance of this device must be carried out by qualified personnel, in observance of the law in force, to prevent from damages to persons or things.

The cleaning of the front panel can be carried out exclusively with a soft cloth. Do not use abrasive products, detergents or solvents.

## 3 Information concerning disposal

 **INFORMATION!** On the disposal of old electrical and electronic equipment (applicable in European countries that have adopted separate waste collection systems).



Products bearing the barred wheeled waste container symbol cannot be disposed of with normal urban waste. Old electrical and electronic equipment should be recycled in a facility authorized to process these items and dispose of the components. Contact your local authority for information on where and how to deliver such products to the authorized site nearest you. Proper recycling and disposal help conserve resources and prevents detrimental effects for health and the environment.

## 4 General info

The purpose of this manual is to describe boards **GC600**, **GC600<sup>Mains</sup>**.

## 5 Definitions

**LOCKOUT** - is used to indicate a fault that prevents the generator from operating and causes automatic and immediate emergency engine shut-down.

**POWER-OFF** - is used to indicate a fault that prevents the generator from operating and causes the standard automatic engine shutoff (including a cooling phase).

**WARNING** - is used to indicate a fault that requires the intervention of the operator without engine shutoff.

**MAINS** – Public power supply line.

**LOAD/BUS** – Electrical power supply line of the loads. It can be connected to more gensets

**GENERATOR** – Electricity line that is connected to the alternator of the Generator set

**LOAD** – Electrical power supply line of the loads. This can be connected to the **Mains** or to the **Generator**

**MCB** - Switch or component to manage the switching between the **Mains** line and the **Load** line.

**GCB** – Switch or component to manage the switching between the **Generator** line and the **Load** line.

**CANBUS** - Interface for the control and diagnostics of engines equipped with SAE J1939 or Can Bus MTU interface.

**ISLAND** - Type of plant where one or more gensets supply the **Load** without being in parallel with the **Mains**.

**MPM** – Type of plant working in **Island mode** and gensets working in parallel among them.

**SSB + SSTP** (Single Stand By + Single Short Time Parallel) - Type of plant where the genset starts and supplies the **Load** in case of **Mains failure**; once back to normal conditions, it carries out a short time parallel with the **Mains**, it disconnects from the **Mains** and from Load and it stops in stand-by. Depending on the configuration of the plant, it is also possible to synchronize the **Genset** with the **Mains** before disconnecting it in order not to leave the Load without supply.

## 6 Main functions

### 6.1 Front panel

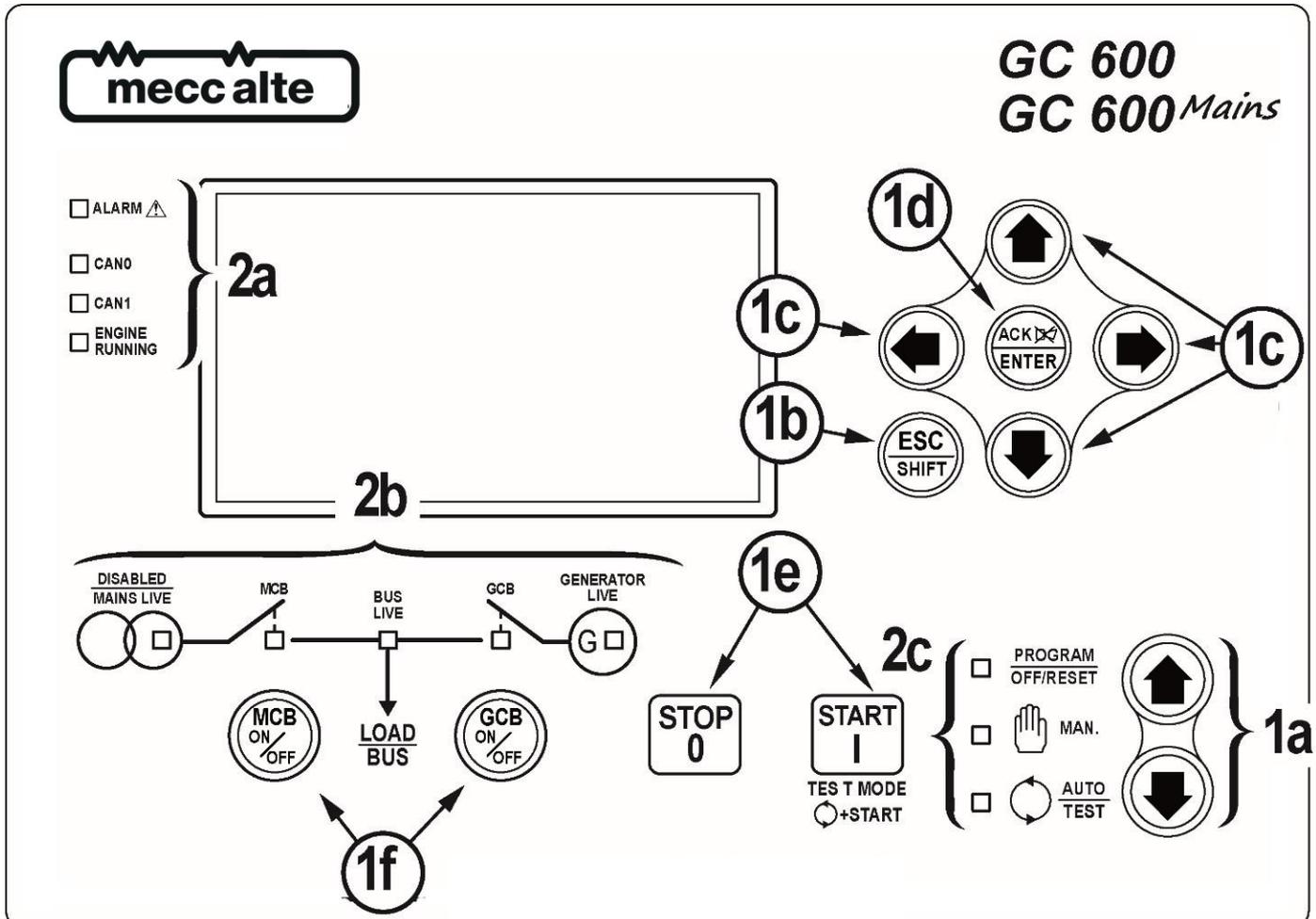


Fig.1 – Front Panel GC600, GC600<sup>Link</sup>

#### KEY

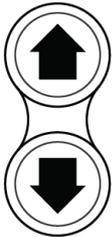
1 - Buttons

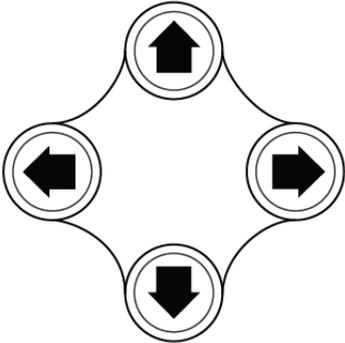
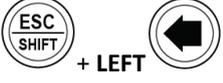
2 - Indicators

The controls consist of 12 buttons (1a, 1b, 1c, 1d, 1e, 1f).

The front panel also has some luminous indicators (2a, 2b, 2c).

## 6.2 Buttons (ref. to fig. 1)

Pushbuttons		Function
<p><b>MODE UP</b></p>  <p><b>MODE DOWN</b></p>  <p><b>Ref. 1a</b></p>	<p><b>OFF/RESET PROGRAM</b></p>	<p>The genset is disabled; all anomaly signals are disabled. All possible alarms are reset. It is possible to access to the parameter's configuration.</p>
	<p><b>MAN (Manual)</b></p>	<p>The Gen-set control module is set for manual gen-set control.</p> <p>Press the <b>START</b>  button to start the engine.</p> <p>Press the <b>STOP</b>  button to stop the engine.</p> <p>With the engine running and up to speed:</p>
	<p><b>GC600</b></p>	<p>Press and hold down the <b>ESC/SHIFT</b> button , and press the <b>GCB</b> button  for the manual open/close command of <b>MCB</b> circuit breaker with possible synchronisation if configured in the plant.</p> <p>Press the <b>GCB</b> button  for the manual open/close command of <b>GCB</b> circuit breaker with possible synchronisation if configured in the plant.</p>
	<p><b>GC600<sup>Mains</sup></b></p>	<p>Press the <b>MCB</b> button  for the manual open/close command of <b>MCB</b> circuit breaker with possible synchronisation if configured in the plant.</p> <p>Press the <b>GCB</b> button  for the manual open/close command of <b>GCB</b> circuit breaker with possible synchronisation if configured in the plant.</p> <p><b>i</b> <b>INFORMATION!</b> <i>For some types of plants, the sequences depend on the <u>Software and Hardware configuration of the plant during the installation activity.</u> In case of voltage on <b>BUS</b>, the synchronization is required.</i></p>
<p><b>AUTO (Automatic)</b></p> <p><b>TEST</b></p>	<p>The controller automatically manages the genset operation, so it will be started if required by the operating conditions.</p> <p>By pressing the <b>START</b>  button it is possible to activate/deactivate the <b>TEST</b> mode. If not differently configured, it does not cause the <b>GCB</b> circuit breaker closure (with eventual opening of <b>MCB</b>).</p> <p><b>!</b> <b>WARNING!</b> <i>The <b>STOP</b>  button, causes the stop of the Generator if running and the activation of a lockout unless configured otherwise.</i></p>	

