mecc alte

BTB200
CONTROLLER

SMARTECH

A DIVISION OF **MECC ALTE**

USER MANUAL

BTB200 User Manual
Code: EAAM059601EN
Rev. 01 | Date: 27/10/2023

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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, in order 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 abrasing 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 helps conserve resources and prevents detrimental effects for health and the environment.

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4 General info

The purpose of this manual is to describe BTB200 board.

5 Definitions

ALARM - is used to indicate a fault that makes it impossible the normal plant management and forces the automatic opening of the BTB circuit breaker.

WARNING - is used to indicate a fault that requires the intervention of the operator but doesn't require the automatic opening of the BTB circuit breaker.

BUSA - It identifies the genset and mains controllers connected on one side (A) of BTB circuit breaker.

BUSB - It identifies the genset and mains controllers connected on the other side (B) of BTB circuit breaker.

BTB - ("Bus Tie Breaker") It identifies the circuit breaker managed by BTB200.

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6 Main functions
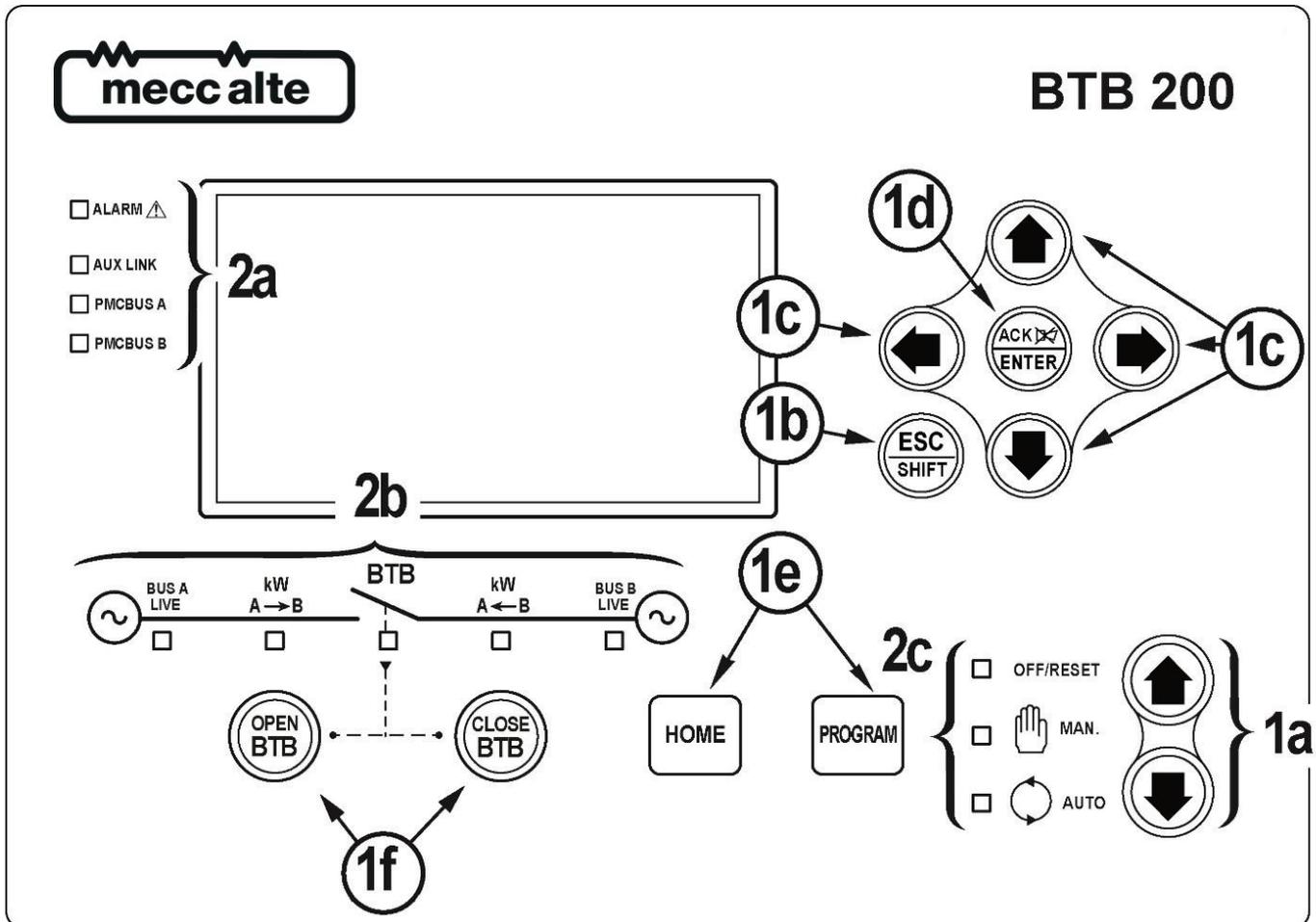
6.1 Front panel
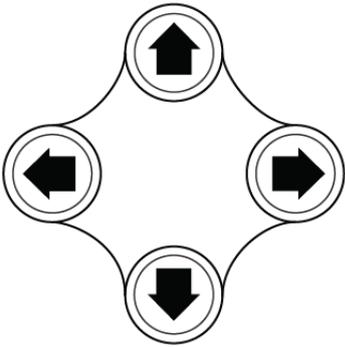

