GENSET CONTROLLER

Automatic Transfer Switch

Instruction Manual

INDEX

1- GENERAL REQUIREMENTS AND INSTALLATION

1- 1 General notes

⚠️ **WARNING!**
- Carefully read the manual before the installation or use.
- This equipment is to be installed by qualified personnel, complying to current standards, to avoid damages or safety hazards.
- Before any maintenance operation on the device, remove all the voltages from measuring and supply inputs.
- Products illustrated herein are subject to alteration and changes without prior notice.
- Technical data and descriptions in the documentation are accurate, to the best of our knowledge, but no liabilities for errors, omissions or contingencies arising there from are accepted.
- A circuit breaker must be included in the electrical installation of the building. It must be installed close by the equipment and within easy reach of the operator. It must be marked as the disconnecting device of the equipment: IEC /EN 61010-1 § 6.12.2.1.
- Clean the instrument with a soft dry cloth; do not use abrasives, liquid detergents or solvents.

1- 2 Dimensions

Genset cut-off dimensions and its total dimensions are as shown below.

245 mm

182 mm

Cut-off dimensions:
220 x 160 mm

40 mm

NOTE!

ℹ️ **Inform the manufacturer the general identification data reported on the label, before asking for technical specifications or information about the equipment.**

1- 3 Hardware ratings

GENERAL CHARACTERISTICS	
Rated voltage Vdc	12Vdc (24Vdc)
Allowed Vdc	from 6Vdc to 33Vdc
Rated voltage Vac	400 Vac
Allowed Vac	Up to 500 Vac
Allowed frequency	From 45 to 75 Hz
Max consumption with backlight	250 mA
Temperature range	-30 °C + 70 °C (electric)
	-20 °C + 70 °C (display)
	-40 °C + 70 °C (storage)
DISPLAY	128x64 px ; 66x33mm
DIGITAL INPUTS	
N°	5
STATIC OUTPUT	
N°	6 (2x4A ; 4x2A)
SERIAL COMMUNICATION INTERFACE	
Interface type	Serial RS -232
Cable length	< 3 m
Baud rate	Up to 115200 bps
Interface type	Serial RS485
Baud rate	Up to 115200 bps
CONTACTORS RELAYS	
N° outputs	2
Type of contacts	1x N.O. genset contactor - 1x N.C. mains contactor
Contatcs capacity	8 A / 250 VAC
LOAD CURRENTS INPUT	
N°	3
Measure range	Up to 5A
VOLTAGE INPUTS	
N°	8
Input type	Resistive coupling
Rated voltage	230 Vac (L-N) - 400 Vac (L-L)
Measure range	TRMS from 0 to 300 Vac (L-N) - from 0 to 500 Vac (L-L)
ACTIVE POWER MEASURE	
Measure type	Instant power integration
HARDWARE	
N°Keys	13
N°LED	10

STANDARD REFERENCE
EN55011
EN55016-2-1
EN55016-2-3
EN60068-2-1
EN60068-2-2
EN60068-2-27
EN60068-2-30
EN60068-2-6
EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-6-2
EN61000-6-4
HBV Bureau Veritas NR320

1- 4 Electrical Installations

1- 4.1 Drawing

⚠️ Warning! Before inserting the plugs and supply the board, make sure that the connections strictly comply with the wiring diagram below.
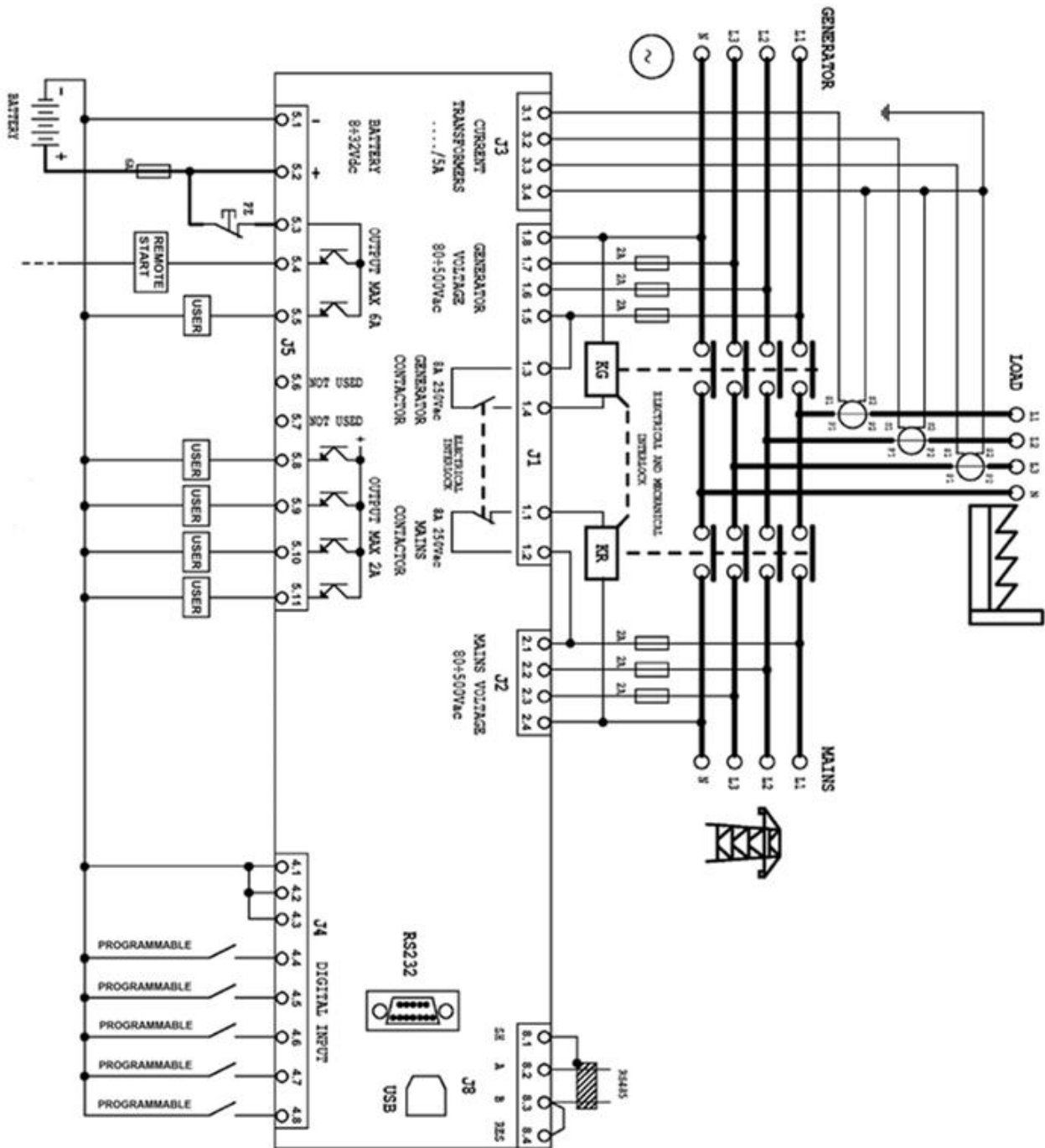
1- 4.2 Connections
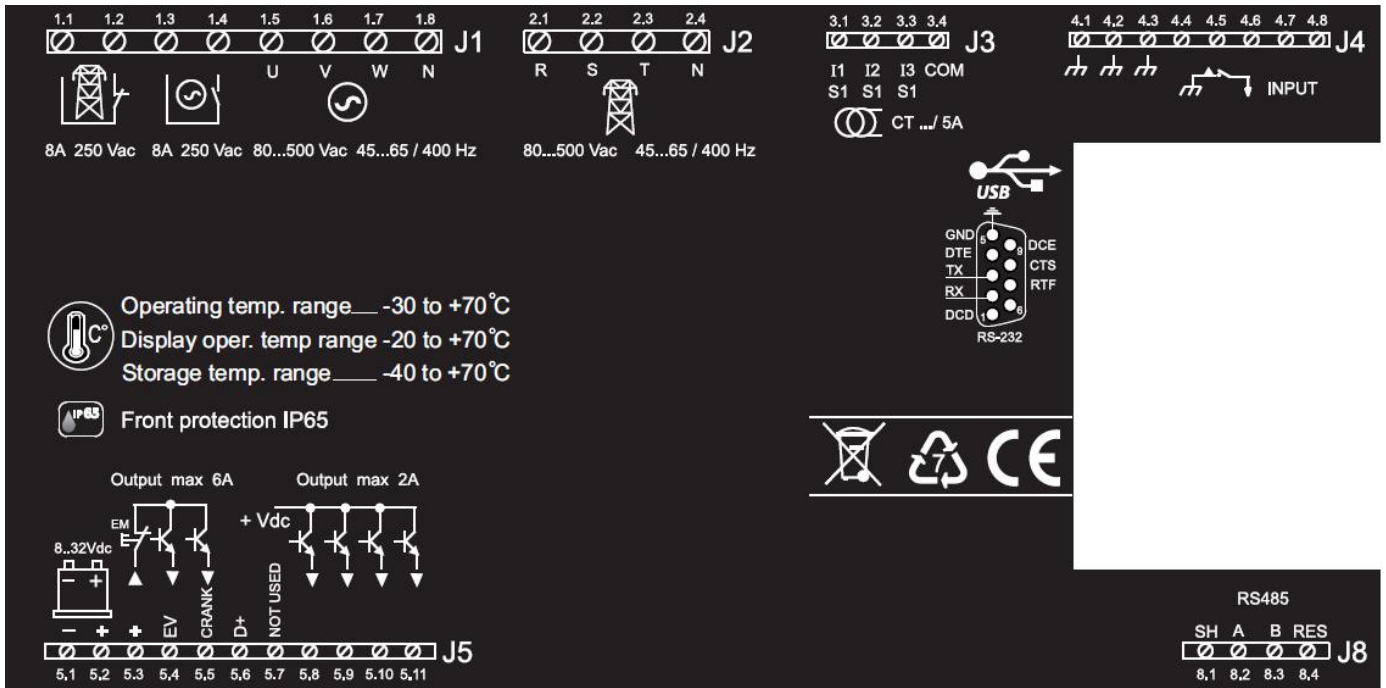
J1 – Genset AC voltage and contactors
1.1 - Mains contactor output (NC)
1.2 - Mains contactor output (NC)
1.3 - Genset contactor output (NO)
1.4 - Genset contactor output (NO)
1.5 - Genset voltage phase 1
1.6 - Genset voltage phase 2
1.7 - Genset voltage phase 3
1.8 - Neutral

J4 – Digital inputs
4.1 - Gnd
4.2 - Gnd
4.3 - Gnd
4.4 - Programmable digital input (default – Electrical Trip)
4.5 - Programmable digital input (default – Ground protection)
4.6 - Programmable digital input (default – Remote start)
4.7 - Programmable digital input (default – Remote stop)
4.8 - Programmable digital input (default – Ext. GE protection)

J2 – Mains AC voltage
2.1 - Mains voltage phase 1
2.2 - Mains voltage phase 2
2.3 - Mains voltage phase 3
2.4 - Neutral

J5 – Supply and Outputs
5.1 - Battery negative
5.2 - Battery positive
5.3 - Common positive for the relay outputs
5.4 - Programmable output (default – Start)
5.5 - Programmable output (default – Faulty start)
5.6 - Not used
5.7 - Not used
5.8 - Programmable output (default – Global alarm #1)
5.9 - Programmable output (default – Auto mode)
5.10 - Programmable output (default – Manual mode)
5.11 - Programmable output (default – Siren)

J3 – Genset AC current
3.1 - Genset current I1
3.2 - Genset current I2
3.3 - Genset current I3
3.4 - CT common

J8 - RS485 port
1- Shield
2- A
3- B
4- Termination resistor

RS232 - Communication ports
RS232 - connection of a remote device

1- 5 Operation modes

At the power on, the Genset is in reset mode. With the buttons you can choose the functioning mode you prefer.

1- 5.1 Automatic mode

Push the AUT button to select this functioning mode.
In case of mains failure the remote start output (J5.4) is activated and is de-activated in the presence of the same. This is the standard logic. It's also possible to activate the remote start output in special conditions. For more information see the special functions menu M6.

1- 5.2 Manual mode

In this operative mode, to turn-on the generator (activating the remote start output) you must press KG button. With engine running, you can manually command the transfer switching with KG and KR buttons. KR, besides transferring the load on mains side, turns off the generator. Pressing and releasing quickly the KR button, KG is opened and the remote start output is deactivated after the cooling time; keeping pressed for 3 seconds KR button, KG is opened and the generator is stopped immediately.

1- 5.3 Reset mode

The remote start output cannot be activated. If the mains is available it is connected to the load. If you select Reset mode, the alarms are reset and the remote start output is deactivated. If the cause of the alarm remains, the cause is still present. Push the RESET button to select this functioning mode.

1- 5.4 Test mode

Manual test: Press the TEST button: the remote start output is activated to test the genset for a programmable time.

a) If activated during MAN mode, the load switching can be controlled only by KG and KR buttons, even if the mains is faulty. Disabling the test (or after the test time), the controller returns to the previous operation mode.

b) If activated during the AUT mode, the test can be made with or without load, depending on the programming of the test setup (see menu M4.3).

Automatic test: If you programmed an automatic test (see menu M4.3), it will run only if you are in automatic mode. The test can be made with or without load, depending on the programming of the test setup (see menu M4.3).