Pushbuttons	Function
 <p>Esc/SHIFT</p> <p>Ref. 1b</p>	<p>In programming mode, it cancels the changes made to a variable value, brings up the previous menu level, or exits programming mode. If it is pressed for at least two seconds in any menu, you exit the programming mode retaining the current menu position for further programming access.</p>  <p>Depending on the selected page, if pressed together with the <b>ENTER</b> button for at least 5 seconds while in <b>OFF/RESET</b> mode, it can reset counters to zero, reload default values of the programming parameters or cancel history logs (in addition, the <b>CANBUS</b> equipped model allows to force exit from <b>BUS OFF</b> mode). When used during the keyboard regulation function, it aborts the function.</p> <p>If it is pressed in any window, it displays the status information on the upper line (displaying them cyclically).</p> <p>When the <b>HELP</b> information is available in the display pages, the <b>HELP</b> message will be displayed on the bottom bar, by pressing the button and hold.</p>
 <p>UP/DOWN LEFT/RIGHT</p> <p>Ref. 1c</p>	<p>Navigation buttons of the multifunction display. They allow selecting previous and following pages of the LCD display (except for <b>PROGRAM</b> and <b>HISTORY LOG</b> mode).</p> <p><b>Horizontal navigation buttons:</b> In the <b>PROGRAM</b> mode, they are used to place the cursor during the string insertion phase.</p>  <p>The horizontal buttons, combined with the button <b>EXIT/SHIFT</b> allow to regulate the contrast.</p> <p>To decrease the contrast (lighten), press the combination of buttons <b>Esc/SHIFT</b></p>  <p>To increase the contrast (darken), press the combination of buttons <b>Esc/SHIFT</b></p>  <p><b>Vertical navigation buttons:</b> In <b>PROGRAM</b> and <b>HISTORY LOGS</b> mode you can scroll the menus and the variables/settings. You can increase/decrease the value of the</p>  <p>variable to change the settings. Used in combination with the <b>Esc/SHIFT</b> button you can scroll through the menu ten entries at a time or increase/decrease the variables ten units at a time.</p>
 <p>ENTER/ACK</p> <p>Ref. 1d</p>	<p>In the <b>PROGRAM</b> menu, you can enter the programming mode and open a submenu, change a variable or parameter, and confirm the operation. In the <b>LOG</b> menu, you can activate the <b>HISTORY LOG</b> function and open the selected log, "acknowledge" any EEPROM errors at power-up.</p> <p>Upon the occurrence of an alarm or lockout, the pressing of the button recognizes the presence of an error and turns off the siren. A further press of the button resets any alarm signals if the operating conditions have returned to normal. Lockout signals can only be reset by activating the "OFF/RESET" mode.</p>

Pushbuttons	Function
 <p><b>MCB</b></p> <p>Ref. 1f</p>	<p><b>GC600<sup>Mains</sup></b></p> <p>The button is disabled in the “OFF/RESET”, “AUTO” and “TEST” modes.</p> <p>In “MAN” it is used to open and/or close the <b>Mains</b> contactor to the <b>Load</b> line.</p> <p>To open the <b>Mains</b> switch <b>MCB</b>, with the engine idle, press and hold the “MCB” button <u>for at least 5 seconds</u>.</p> <hr/> <p><b>GC600</b></p> <p>This button is not present on the devices <b>GC600</b>. Use the buttons combination  and the button <b>GCB</b>  for the manual open/close command of the <b>MCB</b> circuit breaker with possible synchronisation.</p> <p><b>i</b> <b>INFORMATION!</b> <i>For some types of plants, the sequences depend on the Software and Hardware configuration of the plant during the installation activity. In case of voltage on <b>BUS</b>, the synchronization is required.</i></p>
 <p><b>GCB</b></p> <p>Ref. 1f</p>	<p>It is used to command the General Circuit Breaker (GCB) or the changeover switch.</p> <p>The button is disabled in the “OFF/RESET”, “AUTO” and “TEST” modes.</p> <p>In “MAN” it is used to open and/or close the <b>Generator</b> contactor to the <b>Load</b> line. The closure of the <b>Load</b> line to the <b>Generator</b> is only possible if the relative electrical measures are within tolerance range.</p> <p>The button function depends on the plant configuration. In parallel mode with at least one other source powering the BUS, if the button is pressed it activates the fast unload ramp before the circuit breaker opens.</p> <p>In case no ramp is needed, simply keep it pressed for a few seconds until the GCB is opened.</p> <p><b>i</b> <b>INFORMATION!</b> <i>For some types of plants, the sequences depend on the Software and Hardware configuration of the plant during the installation activity.</i></p>
 <p><b>START</b></p> <p>Ref. 1e</p>	<p>In <b>MAN</b> mode it can be used to start the engine. The button can be configured in two ways:</p> <ol style="list-style-type: none"> <li>1. Fully manual (the starter motor is engaged all the time the button is pressed or until the engine running is detected).</li> <li>2. Fully automatic (simply press and release the “START” button to activate an automatic start sequence. If the start is not successful, start failure anomalies will not be reported. The “START” button must be pressed and released again to perform a new start attempt.</li> </ol> <p>In <b>AUTO</b> mode, it enables/disables the <b>TEST</b> status. When the Gen-set control module is activated, keeping it pressed at the same time as the <b>STOP</b>  button allows access to the special functions.</p>

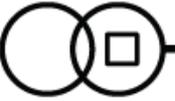
Pushbuttons	Function
 <p>STOP</p> 	<p>Used to control the stop of the engine in “MAN” mode.</p> <p>The button can be configured in two ways:</p> <ol style="list-style-type: none"> <li>1. Stop of the engine in <b>AUTO</b>, <b>TEST</b> or <b>REMOTE START</b> mode with the activation of a lockout.</li> <li>2. No function. The enabling of the button in <b>AUTO</b>, <b>TEST</b> or <b>REMOTE START</b> is irrelevant.</li> </ol> <p>Pressed with the Gen-set control module in <b>OFF/RESET</b> mode, runs the <b>LAMP TEST</b> on all the indicator lights. When the Gen-set control module is activated, keeping it pressed at the same time as the START  button allows access to the special functions.</p>

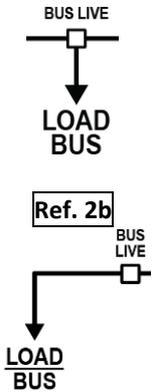
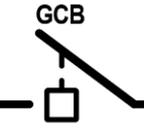
### 6.3 Indicators (ref. to fig. 1)

It is possible to modify the brightness of the indicators (all together) using parameter **P.0496**: the higher the parameter value, the higher the brightness of the indicators. The value can be set between 1 and 10 (default value= 5).

Led off	LED steady ON	LED flashing
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

	Signalling		Function
 <p>PROGRAM OFF/RESET</p> 	PROGRAM OFF/RESET	<input checked="" type="checkbox"/>	Indicates that the operation mode is OFF/RESET
		<input checked="" type="checkbox"/>	Indicates that you are accessing the PROGRAMMING menu
		<input type="checkbox"/>	The Gen-set control module is in another operating mode.
  <p>MAN.</p> 	MANUAL	<input checked="" type="checkbox"/>	Indicates that the operation mode is MANUAL
		<input type="checkbox"/>	The Gen-set control module is in another operating mode.
  <p>AUTO TEST</p> 	AUTO TEST	<input checked="" type="checkbox"/>	Indicates that the operation mode is AUTOMATIC
		<input checked="" type="checkbox"/>	Flashing at 50% indicates that the operating mode is TEST Flashing at 90% indicates that the operating mode is REMOTE START.
		<input type="checkbox"/>	The Gen-set control module is in another operating mode.
 <p>ALARM</p>  	ALARM	<input checked="" type="checkbox"/>	Indicates the presence of at least one lockout or power-off.
		<input checked="" type="checkbox"/>	Signals at least one warning which has not yet been acknowledged with the “ACK/ENTER” button.
		<input type="checkbox"/>	No warnings.

	Signalling		Function
<input type="checkbox"/> CAN0 Ref. 2a	INTERFACE ECU STATUS	<input checked="" type="checkbox"/>	Indicates that the <b>CAN-BUS</b> interface is ON and in <b>ERROR-ACTIVE</b> mode. (J1939 o MTU).
		<input checked="" type="checkbox"/>	Flashing at 25% ON signals a COM error (J1939 or MTU): the port is in <b>ERROR-PASSIVE</b> mode.
		<input type="checkbox"/>	Flashing at 75% ON signals a COM error (J1939 or MTU): the port is in <b>BUS-OFF</b> mode.
<input type="checkbox"/> CAN1 Ref. 2a	PMCBus STATUS	<input checked="" type="checkbox"/>	Indicates that the <b>CAN-BUS</b> interface is ON and in <b>ERROR-ACTIVE</b> mode. Power Management Communication Bus (PMCB).
		<input checked="" type="checkbox"/>	Flashing at 25% ON signals a COM error (J1939 or MTU): the port is in <b>ERROR-PASSIVE</b> mode. Power Management Communication Bus (PMCB).
		<input checked="" type="checkbox"/>	Flashing at 75% ON signals a COM error (J1939 or MTU): the port is in <b>BUS-OFF</b> mode. Power Management Communication Bus (PMCB).
<input type="checkbox"/> ENGINE RUNNING Ref. 2a	ENGINE RUNNING	<input checked="" type="checkbox"/>	It indicates that the engine is running.
		<input checked="" type="checkbox"/>	Flashing at 50% indicates that the engine is running, and the cooling cycle is ongoing.
		<input type="checkbox"/>	It indicates that the engine is idle.
MAINS LIVE  Ref. 2b DISABLED MAINS LIVE <input type="checkbox"/>	MAINS LIVE	<input checked="" type="checkbox"/>	<b>Mains</b> power is ON and stable in the tolerance range. The <b>MAINS SIMULATION</b> digital input is enabled from the set time.
		<input type="checkbox"/>	The <b>Mains</b> power is OFF. The <b>MAINS SIMULATION</b> digital input is disabled.
		<input checked="" type="checkbox"/>	Flashes at 50% during transition between the previous two states. Flashing at 25% the <b>Mains</b> power is on but below the tolerance range. Flashing at 75% the <b>Mains</b> power is on but over the tolerance range.
GENERATOR LIVE 	GENERATOR LIVE	<input checked="" type="checkbox"/>	<b>Generator</b> voltage and frequency are present and steady within the tolerance range.
		<input type="checkbox"/>	<b>Generator</b> voltage and frequency are not present.
		<input checked="" type="checkbox"/>	Flashes at 50% during transition between the previous two states. Flashing at 25% the Mains power and frequency are on but below the tolerance range.

