

AUTO & MANUAL START

GENSET CONTROLLER

Instruction Manual



INDEX

1- GENERAL REQUIREMENTS AND INSTALLATION.....	3
1- 1 General notes.....	3
1- 2 Dimensions.....	3
1- 3 Hardware ratings.....	4
1- 4 Electrical Installations.....	5
1- 4.1 Drawing.....	5
1- 4.2 Connections.....	6
1- 5 Operation modes.....	7
1- 6 Equipment Overview.....	8
1- 7 Display pages.....	9
1- 7.1 Navigation diagram.....	9
1- 7.2 Navigation cursors and first activation.....	10
1- 7.3 Display pages - Genset.....	11
1- 7.4 Display pages - Engine.....	12
1- 7.5 Display pages - Events log.....	12
1- 7.6 Display pages - System.....	12
1- 7.7 Clock and warranty.....	13
1- 7.8 Display pages - Start and stop.....	13
2- PROGRAMMATION MENUS.....	14
2- 1 Navigation chart - Global Setup.....	14
2- 2 Navigation instructions.....	15
2- 3 M2 - Alternator setup.....	16
2- 4 M3 - Engine setup.....	17
2- 4.1 M3.1 - Starting setup.....	17
2- 4.2 M3.2 - Stop setup.....	18
2- 4.3 M3.3 - Preheat setup.....	18
2- 4.4 M3.4 - Fuel setup.....	19
2- 4.5 M3.5 - Oil pressure setup.....	19
2- 4.6 M3.6 - Temperature setup.....	20
2- 4.7 M3.7 - Battery setup.....	20
2- 4.8 M3.8 - Service setup.....	21
2- 4.9 M3.9 - Choke setup.....	22
2- 4.10 M3.10 - Canbus setup.....	22
2- 4.11 Diesel and gasoline engine start/stop charts.....	23
2- 5 M4 - General setup.....	24
2- 5.1 M4.1 - Display setup.....	24
2- 5.2 M4.2 - Clock setup.....	24
2- 5.3 M4.3 - Test setup.....	25
2- 5.4 M4.4 - Security setup.....	26
2- 6 M5 - Alarms list.....	27
2- 6.1 M5 - Alarms default parameters.....	28
2- 6.2 M5 - Alarms description.....	29
2- 7 M6 - Special functions.....	30
2- 7.1 M6.3 - Dummy load.....	30
2- 7.2 M6.4 - TPS.....	31
2- 7.3 M6.5 - Heater.....	31
2- 7.4 M6.6 - Setup Dual.....	32
2- 7.5 M6.7 - Load shedding.....	33
2- 8 M7 - Connectivity.....	34
2- 8.1 M7.1 - Serial port setup.....	34
2- 8.2 M7.2 - GSM Setup.....	35
2- 8.3 M7.3 - Datalogger.....	38
2- 9 M8 - IO setup.....	39
2- 9.1 M8.1 - Input setup.....	39
2- 9.2 M8.2 - Output setup.....	40
2- 9.3 M8.3 - Input type.....	42
2- 9.4 M8.4 - Output type.....	43
2- 9.5 M8.5 - Calibration.....	43
2- 9.6 M8.6 - Expansion.....	44
2- 10 - Modbus RTU.....	455
2- 10.1 General notes.....	455
2- 10.2 RI809 Configuration.....	45
2- 10.3 Modbus commands available.....	45
APPENDIX.....	500
Appendix A: Fuel sensor curves.....	50
Appendix B: Oil pressure sensor curves.....	50
Appendix C: Temperature sensor curves.....	50
USER NOTES.....	51

1- GENERAL REQUIREMENTS AND INSTALLATION

1-1 General notes

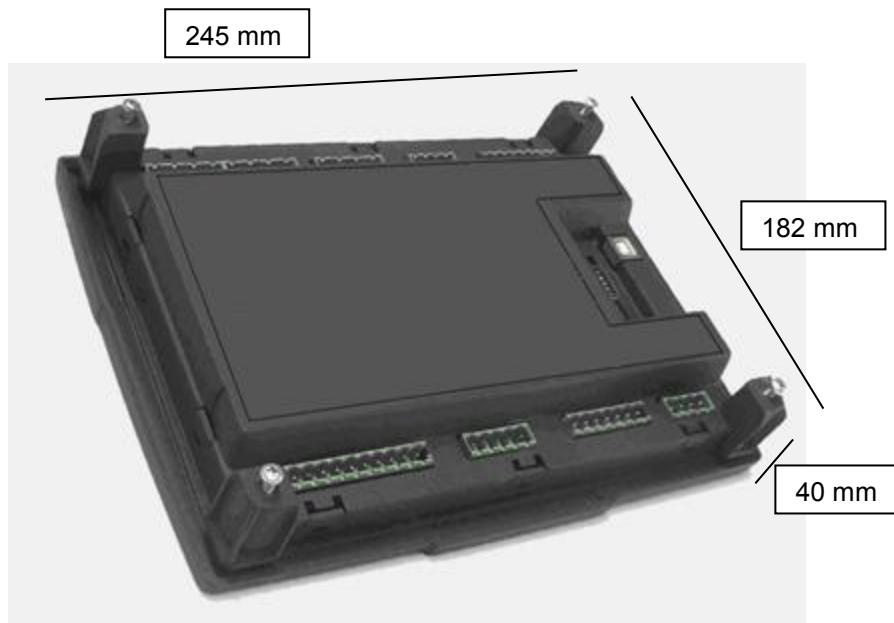


WARNING!