1- 5.5 Alarms

In case of alarm, the display shows its description. If more different alarms are detected, they appear individually in sequence. For each alarm it is available a message that can help to identify the source of the problem. The alarm reset can be made by pressing the RESET button; by this, the alarm is deleted and the genset goes in Reset mode, preventing accidental generator starting attempts. If the alarm, after reset, still remains on the display, the cause of the alarm is not removed.
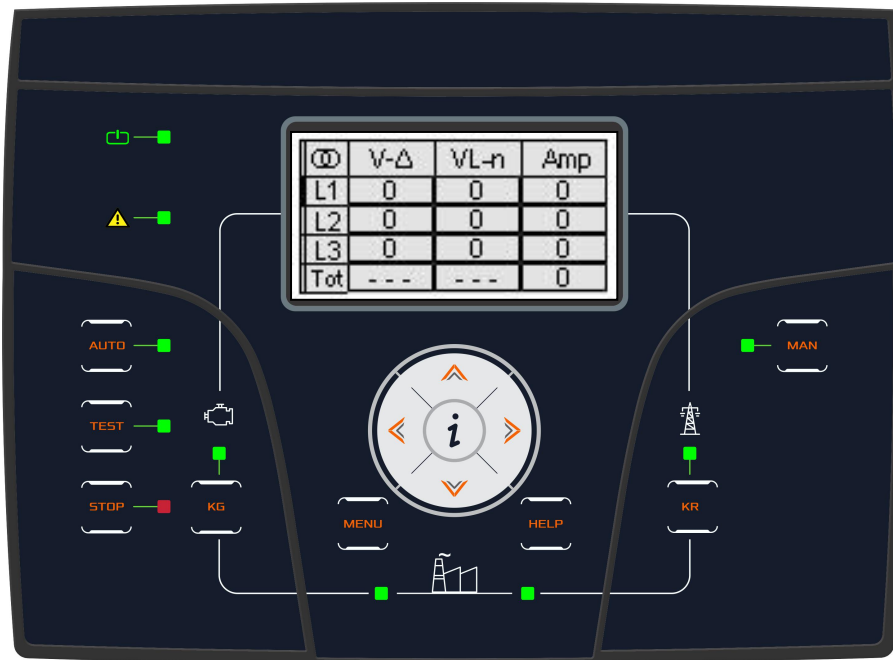
1- 6 Equipment Overview

| POS.	NAME	DESCRIPTION
A	Display	Backlighted display that shows all functions, measures and alarms about the generator and the mains. Automatically the backlight turns off, and it turns on again when you press a button.
B	AUT	Button to select the automatic mode.
C	TEST	Button to select the test mode.
D	RESET	To activate reset/OFF mode. In this operative mode the remote start output is deactivated and the alarms are deleted. If the cause of the alarm persists, the alarm will appear again.
E	KG	Key control to activate the remote start output (only in manual mode). With engine running, and in manual test mode, this button permits to manage the generator contactor.
F	Menu	To enter the programmation menu. Inside the menus, it's used as a button "back" or "esc".
G	KG state led	Led that indicates if KG is closed (led on) or open (led off).
H	KR state led	Led that indicates if KR is closed (led on) or open (led off).
I	Help	From the main page of the menu, it permits to go directly to the active alarms page, if at least one alarm is present.
J	KR	Key control to deactivate the remote start output (only in manual mode). If it's pressed and released quickly, it deactivates the output after the cooling time; if it's pressed for 3 seconds, it deactivates the output immediately. In manual test mode, this button permits to manage the mains contactor.
K	MAN	Button to select the manual mode.
L	Navigation drive	Navigation drive composed by 4 arrows to scroll through the pages (left and right arrows) and increase or decrease the parameters inside the programmation menus. It contains also a special button "i", to select an element on the screen or edit a parameter and confirm the new value. See paragraph 1.8.1 for more information about the navigation of the display pages, and paragraph 2-2 for more information about the navigation through the menus.
M	Mains state led	It shows if the mains status: • led OFF if mains not detected • led blinking if mains detected outside limits • led ON if mains is within limits after delay
N	Generator state led	It shows the status of the generator: • led OFF if genset is not detected • led blinking if genset is running but not within limits • led ON if genset is within limits after delay
O	General alarm led	It blinks if a stopping alarm is present. It remains ON if an alarm enabled as global alarm 1 is present.
P	Battery state led	It turns on when the board is supplied.

1- 7 Display pages

1- 7.1 Navigation diagram

When you turn on the board, you will see the logo page. Then you will be in the mains stand-by page. When you start the generator, you will go in the genset stand-by page. When you stop the engine you will return automatically to the mains stand-by page. With the left and right arrows, you can move through the different sections, and with the up and down arrows you can scroll the pages of the selected section. Pressing the "i" button from navigation pages, you can go to the status and alarm page. Here you can see the organization diagram of the display pages.
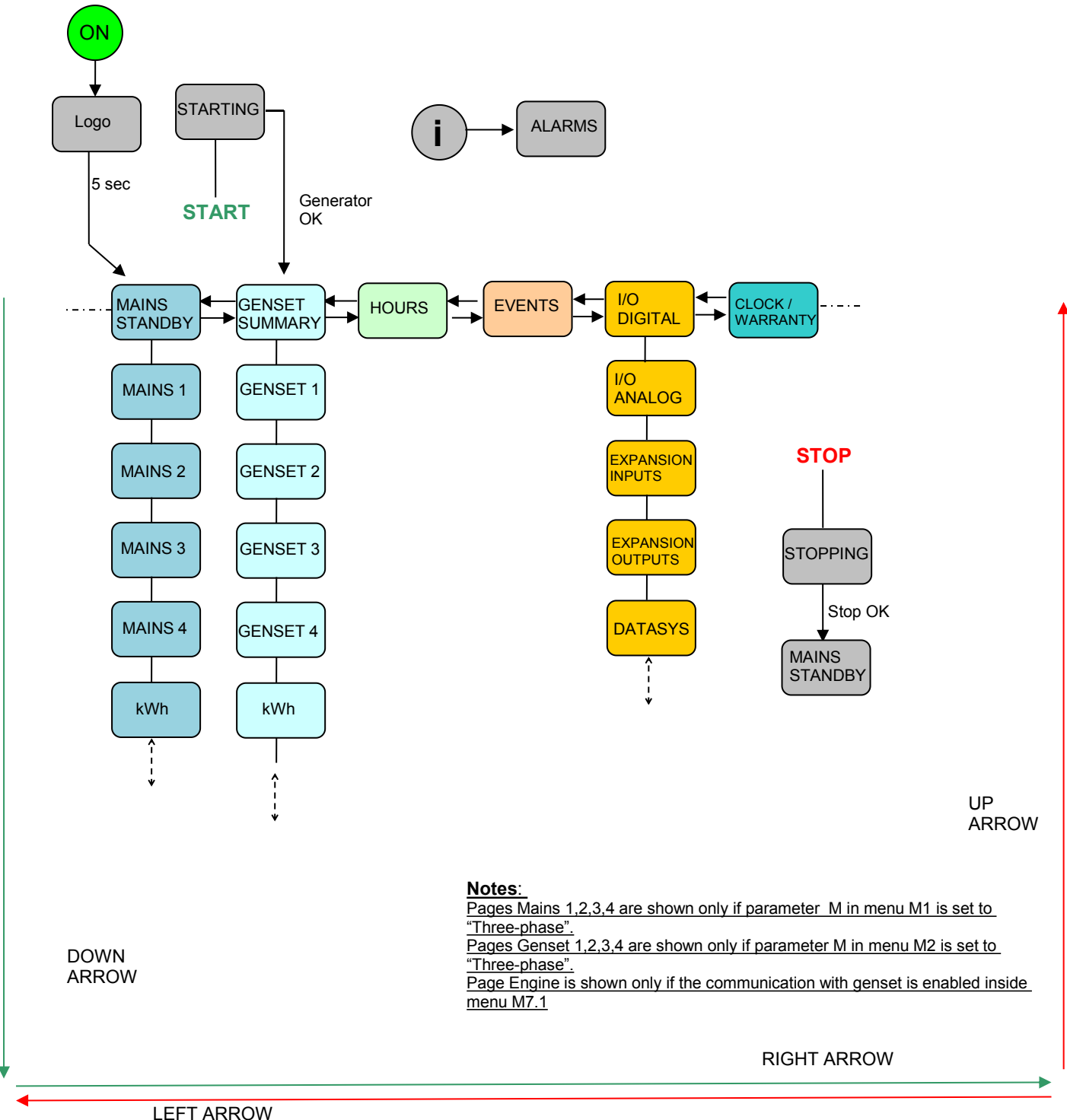
Notes:
Pages Mains 1,2,3,4 are shown only if parameter M in menu M1 is set to "Three-phase".
Pages Genset 1,2,3,4 are shown only if parameter M in menu M2 is set to "Three-phase".
Page Engine is shown only if the communication with genset is enabled inside menu M7.1

1- 7.2 Navigation cursors and first activation
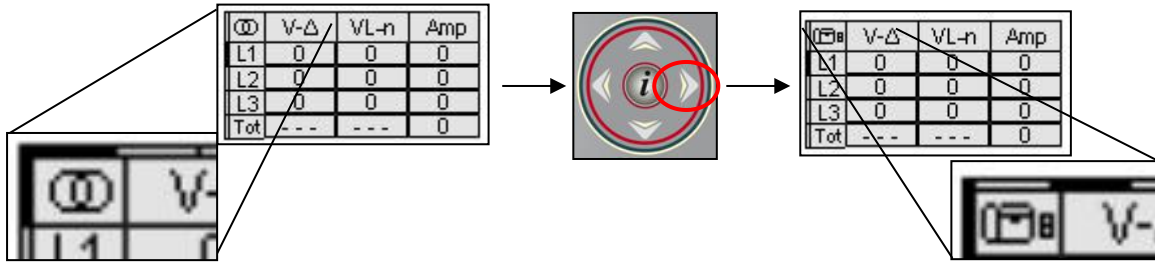
o The cursors on the upper side and left side of the display indicate the position of the page inside the navigation diagram: the left and right arrows move the page along with horizontal cursor.

o The left arrow button allows to return back to the previous section: in this case from the generator pages to the mains pages.

o If the vertical cursor is available on display it's possible to use up and down arrow buttons to see more pages for the section: in this case from the mains measure #1 to mains measure #2.

o With up arrow button you can return to the previous page of the section. Inside the main page there is also the horizontal cursor which means that the left and right arrow buttons are available.
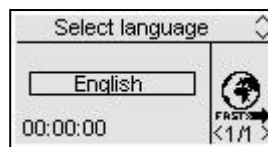
o When the controller is activated for the first time, the language selection screen will appear. If a language different from "DEFAULT" is selected, this screen will not appear anymore at the next start up.

1- 7.3 Display pages - Mains

1- 7.3.1 Mains stand-by

When you turn on the board, you will see the logo page. After 5 seconds you will be in this page, that is the stand-by page with engine OFF:

A	B	C

⊚ V-Δ	Amp	Σ kW
0	0	0
Σ kVA	**PF**	**F Hz**
0	0,00	0,0

D	E	F

A) Mains Vac voltage L1-L2 (or L1-N if the system is single-phase)
B) Mains L1 current
C) Total kW on mains
D) Total kVA on mains
E) Total power factor
F) Mains frequency

1- 7.3.2 Mains 1

(shown only in case of 3-phase system)

A	B	C

⊚	V-Δ	VL-n	Amp
L1	0	0	0
L2	0	0	0
L3	0	0	0
Tot	- - -	- - -	0

A) Mains Vac voltages L1-L2-L3
B) Mains line voltages L1-L2-L3
C) Mains currents L1-L2-L3 and total

1- 7.3.3 Mains 2

(shown only in case of 3-phase system)

A	B	C

⊚	kVA	kW	kVAR
L1	0	0	0,0
L2	0	0	0,0
L3	0	0	0,0
Tot	0	0	0,0

A) Mains apparent power L1-L2-L3 and total
B) Mains active power L1-L2-L3 and total
C) Mains reactive power L1-L2-L3 and total

1- 7.3.4 Mains 3

(shown only in case of 3-phase system)

A	B	C

⊚	kVA	kW	PF
L1	0	0	0,00
L2	0	0	0,00
L3	0	0	0,00
Tot	0	0	0,00

A) Mains apparent power L1-L2-L3 and total
B) Mains active power L1-L2-L3 and total
C) Power factor L1-L2-L3 and total

1- 7.3.5 Mains 4

(shown only in case of 3-phase system)

A	B	C

⊚	kVA	kVAR	PF
L1	0	0,0	0,00
L2	0	0,0	0,00
L3	0	0,0	0,00
Tot	0	0,0	0,00

A) Mains apparent power L1-L2-L3 and total
B) Mains reactive power L1-L2-L3 and total
C) Power factor L1-L2-L3 and total

1- 7.3.6 Mains control kWh

Mains Control	A
kWh 0	B
€ tot 0	
€/MWh 0	C

A) Total active energy supplied by mains
B) Total mains energy cost
C) Cost of each mains MWh

1- 7.4 Display pages - Genset

1- 7.4.1 Genset summary

A	B	C

⊡ᴮ V-Δ	Amp	Σ kW
0	0	0
Σ kVA	**PF**	**F Hz**
0	0,00	0,0

D	E	F

A) Genset Vac voltage L1-L2 (or L1-N if the system is single-phase)
B) Genset L1 current
C) Total kW on genset
D) Total kVA on genset
E) Total power factor
F) Genset frequency

1- 7.4.2 Genset 1

(shown only in case of 3-phase system)

A	B	C

⊡ᴮ	V-Δ	VL-n	Amp
L1	0	0	0
L2	0	0	0
L3	0	0	0
Tot	- - -	- - -	0

A) Generator Vac voltages L1-L2-L3
B) Generator line voltages L1-L2-L3
C) Generator currents L1-L2-L3

1- 7.4.3 Genset 2

(shown only in case of 3-phase system)

	kVA	kW	kVAR
L1	0	0	0,0
L2	0	0	0,0
L3	0	0	0,0
Tot	0	0	0,0

A) Generator apparent power L1-L2-L3 and total
B) Generator active power L1-L2-L3 and total
C) Generator reactive power L1-L2-L3 and total

1- 7.4.4 Genset 3

(shown only in case of 3-phase system)

	kVA	kW	PF
L1	0	0	0.00
L2	0	0	0.00
L3	0	0	0.00
Tot	0	0	0.00

A) Generator apparent power L1-L2-L3 and total
B) Generator active power L1-L2-L3 and total
C) Generator power factor L1-L2-L3 and total

1- 7.4.5 Genset 4

(shown only in case of 3-phase system)

	kVA	kVAR	PF
L1	0	0,0	0.00
L2	0	0,0	0.00
L3	0	0,0	0.00
Tot	0	0,0	0.00

A) Generator apparent power L1-L2-L3 and total
B) Generator reactive power L1-L2-L3 and total
C) Generator power factor L1-L2-L3 and total

1- 7.4.6 Genset control kWh

Genset Control

kWh	0
€tot	0
€MWh	0

A) Total active energy supplied by generator (upgraded every work hour with KG closed)
B) Total generator energy cost
C) Cost of each generator MWh

1- 7.5 Display pages - Engine

Engine Control

⊙Tot	Vdc	⊙
0	0	0
bar	°C	%
0	0	0

A) Total work hours of the generator
B) Battery voltage of the generator
C) Hours left to service
D) Oil pressure
E) Engine temperature
F) Fuel level percentage

Note: this page is shown only if parameter B inside menu M7.1 is set to "Modbus Master" and parameter I is set to "On".