Fig.1 – Front Panel GC600, GC600^Link

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**).

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6.2 Buttons (ref. to fig. 1)

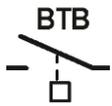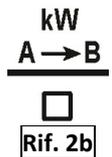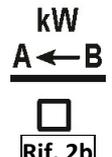| Pushbutton		Function
MODE UP **MODE DOWN** Ref. 1a	**OFF/RESET**	All anomaly signals are disabled and you can program the parameters.
	MAN (Manual)	The board is set for manual control. Press the **OPEN BTB** button for manual opening control of the tie breaker. Press the **CLOSE BTB** button for manual closing control of the tie breaker.
	AUTO (Automatic)	The controller automatically manages the tie breaker operation, so it will be started if required by the operating conditions
ESC/SHIFT Esc/SHIFT Ref. 1b		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. If it is pressed in any window, it displays the status information on the upper line (displaying them cyclically). Depending on the selected page, if pressed together with the **ENTER** button for at least 5 seconds while in **OFF/RESET** mode, it can reset counters to zero, reload default values of the programming parameters or cancel history logs, force exit from **BUS OFF** mode of the CAN-BUS). When used during the keyboard regulation function, it aborts the function.
Ref. 1c		Navigation buttons of the multifunction display. These buttons let you select the previous or next page on the display in all modes, except in the **PROGRAM** and **HISTORY LOG** mode. Horizontal navigation buttons: in **PROGRAM** mode, they are used to position the cursor when entering the strings. Used in combination with the **ESC/SHIFT** buttons, they allow to adjust the contrast. **ESC**/SHIFT + **LEFT** : to decrease the contrast (lighten) **ESC**/SHIFT + **LEFT** : to increase the contrast (darken) Vertical navigation buttons: In **PROGRAM** and **HISTORY LOG** they allow to scroll the menus and the variables / registrations. You can increase/decrease the value of the variable to change the settings. Used in combination with ESC/SHIFT buttons , they allow you to scroll through the menus ten entries at a time or increase/decrease the variables ten units at a time.

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Pushbutton	Function
ENTER/ACK Ref. 1d	In the PROGRAM menu, you can enter the programming mode and open a submenu, change a variable or parameter, and confirm the operation. In ARCHIVE menu, it allows to activate the **HISTORY LOG** menu and allows the entrance in the selected archive. It allows to "accept" eventual anomaly signalling on the memory while turning on. When there is a block alarm, by pressing the button you deactivate the siren. A further press of the button recognises the presence of an anomaly and resets any alarm signals if the operating conditions have returned to normal. Lockout signals can only be reset by activating the "OFF/RESET" mode.
OPEN BTB Ref. 1f	The button is disabled in the "**OFF/RESET**" and "**AUTO**" modes. In "**MAN**" it is used to open the **BTB** tie breaker.
CLOSE BTB Ref. 1f	The button is disabled in the "**OFF/RESET**" and "**AUTO**" modes. In "**MAN**" it is used to close the **BTB** tie breaker (with or without synchronization).
HOME Ref. 1e	It forces the display to show the page "M.01".
PROGRAM Ref. 1e	It forces the PROGRAM mode, showing the last modified parameter. If pressed during the PROGRAM mode, it goes back to the page that was shown before entering the PROGRAM mode.