	Signalling		Function
			Flashing at 75% the Mains power and frequency are on but over the tolerance range.
 MCB Ref. 2b	MCB GC600 <sup>Mains</sup>	<input type="checkbox"/>	The MCB switch is opened.
		<input checked="" type="checkbox"/>	The MCB switch is closed.
			Flashes at 25% ON if open after a closing command.
		<input checked="" type="checkbox"/>	Flashing at 75% ON if closed after an opening command.
 BUS LIVE LOAD BUS Ref. 2b BUS LIVE LOAD BUS	BUSLIVE	<input checked="" type="checkbox"/>	Signals <b>BUS</b> line ON.
		<input type="checkbox"/>	Signals <b>BUS</b> line OFF.
			Flashing at 50% if the <b>BUS</b> line voltage is outside tolerance range.
		<input checked="" type="checkbox"/>	GC600 Flashing at 50% during synchronization phase (alternate to <b>GCB</b> ) or during the back-synchronization phase (alone). GC600 <sup>Mains</sup> Flashing at 50% during synchronization phase (alternate to <b>GCB</b> ) or during the back-synchronization phase (alternate to <b>MCB</b> ).
 GCB Ref. 2b	GCB	<input type="checkbox"/>	The GCB switch is opened.
		<input checked="" type="checkbox"/>	The GCB switch is closed.
			Flashes at 25% ON if open after a closing command.
		<input checked="" type="checkbox"/>	Flashing at 75% ON if closed at opening command (it flashes alternate to <b>BUS LIVE</b> ).

## 6.4 Multifunctional display

### 6.4.1 TFT display lighting

The back-light lamp is managed by the Gen-set control module, which switches off the back light after a programmable time (**P.492**) if no buttons are pressed in the meantime. Press any button to switch the lamp ON

again, (we recommend using the **Esc/SHIFT**  button as it has no function when used alone). It is possible to deactivate the automatic power-off bringing the parameter **P.0492** to 0.

### 6.4.2 Contrast adjustment

Depending on the environmental temperature conditions, the contrast may require adjustment to view the display correctly.

Press in sequence the Esc/SHIFT button + LEFT  button + RIGHT  to reduce the contrast (lighten), press the Esc/SHIFT button + RIGHT  to increase it (darken).

### 6.4.3 Colours scheme

As default, the device shows the information on TFT display using a blue background. It is therefore possible to modify this behaviour using parameter **P.0499**:

- **P.0499 = 0**: blue background (default).
- **P.0499 = 1**: black background.
- **P.0499 = 2**: white background.

The messages colour depends on the background colour selected and on the type of information displayed.

### 6.4.4 Mode navigation

The display has different visualization modes composed by different pages.

Mode	Description	Page identifier
PROGRAMMING	Programming	P.XX
PLC	Information on PLC program	L.XX
STATUS	Status information	S.XX
MEASURES	Electrical measurements	M.XX
ENGINE	Engine measurements	E.XX
PMCB	Pages related to parallel functions	B.XX
HISTORY	History logs	H.XX

Generally, navigation between modes takes place via buttons **UP**  and **DOWN**  **Ref. 1c.**

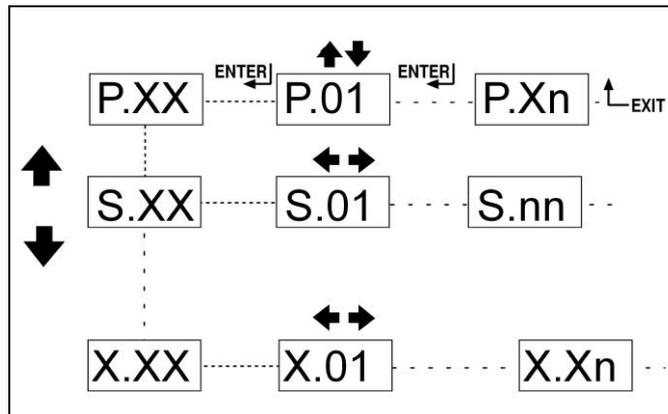


Fig. 2 - Mode navigation

Use the **LEFT**  and **RIGHT**  **Ref. 1c** buttons to display the pages in the mode.

In some modes (e.g.: mode P.xx and mode H.xx) to view the pages, the **ENTER**  button, and then the **UP**  **Ref. 1c** and **DOWN**  **Ref. 1c** buttons must be pressed to navigate between pages.

If the **UP**  and **DOWN**  buttons have to be used to manage the functions within the mode, the **ENTER**  button must be pressed to activate the said functions, and the **Esc/SHIFT**  button to deactivate them.

### 6.4.5 Display area layout (ref. to fig. 3)

KEY:  
 1 - Status bar  
 2 - Data area

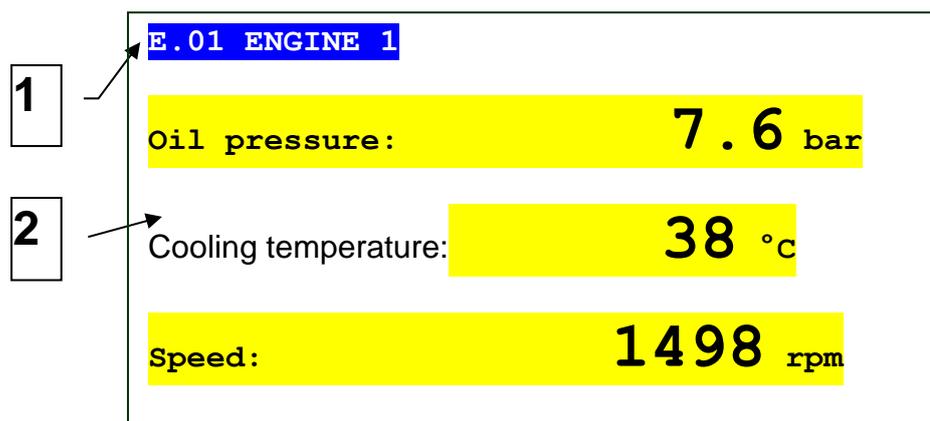


Fig. 3 - Display areas

## 6.4.6 Top status bar (ref. to fig. 4)

The top status bar contains information on navigation, times and/or some status information.

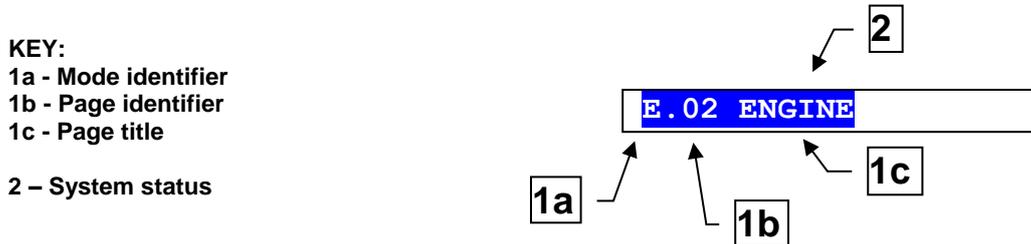


Fig. 4 - Top status bar

The current mode is shown in the relevant field of the top status bar (1a).

The mode identifier (1a), and the page identifier (1b) identify and refer to the page so there is no chance of error.

The system status (2) displays part of the information of page S.01 (STATUS) that is useful to the operator, as it can be displayed even if other pages or display mode are being accessed.

In some pages, pressing the **Esc/SHIFT**  button replaces the upper status bar with a **System Status** message all the time the button is held down. By double clicking the **Esc/SHIFT**  button, the upper status bar is replaced with a **System Status** message so long as you remain on that page. If the message is unavailable, the bar is cleared and restored when the button is released.

## 6.5 Display mode

### 6.5.1 Programming (P.xx)

 **WARNING!** Assigning an incorrect value to one or more parameters can cause malfunctions, damage to things or injury to people. The parameters must only be changed by qualified personnel. Parameters may be password protected (see par. Access codes) Access codes).

This mode allows the display and change of the programming parameters.