1- 7.6 Display pages - Hours

Hour Counters

On	0
KG	0
KR	0

A) Total work hours of the generator
B) Total work hours with KG closed and load > 0
C) Total work hours with KR closed and load > 0

1- 7.7 Display pages - Events log

The events log page shows you the last alarms with the date and time.

Events Log

05/06/15 10:10:31
01001 Start failure
05/06/15 10:10:21
20012 Stopping
1

A) First event inside selected page: each event records alarm ID, alarm name, date and hour.
B) Second event inside selected page.
C) Press the UP or DOWN button to select the up or down arrow, then press " I ". This way you can scroll the events (up to 250).

1- 7.8 Display pages - System

1- 7.8.1 I/O digital

IO Monitor Digital

In4.4	Out 5.8	Out 5.4
In4.5	Out 5.9	Out 5.5
In4.6	Out 5.10	Out 1.4
In4.7	Out 5.11	Out 1.1
In4.8		

In this page you can see the state of all the 5 digital inputs (from J4.4 to J4.8) and outputs KG (J1.4), KR (J1.1), plus 6 programmable outputs (from J5.8 to J5.11, J5.4 and J5.5).

1- 7.8.2 I/O analog

IO Monitor Analog

J6.2	0.0	J3.1	0
J6.3	0.0	J3.2	0
J6.4	0	J3.3	0
J7.1	0	J5.6	0.0

In this page you can see the state of 8 analog inputs (mains voltages excluded).

1- 7.8.3 Expansion inputs

```
        Exp. inputs
| ExIn 0  O  ExIn 4  O
| ExIn 1  O  ExIn 5  O
| ExIn 2  O  ExIn 6  O
| ExIn 3  O  ExIn 7  O
```

Here you can see the state of the 8 digital inputs of the expansion board (only with expansion enabled).

1- 7.8.4 Expansion outputs

```
        Exp. outputs
| ExOut 0 O  ExOut 4 O
| ExOut 1 O  ExOut 5 O
| ExOut 2 O  ExOut 6 O
| ExOut 3 O  ExOut 7 O
```

Here you can see the state of the 8 digital outputs of the expansion board (only with expansion enabled).

1- 7.8.5 Data info

```
        Data System
| Rel: 2.0.0ZF
| FW: 0.82.18 EAS-A
| SW: 4.6.4.14
| DA: 5/6/2015
```

This page contains the the information about the release file:
REL: Project release version
FW: Firmware release version
SW: TE Utilities release version
DA: Release date

1- 7.9 Clock and warranty

```
A          Clock Control
        05 / 06 / 2015
        Mon / 12:02:30  🕐
       📄 Warranty   mm / yy      B
       ⭐ expires ➡  06 / 17
```

A)   Clock: date and time
B)   Controller warranty expiry date detected automatically by controller after 2 hours with mains voltage and frequency within limits

1- 8 Connection via RS485 with genset controller

It's possible to connect the ATS with a genset controller via RS485. This way it's possible to read the most important measures and alarms directly by the ATS controller, and command the starting and stopping of the genset via RS485, without other external connections.

The connection can be done following the drawing:
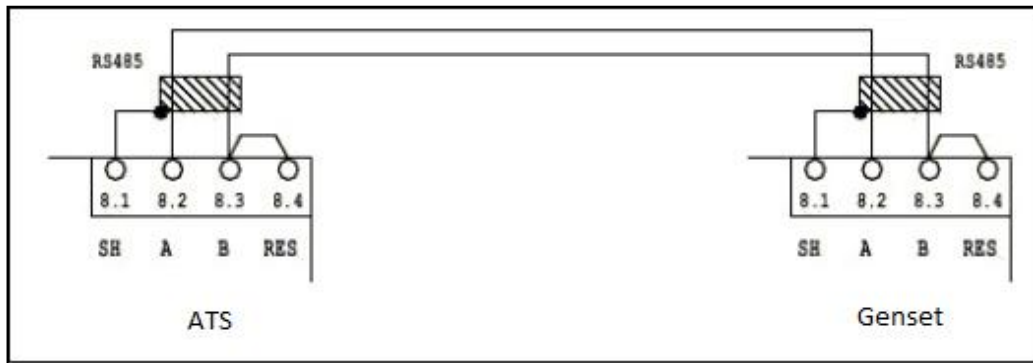
2- PROGRAMMATION MENUS

2- 1 Navigation chart - Global Setup

Direct to parameters

Direct to parameters

Alarm category setup

Directly to parameters

Global Setup

M6.1 – EJP setup

M6.2 – Start by mains kW

M6.3 – Dummy load

M6.4 – Setup TPS

M6.5 – Hour counters

M7.1 – Serial port setup

M7.2 – GSM setup

M7.3 - Datalogger

M8.1 – Input setup

M8.2 – Output setup

M8.3 – Input type

M8.4 – Output type

M8.5 - Calibrations

M8.6 – Expansion

M4.1 – Display setup

M4.2 – Clock setup

M4.3 – Test setup

M4.4 – Setup Security

2- 2 Navigation instructions

Entering global setup, pressing the MENU button, you have to insert the correct password to access to the programming menu. Press the DOWN arrow to highlight the square with the password, and press "i" to confirm. Modify the password with the LEFT and RIGHT arrows, then confirm with "i". The password, by default, is 1. If you enter the wrong password, you will see the indication "wrong code" and you will not be able to enter inside the menu. To change the password, see the Security setup, M.4.4.

If the password is correct, press the DOWN arrow to select the icon (A) and confirm with "i" to enter in the programming menus.

The correct password
is, by default, 1

Note: the password that you insert will remain in memory until you turn-off the controller.
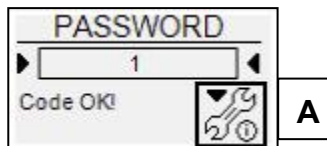
From the main page you can choose 8 different menus:
- A) Mains setup
- B) Alternator setup
- C) Engine setup
- D) General setup
- E) Alarms setup
- F) Special functions
- G) Connectivity
- H) I/O setup
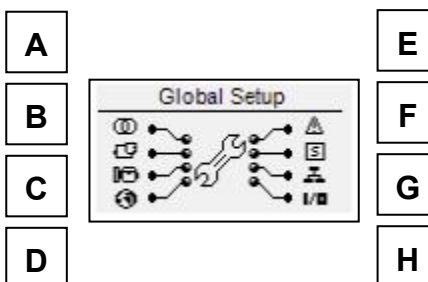
If the HELP symbol is present, it means that there is at least one alarm active. Pressing the HELP button, you directly go to the active alarms page. With the arrows you can select the menu. Once selected the desired menu, press the "i" button to confirm and enter or press "menu" to return to the previous screen. Then you will see a screen for the choice of the sub menu (except for Alternator, Mains and Alarms, in which you will see directly the programming parameters). This screen is composed by 3 parts:
- A) The name of the submenu
- B) The icon of the submenu
- C) The page and the icon of the menu that contains the submenu
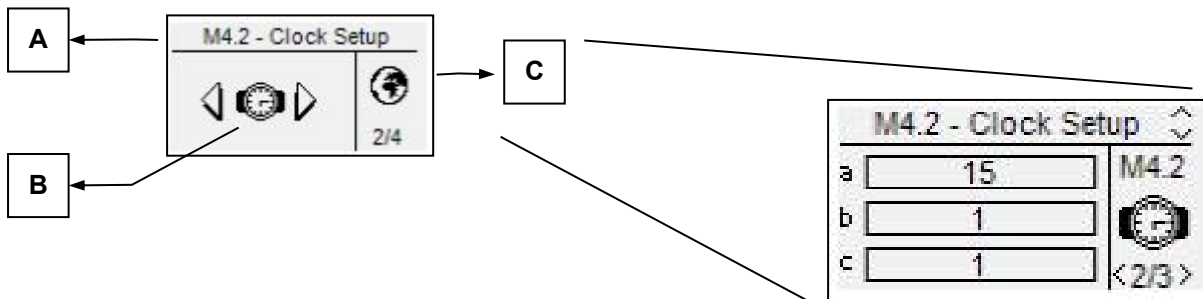
Press "i" to confirm and enter, or press the left or right arrows to see the next submenu, or press "menu" to return to the previous screen. In the submenus, the parameters are divided in different pages; choose the page with the left and right arrows, and choose the parameter with the up and down arrows. Then press "i" to confirm and modify the parameter. Then press "i" to confirm or "menu" to cancel.

2- 3 M1 - Mains setup

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Mains rated V	Allows you to set the rated voltage of the mains.	0-600 [Vac]	400
B	Mains high V	You can set the high threshold voltage; if the voltage measured is higher than this value (% of the rated voltage), the mains is considered faulty and Genset starts the generator (in automatic mode).	100-200 [%]	115
C	Mains low V	You can set the low threshold voltage; if the voltage measured is lower than this value (% of the rated voltage), the mains is considered faulty and Genset starts the generator (in automatic mode).	0-100 [%]	85
D	Mains rated F	Allows you to set the rated frequency.	50-60 [Hz]	50
E	Mains high F	You can set the high frequency threshold; if the frequency measured is higher than this value (% of the rated frequency), the mains is considered faulty and Genset starts the generator (in automatic mode).	100-200 [%]	110
F	Mains low F	You can set the low frequency threshold; if the frequency measured is lower than this value (% of the rated frequency), the mains is considered faulty and Genset starts the generator (in automatic mode).	0-100 [%]	90
G	KR delay	You can set a delay time for the closure of the mains contactor. This time starts from when the Genset opens the generator contactor (software interlock function).	0-100 [s]	1
H	Mains OK	It is the delay time after which, if the mains returns within the limits set (see parameters B, C, E, F), it's considered stable and the mains contactor is closed, then begins the stop phase of the generator (in automatic mode).	0-600 [s]	10
I	Faulty mains	It is the delay time after which the mains is considered faulty, compared with the limits specified in parameters B, C, E, F. This parameter is used to filter any temporary instability of the mains. Increase this parameter to avoid fast start/stop procedures due to mains flickering.	0-600 [s]	5
J	Phase sequence	Choose the sequence of the phases: R-S-T or T-S-R, or OFF	OFF-RST-TSR	RST
K	V Asymmetry	If the difference between the lower and the higher phase voltages is greater than this parameter, the asymmetry alarm (if enabled) is shown.	0-100 [%]	10
L	KR protection	Parameter to enable the protection on mains failure. If On, the alarms about the mains immediately open the mains contactor. If Off, the mains contactor is opened only when the generator is ready.	On-Off	On
M	System type	You can set the type of system of the mains: three-phase, single-phase or two-phase with neutral.	Three-phase Single-phase Two-phase+n	Three-phase
N	Cost for MWh	Set the cost for every Mega Watt per hour supplied by mains	1-999999	210
O	Start by KR	If On, if parameter "KR protection" is set to ON, every condition which activates KR protection (phase inversion, feedback KR, asymmetry alarm, etc...) also triggers an engine start with changeover on generator until the mains returns ok.	On-Off	On

2- 4 M2 - Alternator setup

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	GE rated V	Rated voltage of the generator.	0-600 [VAC]	400
B	GE high V	You can set the high threshold voltage; if the voltage measured is higher than this value (% of the rated voltage), the generator is considered faulty and Genset shows the "high GE voltage" alarm.	100-200 [%]	115
C	GE low V	You can set the low threshold voltage; if the voltage measured is lower than this value (% of the rated voltage), the generator is considered faulty and Genset shows the "low GE voltage" alarm.	0-100 [%]	85
D	GE rated F	Rated frequency of the generator.	40-70 [Hz]	50
E	GE high F	You can set the high threshold frequency; if the frequency measured is higher than this value (% of the rated frequency), the generator is considered faulty and Genset shows the "high GE frequency alarm".	100-200 [%]	110
F	GE low F	You can set the low threshold frequency; if the frequency measured is lower than this value (% of the rated frequency), the generator is considered faulty and Genset shows the "low GE frequency alarm".	0-100 [%]	90
G	Rated current	You set the nominal operating current of the generator.	0-9999 [A]	100
H	Imax overload	You set the maximum overload admitted on the generator. If exceeded, an alarm message is shown.	0-1000 [%]	200
I	Imax short circuit	You set the value that permits to consider a short circuit on the generator. If exceeded, related alarm message is shown.	0-1000 [%]	300
J	KG delay	You can set a delay time for closing the generator contactor.This time starts from when the Genset opens the mains contactor (software interlock function).	0-100 [s]	1
K	GE Ok delay	It is the delay time over which if the voltage and frequency are within limits (parameters B, C, E, F), the generator is considered stable and its contactor is closed.	0-65535 [s]	5
L	CT ratio	It sets the ratio of Current Transformers to read the current value (example: CT 100/5A, you must set it at 20, because 100: 5 = 20).	0-10000	20
M	System type	You can set the type of system of the generator: three-phase, single-phase or two-phase with neutral.	Three-phase Single-phase Two-phase+n	Three-phase
N	Set kWh	Here you can set the initial value of the kWh.	0-10E+8 [kWh]	0
O	Phase sequence	Choose the sequence of the phases: R-S-T or T-S-R, or OFF	OFF-RST-TSR	RST
P	Asymmetry	If the difference between the lower and the higher phase voltages is greater than this value, the asimmetry alarm (if enabled) is shown.	0-100 [%]	10
Q	GE Filter	Insert a 5-levels software filter on eventual disturbs on generator voltage and frequency. It can be set from 0 (no flitering) to 5 (high filtering), to avoid accidental opening of the generator contactor.	0-5	1
R	Neutral	Set if the system is with (On) or without (Off) neutral.	On-Off	On
S	Single CT	If On, line 2 and line 3 load currents are the same value of line 1. In this case it is possible to calculate all 3-phase load measurements (kW, kVA, kVAR, PF) using a single current transformer. This feature is intended to be used only with balanced three-phase loads.	On-Off	Off
T	Cost for MWh	Set the cost for every Mega Watt per hour supplied by the generator.	1-999999	350