6.3 Indicators (ref. to fig. 1 and 2)

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

LED OFF	LED steady ON	LED flashing
□	▣	▣

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	Signalling		Function
□ OFF/RESET **Ref. 2c**	OFF/RESET	▣	Indicates that the operation mode is OFF/RESET
		◉	Indicates that you are accessing the PROGRAMMING menu
		□	The controller is in another operating mode.
□ MAN. **Ref. 2c**	MANUAL	▣	Indicates that the operation mode is MANUAL
		□	The Gen-set control module is in another operating mode.
□ AUTO **Ref. 2c**	AUTO	▣	Indicates that the operation mode is AUTOMATIC
		◉	Flashing at 50% indicates that the operating mode is TEST
			Flashing at 90% indicates that the operating mode is REMOTE START.
		□	The control module is in another operating mode.
□ ALARM ⚠ **Ref. 2a**	ALARM	▣	Signals at least one active alarm.
		◉	There is at least one active warning.
		□	No anomalies.
□ AUX. LINK **Ref. 2a**	AUX. LINK	▣	At least one Modbus or Modbus/TCP communication is running over the serial ports, the USB port or the ETHERNET port.
		◉	No Modbus nor Modbus/TCP communications are running.
□ PMCBUS A **Ref. 2a**	PMCBUS A	▣	Signals that the **CAN-BUS** interface is active and in **ERROR-ACTIVE** mode.
		◉	Flashing at 25% ON signals a COM error: the port is in **ERROR-PASSIVE** mode.
			Flashing at 75% ON signals a COM error: the port is in **BUS-OFF** mode.
		□	Indicates that the **CAN-BUS** is disabled, or that it is enabled and operating, but no messages from engine and/or expansion modules for at least 2 seconds are received.
□ PMCBUS B **Ref. 2a**	PMCBUS B	▣	Signals that the **CAN-BUS** interface is active and in **ERROR-ACTIVE** mode.
		◉	Flashing at 25% ON signals a COM anomaly: the interface is in **ERROR-PASSIVE** mode.
			Flashing at 75% ON signals a COM anomaly: the interface is in **BUS-OFF** mode.
		□	Indicates that the **CAN-BUS** has been disabled.

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	Signalling		Function
BUS A LIVE Ref. 2b	**BUS A LIVE**	▣	BUS A voltage and frequency are present and stead within the tolerance range.
		☐	BUS A voltage and frequency are not present.
		◙	Flashes at 50% during transition between the previous two statuses.
			Flashing at 25% the BUS A voltage and frequency are under the tolerance threshold.
			Flashing at 75% the BUS A voltage and frequency are above the tolerance threshold.
BUS B LIVE Ref. 2b	**BUS B LIVE**	▣	BUS B voltage and frequency are present and stead within the tolerance range.
		☐	BUS B voltage and frequency are not present.
		◙	Flashes at 50% during transition between the previous two statuses.
			Flashing at 25% the BUS B voltage and frequency are under the tolerance threshold.
			Flashing at 75% the BUS B voltage and frequency are above the tolerance threshold.
BTB Ref. 2b	**BTB**	☐	The BTB switch is opened.
		▣	The BTB switch is closed.
		◙	Flashes at 25% ON if open after a closing command.
			Flashing at 75% ON if closed after an opening command.
kW A→B Rif. 2b	**A -> B**	▣	Indicates that the active power is flowing from BUSA to BUSB through the BTB circuit breaker.
		☐	-
kW A←B Rif. 2b	**A -> B**	▣	Indicates that the active power is flowing from BUSB to BUSA through the BTB circuit breaker.
		☐	-

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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 in order to view the display correctly.

Press in sequence the Esc/SHIFT button + LEFT 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.

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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
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.
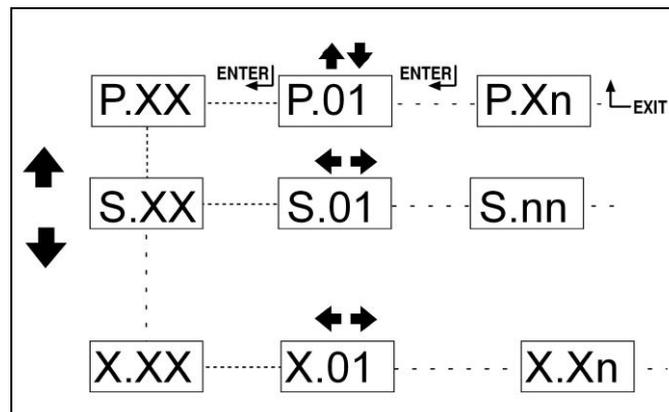
Fig. 2 - Mode navigation

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.