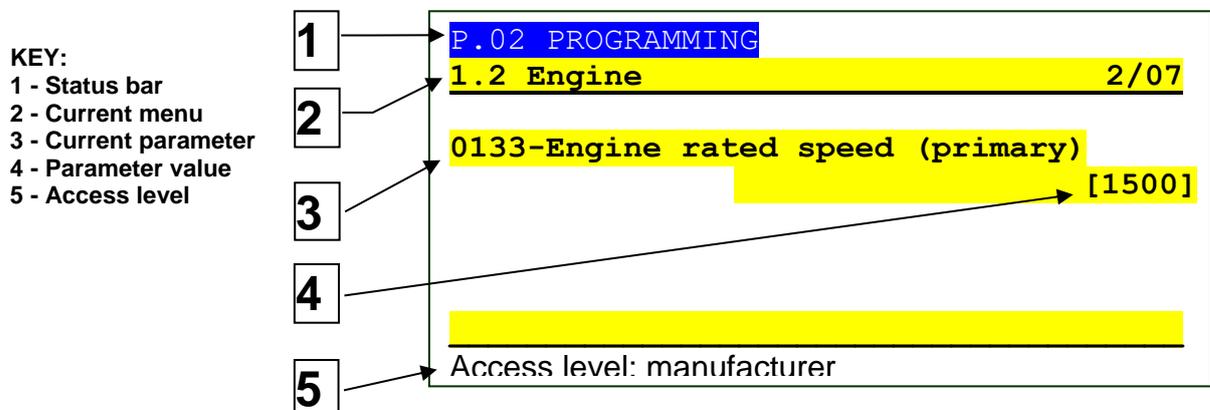


Fig. 5 - Display areas

Each programming parameter **Ref. 3** has a 4-digit numeric code (e.g. **P.0133**) to identify the variables regardless of the language used. The current value of the parameter is displayed below the description **Ref.4**.

The first line **Ref.2** under the top status bar allows to identify the present menu by means of the identification number of the menu and by the associated text. A pair of numbers is displayed on the right of this line (**2/07** in the example in **fig. 5**). The first indicates which entry in the menu is selected or which page is displayed, the seconds indicates how many entries or pages can be displayed in the current menu/submenu.



Pressing **ESC/SHIFT** button, the first line (1) is temporarily substituted with a status message.

### 6.5.1.1 Access codes

Access to the parameters programming mode can be controlled by 3 different **PASSWORD** levels, which are listed in order of priority.

1. **Mecc Alte Password**
2. **Manufacturer Password**
3. **Installer Password**
4. **User Password**

*If the password is lost, you can reconfigure it using a higher-level password. Contact our service centre if the "MANUFACTURER" password is lost.*

Enter the authentication password on page **1.1.1 Authentication**. To access, enter the various menus and submenus following the path: **PROGRAMMING, 1. SYSTEM, 1.1 SECURITY, 1.1.1 AUTHENTICATION**.

The (**000-Access Code**) page of the **Safety 1/02** menu requires the setting of the access code if one or more passwords have been assigned.

The Password/s can be modified or cancelled (authentication level or lower) in submenu **1.1.2 Password**, after being authenticated with the password.

If a password is set to 0, it is not assigned and not required.

The **USER** can only display and change the User Password.

The **INSTALLER** can change the User Password and the Installer Password.

The **MANUFACTURER** can display and change all three passwords.

As **Mecc Alte**, it is possible to display and change some parameters of plant configuration, related to the parallel functions.



**Warning: The critical parameters must not be changed by the user.**

In programming mode, if the page for changing the password isn't displayed when the Password is entered, press



**Esc/SHIFT** to return to the previous menu and try opening the page again.

The set access code remains in the memory for about 10 minutes after programming has been completed. After that it must be entered again to access the programming mode.

### 6.5.1.2 Setting the parameters

In the **PROGRAMMING** page, enable the mode with the **ACK/ENTER**  button.

Use the **UP**  **Ref. 1a** and **DOWN**  **Ref. 1a** navigation buttons to select a menu and **ACK/ENTER**  to open it. Select the variable or submenu with the **UP**  **Ref. 1a** and **DOWN**  **Ref. 1a**

navigation buttons. Pressing **ACK/ENTER**  when there are no submenus, displays the page of variables for the menu entry.

The value of the variable is displayed in square brackets, for example: [0400]

To change the variable, press **ACK/ENTER** ; the square brackets [...] will flash. Use the **UP**  **Ref. 1a** and **DOWN**  **Ref. 1a** navigation buttons to modify the value and press **ACK/ENTER**  to confirm or **Esc/SHIFT**  to cancel the modification.

The variation of the parameters requires the “**OFF/RESET**” operating mode.

Some parameters can also be modified with operating modes different than “**OFF/RESET**”.

If it is not permitted to change a value in any condition, it will be represented in the following manner: <400> showing that the parameter cannot be changed in this status.

To exit the programming menu, use the **Esc/SHIFT**  button.

### 6.5.1.3 How to input string value

Some parameters require the setting or modification of the alphanumeric strings.

In this case, pressing **ACK/ENTER**  makes the square brackets [...] around the variable flash, and a cursor appears under the first character of the string.

Using the **LEFT**  and **RIGHT**  buttons, you can select which character to change. Then, use the **UP**  **Ref. 1a** and **DOWN**  **Ref. 1a** buttons to change the character selected. Repeat the procedure for each character that needs changing.

Use **ACK/ENTER**  (confirm) or **Esc/SHIFT**  (abort) to end the procedure.

### 6.5.1.4 Direct access to the previous page

You can open the last programming page displayed directly. This is possible if, when exiting programming mode, instead of going back through the menus until you exit programming, you hold down **Esc/SHIFT**  for approximately 2 seconds.

The same is true when accessing the programming mode after Gen-set has automatically exited programming. This occurs if, for 60 consecutive seconds, no operations are performed on the programming or if the operating mode is changed to "MAN" or "AUTO".

### 6.5.1.5 Alarms and protection parameters

Protections and alarms can generally be configured using dedicated variables. Generally, the trip time can also be configured.

 **INFORMATION!** Setting the trip time to 0 disables the protection.

## 6.5.2 PLC (L.xx)

The status pages from **L.01** to **L.07** contain the information related to the PLC logic and they are displayed only if the controller is equipped with a valid PLC program. Refer to technical manual for information on PLC.

Page **L.01 (PLC)** contains identification information of the PLC program installed in the PC, as:

- The title and the description of PLC program.
- The date of the last modification.
- The firmware PLC version of the filler and the editor.
- The maximum and minimum time of exposition. These times are automatically reset when the PLC program is transferred to the controller or it is possible to force the reset by pressing the buttons

 **ACK/ENTER** +  **+Esc/SHIFT** for 5 seconds.

The page **L.02 (PLC LOGIC)** contains the information related to the single PLC block.

**KEY:**

- 1 - Identification
- 2 - Parameter type
- 3 - Associated resource
- 4 - Resource value

L.02 LOGIC PLC			
PLC Block:		[AND-001]	
<b>1</b>	<out>	DI_VIRTUAL_01	0
<b>2</b>	<in>	DI_CONTROLLER_01	1
<b>3</b>		DI_CONTROLLER_02	0
<b>4</b>			

The selected block is shown with format "TIPO-NUMERO" **(1)** in the second line of the display. In the example we have a block called "AND-001".

In the next lines all parameters of the selected block are shown (one line for each parameter):

- The first column (2) identifies the parameter type of the block (input or output). In the example, the block AND-001 has two inputs <in> and one output <out>.
- The second column (3) identifies the resource associated to the block parameter. In the example, the block AND-001 has two physical inputs of the GC600 controller (DI\_CONTROLLER\_01 and 02) associated to its inputs (<in>) and the result of the logic is withdrawn from the output <out> of the block and transferred on a virtual digital input (DI\_VIRTUAL\_01) of the controller.
- The third column (4) shows the current value of the resource. As for the digital resources, if the value is displayed in REVERSE, this means that the relative parameter is denied.

Page **L.03 (VIRTUAL INPUTS)** shows the status of all virtual digital inputs (that is, those inputs which status is not acquired by the hardware, but it is determined by the PLC program).

Page **L.04 (DIGITAL FLAGS)** shows the status of all digital temporary variables available for the PLC program. There are more pages that alternate every 2 seconds to display all the digital supports. If you keep

 **Esc/SHIFT** button pressed, the rotation of pages is stopped (keeping on the display the page currently shown).

Page **L.05 (DIGITAL STATE)** shows the value of all controller internal statuses (ST.XXX) available for the PLC program.

Page **L.06 (VIRTUAL ANALOGUE)** shows the status of all virtual analogue inputs (that is, those inputs which the heat is not acquired by the hardware, but it is determined by the PLC program).

Page **L.06 (NUMERICAL SUPPORT)** shows the status of all numeric temporary variables (AT\_XXX) available for the PLC program. There are more pages that alternate every 2 seconds to display all the numerical

supports. If you keep  **Esc/SHIFT** button pressed, the rotation of pages is stopped (keeping on the display the page currently shown).

### 6.5.3 Status information (S.XX)

In this mode, the information on the system status are supplied.

You can scroll through the various pages using the **LEFT**  and **RIGHT**  buttons.

Page **S.01 (STATUS)** shows system status information. Part of this information are displayed in the upper title bar

if you press and hold the  **ESC/SHIFT** button.

The page **S.02 (ANOMALIES)** is automatically displayed in case a new anomaly arises. For every anomaly, it is shown:

- A letter that identify the type.
  - "A": alarm (block)
  - "U": Unload.
  - "D": deactivation.