2- 5 M3 - Engine setup

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	ON alarm delay	It is the time delay from the engine running detection to the enable of the alarms; this time allows the generator to reach the nominal operating conditions.	0-1000 [s]	8
B	Cooling time	It sets the cooling time after which the engine is stopped: after the generator contactor opening, the remote start output remains active for the set time, to cool down without load. It works only in automatic mode.	0-255 [s]	1
C	Siren time	It is the duration time of the acoustic advisor in case of alarm, if a programmable output is set for "Siren".	0-1000 [s]	20

**NOTES:**

**To avoid any incompatibility between the timings of the ATS and the controller for engine protection, remember that the "ON alarm delay" must be at least 5 seconds higher than the preheat time in the engine protection controller.**

**The cooling procedure is managed by the ATS. If the engine protection controller allows to set a cooling procedure, we advise to disable it and maintain active only the procedure on the ATS controller.**

2- 6 M4 - General setup

The general setup is composed by 4 submenus:

    A)   Display setup: Submenu that contains all the parameters settings of the screen: language, contrast, etc
    B)   Clock setup: Submenu with the general settings about the clock: date, time and day of the week
    C)   Test setup: Submenu with the settings of the test operation mode, like the length and day of the programmable tests
    D)   Security setup: Submenu to set the passwords for different levels that lock and unlock the various menus

2- 6.1 M4.1 - Display setup

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Language	You select the language. On board are available the following languages: English, Italian and French. Another language can be inserted by request in the "custom" position. The controller at the turn-on will ask the settings of the language only if the "default" option is selected.	IT – EN – FR – Custom – Default	Default (EN)
B	Contrast	To set the display contrast preferred for the Genset.	0-15	10
C	Show warranty	If On the automatic controller warranty time will be shown on display, otherwise it will remain hidden.	Off-On	On
D	Show IO	If On the IO monitor pages will be shown on display, otherwise they will remain hidden.	Off-On	On

2- 6.2 M4.2 - Clock setup
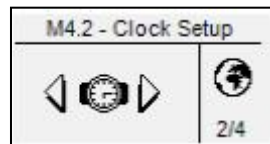
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
-	Set clock	Used to confirm the adjusted date/clock, it updates the current time with the values set in parameters A,B,C,D,E,F. To do it, you must select the area using the drive arrows and then confirm by the "i" drive button.	-	-
-	Current setting	It shows current date and clock set.	-	-
A	Year	To set the year	0-99	13
B	Month	To set the month	0-12	1
C	Day	To set the day	0-31	1
D	Day of the week	To set the day of the week from Sunday to Saturday	Sun - Sat	Sun
E	Hours	To set the current hour	0-23	12
F	Minutes	To set the current minute	0-59	0

2- 6.3 M4.3 - Test setup

M4.3 - Test Setup
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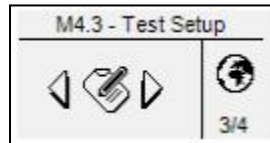
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Start hour	You set the hour of test 1 starting.	0-23	9
B	Start min.	You set the minute of test 1 starting.	0-59	30
C	Test length	You set the length time for the test 1. If Off, test 1 is disabled.	Off -255 [min]	5
D	Start hour	You set the hour of test 2 starting.	0-23	10
E	Start min.	You set the minute of test 2 starting.	0-59	30
F	Test length	You set the length time for the test 2. If Off, test 2 is disabled.	Off -255 [min]	Off
G	Test with load	If you set it to ON, during the test, the switching between Mains and Genset should be done.	On-Off	Off
H	No remote stop	If ON, during the test the remote stop signal is not considered. If OFF, if the remote stop signal is active during the test, the engine is stopped and the test finishes automatically.	On-Off	Off

| POS.	NAME	DESCRIPTION
-	Sunday	If the tick is present, it enables the daily test on Sunday. If the tick is removed, on this day the test is not executed.
-	Monday	If the tick is present, it enables the daily test on Monday. If the tick is removed, on this day the test is not executed.
-	Tuesday	If the tick is present, it enables the daily test on Tuesday. If the tick is removed, on this day the test is not executed.
-	Wednesday	If the tick is present, it enables the daily test on Wednesday. If the tick is removed, on this day the test is not executed.
-	Thursday	If the tick is present, it enables the daily test on Thursday. If the tick is removed, on this day the test is not executed.
-	Friday	If the tick is present, it enables the daily test on Friday. If the tick is removed, on this day the test is not executed.
-	Saturday	If the tick is present, it enables the daily test on Saturday. If the tick is removed, on this day the test is not executed.

2- 6.4 M4.4 - Security setup

M4.4 - Security Setup
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The security setup menu permits to enter the access codes the permit to lock/unlock the programming menus. By default, the access codes are set correctly, so you can access to all the menus. You have the possibility to protect the programming menus entering wrong codes: this way the menus correspondent to the wrong code inserted are locked. When you want to unlock the menus, simply enter in this menu and set the codes to the correct values. The 6 codes are shown in the table.

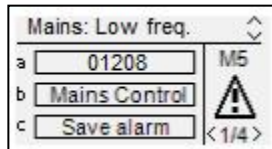| POS.	NAME	DESCRIPTION	CODE
A	Global code	This is the password to access to the programming menus. It's possible to change it, from 000 to 999.	1
B	Clear events log	Confirm to erase events log register.	-
C	State password	Password to lock/unlock all the alarms except the mains, generator and engine ones.	70
D	Mains password	Enter the password that locks/unlocks the mains setup and the relative alarms. If you enter the code correctly to 60, the mains menu is completely unlocked. If you enter a wrong code, the menu is locked until the correct code will be inserted.	60
E	Genset password	Enter the password that locks/unlocks the alternator setup and the relative alarms. If you enter the code correctly to 50, the alternator setup is completely unlocked. If you enter a wrong code, the menu is locked.	50
F	Engine password	Enter the password that locks/unlocks the engine setup and the relative alarms. If you enter the code correctly to 40, the engine setup is completely unlocked. If you enter a wrong code, the menu is locked.	40
G	Special password	Enter the password that locks/unlocks the special functions setup. If you enter the code correctly to 30, the special functions setup is completely unlocked. If you enter a wrong code, the menu is locked.	30
H	Connectivity password	Enter the password that locks/unlocks the connectivity setup. If you enter the code correctly to 20, the connectivity setup is completely unlocked. If you enter a wrong code, the menu is locked.	20
I	I/O password	Enter the password that locks/unlocks the I/O setup. If you enter the code correctly to 10, the I/O setup is completely unlocked. If you enter a wrong code, the menu is locked.	10

2-7 M5 - Alarms list
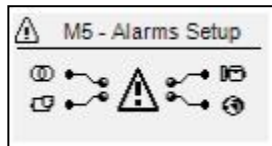
The alarms setup is composed by 4 different alarm groups:
   a)   Mains alarms
   b)   Generator alarms
   c)   Engine alarms
   d)   General alarms

Select the category with the down and up arrows, then press "i" to confirm and enter.
You will see a general screen for the setup of the alarms, composed by 4 pages. In the first page, select and confirm the parameter "a" to choose the code of the alarm. In the upper part of the screen you will see the name of the correspondent alarm. Then modify the parameters from "d" to "l" as you prefer. Return then to the first page and confirm the parameter "c" to save the modifications.

For every alarm, you can program all the following parameters:

POS.	NAME	DESCRIPTION	RANGE
A	Alarm code	Select this parameter to choose the alarm that you want to set. All the parameters in the next pages refer to the alarm selected in this parameter. In the upper part of the screen you will see also the name correspondent to the code that you are selecting.	-
B	Category of the alarm	Name of the category selected from the first screen of the alarm setup. It's not possible to modify it directly in this page.	-
C	Save alarm	Parameter that has to be confirmed with the "i" button to save all the parameters from D to L in the configuration of the alarm selected at parameter A.	-
D	Activation	It permits to choose when the alarm condition must be verified and make the alarm appear: Always (always enabled), Run (active only with engine running) or Disabled (disabled).	Always - Run-Disabled
E	Delay	Before the activation of the alarm, the cause must remain present for this time.	0-255 [s]
F	Retentive	Choose if the alarm must be retentive (ON: the alarm indication remains on display until you press the reset button, even if the cause has disappeared) or not (OFF: the alarm indications disappears when the cause disappears).	Off-On
G	Action	Select the action in consequence of the activation of the alarm: Warning (only indication), Stop (the alarm stops the engine immediately) or Cooling (the alarms stops the engine with cooling).	Warning - Stop - Cooling
H	Siren	Set if the activation of the alarms must also activate the output programmed for Siren. It can be set to ON (the output set for "siren" is activated when the alarm is present) or OFF.	Off-On
I	Remote	Set if the activation of the alarm must also send an SMS message if Remote APP option is enabled and one or more of programmed GMS numbers are correctly saved (see menu M7). It can be set to ON (if a modem is connected, the board sends a SMS when the alarm appears) or OFF. Enable also the single alarm flag inside modbus map.	Off-On
J	Global 1	Set if the activation of the alarms must also activate the output programmed for Global alarm 1. It can be set to ON (the output is activated when the alarm is present) or OFF.	Off-On
K	Global 2	Set if the activation of the alarms must also activate the output programmed for Global alarm 2. It can be set to ON (the output is activated when the alarm is present) or OFF.	Off-On
L	Global 3	Set if the activation of the alarms must also activate the output programmed for Global alarm 3. It can be set to ON (the output is activated when the alarm is present) or OFF.	Off-On

2- 7.1 M5 - Alarms default parameters

N.	Category	Alarm code	Alarm name	Activation			Delay	Retentive	Action			Siren	REMOTE	Global 1	Global 2	Global 3
				Always	Disabled	Run			Cooling	Stop	Warning					
1	Mains	1208	Mains: low freq.		☑		2				☑		☑			
2	Mains	1209	Mains: high freq.		☑		2				☑		☑			
3	Mains	1213	Mains: V asymmetry	☑			1				☑	☑	☑	☑		
4	Mains	20025	Faulty mains	☑			2				☑		☑			
5	Mains	20034	KR feedback	☑			5				☑	☑	☑	☑		
6	Mains	20052	Mains: phase seq.	☑			0				☑	☑	☑	☑		
7	Mains	20060	Mains: low voltage		☑		5				☑		☑			
8	Mains	20061	Mains: high voltage	☑			5				☑		☑			
9	Generator	1201	GE: low freq.			☑	5	☑		☑		☑	☑	☑		
10	Generator	1202	GE: high freq.			☑	5	☑		☑		☑	☑	☑		
11	Generator	1205	GE: phase seq.	☑			0	☑		☑		☑	☑	☑		
12	Generator	1206	GE: short circuit			☑	2	☑		☑		☑	☑	☑		
13	Generator	1207	GE: Imax overload			☑	5	☑	☑			☑	☑	☑		
14	Generator	1214	GE: V asymmetry			☑	1	☑			☑	☑	☑	☑		
15	Generator	20007	Ground protection	☑			2	☑		☑		☑	☑	☑		
16	Generator	20032	Emergency stop	☑			0	☑		☑		☑	☑	☑		
17	Generator	20033	KG feedback	☑			5	☑			☑	☑	☑	☑		
18	Generator	20036	User alarm 1	☑			3	☑			☑	☑	☑	☑		
19	Generator	20037	User alarm 2	☑			3	☑			☑	☑	☑	☑		
20	Generator	20038	User alarm 3	☑			3	☑			☑	☑	☑	☑		
21	Generator	20062	GE: low voltage			☑	5	☑		☑		☑	☑	☑		
22	Generator	20063	GE: high voltage			☑	5	☑		☑		☑	☑	☑		
23	Generator	20064	Electrical trip			☑	2			☑		☑	☑	☑		
24	Generator	20065	Load breaker open	☑			1				☑		☑	☑		
25	Generator	20066	GE protection			☑	2			☑		☑	☑	☑		
26	Engine	20015	Stop engine failure		☑		1				☑	☑	☑	☑		
27	Engine	20058	Start failure	☑			10	☑			☑	☑	☑	☑		
28	Engine	20067	Master com error	☑			10				☑	☑	☑	☑		
29	Engine	20068	Temperature alarm	☑			0				☑	☑	☑	☑		
30	Engine	20069	Oil alarm	☑			0				☑	☑	☑	☑		
31	Engine	20070	Battery alarm	☑			0				☑	☑	☑	☑		
32	Engine	20071	Fuel alarm	☑			0				☑	☑	☑	☑		
33	Engine	20072	Service alarm	☑			0				☑	☑	☑	☑		
34	Engine	20073	genset warning	☑			0				☑	☑	☑	☑		
35	Engine	20074	genset failure	☑			0				☑	☑	☑	☑		
36	General	20008	Test active	☑			0				☑					
37	General	20021	Remote start	☑			1				☑					
38	General	20022	Remote stop	☑			1		☑			☑		☑		
39	General	20026	EJP	☑			0				☑					
40	General	20027	Failed test	☑			0	☑			☑	☑	☑	☑		
41	General	20045	GE running…	☑			0				☑					
42	General	20046	GE ready…	☑			0				☑					
43	General	20059	TPS mode on	☑			0				☑					