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

KEY:
1 - Status bar
2 - Data area


```
M.07 ENERGY METERS A->B


Partial:                      32 kWh
                              36 kvarh


Total:                       223 kWh
                             138 kvarh
```

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.
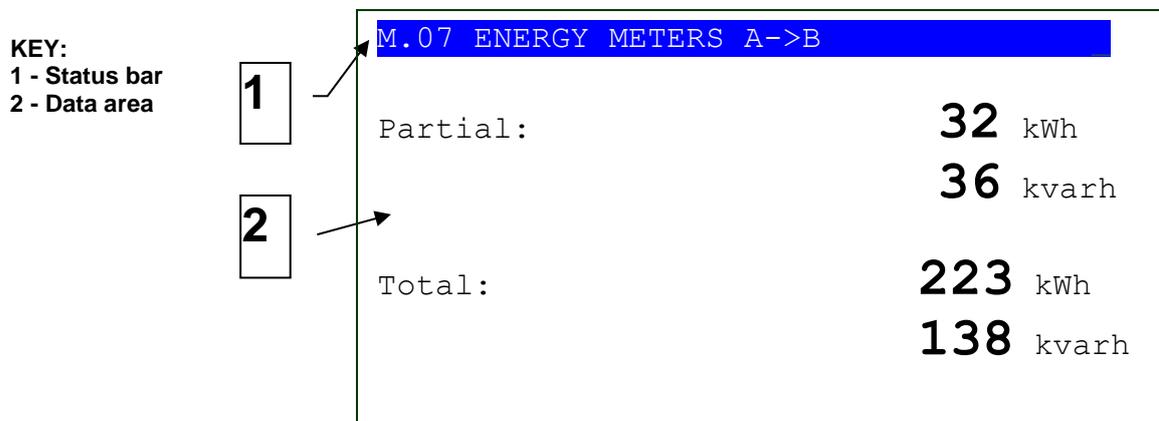
KEY:
1a - Mode identifier
1b - Page identifier
1c - Page title

2 – System status


```
M.07 ENERGY METERS A->B
```
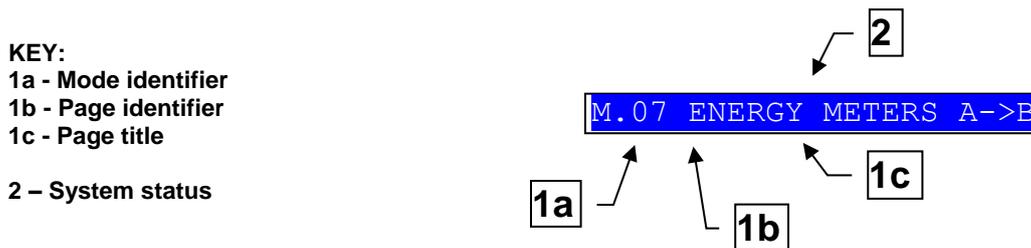
Fig. 4 - Top status bar

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.

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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).*

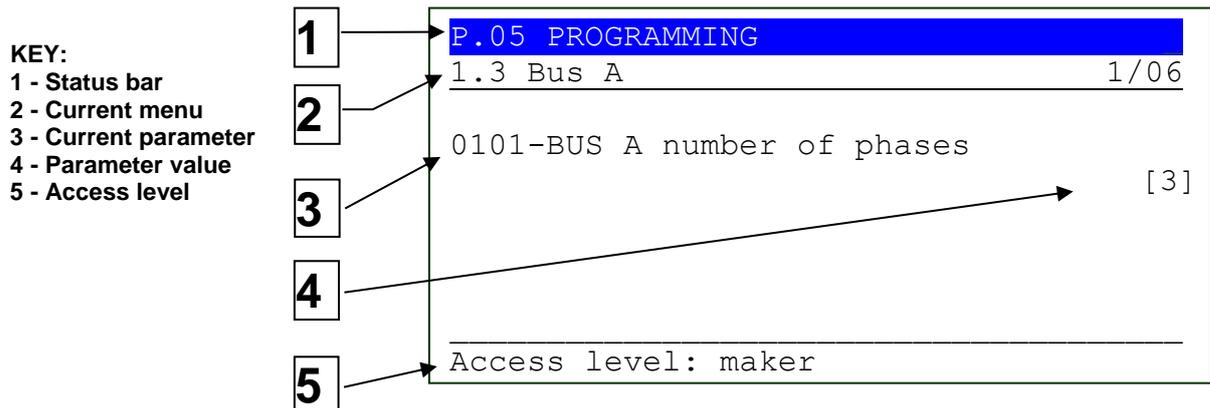This mode allows the display and change of the programming parameters.