- “W”: warning.
- A three-digit numeric code that uniquely identify the anomaly. This code flashes if the anomaly has

not been acknowledged yet with **ACK/ENTER**



Page **S.03 (BOARD STATUS)** displays the information of the device and contains:

- Current date and time in long format (flashing if the clock is not valid)
- The univocal series number of the controller (“Cod. ID”).
- The software codes are currently uploaded on the controller.
- The necessary internal code to get a temporary Mecc Alte level password.
- The internal temperature of the controller
- The language currently used by the device. It is also possible to select a different language: press

button **ACK/ENTER** , select a language using vertical **UP**  and horizontal **DOWN**  navigation buttons and confirm with **ACK/ENTER** .

**NOTE: GC600 is provided with the only languages ENGLISH, ITALIAN and PORTUGUESE. With program BoardPrg3 is possible to transfer other languages to the controller.**

The page **S.04 (SERIAL COMMUNICATION)** displays the status of the serial communication towards the two serial ports and by USB. In case of functional problems, please check the content of this page.

For each serial port (and for the USB too) the status (stand-by, communicating, etc.) and the counter of the receiving errors are displayed.

If the controller is connected to a modem, it is also displayed:

- The modem’s model.
- In case of a GSM modem:
  - The name of the telephone provider.
  - The GSM signal level

Page **S.05 (NETWORK)** is dedicated to the status of the connection and of the communication via TCP/IP on the Ethernet interface.

The controller shows:

- The status of the connection:
  - “Stand by”: no ongoing communication and Ethernet cable disconnected.
  - “Stand by-connected”: no ongoing communication and cable connected to Ethernet network.
  - “Ongoing communication”: ongoing communication and cable connected to Ethernet network.
- MAC address of physical network interface.

- IP address of the controller, address of router/gateway, the Sub-net mask and the DNS server address. These values can be those set with the controller parameters or those acquired dynamically by the DHCP server.

Page **S.06 (SMARTCLOUD)** is displayed only if the connection with the Mecc Alte SMARTCLOUD system is enabled. It shows the controller name (useful to upload it in “SMARTCLOUD” system and the IP address of “SMARTCLOUD” server. Moreover, it displays the communication status with the server:

Page **S.07 (CANBUS)** displays the status of the CAN-BUS interfaces of the controller. Each interface displays

- The communication status of the bus. There are three possible signalling:
  - - ERROR-ACTIVE: normal operation
  - - ERROR-PASSIVE: communication is working despite faults (errors).
  - - BUS-OFF: Gen-set has interrupted the connection to the bus due to too many errors.
- Communication error counters are displayed. The counters of the instantaneous transmission/reception errors and the maximum values reached are displayed. It is possible to reset the maximum values (and force the output status of BUS-OFF) by pressing for 5 seconds the buttons

 **ACK/ENTER** and  **Esc/SHIFT**. Since there are two CAN faces, it is necessary to select the CAN interface first and then reset the counters: to select an interface, press  **UP** and horizontal  **DOWN** navigation buttons.

The pages **S.08-09-10 (SYSTEM STATUS)** display the general status of the digital inputs. Digital inputs assigned as Warnings, Lockouts or Power-offs do not come under this category. The generic status functions, and the display priority of the same in the pages are pre-assigned when configuring the system parameters.

The page uses one line for each configured input. If more than 6 inputs are configured on each page, the

controller shows them all letting them rotate (6 at a time) every two seconds: keeping the  **Esc/SHIFT** button pressed, you stop the rotation. If there are no configured inputs on a page, the page is not displayed.

On each line the controller shows the configured text for the digital input and the logic status of the input.

The page **S.11 (DIGITAL INPUTS)** displays the status of:

- Digital inputs
- Analogue inputs used as digital (if they are not used as digital they are displayed with hyphens).
- Virtual digital inputs

The page **S.12 (DIGITAL INPUTS)** is displayed only if **DITEL** modules have been configured. It displays the status of the digital inputs acquired by **DITEL** modules. If a **DITEL** module does not communicate correctly, the controller displays some hyphens in place of the input's status.

Page **S.13 (DIGITAL OUTPUTS)** shows the status of controller digital outputs.

Page **S.14 (DIGITAL OUTPUTS)** is displayed only if **DITEL** modules have been configured. It displays the status of the digital outputs controlled by **DITEL** modules. If a **DITEL** module does not communicate correctly, the controller displays some hyphens in place of the input's status.



**ACK/ENTER** button scrolls through three different pages (**LOGIC STATE, PHYSICAL STATE, BY FUNCTION**), showing the status of the digital inputs or outputs:

- **LOGIC STATE:** The inputs/output logic state (active or inactive) used by the controller in the management of the operating sequence.
- **PHYSICAL STATE:** Electrical level (active or inactive, or high or low) really present on the input/output; this can be the opposite in comparison to the corresponding logic state. Displayed in negative.
- **BY FUNCTION** (only for pages **S.11** and **S.13**: the controller shows a list of functions really associated to the digital inputs/outputs, displaying the logic status (1/0) related to each function, independently from the input/output really associated to the functions. If more than 8 inputs/outputs are configured on each page, the controller shows them all letting them rotate (8 at a time) every two



seconds: keeping the **Esc/SHIFT** button pressed, you stop the rotation.

Page **S.15 (ANALOG INPUTS)** displays the value of the Gen-set control module's analogue inputs.



Pressing **ACK/ENTER** it is possible to display the rotating inputs in two different ways:

- **PHYSICAL STATE:** For each input the measure in Volt is displayed, for terminals JK-2, JK-3, JK-4 and JK-5 the measure in Ohm is also displayed.
- **BY FUNCTION:** the controller shows a list of the functions really associated to the analogue inputs, showing the relative acquired value, independently from the input really associated to the functions. If more than 8 inputs/outputs are configured on each page, the controller shows them all letting



them rotate (8 at a time) every two seconds: keeping the **Esc/SHIFT** button pressed, you stop the rotation.

Page **S.16 (ANALOGUE INPUTS)** displays the value of the expansion modules analogue inputs. The page is available only if one or more **DITEMP** or **DIGRIN** modules are installed in the system. If more than 8 **DITEMP/DIGRIN** are used, the controller shows them on two pages, letting them alternate every 2 seconds:



(keep **Esc/SHIFT** pressed to stop the rotation).

Page **S.17 (ANALOGUE INPUTS)** displays the value of the expansion modules analogue inputs. The page is available only if the **DIVIT** expansion module is installed in the system. If more than 3 **DIVIT** are used, the



controller shows them on two pages, letting them alternate every 2 seconds: (keep **Esc/SHIFT** pressed to stop the rotation).

The page **S.18 (ANALOGUE OUTPUTS)** displays the value of the controller analogue outputs and the related function.

Pressing **ENTER** you pass to a viewing by function: the controller shows a list of functions really associated to the analogue outputs, showing the analogue value related to each function, independently from the output really associated to the functions. If more than 8 inputs/outputs are configured on each page, the controller shows them all letting them rotate (8 at a time) every two seconds: keeping the **Esc/SHIFT** button pressed, you stop the rotation.

The **S.19 (ANALOG OUTPUTS)** page displays the analogue output value of the **DANOUT** expansion module. The page is available only if the **DANOUT** expansion module is installed in the system. If more than 3 **DANOUT** are used, the controller shows them on two pages, letting them alternate every 2 seconds: (keep



**Esc/SHIFT** pressed to stop the rotation).

The page **S.20 (MAINS PROTECTION)** is displayed only if the type of plant considers the temporary parallel with the mains.

It displays the status of all protections of parallel with the mains. The disabled protections are not displayed. For each protection enabled, the controller displays a text (for example "27<<": it is displayed in reverse if the protection is enabled - mains out of tolerance).

Possible codes are: "27<<", "27<", "27T", "27Q", "59>", "59>>", "81<<", "81<", "81>", "81>>", "81R", "VJ", "MC" (by MC100), "DI" (by contact).

Page **S.21 (PULSE COUNTER)** is displayed only if the controller is configured as a pulse counter. From version 01.19, it is in fact possible to count the activations/deactivations of the digital inputs, up to a maximum of 8 counters. For this purpose, functions DIF.2401...DIF.2408 have been added for configuring the digital inputs. When a configured input changes from "inactive" to "active", the relative counter is incremented by 1. When the input configured with functions DIF.2417...DIF.2424 is active, the relative counter is forced to zero.

The page **S.22 (SHARED DIGITAL INPUTS)** displays the status of the controller's shared digital inputs. They are displayed in groups of 16 inputs and only those used (by the controller or received via PMCB).

The page **S.23 (SHARED ANALOGUE INPUTS)** displays the status of the controller's shared analogue inputs. Only those used (by the controller or received via PMCB) are displayed.

## 6.5.4 Electrical measurements (M.XX)

You can scroll through the various pages using



the **LEFT**



and **RIGHT**

buttons.

This mode displays all the information on the measurements taken by the Gen-set control module on the electric lines.

Under some electrical measures, the controller also displays a bar showing graphically the value measured compared to the rated power: on the bar are also one or more notches representing the eventual thresholds. The colour with which the band is filled is green if the measure is in tolerance, yellow if the measure is out of tolerance.