2- 7.2 M5 - Alarms description

N.	Alarm code	Alarm name	Alarm description	Menu / Parameter
1	1208	Mains: low freq.	Indicates that the mains frequency is under the programmed threshold	M1-F
2	1209	Mains: high freq.	Indicates that the mains frequency is over the programmed threshold	M1-E
3	1213	Mains: V asymmetry	Indicates that the difference between the higher and the lower mains voltages is too high	M1.K
4	20025	Faulty mains	Indicates that the mains is out of limits	M1-BCEF
5	20034	KR feedback	If KR contactor output status is not equal to input status	M8
6	20052	Mains: phase seq.	Indicates a wrong phase sequence of the mains	M1-J
7	20060	Mains: low voltage	Indicates that the mains voltage is under the programmed threshold	M1-C
8	20061	Mains: high voltage	Indicates that the mains voltage is over the programmed threshold	M1-B
9	1201	GE: low freq.	Frequency values are under the programmed limits	M2-F
10	1202	GE: high freq.	Frequency values are over the programmed limits	M2-E
11	1205	GE: phase seq.	Indicates wrong generator voltages sequence	M2-O
12	1206	GE: short circuit	Indicates an instantaneous current higher than the programmed limits for short circuit	M2-I
13	1207	GE: Imax overload	Indicates an instantaneous current higher than the programmed limits for overload	M2-H
14	1214	GE: V asymmetry	Indicates that the difference between the higher and the lower genset voltages is too high	M2-P
15	20007	Ground protection	Ground protection digital input alarm	M8
16	20032	Emergency stop	It indicates that the input programmed as "emergency button" is active	M8
17	20033	KG feedback	If KG contactor output status is not equal to input status	M8
18	20036	User alarm 1	Alarm that is present when the digital input programmed as user alarm 1 is active	M8
19	20037	User alarm 2	Alarm that is present when the digital input programmed as user alarm 2 is active	M8
20	20038	User alarm 3	Alarm that is present when the digital input programmed as user alarm 3 is active	M8
21	20062	GE: low voltage	Voltage values are under the programmed limits	M2-C
22	20063	GE: high voltage	Voltage values are over the programmed limits	M2-B
23	20064	Electrical trip	Alarm that indicates that the relative digital input is active	M8
24	20065	Load breaker open	Alarm that indicates that the relative digital input is active	M8
25	20066	GE protection	Alarm that indicates that the relative digital input is active	M8
26	20015	Stop engine failure	Indicates that the engine is detected running if the remote start output is removed and after cooling time delay + 10s.	M3.1
27	20058 / 1001	Start failure	Indicates that the engine is not detected running after the start attempts in automatic mode	M3.1
28	20067	Master com error	Indicates a communication error with the genset connected	-
29	20068	Temperature alarm	Indicates a temperature alarm from the genset controller	-
30	20069	Oil alarm	Indicates an oil alarm from the genset controller	-
31	20070	Battery alarm	Indicates a battery alarm from the genset controller	-
32	20071	Fuel alarm	Indicates a fuel alarm from the genset controller	-
33	20072	Service alarm	Indicates a service alarm from the genset controller	-
34	20073	Genset warning	Indicates a warning message from the genset controller	-
35	20074	Genset failure	Indicates a severe alarm message from the genset controller	-
36	20008	Test active	Signalization active during test procedure	M4.3
37	20021	Remote start	Indicates remote start function from digital input	M8
38	20022	Remote stop	Indicates remote stop function from digital input	M8
39	20026	EJP	Indicates that the remote start input (if programmed as EJP) is active	M6.1
40	20027	Failed test	Indicates an unsuccessful test in automatic mode: a stopping alarm occurs during test procedure	M4.3
41	20045	GE running…	Indication that is active when the generator is detected running	-
42	20046	GE ready…	Indication that the generator is not running and without blocking alarms	-
43	20059	TPS mode on	Indicates that the TPS (timed programmable start) is active	M6.4

2- 8 M6 - Special functions

The Genset has 5 menus for special functions: EJP, Start by mains kW, Dummy load, TPS, Hour counters. The relative parameters can be set in this menu. The submenus are the following:

A) EJP - only auto mode
B) Start by mains kW (peak shaving) - only auto mode
C) Dummy Load - only auto mode
D) TPS (timer programmable start stop) - only auto mode
E) Hour counters

2- 8.1 M6.1 - EJP

```
┌─────────────────────────┐
│   M6.1 - Setup EJP      │
│                    ⊕⊕    │
│          0▣      ├─#     │
│   ◁  EJP  ▷     ⬚⬚      │
│                          │
│                   1/6    │
└─────────────────────────┘
```
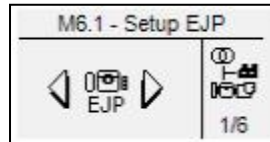
Start the generator by a remote signal on one of the programmable inputs previously programmed as remote start (see par. 2-10). When that input is closed to negative, after a delay time, the generator starts. Then:

a) If EJP 2 ENABLE is OFF: when the KG DELAY time has elapsed, Genset switches the changeover switch on generator side, even if the mains is detected.
b) If EJP 2 ENABLE is ON: after the generator has started, you have to wait that the second programmable input (that you have to set to CHANGEOVER, see par. 2-10) is closed to negative, then after the KG delay time, Genset switches the changeover switch on generator side, even if the mains is detected.

"No KR with EJP" option permits to inhibit, in case of generator alarm, the changeover switch on mains side.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	EJP enable	If ON the function is enabled, if OFF the function is disabled.	On-Off	Off
B	Start delay	It is the delay time that elapses when you close to negative the terminal programmed as remote start before the generator starting.	0-999 [s]	5
C	KG delay	It is the delay time that elapses after the starting of the generator (if parameter D is OFF) or after the closure to negative of the input programmed as changeover (if parameter D is ON) before the switching of the changeover switch.	0-999 [s]	5
D	EJP2 input	If ON, it enables the changeover switch control by the changeover input terminal closed to negative; when closed and after the delay time at point C, the load switches to generator. If OFF, the changeover input is not necessary to control the changeover switch: changeover switch is automatically closed on generator side when the engine is started by the remote start input and after the delay time at point C.	On-Off	Off
E	No KR with EJP	If ON, when EJP mode is active (remote start input active), the mains contactor opens and it's not possible to close it also if the generator is stopped by an alarm.	On-Off	Off
F	Off delay	It is the delay time during which the EJP signal must be disabled to permit the stopping of the generator and the switching on the mains.	0-999 [s]	5

2- 8.2 M6.2 - Start by mains kW

M6.2 - Setup kW Mains

◁ kWatt ▷   2/6
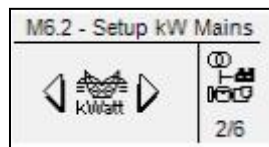
Function that allows the generator's automatic start and stop, according to the maximum and minimum thresholds programmable on mains consumption.

If the load consumption from the mains supplies exceeds the START THRESHOLD for a period of time longer then the TIME FOR START, Genset starts the generator and switch the load for the generator. When the value of load's consumption is less than the STOP THRESHOLD at least for the TIME FOR STOP time, the load is commutated to the mains (if available) and the generator is stopped. If the mains is missing, the load remains on generator until the mains voltage is detected.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	kW mains Enable	If ON the function is enabled, if OFF it is disabled.	On-Off	Off
B	Start power	Load supplied by the mains: if the power consumption exceeds this value (at least for the "time for start" at point C), the generator starts and the power switching moves on the generator.	0-255 [%]	80
C	Time for start	It is the delay time for which the load consumption must remain over the threshold value on the mains (point B); after this time the generator starts.	0-255 [s]	5
D	Stop power	Load is supplied by the generator: if the power consumption returns to be less than this threshold value set (at least for the "time for stop at point E), the load switches to the Mains and the generator is stopped.	0-255 [%]	30
E	Time for stop	It's the delay time for which the load consumption must remain below the threshold value; after this time the load returns to the Mains and the generator is stopped.	0-255 [s]	5

Note: power percentage thresholds are referred to the rated kW value, that is calculated from the rated voltage, the rated current, the rated power factor (0,8) and the type of the system selected.

2- 8.3 M6.3 - Dummy load

M6.3 - Dummy load

◁ Dummy ▷   3/6
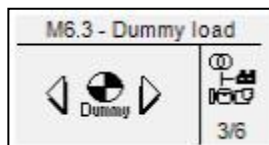
Function that allows to activate one of the programmable outputs, according to the maximum and minimum thresholds programmable on load consumption. If the load consumption is lower than the DUMMY ON for a period of time longer then the ON DELAY, the board activates all the outputs that you programmed for Dummy load function (see par. 2-10 for the programmation of the outputs). When the value of load consumption is higher than the DUMMY OFF at least for the OFF DELAY time, the outputs are de-activated. To activate this function, you have to set at least one of the programmable outputs for "dummy load" (see par. 2-10), then you have to set the following parameters.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Dummy enable	If ON the function is enabled, if OFF the function is disabled.	On / Off	Off
B	Dummy On	Load supplied by generator: if the power consumption is lower than this value (at least for the "On delay" at point C), the outputs programmed as "dummy load" are activated.	0-255 [%]	30
C	On delay	It is the delay time for which the load consumption must remain under the threshold value on the generator (point B); after this time the outputs are activated.	0-255 [s]	5
D	Dummy Off	Load is supplied by the generator: if the power consumption exceeds the threshold value set (at least for the "Off delay" at point E), the outputs programmed as "dummy load" are deactivated.	0-255 [%]	80
E	Off delay	It is the delay time for which the load consumption must remain over the threshold value on the generator (point D); after this time the outputs are deactivated.	0-255 [s]	5

Note: power percentage thresholds are referred to the rated kW value, that is calculated from the rated voltage, the rated current, the rated power factor (0,8) and the type of the system selected.

2- 8.4 M6.4 - TPS

M6.4 - Setup TPS

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This function similar to automatic test is used to program up to two working intervals which activate the generator at chosen clock time and stop it at a chosen clock time. It's also possible to program if the working time is with or without load, with or without remote stop and which are the days allowed to work.

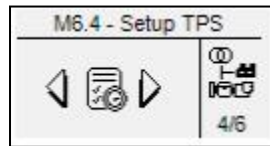| POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A 1-2	TPS1 start (h) - TPS1 start (m)	TPS1 start hour and minute.	0-23 / 0-59	8:30
B 1-2	TPS1 stop (h) - TPS1 stop (m)	TPS1 stop hour and minute.	0-23 / 0-59	12:30
C	TPS1 enable	If Off, the working period 1 is disabled.	On-Off	Off
D	TPS2 start (h) - TPS2 start (m)	TPS2 start hour and minute.	0-23 / 0-59	14:30
E	TPS2 stop (h) - TPS2 stop (m)	TPS2 stop hour and minute.	0-23 / 0-59	18:30
F	TPS2 enable	If Off, the working period 2 is disabled.	On-Off	Off
G	TPS with load	If On, the TPS mode will be with load on generator side, id Off the load will remain on mains side and the changeover will happen only in case of mains failure during TPS.	On-Off	Off
H	No remote stop	If On, the TPS mode will override remote stop activation to start the generator.	On-Off	Off

POS.	NAME	DESCRIPTION
-	Sunday	If the tick is present, it enables the TPS on Sunday. If the tick is removed, on this day the TPS is not executed.
-	Monday	If the tick is present, it enables the TPS on Monday. If the tick is removed, on this day the TPS is not executed.
-	Tuesday	If the tick is present, it enables the TPS on Tuesday. If the tick is removed, on this day the TPS is not executed.
-	Wednesday	If the tick is present, it enables the TPS on Wednesday. If the tick is removed, on this day the TPS is not executed.
-	Thursday	If the tick is present, it enables the TPS on Thursday. If the tick is removed, on this day the TPS is not executed.
-	Friday	If the tick is present, it enables the TPS on Friday. If the tick is removed, on this day the TPS is not executed.
-	Saturday	If the tick is present, it enables the TPS on Saturday. If the tick is removed, on this day the TPS is not executed.