KEY:
1 - Status bar
2 - Current menu
3 - Current parameter
4 - Parameter value
5 - Access level

```
1  P.05 PROGRAMMING
2  1.3 Bus A                          1/06

3  0101-BUS A number of phases
                                         [3]
4

   _____
5  Access level: maker
```

Fig. 5 - Display areas

Each programming parameter **Ref. 3** has a 4-digit numeric code (e.g. **P.0101**) 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 (**1/06** 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** (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 three different **PASSWORD** levels, which are listed in order of priority.

1. *Manufacturer Password*

2. *Installer Password*

3. *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 Safety**, **1.1.1.** Authentication

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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.

⚠ *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** (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** (ACK/ENTER) button.

Use the **UP** (UP) **Ref. 1a** and **DOWN** (DOWN) **Ref. 1a** navigation buttons to select a menu and ACK/ENTER (ACK/ENTER) to open it. Select the variable or submenu with the **UP** (UP) **Ref. 1a** and DOWN (DOWN) **Ref. 1a** navigation buttons. Pressing **ACK/ENTER** (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** (ACK/ENTER) ; the square brackets [...] will flash. Use the **UP** (UP) **Ref. 1a** and **DOWN** (DOWN) **Ref. 1a** navigation buttons to modify the value and press **ACK/ENTER** (ACK/ENTER) to confirm or Esc/SHIFT (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**".

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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 by pressing **PROGRAM** key. This is possible if, when exiting programming mode, instead of going back though 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 controller 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.

*(i)***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.