Page **M.01 (SYSTEM)** displays a wiring diagram of the system. The states of the switches, the **MAINS**, the **GENERATOR**, the **USERS** and the electrical values depend on the system configuration.

In this page it is possible to change the power supplied in the application of parallel with the mains **BASE LOAD** and **IMPORT/EXPORT**

Page **M.02 (MAINS/BARS)** displays the main electrical measurements of Mains/Bus. In this page are the voltages, the frequency and the rotation direction of the mains/bars phases. The information really displayed depend on the configuration.

- **Three-phase system with neutral connected to the controller:** The controller shows the three phase-to-phase voltages, the frequency, the rotation direction and the neutral-battery voltages.



By keeping the **ACK/ENTER**

button pressed, in place of phase-to-phase voltages, the phase voltages are shown.

- **Three-phase system without neutral.** The controller shows the three phase-to-phase voltages, the frequency and the rotation direction.
- **Single-phase system.** The controller displays the phase voltage, the frequency and the neutral-battery voltage.

Page **M.03 (GENERATOR)** displays the electrical magnitudes of the **GENERATOR**. In this page the voltages, the frequency and the rotation direction of the mains/bars are displayed. The information really displayed depend on the configuration.

- **Three-phase system with neutral connected to the controller.** The controller shows the three phase-to-phase voltages, the frequency, the rotation direction and the neutral-battery voltages.



By keeping the **ACK/ENTER** button pressed, in place of phase-to-phase voltages, the phase voltages are shown.

- **Three-phase system without neutral.** The controller shows the three phase-to-phase voltages, the frequency and the rotation direction.
- **Single-phase system.** The controller displays the phase voltage, the frequency and the neutral-battery voltage.

Page **M.04 (CURRENTS)** displays the phase currents of the **Generator/Load**, the negative sequence current, the auxiliary current, the neutral current and the differential current.

Page **M.05 (POWERS)** displays the active powers (kWh), the power factors and types of load on single and total phases (for single-phase systems, the information relative to phases 2 and 3 are replaced by dashes).

Page **M.06 (POWERS)** shows the reactive powers (kvar), and the apparent powers (kVA) on single and total phases (for single-phase systems, the information related to phases 2 and 3 are replaced by dashes).

Page **M.07 (ENERGY METERS)** displays the **Load/Generator** partial energy counters (active and reactive energy), total energy (active and reactive energy). Available only if the configuration of the CT (Current Transformer) is set to **Generator**.

Page **M.08 (ENERGY METERS)** displays the **Load/Mains** partial energy counters (active and reactive energy), total energy (active and reactive energy). Available only if the configuration of the CT (Current Transformer) is set to **User**

Page **M.09 (AUXILIARY MEASURES)** displays the additional information on genset voltages and currents, used for the protection of the 27Q mains parallel.

Page **M.10 (REGULATIONS)** displays genset and mains/bus voltages and frequency at the same time. It displays the parameters used to monitor the parallel operation. This window allows you to change the power supplied in the mains parallel applications in **BASE LOAD** and **IMPORT/EXPORT** operation.

Page **M.11 (SYNCHRONIZATION)** displays synchronization information. The use of the displayed synchronoscope in **MAN** mode allows the manual synchronization (par. 6.2.1).

Page **M.12 (PARALLEL)** displays the information when the genset is in parallel with the mains or other gensets. It displays the active and reactive power and the power factor. It also displays currents, medium voltage and genset frequency. In this page it is possible to change the power supplied in the application of parallel with the mains **BASE LOAD** and **IMPORT/EXPORT**

Page **M.13 (SETPOINTS)** shows and allows to modify (in a unique point) all setpoints applicable for plant, relative to speed and voltage governor.

The setpoints are shown only if are not acquired by analogue inputs and are provided in the plant configuration.

Page **M.14 (SETPOINTS 2)** shows (in a unique point) all setpoints applicable for plant, relative to speed and voltage governor, acquired by analogue inputs.

 **INFORMATION!** *Some of the data is not displayed in mono-phase configuration.*

## 6.5.5 Engine measurements (E.XX)

The engine related measurements are shown in this mode.

Page **E.01 (ENGINE 1)** displays the main values of the engine: Oil pressure (bar), Coolant temperature (°C) and engine speed (rpm).

If any of these values is not available, it'll be replaced with dashes. Under some electrical measures, the controller also displays a bar showing graphically the value measured compared to the full-scale: on the bar are also one or more notches representing the eventual thresholds. The colour with which the band is filled is green if the measure is in tolerance (shutdown), yellow if the measure is out of tolerance (for warning).

Page **E.02 (ENGINE 2)** displays the starter battery voltage (V), the fuel level (%) and the oil temperature (°C).

If any of these values is not available, it'll be replaced with dashes. Under some electrical measures, the controller also displays a bar showing graphically the value measured compared to the full-scale: on the bar are also one or more notches representing the eventual thresholds. The colour with which the band is filled is green if the measure is in tolerance (shutdown), yellow if the measure is out of tolerance (for warning).

Page **E.03 (ENGINE COUNTERS)** displays the starter and hours of work counter (partial and total hours, load hours, Override and hours until the next maintenance).

The number of pages displayed may depend on the type of engine (**J1939, MTU** or **without communication interface**).

Pages **E.04, E.05, E.06, E.07, E.08, E.09 (CANBUS 1...6)** display a series of information acquired via CAN-BUS by the engine (or via RS485 for some CUMMINS engines). The number and type of available measures depend on the engine type. The information not available are shown with some dashes. The measures are acquired only if the CAN-BUS communication with engine has been enabled.

 **INFORMATION!** *The display of some parameters depends on the engine model used. If some information is not available, some pages might not to be visible.*

The **E.10 FUEL PUMP (FUEL PUMP)** page (available only if the fuel pump management output is configured) contains information and commands for the fuel pumps.

The pages **E.11-12-13 (EXTERNAL MEASURES)** display the measures acquired by the analogue inputs configured as generic sensors. The controller shows one measure per line: it shows the configured text for the analogue input and relative measure. If more than 9 measures are associated to one of these pages, the controller shows them all, rotating them on the display every two seconds.

By keeping the **Esc/SHIFT**  button pressed, the rotation on current view can be stopped.

The page **E.14 (SERVICE)** displays the counters related to the Genset maintenance. The page is hidden, if no time limits are set for maintenance operations.

The pages **E.15-16-17-18 (EXHAUST GAS TREAT.)** display the icons and the measurement related to the engine emission system, acquired from the engine's ECU. These icons and measurements are compliant with TIER 4 / STAGE 5 standard.

The pages **E.19-20-21-22-23-24** are defined by the configuration files of the ECU of the engines. Using these files, it is possible to create custom pages showing the information got from the ECU that are not J1939 standard (specific for that ECU).

## 6.5.6 PMCBus (B.XX)

In this mode are shown the measures and the statuses which are connected and transit on the CAN-BUS PMCBus, which connects Mecc Alte devices among them. All pages of this mode are displayed only if the CAN-BUS PMCBus is enabled.

The page **B.01 (DEVICES ON PMCB)** displays, for diagnostic purposes, the genset controller boards, the mains controllers (MC), the tie breaker controllers (BTB) and the renewable controllers (RN) connected to the PMCBus.

The pages **B.02, B.03, B.04 (GENSETS)** display the information related to the **PMC-Bus** mains (PMC-Bus address, active and reactive power and status) up to 8 gensets.

The status is displayed in red if the genset is not available for the operation in automatic. Inside a page, each controller shows the generator data, managed by itself, in reverse.

Page **B.05 (TOTALS ON PMCB)** displays the totals calculated on all genset control boards connected to PMCBus. The total rated power of the gensets (MDPt, kW), the total active power (kW), the total reactive power (kvar), the total active energy (kWh) and the total reactive energy (kvarh).

The pages **B.06 (LOAD FUNCTION)** display the information related to the load function. This includes the number of network devices, the operating mode of the load function, the identifier of the pilot generator and the list of priorities. It is possible to manually select

The pages **B.07 (LOAD FUNCTION)** display the information related to the load function.

- The power supplied by the gensets (percentage compared to the maximum that the gensets currently supplying can afford).
- The threshold (%) over which a new genset must start (or you need to pass to the combination of higher gensets compared to the rated power level).
- The power supplied by the gensets (percentage compared to the maximum) calculated in the hypothesis that the less priority genset is stopped (or that you select a combination of gensets which is lower for rated power).
- The threshold (%) to be compared with the calculated power at the previous point, under which the less priority genset must be stopped (or you need to pass to the combination of lower gensets compared to the rated power level).

If, in addition to the normal "load management" also the management of the load reserve is enabled, this page alternates the above written values every two seconds with:

- The current load reserve (the difference between rated power of the gensets and the supplied power).
- The minimum load reserve to activate a new genset.
- The current load reserve (the difference between rated power of the gensets and the supplied power) calculated in the hypothesis that the less priority genset is stopped (or that you select a combination of gensets which is lower for rated power).

- The minimum load reserve to deactivate one of the gensets.

Some of these measurements can be displayed in reverse to indicate an “out of threshold” situation (which can require the starting or stopping of the genset).

When possible, the controller also displays the time available before the start of a new genset or the stop of one of the supplying gensets).

### 6.5.7 History logs (H.XX)

In this mode, you can access the events and data recording.

A number and time/date stamp identify each record.

The number is shown in the first line of the multifunctional display with the total number of records.

When the archive is full, a new record overwrites the old one; so, the identification number may change in time.