2- 8.5 M6.5 - Hours

M6.4 - Hour counters

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POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Initial work	Here you can set a value of the work hours, then confirm the parameter D to set the actual work hours to this value.	0-999999 [h]	0
B	KG hours	Here you can set a value of the work hours with KG closed, then confirm the parameter D to set the actual work hours with KG closed to this value.	0-999999 [h]	0
C	KR hours	Here you can set a value of the hours with KR closed, then confirm the parameter D to set the actual hours with KR closed to this value.	0-999999 [h]	0
D	Counter reset	Confirm this parameter to set the values at parameters A, B and C. It becomes 1 for a small time after you confirmed it, to indicate that the procedure of hours updating is working.	Wait…-Ok	Ok
E	Clear events log	If you confirm this option with "i" button, the events in the events log are deleted.	-	Ok

2- 9 M7 - Connectivity

2- 9.1 M7.1 - Serial port setup

M7.1 - Serial Setup

◁ 🖥 ▷   🖧
1/3

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Unit ID	It's the address of the board for RS485 communication.	0-255	1
B	RS485 protocol	Protocol types available: **None:** Serial port disabled. **Modbus Master:** used for the connection with RI6010 expansion and Genset Slave module for Dual standby mode. **Modbus slave:** used for remote monitoring via serial cable or Dual standby connection with a master modbus device. **GSM modem:** used to connect GSM modem.	None Modbus Master Modbus Slave Gsm modem	Modbus Slave
C	RS485 baud-rate	Communication speed in bit per second: for modem connections, it is recommended speed of 9600.	9600-115200 [bps]	115200
D	RS232 protocol	Protocol types available: **None:** Serial port disabled. **Modbus Master:** used for the connection with RI6010 expansion and Genset Slave module for Dual standby mode. **Modbus slave:** used for remote monitoring via serial cable or Dual standby connection with a master modbus device. **GSM modem:** used to connect GSM modem.	None Modbus Master Modbus Slave Gsm modem	Modbus Slave
E	RS232 baud-rate	Communication speed in bit per second for RS232 port.	9600-115200 [bps]	115200
F	Activate USB	Confirm to activate USB port to communicate with PC. The communication channel disables as protection CAN port and current measures on J3, use it without machine running for programmation only.	Off-On	Off
G	232 parity	Set the parity for 232 serial port: 1 = Even 2 = Odd 3 = Mark 4 = Space	None - 4	None
H	485 parity	Set the parity for 485 serial port: 1 = Even 2 = Odd 3 = Mark 4 = Space	None - 4	None
I	Enable genset	It permits to enable (On) or disable (Off) the communication with a genset engine protection controller, to see its measures about the engine and the main alarms, and to send starting and stopping commands via RS485.	On-Off	Off

2- 9.2 M7.2 - GSM Setup

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Modem status	Status of the modem: initial (initializing phase), wait (waiting), ready (stand-by phase), send (sending a message), send wait (waiting the response).	-	-
B	APP enable	It enables the automatic status messages and alarm via SMS for SMS app or standard mobile.	On-Off	Off
C	SMS filter (s)	Set the minimum time between two different SMS events to avoid to send many messages in short period of time.	1-255 [s]	3
D 1-2	Generator Ok - Engine running	If enabled, the activation of this condition will trigger a SMS info message	On-Off	Off-On
E 1-2	Engine stopping - Stopping ok	If enabled, the activation of this condition will trigger a SMS info message	On-Off	Off-On
F 1-2	KG active - KR active	If enabled, the activation of this condition will trigger a SMS info message	On-Off	On-On
G 1-2	Auto mode - Test mode	If enabled, the activation of this condition will trigger a SMS info message	On-Off	On-Off
H 1-2	Off mode - Man mode	If enabled, the activation of this condition will trigger a SMS info message	On-Off	On-On
I 1-2	Ejp on - Mains return	If enabled, the activation of this condition will trigger a SMS info message	On-Off	Off-Off
J	Remote stop	If enabled, the activation of this condition will trigger a SMS info message	On-Off	On
K 1-2-3	Pw char 1-2-3	Set the 6 characters password code for SMS commands: if password is different from 0-0-0-0-0-0, every SMS command received without the correct password code will be discarded. The syntax to send the correct SMS with password is: *PWD=[XXXXXX] [Command]* For example if password is 1-0-2-A-z-X, the SMS command to start the engine must be composed this way: *PWD=102AzX START*	[0-9] or [A-Z] or [a-z]	0 - 0 - 0
L 1-2-3	Pw char 4-5-6	Set the other 3 characters for the password	[0-9] or [A-Z] or [a-z]	0 - 0 - 0
M	Call Numbers	It shows the mobile phone numbers set in position 1	-	-
N	Call Numbers	It shows the mobile phone numbers set in position 2	-	-
O	Call Numbers	It shows the mobile phone numbers set in position 3	-	-
P	Call Numbers	It shows the mobile phone numbers set in position 4	-	-
Q	Call Numbers	It shows the mobile phone numbers set in position 5	-	-

2- 9.2.1 - System info SMS message

SMS sent by remote device will be received by mobile device with the following format:

EAS=Gen.Name--------
O=AUTO,P=000
M237,237,232,49.9
G000,000,000,00.0
A003.0,000.0,000.0
B=14.1V,h=00000
T=99%,U=00
MC=ON,Z=00
E0000,A000
#41001,Start failure

SMS SECTION	FORMAT DESCRIPION	# DATA CHARACTERS	DATA DESCRIPTION
EAS	[Message type]	3	Message header for ATS Genset
=---------------	=[Generator name]	16	Name of the generator
O=AUTO	O=[Program]	4	Operative mode active ("OFF"-"MAN"-"AUTO"-"TEST")
,P=000	,P=[Active power kW]	3	Total active power
M237	M[Mains voltage line 1]	3	Mains L1-n voltage
,237	,[Mains voltage line 2]	3	Mains L2-n voltage
,232	,[Mains voltage line 3]	3	Mains L3-n voltage
,49.9	,[Mains frequency]	4	Mains frequency
G=000	G=[Genset voltage line 1]	3	Generator L1-n voltage
,000	,[Genset voltage line 2]	3	Generator L2-n voltage
,000	,[Genset voltage line 3]	3	Generator L3-n voltage
,00.0	,[Genset frequency]	4	Generator frequency
A003.0	A[Load current line 1]	4	Load current L1
,000,0	,[Load current line 2]	4	Load current L2
,000.0	,[Load current line 3]	4	Load current L3
B=14.1V	B=[Battery voltage]V	4	Battery voltage
,h=00000	,h=[Work hours]	5	Total work hours
T=99%	T=[Fuel level]	2	Fuel level percentage (if connected to a genset controller)
%,U=00	%,U=[Oil pressure]	2	Oil pressure (if connected to a genset controller)
MC=ON	[Contactor status]	5	Contactors status: • MC=ON means mains contactor ON • GC=ON means generator contactor ON • C=OFF means both contactors OFF
,Z=00	,Z=[Engine temperature]	3	Engine temperature (if connected to a genset controller)
E0	E[Input I4.4 status]	1	Status of input I4.4 (0=not active, 1=active)
0	[Input I4.5 status]	1	Status of input I4.5 (0=not active, 1=active)
0	[Input I4.6 status]	1	Status of input I4.6 (0=not active, 1=active)
0	[Input I4.7 status]	1	Status of input I4.7 (0=not active, 1=active)
,A0	,A[output O5.8 status]	1	Status of output 5.8 (0=not active, 1=active)
0	[output O5.9 status]	1	Status of output 5.9 (0=not active, 1=active)
0	[output O5.10 status]	1	Status of output 5.10 (0=not active, 1=active)
#41001	#[message ID]	5	Message ID without alarms: • 00250 = Power on • 00201 = Generator ready • 00202 = Engine running • 00203 = Engine stopping • 00204 = Engine stop successful • 00205 = KG on • 00206 = KR on • 00207 = Auto mode • 00208 = Test mode • 00209 = Off mode • 00210 = Man mode • 00211 = Ejp on • 00212 = Mains return • 00219 = Remote stop • 00222 = System info Message ID with alarms, the first digit is the alarm severity: • 1 = Global alarm #1 On • 2 = Global alarm #2 On • 3 = Global alarm #3 On • 4 = Shutdown alarm The other four digits are the alarm code, if the alarm code is greater than 20000, than the SMS code will be: $[SMS\_alarm\_code]=[Alarm\_ID]-17000$ For example "Emergency stop" alarm code 20032 which is a shutdown alarm will be reported with the following code: $[Emergency\_stop\_alarm\_code] = (4*10^5)+(20032-17000) = 43032$
,Start failure	,[message text]	16	Message text

2- 9.2.2 - SMS commands list

This is the list of commands which could be sent to mobile device:

COMMAND NAME	TEXT SENT (case sensitive)	DESCRIPTION
MANUAL MODE	**MAN**	Activate manual mode on remote device
AUTO MODE	**AUT**	Activate auto mode on remote device
OFF MODE	**OFF**	Activate Off mode on remote device
RESET ALARMS	**RESET**	Alarms reset on remote device
MAINS CONTACTOR	**MAINS**	Changeover switch on mains side in manual mode
GENSET CONTACTOR	**GEN**	Changeover switch on generator side in manual mode
START ENGINE	**START**	Start generator command in manual mode (if man mode is not selected, the controller will activate manual mode before start)
STOP ENGINE	**STOP**	Stop generator command in manual mode (if man mode is not selected, the controller will activate manual mode before start)
TEST MODE	**TEST**	Activate test mode
NAME	**NAME:[name_parameter]** Name_paramete is max 16 characters string	Set remote device name
CUSTOM PARAMETER	**SET:[ID_parameter] [Value_parameter]** Both values are numeric between 0-9999; for example if I want to set parameter 300 to 10, the text sent will be: SET:300 10	Set an enabled parameter of remote device. ***Warning: consult the correct memory map to verify the address of the parameter you want to modify. A wrong setting could compromise the functioning of the machine.***
SET GSM NUMBER	**SET[Position_number]:[Cellphone_number]** Position_number value is numeric between 1-6, cellphone_number is a telephone number which allows the remote device to know where SMS need to be sent. For instance to set number 339 333 9000 in position #3 of remote device, the sent text will be: SET3:3393339000	Set the telephone number which will be used by remote device to send SMS. Usually this number is the one of the receiver device where the app is installed.
SYSTEM INFO	**INFO**	Command to request info to the remote device.

2- 9.3 M7.3 - Datalogger

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Enable datalog	Enable automatic datalog.	Off-On	Off
B	Sample time (s)	Set the sampling time for datalog, change this value with datalog disabled. Then enable datalog with the new value. The datalog memory size is 1588 samples, when the memory is full, no more samples are taken and an erase memory must be performed before start sampling again, below a table of sampling intervals with time by hours and days before fulfilling the memory size: {SUBTABLE}	[5-65535]	12400

Sub-table for POS. B:

Sample time (s)	Hours to full memory	Days to full memory	Samples per day
10	4,41	0,18	8640,00
60	26,47	1,10	1440,00
300	132,33	5,51	288,00
600	264,67	11,03	144,00
1800	794,00	33,08	48,00
3600	1588,00	66,17	24,00
7200	3176,00	132,33	12,00
12400	5469,78	227,91	6,97
14400	6352,00	264,67	6,00

		18000	7940,00	330,83	4,80		
		21600	9528,00	397,00	4,00		

List of logged variables:

- Generator voltage L1-n (V)
- Generator voltage L2-n (V)
- Generator voltage L3-n (V)
- Generator frequency (Hz)
- Mains voltage L1-n (V)
- Mains voltage L2-n (V)
- Mains voltage L3-n (V)
- Mains frequency (Hz)
- Load current L1 (A)
- Load current L2 (A)
- Load current L3 (A)
- Total active power (kW)
- Total apparent power (kVA)
- Total reactive power (kVAR)
- Total power factor (PF)
- Battery voltage (Vdc)
- Shutdown alarm
- Global alarm
- Last alarm ID

C	Memory status	If Ok the memory is not full, if Full, you can select it to erase memory.	Ok	-

2- 10 M8 - IO setup

The IO setup is composed by 6 submenus:
A) Input setup: Submenu that contains all the parameters about the input functions available.
B) Output setup: Submenu that contains all the parameters about the output functions available.
C) Input type: Submenu to set input types, you can select between disabled, normally open, normally closed or analog if the input allows it.
D) Output type: Submenu to set output types, you can select between disabled, normally open or normally closed
E) Calibrations: Submenu to adjust voltage and current measures with a programmable offset.
F) Expansion: Submenu to configure expansion outputs

2- 10.1 M8.1 - Input setup
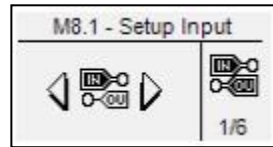
The I/O menu permits to select the type of use of the programmable digital inputs. The inputs I4.4, I4.5, I4.6, I4.7, I4.8, and the digital inputs from the TE6010 expansion board (EXIN0 - EXIN7), can be programmed as:

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Changeover	Changeover command from digital contact: works in auto mode with remote start, EJP, automatic test. If it's activated with generator measures within limits, the load is switched to genset.	None - I4.4 - I4.5 - I4.6 - I4.7 - I4.8 - ExIn_0 ~ ExIn_7	None
B	Remote start	Start the generator in auto mode with mains detected within limits.	Same as parameter A	I4.6
C	Remote stop	Stop the generator in auto mode even if there are some conditions which would start the engine, as faulty mains or remote start. It's possible to disable remote stop during normal test or TPS test.	Same as parameter A	I4.7
D	Ground protection	Ground protection alarm from digital contact.	Same as parameter A	I4.5
E	Feedback KG	Feedback generator contactor. Is activated if KG output is On but feedback is not and viceversa.	Same as parameter A	None
F	Feedback KR	Feedback generator contactor. Is activated if KR output is On but feedback is not and viceversa. Please note: This alarm is considered to start the generator in auto mode with "Start by KR" parameters programmed to On. In this case this alarm should be programmed as retentive to avoid start and stop loops.	Same as parameter A	None
G	User alarm 1	Label editable alarm from digital contact	Same as parameter A	None
H	User alarm 2	Label editable alarm from digital contact	Same as parameter A	None
I	User alarm 3	Label editable alarm from digital contact	Same as parameter A	None
J	Off mode	Activates Off mode.	Same as parameter A	None
K	Auto mode	Activates automatic mode.	Same as parameter A	None
L	External mains control	If the selected input is active, the mains is detected within limits also if measurements of voltage and frequency are outside programmed values.	Same as parameter A	None
M	Electrical trip	"Electrical trip" alarm from digital contact.	Same as parameter A	I4.4
N	Load breaker open	"Load breaker open" alarm from digital contact.	Same as parameter A	None
O	GE protection	"GE protection" alarm from digital contact.	Same as parameter A	I4.8

2- 10.2 M8.2 - Output setup

M8.2 - Setup Output

◁ [IN→O / O→OUT] ▷   [IN→O / O→OUT]

2/6
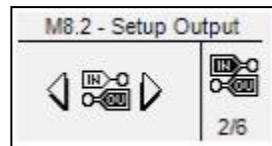
The Output setup permits to select the type of use of the programmable outputs.