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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** (ACK/ENTER) **+Esc/SHIFT** (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]
           |                  |
<out>|DI_VIRTUAL_01           |        0
<in> |DI_CONTROLLER_01        |        1
<in> |DI_CONTROLLER_02        |        0
     |                  |
     |                  |
     |                  |
     |                  |
```

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** (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.

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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.

    o   "A": alarm (block)

    o   "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 (CONTROLLER STATUS)** displays the information of the device and contains:

- Current date and time in long format (flashing if the clock is not valid, date in reverse if Daylight Save Time in progress).

- The univocal series number of the controller ("ID Code").

- The software codes currently uploaded on the controller.

- The necessary internal code to get a temporary Mecc Alte level password.

- The internal temperature of the controller

- The power supply voltage.

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- The language currently used by the device. It is also possible to select a different language button **ACK/ENTER**, select a language using vertical **UP** and horizontal **DOWN** navigation buttons and confirm with **ACK/ENTER**.

NOTE: BTB200 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 model.

- In case of a GSM modem:

    o The name of the telephone provider.

    o 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:

    o *"Stand by"*: no ongoing communication and Ethernet cable disconnected.

    o *"Stand by-connected"*: no ongoing communication and cable connected to Ethernet network.

    o *"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.07 (CAN_BUS)** 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:

    o - ERROR-ACTIVE: normal operation

    o - ERROR-PASSIVE: communication is working despite faults (errors).

    o - BUS-OFF: Gen-set has interrupted the connection to the bus due to too many errors.

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- 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 face first and then reset counters: to select an interface, press ENTER and use vertical **UP** and horizontal **DOWN** navigation buttons.

The pages **S.08-09-10 (GENERIC 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.

Page **S.12 (DIGITAL OUTPUTS)** shows the status of controller digital outputs.

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.12**: 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.13 (ANALOG INPUTS)** displays the value of the control module's analogue inputs.

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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.

The page **S.14 (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 page **S.15 (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.16 (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 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 tie breaker **(BTB)**, the **MAINS**, the **BUS A**, the **BUS B** and the electrical values depend on the system configuration.

Page **M.02 (BUS A)** displays the main electrical measurements of **BUS A**. In this page the voltages, the frequency and the rotation direction of the BUS A B 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.

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- **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** (**BUS B**) displays the electrical magnitudes of the **BUS B**. In this page the voltages, the frequency and the rotation direction of the BUS B 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 measured by the controller, the negative sequence current, the auxiliary current and the neutral current. At the bottom-right corner, the controller shows one symbol which immediately permits to identify the real source of the currents (BUS A or BUS B).

Page **M.05** (**POWERS**) displays the active powers (kW), 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 COUNTERS A→B)** displays active and reactive energy counters (partial and total), counted by the controller **when the related powers flow from BUS A to BUS B.**

Page **M.08 (ENERGY COUNTERS B→A)** displays active and reactive energy counters (partial and total), counted by the controller **when the related powers flow from BUS B to BUS A.**

Page **M.09 (SYNCHRONIZATION)** displays synchronization information. The use of the displayed synchronoscope in MAN mode allows the manual synchronization (par. 6.2.1).

Pages **M.10-11-12 (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.

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

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6.5.5   PMCBus (B.xx)

The page **B.01 (BUS A)** displays, for diagnostic purposes, the mains controllers (MC), the genset controller boards, the tie breaker controllers (BTB) and the renewable controllers (RN) recognised on the Can-Bus PMCB connection of BUS A.

The page **B.02 (BUS B)** displays, for diagnostic purposes, the mains controllers (MC), the genset controller boards, the tie breaker controllers (BTB) and the renewable controllers (RN) recognised on the Can-Bus PMCB connection of BUS B.

6.5.6   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.

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7 Operating principles

7.1 Operation modes

Three modes are available for the device management.

- **OFF/RESET**: BTB circuit breaker is opened, alarms/warnings are reset and it is possible to modify parameters in PROGRAM mode. The controller does not accept closure command for BTB.

- **MAN**: opening and closure of BTB are made by the operator (the board does not perform these operations automatically). However, since the protections are enabled, the board can open the BTB in case of alarms. It is allowed the access to programming but only few parameters can be changed.

- **AUTO**: opening and closure of BTB are made automatically by the controller as required by the plant status. Protections are enabled. It is allowed the access to programming but only few parameters can be changed.

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 configured as remote OFF/MAN/AUTO.

- Sending Modbus commands through the serial ports, USB port, the Ethernet port or through the modems.

7.2 Management logic

7.2.1 OFF/RESET management logic

The board always opens the tie breaker (BTB).

7.2.2 Management logic in MAN mode

The controller always opens the tie breaker (BTB) if alarms are active.The operator can request the opening/closure of the BTB in many ways.

- Using the keys of the controller.

  o Pressing "**OPEN BTB**" when BTB is closed, the operator requires the opening of the BTB.

  o Pressing "**CLOSE BTB**" when BTB is opened, the operator requires the closure of the BTB. If synchronization is needed, adjust commands will be sent to BUSA (if possible).

  o Pressing **ESC/SHIFT** (ESC SHIFT) + "**CLOSE BTB**" when BTB is opened, the operator requires the closure of the BTB. If synchronization is needed, adjust commands will be sent to BUSB (if possible).

- Using the digital inputs of the controller.

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- Using commands from the serial ports.

7.2.3 Management logic in AUTO mode

The controller always opens the tie breaker (BTB) if alarms are active. Automatically, opens/closes the tie breaker, depending on the requests:

- Using the digital inputs of the controller.

- Using commands from the serial ports.

The controller automatically decides if tie breaker can be closed or not, based on BUSA and BUSB statuses (and also on the information collected from the CAN-BUS lines):

- BTB can be closed without synchronization. This is true when no voltages are detected on one or both buses; it also checks (information collected by CAN-BUS) that no genset are supplying on the bus "without voltage", and also that no MC boards is connecting the mains to that bus.

- BTB can be closed with synchronization. This is true when voltages/frequency are present and "in thresholds" on both buses.

- BTB cannot be closed. This is true when:

  - Voltages/frequency are present on both buses, but at least one bus is "out of thresholds".

  - No voltages are detected on one or both buses, but on the same bus it detects (information collected by CAN-BUS) one or more genset supplying, or one or more MC board connecting the mains to the bus. This condition happens only with wrong wirings.

Moreover, the controller can automatically select the better bus to which send the commands to adjust frequency and voltages, to synchronize the buses before closing the tie breaker. The logic is:

- If both buses are connected to the mains (information collected by CAN-BUS), any choice is correct: BUSA is selected.

- If one bus is connected to the mains, and the other one is not connected (information collected by CAN-BUS), the second one is selected.

- If both buses are not connected to the mains (information collected by CAN-BUS):

  - If there are a different number of supplying gensets on the two buses, the bus with the lower number of supplying gensets is selected

  - If there are the same number of supplying gensets on the two buses, the bus with lower percent load is selected (the one with lower kW/nominal ratio).

  - If there are the same number of supplying gensets on the two buses with the same kW/nominal ratio, BUSA is selected.

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.*

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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:

- Configurable calendars.

- 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.05 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.

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