To activate the mode, press the **ACK/ENTER** button. A menu will guide you to the selection of the desired function.

## 7 Operating principles

### 7.1 Operation modes

Five modes are possible in the device management:

- **OFF\_RESET:** the gensets is not working (or it is stopping), anomalies are all reset, and it is possible to enter to the programming to modify parameters. GCB circuit breaker is open to insulate the genset from the loads. MCB circuit breaker (if provided) is closed to connect the users to the mains.
- **MAN:** the starting and the stopping of the genset, and the management of the GCB and MCB circuit breakers (if provided) are managed by the operator (the controller does not perform these operations automatically): being the protections activated, the controller can automatically open GCB though, stopping the genset and closing MCB (if provided) in case of need. Accessing programming is allowed, though only some parameters can be modified.
- **AUTO:** the gensets starting and stopping and the management of GCB and MCB circuit breakers are managed by the board (the operator cannot intervene). All protections are enabled. Accessing programming is allowed, but only some parameters can be modified.
- **TEST:** this working mode is almost identical to AUTO mode. It differs by the fact that the engine is in all cases started (automatically) also with mains present and/or with inhibition to the automatic intervention. The controller provides explicit commands to activate the void test (without closure of GCB) or with load (with closure of GCB); moreover, generic commands are needed: in these cases with parameter P.0222 “Enabling load taking in test” is possible to indicate to the controller if it has to close the GCB circuit breaker automatically. In any case, the operator has the possibility to control MCB and GCB switches as for in MAN. When the controller goes back to AUTO (when the test ends), the loads are automatically switched to the mains (if provided) and the engine is stopped with the normal procedure. The board will pass automatically from TEST to AUTO if the conditions for an automatic gensets intervention happens. Accessing programming is allowed, but only some parameters can be modified.
- **REMOTE START:** this working mode is almost identical to AUTO. It only differs in the fact that the engine is in any case started (automatically) also with mains on and/or with inhibitions to the automatic intervention; the board automatically provides for the closure of the GCB switch (prior opening of MCB if the temporary parallel is not provided with the mains). This mode is priority

compared to TEST (that is, it can interrupt the recurring test or replace it). It is also priority compared to AUTO (once the remote starting is activated, eventual requests of automatic intervention are ignored). The operator cannot changeover the GCB and MCB switches manually. Accessing programming is allowed, but only some parameters can be modified.

The operating mode can be selected in three different ways:

- Using the buttons **UP**  **Rif. 1C** and **DOWN**  of the board. The buttons must be pressed continuously for at least half a second to force the mode change. The buttons appear disabled (on the first line of the display a flashing, key-shaped lighting is shown) if at least one of the inputs described on the following point exists and is active.
- Using one or more configured inputs.
- Sending Modbus commands through the serial ports, USB port, the Ethernet port or through the modems.

To activate the **TEST** mode, it is necessary that the operating mode is set to AUTO and that no requests of automatic starting are there. The TEST mode is indicated through the AUTO indicator flashing on the panel (50% on and 50% off). You can shift to TEST mode as follows:

- Pressing the START pushbutton from the board panel. Shifting to TEST mode is immediate. To return to AUTO mode, press again the START pushbutton. If the duration of the test (P.0420) is configured (different from zero), this test automatically ends after the indicated time. Parameter P.0222 establishes if the test is void or with load.
- By configuring the parameters properly:
  - P.0418: Test enable days.
  - P.0419: Test start time.
  - P.0420: Test duration.

They permit to program weekly time slots during which the generators must run in TEST mode (to maintain them efficient). In this case, the passage to TEST is automatic in the scheduled days and hour. The controller returns to AUTO when the TEST time interval ends. Parameter P.0222 establishes if the test is void or with load.

- By means of an SMS. In this case, the controller shifts to TEST as soon as it receives the SMS and returns to AUTO after the time P.0420 "Duration of starting in test mode (min.)" Parameter P.0222 establishes if the test is void or with load.
- From a PC connected to the serial ports, to the USB port, Ethernet port or via modem (with RTU Modbus protocol or Modbus/TCP). The board passes to TEST as soon as receives the command, comes back to AUTO when it receives the opposite command or when it considers the serial connection lost (60 seconds without messages).

## 7.2 Plant types

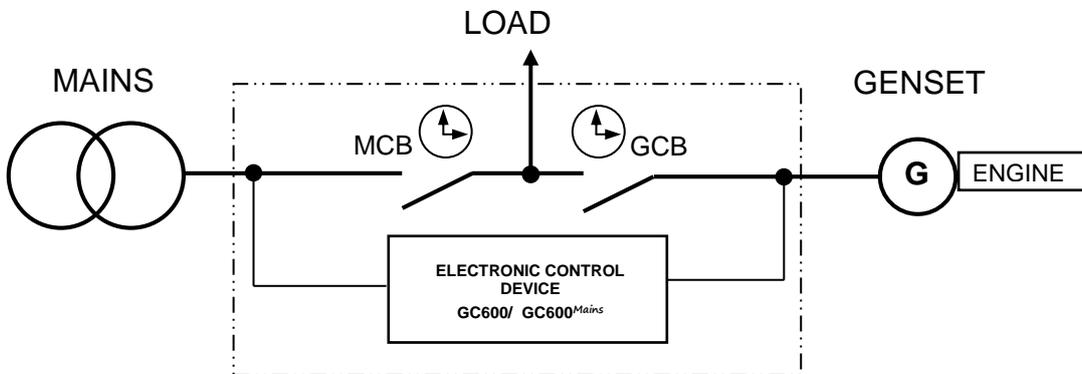
The **GC600** devices can be configured to manage several types of plant and the use modes can vary consequently

For example, please find below some basic operations of a **SSB+SSTP** plant (Single Stand-By + Single Short Time Parallel) and a **MPM** plant (Multiple Parallel to Mains).

For eventual details on the others, refer to the Device Technical manuals.

## 7.2.1 SSB + SSTP Systems

Following a brief example of the operation sequence of a generic **SSB + SSTP** system, where, when the mains is back,



the parallel with the Generator is performed, so not to leave the Loads not supplied. The system consists of a public power line “**Mains**”, a “**Load**” line (the load that you want to feed), a “**Generator**” line (**Generator** set with alternator and drive diesel engine), a control panel containing: a **MCB** contactor to manage the electric **Mains**, a **GCB** contactor to manage the **Generator** a device **GC600<sup>Mains</sup>** to control the engine and the electric lines concerned, an electronic board to adjust the speed of the engine, a battery trickle charger and a number of components to manage the auxiliaries (relays, fuses, terminals, etc ...).

Some sequence steps depend on the configuration of the plant, as the circuit breaker management, or the Mains/GenSet status.

### 7.2.1.1 Off/Reset Mode

In this mode the GenSet is off and the Load is usually supplied by the **Mains** with the **MCB** contactor closed. The supply of the **Load** is guaranteed all the time the **MCB** remains closed because it is fed by the same **Mains**. If a **Black out** occurs on the **Mains**, the **Load** will remain de-energized and the gen-set idle. The protections on the electrical measures and on the engine are disabled.

### 7.2.1.2 MAN Mode

Usually, this mode is used only for the management of the genSet by the skilled operators, mainly to carry out tests on the plant or in particular situations.

In this mode the **Load** is usually powered by the **Mains** with the **MCB** contactor closed. The supply of the **Load** is guaranteed all the time the **MCB** remains closed because it is fed by the same **Mains**. The management of the switching between the **Mains** and **Generator** (**MCB** and **GCB** contactors), the starting and stopping of the Generator set are managed entirely by the operator.

With GenSet off, the **MCB** contactor is commanded to open after pressing the “**MCB**” button for at least 5 seconds. The **Load** stays disconnected.

The engine must be started by the operator by pressing **START**.

With the **GenSet** parameters and **Mains** live and with controller configured to manage the synchronisation on the **GCB** contactor pressing the “**GCB**”, the synchronisation is activated. Once the synchronisation is done, the **MCB** contactor is opened and the **Load** stays supplied by the **GenSet**.

With **Mains** off and with the **GenSet** parameters, by pressing the “**GCB**” button the **GCB** contactor is automatically closed.

With genset running, **Load** supplied by the **Genset** and **Mains** live, by pressing the “**MCB**” button, the synchronisation with the **Mains** is activated. Once the synchronisation is done, the **GCB** contactor is opened and the **Load** stays supplied by the **Mains**. The genset can be stopped by the “**STOP**” button.

During the synchronisation between **Mains** and **Genset**, if necessary, to regulate manually the engine speed and/or the voltage, press

 and the buttons **LEFT**  and **RIGHT**  to select speed and voltage regulation; use the **UP**  and **DOWN**  button to modify the value in percentage (%).

At any time, pressing **EXIT/SHIFT**  disables the speed manual controls and allows page changing.

### 7.2.1.3 AUTO Mode

It is the normal operating mode.

In this mode the main task of the device is to ensure the electrical power to the **Load** in any situation. To implement this task, the device continuously monitors the **Mains** for voltage/frequency faults, phase failure or phase unbalance.

In this mode the **Load** is usually powered by the **Mains** with the **MCB** contactor closed. The supply of the **Load** is guaranteed all the time the **MCB** remains closed because it is fed by the same **Mains**. The management of the switch between the **Mains** and **Generator** (**MCB** and **GCB** contactors), the starting and stopping of the Genset are managed entirely by the operator.