The outputs O5.8, O5.9, O5.10, O5.11, O5.5 and O5.4 can be programmed as:
- None: no function associated to the output
- Start: the output is used to command the start of the genset to the engine protection controller
- Siren: the output is used to command a siren that sounds when an alarm with siren enabled appears
- Global alarm 1: the output is used to command an indication when an alarm set as general alarm 1 appears. The output remains active until you reset or the alarm disappears
- Engine running: the output is activated when the generator is running
- Test active: the output is used to signal that the test is active
- Dummy load: the output is used for the dummy load function. To have more information about this function, see menu 2-8.3
- Off mode: indicates that the controller is in off/reset mode
- Auto mode: indicates that the controller is in automatic mode
- Man mode: indicates that the controller is in manual mode
- Global alarm 2: the output is used to command an indication when an alarm set as general alarm 2 appears. The output remains active until you reset or the alarm disappears
- Global alarm 3: the output is used to command an indication when an alarm set as general alarm 3 appears. The output remains active until you reset or the alarm disappears
- KG active: indicates that the generator contactor is closed
- KR active: indicates that the mains contactor is closed
- Alarm A: the output is active when the alarm assigned to A position by M8.2 - g parameter is active
- Alarm B: the output is active when the alarm assigned to B position by M8.2 - h parameter is active
- Alarm C: the output is active when the alarm assigned to C position by M8.2 - i parameter is active
- Start failure: indicates that the generator is not detected running after the starting procedure
- Electrical trip: the output is activated if the Electrical trip alarm is active
- GE.ready: the output is activated when the generator is ready to take the load

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	O5.8	None - Start - Siren - Global alarm 1 - Engine running - Test active - Dummy load - Off mode - Auto mode - Man mode - Global alarm 2 - Global alarm 3 - KG active - KR active - Alarm A - Alarm B - Alarm C - Start failure - Electrical trip – GE ready	Global alarm 1
B	O5.9	Same as parameter A	Auto mode
C	O5.10	Same as parameter A	Man mode
D	O5.11	Same as parameter A	Siren
E	O5.5	Same as parameter A	Start failure
F	O5.4	Same as parameter A	Start
G	Alarm A	[Off - 64] - see single alarm ID list below	Off
H	Alarm B	[Off - 64] - see single alarm ID list below	Off
I	Alarm C	[Off - 64] - see single alarm ID list below	Off

Single alarms ID list:

Use the list below in conjunction with M8.2G, M8.2H and M8.2 I parameters to assign a specific alarm to an output.

Configuration example:

- M8.2 - b programmed to "ALARM A"
- M8.2 - c programmed to "ALARM B"
- M8.2 - d programmed to "ALARM C"
- M8.2 - g programmed to 8
- M8.2 - h programmed to 4
- M8.2 - i programmed to 3

With this configuration output O5.9 will be activated with "Mains phase seq." alarm, output O5.10 will be activated with "Mains: high voltage" and output 5.11 will be activated with "Mains: low voltage" alarm.

1	Mains: low freq.
2	Mains: high freq
3	Mains: low voltage
4	Mains: high voltage
5	Mains: v asymmetry
6	Faulty mains
7	KR feedback
8	Mains phase seq.
9	Ge: low freq.
10	Ge: high freq.
11	Ge: low voltage
12	Ge: high voltage
13	Ge: phase seq.
14	Ge: short circuit
15	Ge: Imax
16	Ge: v asymmetry
17	Ground protection
18	Emergency stop
19	KG feedback
20	User alarm1
21	User alarm2
22	User alarm3
23	Start failure
24~32	NOT USED
33	Stop engine failure
34~45	NOT USED
46	Test fail
47~53	NOT USED
54	Electrical trip
55	Load breaker open
56	External GE failure
57	Master Com error
58	Genset temp. alarm
59	Genset oil alarm
60	Genset battery alarm
61	Genset fuel alarm
62	Genset service alarm
63	Genset warning alarm
64	Genset shutdown alarm

2- 10.3 M8.3 - Input type
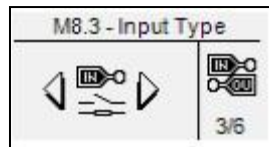
The input type setup permits to select the type of programmable inputs. The inputs I4.4, I4.5, I4.6, I4.7, I4.8 can be programmed as:
- Disabled: the input is not active
- Digital NO: the input is digital type normally open
- Digital NC: the input is digital type normally closed

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	I4.4	Disabled – Digital NO – Digital NC	Digital NO
B	I4.5	Disabled – Digital NO – Digital NC	Digital NO
C	I4.6	Disabled – Digital NO – Digital NC	Digital NO
D	I4.7	Disabled – Digital NO – Digital NC	Digital NO
E	I4.8	Disabled – Digital NO – Digital NC	Digital NO

2- 10.4 M8.4 - Output type
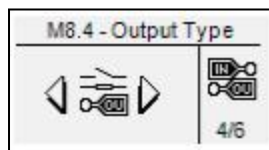
The output type setup permits to select the type of programmable outputs.

The outputs O5.8, O5.9, O5.10, O5.11, O5.4, O5.5 can be programmed as:
- Disabled: the output is not active
- Digital NO: the output is digital type normally open
- Digital NC: the output is digital type normally closed

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	O5.8	Disabled – Digital NO – Digital NC	Digital NO
B	O5.9	Disabled – Digital NO – Digital NC	Digital NO
C	O5.10	Disabled – Digital NO – Digital NC	Digital NO
D	O5.11	Disabled – Digital NO – Digital NC	Digital NO
E	O5.4	Disabled – Digital NO – Digital NC	Digital NO
F	O5.5	Disabled – Digital NO – Digital NC	Digital NO

2- 10.5 M8.5 - Calibration
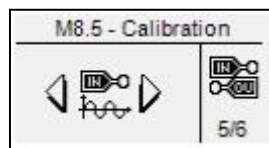
The measures setup allows to adjust the measured values for genset and mains voltages and load currents. For each voltage measure it's possible to set a calibration offset with steps of 0.1 V. For each current measure the offset is a percentage of the CT ratio, in steps of 0,1 %.

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	VL1 Gen	-100 +100 (V/10)	0
B	VL2 Gen	-100 +100 (V/10)	0
C	VL3 Gen	-100 +100 (V/10)	0
D	VL1 Mains	-100 +100 (V/10)	0
E	VL2 Mains	-100 +100 (V/10)	0
F	VL3 Mains	-100 +100 (V/10)	0
G	IL1	50.0 – 150.0 (%)	100
H	IL2	50.0 – 150.0 (%)	100
I	IL3	50.0 – 150.0 (%)	100

2- 10.6 M8.6 - Expansion

M8.6 - Expansion

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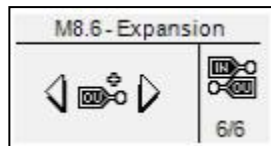
The Expansion setup permits to select the type of use of the programmable outputs of an eventual TE6010 expansion board.

The outputs from ExOut_1 to ExOut_7 can be programmed as:
- None: no function associated to the output
- Start: the output is used to command the start of the genset to the engine protection controller
- Siren: the output is used to command a siren that sounds when an alarm with siren enabled appears
- Global alarm 1: the output is used to command an indication when an alarm set as general alarm 1 appears. The output remains active until you reset or the alarm disappears
- Engine running: the output is activated when the generator is running
- Test active: the output is used to signal that the test is active
- Dummy load: the output is used for the dummy load function. To have more information about this function, see menu 2-8.3
- Off mode: indicates that the controller is in off/reset mode
- Auto mode: indicates that the controller is in automatic mode
- Man mode: indicates that the controller is in manual mode
- Global alarm 2: the output is used to command an indication when an alarm set as general alarm 2 appears. The output remains active until you reset or the alarm disappears
- Global alarm 3: the output is used to command an indication when an alarm set as general alarm 3 appears. The output remains active until you reset or the alarm disappears
- KG active: indicates that the generator contactor is closed
- KR active: indicates that the mains contactor is closed
- Alarm A: the output is active when the alarm assigned to A position by M8.2 - g parameter is active
- Alarm B: the output is active when the alarm assigned to B position by M8.2 - h parameter is active
- Alarm C: the output is active when the alarm assigned to C position by M8.2 - i parameter is active
- Start failure: indicates that the generator is not detected running after the starting procedure
- Electrical trip: the output is activated if the Electrical trip alarm is active
- GE ready: the output is activated when the generator is ready to take the load

All the parameters available in the Expansion setup are:

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	Enable	On to enable communication between Genset and expansion board.	Off
B	Bitrate (bps)	Change the serial speed value for expansion board. To activate the new port speed the expansion must be switch off. At the new start up the serial port will be ready at the new speed value: 1 = Set 9600 bps 2 = Set 19200 bps 3 = Set 38400 bps (expansion def.) 4 = Set 57600 bps 5 = Set 115200 bps	0 (expansion def.)
C	Timeout (s)	Set the timeout delay on communication between Genset and expansion board: Set the value from 1 to 255 (s), 0 is the expansion default value which is 5 s.	0 (expansion def.)
D	ExOut_0	None - Start - Siren - Global alarm 1 - Engine running - Test active - Dummy load - Off mode - Auto mode - Man mode - Global alarm 2 - Global alarm 3 - KG active - KR active - Alarm A - Alarm B - Alarm C - Start failure - Electrical trip – GE ready	None
E	ExOut_1	Same as parameter A	None
F	ExOut_2	Same as parameter A	None
G	ExOut_3	Same as parameter A	None
H	ExOut_4	Same as parameter A	None
I	ExOut_5	Same as parameter A	None
J	ExOut_6	Same as parameter A	None
K	ExOut_7	Same as parameter A	None

Note: If you are using a RI6010M (8 digital outputs), the 8 outputs are from ExOut_0 to ExOut_7.
If you are using a RI6010C (5 relay outputs), the 5 outputs are from ExOut_0 to ExOut_4.

2-11- MODBUS RTU

2- 11.1 General notes

The purpose of this document is to give the instructions to communicate with the Genset with a Modbus Master device, through the Modbus RTU (zero-based) serial protocol.

The Genset controller can be configured as a Modbus slave device, that can be queried by a Modbus master device. The Modbus communication anyway must be established and configured by skilled users following the Modbus protocol rules. For more documentation about the Modbus protocol, please refer to the following link:

http://www.modbus.org/specs.php

For first tests and trials it's possible to use the demo version of the Modbus Poll program, downloadable at the following link:

http://www.modbustools.com/modbus_poll.asp

The Genset has 2 ports that can be used for the Modbus communication: 1 RS232 and 1 RS485.

2- 11.2 Genset Controller configuration

The only thing to configure in the Genset is the serial port. Go to Connectivity setup M7, then select Serial setup M7.1.

If you are using the RS485 port, check that parameter B is set to **Modbus Slave**. Then set parameter C to the desired speed of communication, and parameter A that is the address of the device. If you are using more than one device, be sure that all of them have a different address.

If you are using the RS232 port, check that parameter E is set to **Modbus Slave**. Then set parameter F to the desired speed of communication, and parameter A that is the address of the device.

2- 11.3 Modbus command available

It's possible to send 2 different types of requests to the Genset. A reading requests or read single registers (modbus function: 03) or a writing request to set a single register (modbus function: 06). Every register is composed by 1 word (2 bytes).

The function 03-Read Holding Registers permits to read one or more registers from the Genset.

Example:

Request: Send to slave address 25 the request of reading register 69:

ADDR	FUNC	DATA start Addr HI	DATA start Addr LO	DATA bit # HI	DATA bit # LO	CRC HI	CRC LO
19	03	00	44	00	01	46	06

| Slave address | Function | Address of the desired register | | Number of registers required | | CRC checksum | |

Answer:

ADDR	FUNC	DATA byte count	DATA byte 69 HI	DATA byte 69 LO	CRC HI	CRC LO
19	03	02	02	2B	AF	7A

| Slave address | Function | Number of bytes | Value of the required register | | CRC checksum | |

The function 06-Preset Single Register permits to set one register of the Genset to a desired value.

Example:

Request: Send to slave address 35 the request of writing the value 928 into register 26:

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA Word HI	DATA Word LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07

| Slave address | Function | Address of the desired register | | Value to set in the register | | CRC checksum | |

Answer (identical message re transmitted after editing the register):

ADDR	FUNC	DATA bit # HI	DATA bit # LO	DATA Word HI	DATA Word LO	CRC HI	CRC LO
23	06	00	19	03	A0	5E	07
Slave address	Function	Address of the desired register		Value to set in the register		CRC checksum	

First measures registers which can be read with a single read holding register function of 44 registers starting from address 635 (634 if zero based modbus):

Memory map

Var.Name - FIRST PACK	Description	Var.Visual	ID	R/W	Scale
Active program	Mode of operation GENSET: 0=Manual 1=Automatic 2=Reset	DT_NUMERIC	40635	R	1
Fuel level percentage	Fuel level percentage	DT_NUMERIC	40636	R	10
Not used	Not used	DT_NUMERIC	40637	R	1
Oil pressure	Oil pressure	DT_NUMERIC	40638	R	10
Engine temperature	Engine temperature	DT_NUMERIC	40639	R	1
Mains Line voltage L1-L2	Mains Line voltage L1-L2	DT_NUMERIC	40640	R	1
Mains Line voltage L2-L3	Mains Line voltage L2-L3	DT_NUMERIC	40641	R	1
Mains Line voltage L3-L1	Mains Line voltage L3-L1	DT_NUMERIC	40642	R	1
Mains phase voltage L1	Mains phase voltage L1-N	DT_NUMERIC	40643	R	1
Mains phase voltage L2	Mains phase voltage L2-N	DT_NUMERIC	40644	R	1
Mains phase voltage L3	Mains phase voltage L3-N	DT_NUMERIC	40645	R	1
Mains frequency	Mains frequency	DT_NUMERIC	40646	R	10
Mains kWh	Mains kWh	DT_NUMERIC	40647	R	1
Generator Line voltage L1-L2	Generator Line voltage L1-L2	DT_NUMERIC	40648	R	1
Generator Line voltage L2-L3	Generator Line voltage L2-L3	DT_NUMERIC	40649	R	1
Generator Line voltage L3-L1	Generator Line voltage L3-L1	DT_NUMERIC	40650	R	1
Generator phase voltage L1	Generator phase voltage L1-N	DT_NUMERIC	40651	R	1
Generator phase voltage L2	Generator phase voltage L2-N	DT_NUMERIC	40652	R	1
Generator phase voltage L3	Generator phase voltage L3-N	DT_NUMERIC	40653	R	1
Generator frequency	Generator frequency	DT_NUMERIC	40654	R	10
Generator kWh	Generator kWh	DT_NUMERIC	40655	R	1
Not used	Not used	DT_NUMERIC	40656	R	1
Battery voltage	Battery voltage	DT_NUMERIC	40657	R	10
Not used	Not used	DT_NUMERIC	40658	R	1
Work hours	Work hours	DT_NUMERIC	40659	R	1
Not used	Not used	DT_NUMERIC	40660	R	1
Not used	Not used	DT_NUMERIC	40661	R	1
Test mode on	Test mode on	DT_NUMERIC	40662	R	1
IO status: Bit0= Input 4.4 Bit1= Input 4.5 Bit2= Input 4.6 Bit3= Input 4.7 Bit4= Input 4.8 Bit5= Input 6.2 Bit6= Input 6.3 Bit7= Input 6.4 Bit8= Output 5.8 Bit9= Output 5.9 Bit10= Output 5.10 Bit11= Output 5.11 Bit12= Output KR Bit13= Output KG Bit14= Output 5.5 BIt15= Output 5.4	Status of inputs and outputs 0=Not active (closed if NC - open if NO) 1=Active (closed if NO – open if NC)	DT_NUMERIC	40663	R	Bin
Load current L1	Load current L1	DT_NUMERIC	40664	R	1
Load current L2	Load current L2	DT_NUMERIC	40665	R	1
Load current L3	Load current L3	DT_NUMERIC	40666	R	1
Total load current	Total load current	DT_NUMERIC	40667	R	1
Total active power	Total active power	DT_NUMERIC	40668	R	1
Total reactive power	Total reactive power	DT_NUMERIC	40669	R	1
Total apparent power	Total apparent power	DT_NUMERIC	40670	R	1
Not used	Not used	DT_NUMERIC	40671	R	10
Not used	Not used	DT_NUMERIC	40672	R	1
Not used	Not used	DT_NUMERIC	40673	R	10
Not used	Not used	DT_NUMERIC	40674	R	10
Not used	Not used	DT_NUMERIC	40675	R	10
Total power factor	Total power factor	DT_NUMERIC	40676	R	100
Not used	Not used	DT_NUMERIC	40677	R	1
Not used	Not used	DT_NUMERIC	40678	R	1

Var.Name - SECOND PACK	Description	Var.Visual	ID	R/W	Scale
Active power L1	Active power L1	DT_NUMERIC	40727	R	1
Active power L2	Active power L2	DT_NUMERIC	40728	R	1
Active power L3	Active power L3	DT_NUMERIC	40729	R	1
Apparent power L1	Apparent power L1	DT_NUMERIC	40730	R	1
Apparent power L2	Apparent power L2	DT_NUMERIC	40731	R	1

Apparent power L3	Apparent power L3	DT_NUMERIC	40732	R	1
Reactive power L1	Reactive power L1	DT_NUMERIC	40733	R	10
Reactive power L2	Reactive power L2	DT_NUMERIC	40734	R	10
Reactive power L3	Reactive power L3	DT_NUMERIC	40735	R	10
Power factor L1	Power factor L1	DT_NUMERIC	40736	R	100
Power factor L2	Power factor L2	DT_NUMERIC	40737	R	100
Power factor L3	Power factor L3	DT_NUMERIC	40738	R	100
Not used	Not used	DT_NUMERIC	40739	R	1
Not used	Not used	DT_NUMERIC	40740	R	1
Not used	Not used	DT_NUMERIC	40741	R	1
Not used	Not used	DT_NUMERIC	40742	R	1
Not used	Not used	DT_NUMERIC	40743	R	1
Not used	Not used	DT_NUMERIC	40744	R	1
Not used	Not used	DT_NUMERIC	40745	R	10
Not used	Not used	DT_NUMERIC	40746	R	10
Not used	Not used	DT_NUMERIC	40747	R	10
Not used	Not used	DT_NUMERIC	40748	R	10
Not used	Not used	DT_NUMERIC	40749	R	10
Not used	Not used	DT_NUMERIC	40750	R	10
Not used	Not used	DT_NUMERIC	40751	R	10
Not used	Not used	DT_NUMERIC	40752	R	10
Not used	Not used	DT_NUMERIC	40753	R	10
Not used	Not used	DT_NUMERIC	40754	R	Dec
Not used	Not used	DT_NUMERIC	40755	R	Dec
Alarm package 1: Bit0= Mains: low freq. Bit1= Mains: high freq Bit2= Mains: low voltage Bit3= Mains: high voltage Bit4= Mains: v asymmetry Bit5= Faulty mains Bit6= KR feedback Bit7= Mains phase seq. Bit8= Ge: low freq. Bit9= Ge: high freq. Bit10= Ge: low voltage Bit11= Ge: high voltage Bit12= Ge: phase seq. Bit13= Ge: short circuit Bit14= Ge: Imax BIt15= Ge: v asymmetry	Status of alarms: 0 = alarm not active 1 = alarm active	DT_NUMERIC	40756	R	Bin
Alarm package 2: Bit0= Ground protection Bit1= Emergency stop Bit2= KG feedback Bit3= User alarm1 Bit4= User alarm2 Bit5= User alarm3 Bit6= Start failure Bit7= Mechanical fault Bit8= Temp. pre alarm Bit9= High eng. Temp. Bit10= Fuel pre alarm Bit11= Low fuel level Bit12= Oil pressure prealarm Bit13= Low oil pressure Bit14= Low oil level BIt15= Low coolant level	Status of alarms: 0 = alarm not active 1 = alarm active	DT_NUMERIC	40757	R	Bin
Alarm package 3: Bit0= Stop engine failure Bit1= Service Bit2= Refueling timeout Bit3= Faulty D+ Bit4= High GE temp. D Bit5= Low fuel level D Bit6= Low oil pressure D Bit7= Autonomy low Bit8= Clogged filter Bit9= Tank full Bit10= No oil sensor Bit11= Low battery voltage Bit12= High battery voltage Bit13= Test fail Bit14= Low RPM BIt15= High RPM	Status of alarms: 0 = alarm not active 1 = alarm active	DT_NUMERIC	40758	R	Bin
Alarm package 4: Bit0= Water in fuel Bit1= High coolant temp Bit2= Master comm error Bit3= Battery Efficiency Bit4= Free Bit5= Free Bit6= Free Bit7= Free Bit8= Free Bit9= Free Bit10= Free Bit11= Free Bit12= Free Bit13= Free	Status of alarms: 0 = alarm not active 1 = alarm active	DT_NUMERIC	40759	R	Bin

Bit14= Free BIt15= Free					
RTC clock minutes	RTC clock minutes	DT_NUMERIC	40760	R	1
RTC clock hours	RTC clock hours	DT_NUMERIC	40761	R	1
RTC clock seconds	RTC clock seconds	DT_NUMERIC	40762	R	1
RTC clock day of the week	RTC clock day of the week	DT_NUMERIC	40763	R	1
RTC clock day of the month	RTC clock day of the month	DT_NUMERIC	40764	R	1
RTC clock month	RTC clock month	DT_NUMERIC	40765	R	1
RTC Clock year	RTC Clock year	DT_NUMERIC	40766	R	1
Expansion board enable	Expansion board enable	DT_NUMERIC	40767	R	Flag
Expansion board input status - High byte	Status of the inputs of RI6010 0=Not active (closed if NC - open if NO) 1=Active (closed if NO – open if NC)	DT_NUMERIC	40768	R	Bin
Expansion board outputs - Low byte	Status of the outputs of RI6010 0=Not active (closed if NC - open if NO) 1=Active (closed if NO – open if NC)	DT_NUMERIC	40769	R	Bin
Not used	Not used	DT_NUMERIC	40770	R	1

Var.Name - ALARMS	Description	Var.Visual	ID	R/W	Scale
Out special A	Out special A	DT_NUMERIC	41917	R	Flag
Out special B	Out special B	DT_NUMERIC	41918	R	Flag
Out special C	Out special C	DT_NUMERIC	41919	R	Flag
Cumulative alarm mains	Cumulative alarm mains	DT_NUMERIC	41920	R	Flag
Cumulative alarm generator	Cumulative alarm generator	DT_NUMERIC	41921	R	Flag
Not used	Not used	DT_NUMERIC	41922	R	Flag
Not used	Not used	DT_NUMERIC	41923	R	Flag
Not used	Not used	DT_NUMERIC	41924	R	Flag
Not used	Not used	DT_NUMERIC	41925	R	Flag
Mains: low freq.	Mains: low freq.	DT_NUMERIC	41926	R	Flag
Mains: high freq	Mains: high freq	DT_NUMERIC	41927	R	Flag
Mains: low voltage	Mains: low voltage	DT_NUMERIC	41928	R	Flag
Mains: high voltage	Mains: high voltage	DT_NUMERIC	41929	R	Flag
Mains: v asymmetry	Mains: v asymmetry	DT_NUMERIC	41930	R	Flag
Faulty mains	Faulty mains	DT_NUMERIC	41931	R	Flag
KR feedback	KR feedback	DT_NUMERIC	41932	R	Flag
Mains phase seq.	Mains phase seq.	DT_NUMERIC	41933	R	Flag
Ge: low freq.	Ge: low freq.	DT_NUMERIC	41934	R	Flag
Ge: high freq.	Ge: high freq.	DT_NUMERIC	41935	R	Flag
Ge: low voltage	Ge: low voltage	DT_NUMERIC	41936	R	Flag
Ge: high voltage	Ge: high voltage	DT_NUMERIC	41937	R	Flag
Ge: phase seq.	Ge: phase seq.	DT_NUMERIC	41938	R	Flag
Ge: short circuit	Ge: short circuit	DT_NUMERIC	41939	R	Flag
Ge: Imax	Ge: Imax	DT_NUMERIC	41940	R	Flag
Ge: v asymmetry	Ge: v asymmetry	DT_NUMERIC	41941	R	Flag
Ground protection	Ground protection	DT_NUMERIC	41942	R	Flag
Emergency stop	Emergency stop	DT_NUMERIC	41943	R	Flag
KG feedback	KG feedback	DT_NUMERIC	41944	R	Flag
User alarm1	User alarm1	DT_NUMERIC	41945	R	Flag
User alarm2	User alarm2	DT_NUMERIC	41946	R	Flag
User alarm3	User alarm3	DT_NUMERIC	41947	R	Flag
Start failure	Start failure	DT_NUMERIC	41948	R	Flag
Not used	Not used	DT_NUMERIC	41949	R	Flag
Not used	Not used	DT_NUMERIC	41950	R	Flag
Not used	Not used	DT_NUMERIC	41951	R	Flag
Not used	Not used	DT_NUMERIC	41952	R	Flag
Not used	Not used	DT_NUMERIC	41953	R	Flag
Not used	Not used	DT_NUMERIC	41954	R	Flag
Not used	Not used	DT_NUMERIC	41955	R	Flag
Not used	Not used	DT_NUMERIC	41956	R	Flag
Not used	Not used	DT_NUMERIC	41957	R	Flag
Stop engine failure	Stop engine failure	DT_NUMERIC	41958	R	Flag
Not used	Not used	DT_NUMERIC	41959	R	Flag
Not used	Not used	DT_NUMERIC	41960	R	Flag
Not used	Not used	DT_NUMERIC	41961	R	Flag
Not used	Not used	DT_NUMERIC	41962	R	Flag
Not used	Not used	DT_NUMERIC	41963	R	Flag
Not used	Not used	DT_NUMERIC	41964	R	Flag
Not used	Not used	DT_NUMERIC	41965	R	Flag
Not used	Not used	DT_NUMERIC	41966	R	Flag
Not used	Not used	DT_NUMERIC	41967	R	Flag
Not used	Not used	DT_NUMERIC	41968	R	Flag
Not used	Not used	DT_NUMERIC	41969	R	Flag
Not used	Not used	DT_NUMERIC	41970	R	Flag
Test fail	Test fail	DT_NUMERIC	41971	R	Flag
Not used	Not used	DT_NUMERIC	41972	R	Flag
Not used	Not used	DT_NUMERIC	41973	R	Flag
Not used	Not used	DT_NUMERIC	41974	R	Flag
Not used	Not used	DT_NUMERIC	41975	R	Flag
Not used	Not used	DT_NUMERIC	41976	R	Flag
Not used	Not used	DT_NUMERIC	41977	R	Flag
Not used	Not used	DT_NUMERIC	41978	R	Flag
External trip	External trip	DT_NUMERIC	41979	R	Flag
Load breaker open	Load breaker open	DT_NUMERIC	41980	R	Flag
External Gen failure	External Gen failure	DT_NUMERIC	41981	R	Flag

Master comm error	Master comm error	DT_NUMERIC	41982	R	Flag
Genset temperature alarm	Genset temperature alarm	DT_NUMERIC	41983	R	Flag
Genset oil alarm	Genset oil alarm	DT_NUMERIC	41984	R	Flag
Genset battery alarm	Genset battery alarm	DT_NUMERIC	41985	R	Flag
Genset fuel alarm	Genset fuel alarm	DT_NUMERIC	41986	R	Flag
Genset service alarm	Genset service alarm	DT_NUMERIC	41987	R	Flag
Genset warning alarm	Genset warning alarm	DT_NUMERIC	41988	R	Flag
Genset trip alarm	Genset trip alarm	DT_NUMERIC	41989	R	Flag
Last alarm ID	Last alarm ID	DT_NUMERIC	42054	R	Dec

Var.Name - COMMANDS	Description	Var.Visual	ID	R/W	Scale
Manual mode	Manual mode	DT_NUMERIC	40539	W	1
Auto mode	Auto mode	DT_NUMERIC	40544	W	1
Reset mode	Reset mode	DT_NUMERIC	40549	W	1
Start engine	Start engine	DT_NUMERIC	40554	W	1
Stop engine	Stop engine	DT_NUMERIC	40559	W	1
Test mode	Test mode	DT_NUMERIC	40564	W	1
KG contactor	KG contactor	DT_NUMERIC	40569	W	1
KR contactor	KR contactor	DT_NUMERIC	40574	W	1