In case of anomaly on the **Mains**, the device automatically:

- Opens the **MCB** contactor
- Starts the genset engine
- With the Genset parameters, carries out the switch of the Load on the Genset by closing the **GCB** contactor
- Once the correct **Mains** conditions are back, automatically starts the synchronisation and closes the **MCB**.
- Once the synchronisation is done, opens the **GCB**. The loads are supplied by the Mains again.
- After the time for the engine cooling, the genset is stopped. The device stays in stand-by.

 **INFORMATION!** The operating sequence described above is generic and, in some cases, may not correspond to the one implemented in your system. For further information, please contact your installer/Manufacturer.

### 7.2.1.4 TEST

The sole purpose of the “**TEST**” sequence is that of testing the **Generator** set to check the operating condition in preparation for a possible emergency (e.g. a Black out) and to periodically keep the mechanical parts efficient and lubricated.

The **TEST** sequence can be scheduled and executed automatically by the Gen-set control module and periodically with a programming schedule, or manually by means of the operator panel. To activate the manual sequence, the device must be in the “**AUTO**” mode. Pressing the “**START**” button in this mode

activates the **Generator** set for the "TEST" sequence. The engine stays on without switching between contactors **MCB** and **GCB**. The operator decides if to stop the "TEST" by pressing the "START" button again.

**⚠ WARNING!** Pressing the "STOP" button during the test activates an alarm which prevents the restart of the engine, which can only be reset in the "OFF RESET" mode.

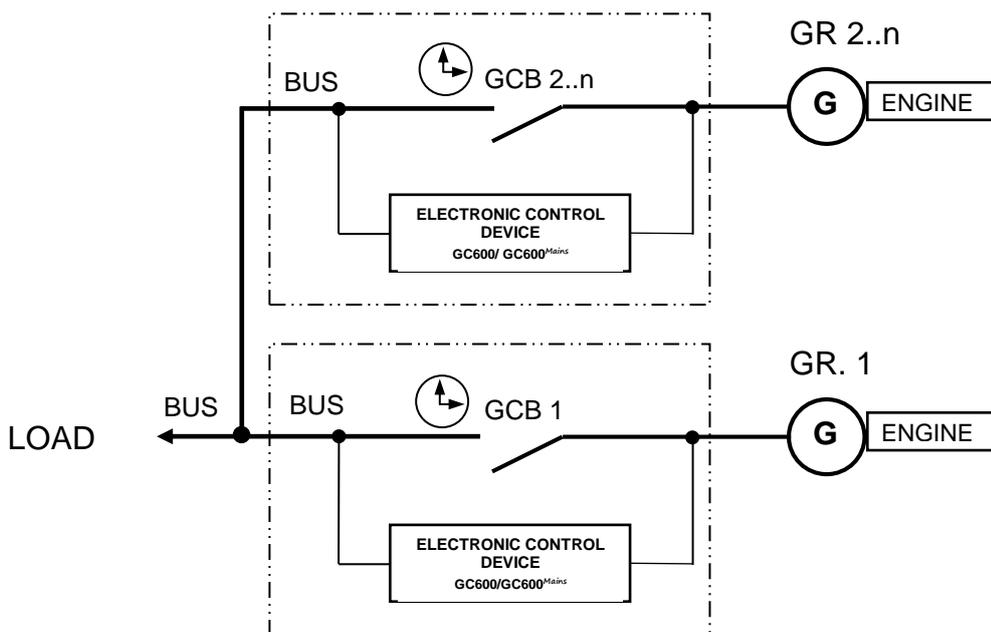
**i INFORMATION!** If a fault occurs on the Mains during the "TEST" phase, causing the automatic activation of the Generator, the operating mode independently passes from "TEST" to automatic "AUTO". When the Mains returns, the mode remains in "AUTO".

The "TEST" sequence does not foresee the load test with switching from the **Mains** to the **Generator** so as not to cause an unnecessary **Black out** on the **Load**. However, it is possible that your system has been configured to handle the load in "TEST" (parameter P.0222).

**i INFORMATION!** The operating sequence described above is generic and, in some cases, may not correspond to the one implemented in your system. For further information, please contact your installer/Manufacturer.

## 7.2.2 MPM Systems

### MPM (Multiple Prime Mover)



This type of plant considers the presence of more gensets in parallel among them in **island mode** and to supply the **Load**. The normal operation is **AUTO** mode and considers all gensets not in **OFF/RESET** or **MAN** on, in parallel among them and in power sharing.

The power supplied by the single genset is defined by a parameter or an external potentiometer. It can also be regulated manually as indicated below.

The gensets can be switched off automatically, or cyclically, if the load function is activated.

By selecting the **AUTO** mode, with the conditions for the genset operation, the device starts the engine and, after the synchronisation, closes its **GCB** contactor. The power supplied by the genset increases

following the load ramp set. Once the power set is reached, the device automatically regulates the active power and potentially the reactive one, sharing it with the other gensets.

If the genset is commanded to stop, the power unload is carried out and the **GCB** is commanded to open. After a cooling cycle, the engine is automatically stopped.

In **MAN** mode, the engine start/stop and **GCB** switch are carried out by the operator. By pressing the “**GCB**” button for the connection of the genset, the synchronisation is activated; **GCB** is closed, and the load ramp is activated. When supplying, by pressing the **GCB** button the sequence of power unload is activated and, once over, the **GCB** is opened. Press the “**STOP**” button to stop the engine.

### 7.2.2.1 Manual power regulation

 **WARNING!** *As some slow power ramps may have been set, check the command against the “Power reference” value shown in the same page and not against the value of the power produced.*

It is possible to manually regulate the power to supply without modifying directly the parameter that defines the regulation power.

Display the page **M.01** (available only for MPM plants), press **ENTER**  to change and the buttons **LEFT**  and **RIGHT**  to select between “power required” and/or “cosphi required”; use the button **UP**  **Ref. 1c** to increase the value and **DOWN**  **Ref. 1c** to decrease the value set in percentage (%). The value that will be changed is highlighted in negative.

 **INFORMATION!** *The value modified is acquired and saved without needing to confirm the variation with the **ENTER** button.*

Press the **ESC/SHIFT**  button to exit the adjustment procedure.

 **INFORMATION!** *Note: The described function is only available if no external potentiometer has been configured for power regulation.*

## 8 Special setting

### 8.1 Selecting the language

The Gen-set control module can display the texts in various languages.

To select a language different from that set, view the screen **S.03 (GEN-SET)** using the navigation buttons. To

change the **LANGUAGE** press **ACK/ENTER**  : the square brackets [ ] will start flashing. Use the **UP**  and **DOWN**  buttons to display the available **LANGUAGES**, then press **ACK/ENTER**  to confirm or **Esc/SHIFT**  to cancel the changes.

## 8.2 Date/Time setting

The device includes an internal clock/calendar used primarily for the functions:

- Weekly working hours of the generator set.
- Calendar for the scheduled "TEST".
- Recording of events with date and time in the history logs.

The calendar/time setting is possible in all operating modes: "OFF/RESET", "MAN", "AUTO" or "TEST".

To update the time and/or date of the device, enter the "4.7.1 Date – Time" menu.

Use the **UP**  and **DOWN**  buttons to navigate between the sub-menus and the **ACK/ENTER**  button to open the sub-menu. The full path to the Date/Time programming page is:

"P.023 PROGRAMMING, 4 AUXILIARY FUNCTIONS, 4.7 Device, 4.7.1 Date-Time".

Press the **ACK/ENTER**  button to view the 6 **Date/Time** pages.

Use the **UP**  and **DOWN**  ; navigation buttons to move between the parameters and/or change their values the **ACK/ENTER**  button is used to confirm the value and/or the **Esc/SHIFT**  button to cancel the change.

If the values are between <...> this means you are not authorised to access and modify the parameters. See paragraph 4.5.1.1 **Access codes** to enable authentication for the "User" password.

To return to the start menu, press the **Esc/SHIFT**  button consecutively.

## 9 Fuel pump (if present on the system)

Gen-set implements the full management of the fuel pump, to pump fuel from the storage tank to the tank on the generator. The pump can be managed automatically or manually using the controls on the front panel. Select function

### 9.1 Operation selection

With **MODE UP**  **Ref.1a** and **MODE DOWN**  **Ref.1a** buttons, select the **MAN**, **AUTO** or **TEST** mode.

With the **UP**  and **DOWN**  navigation buttons, select the "STATUS (S.xx) Status information" menu, scroll the pages with the **LEFT**  and **RIGHT**  navigation buttons to page **S.10 FUEL PUMP**. From here

you can use the standard setting procedure by pressing the **ACK/ENTER**  button to start (square brackets

[xxxxxxx] flashing), and the **UP**  and **DOWN**  buttons to modify the command mode:

- **2-AUTOMATIC** (the pump is automatically activated when the low fuel level sensor intervenes and stops at the fuel maximum level)
- **1-MANUAL-ON** (pump active - the pump is activated when the fuel drops below the maximum level, and turns off when it exceeds it, keeping the level constant).
- **0-MANUAL-OFF** (pump off)

Press **ACK/ENTER**  to confirm the mode.

 **INFORMATION!** *The second option (**MANUAL-ON**) can be disabled by the Gen-set control module in relation to the fuel level (the pump cannot be started with a full tank).*

*Warning: With the fuel pump warning active, the command mode is automatically set to "0-MANUAL-OFF".*



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