- 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 and short-circuit the CT input terminals.
- 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.



NOTE!



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	Up 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
SPEED INPUT – pickup/W	
Voltage range	From 1 to 36 V
Frequency range	Up to 8 kHz
STATIC OUTPUT	
N°	6 (2x4A ; 4x2A)
ANALOG INPUTS	
N°	3
Input type	Resistance to ground measurements
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
Can Bus	1 Canbus interface
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
EXPANSION TE6010	
Serial interface	2x RJ11 4c4p connector not isolated
Supply	from 6Vdc to 33Vdc
Installation	Internal panel DIN rail mounting
Inputs	8x configurable 0-500 ohm / 4-20 mA / 0-5 Vdc

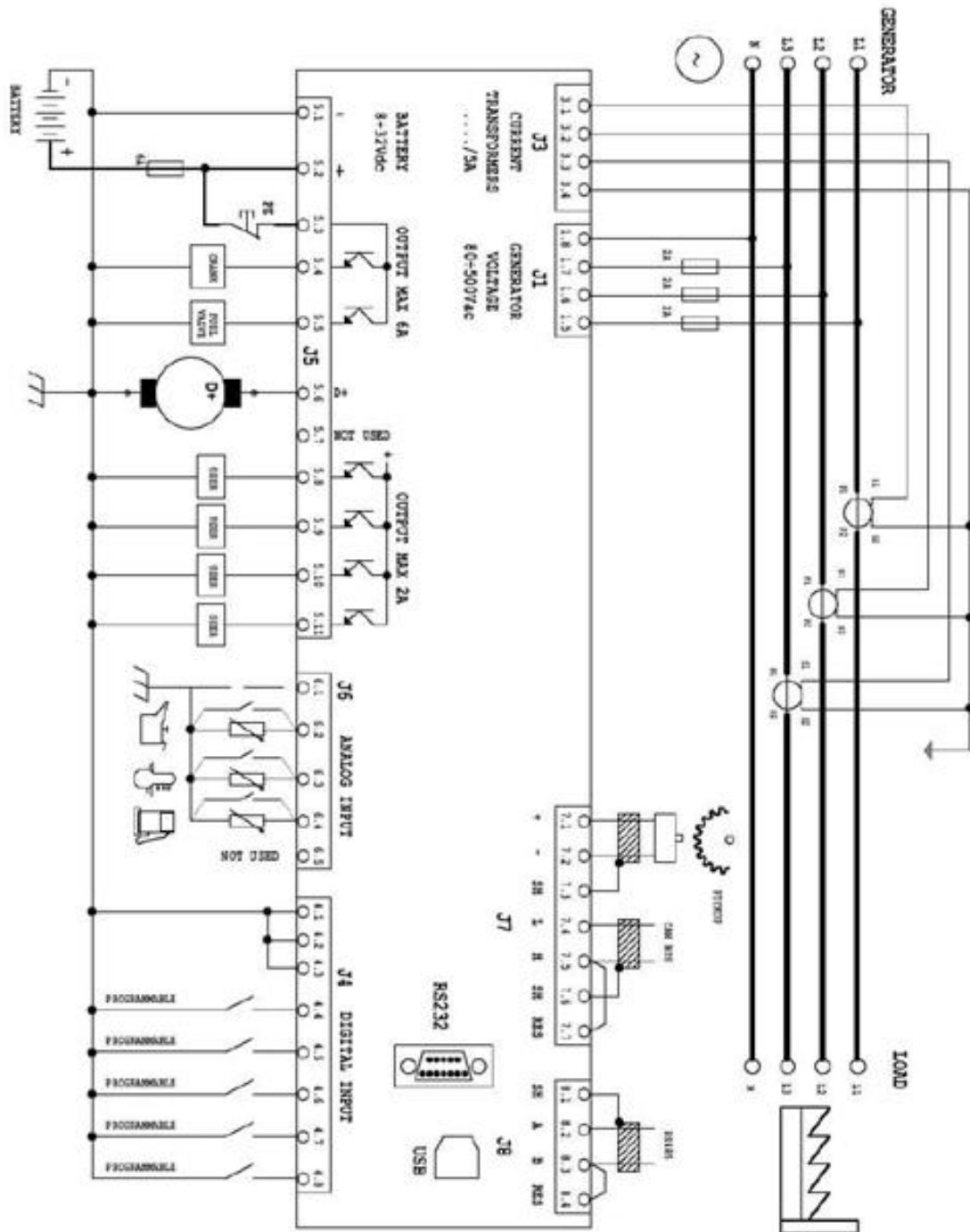
STANDARD REFERENCES
EN55011
EN55016-2-1
EN55016-2-3
EN60068-2-1
EN60068-2-2
EN60068-2-27
EN60068-2-30
EN60068-2-6
EN61000-4-2
EN61000-4-3
EN61000-4-4
EN61000-4-5
EN61000-4-6
EN61000-4-8
EN61000-6-2
EN61000-6-4
HBV Bureau Veritas NR320

1- 4 Electrical Installations

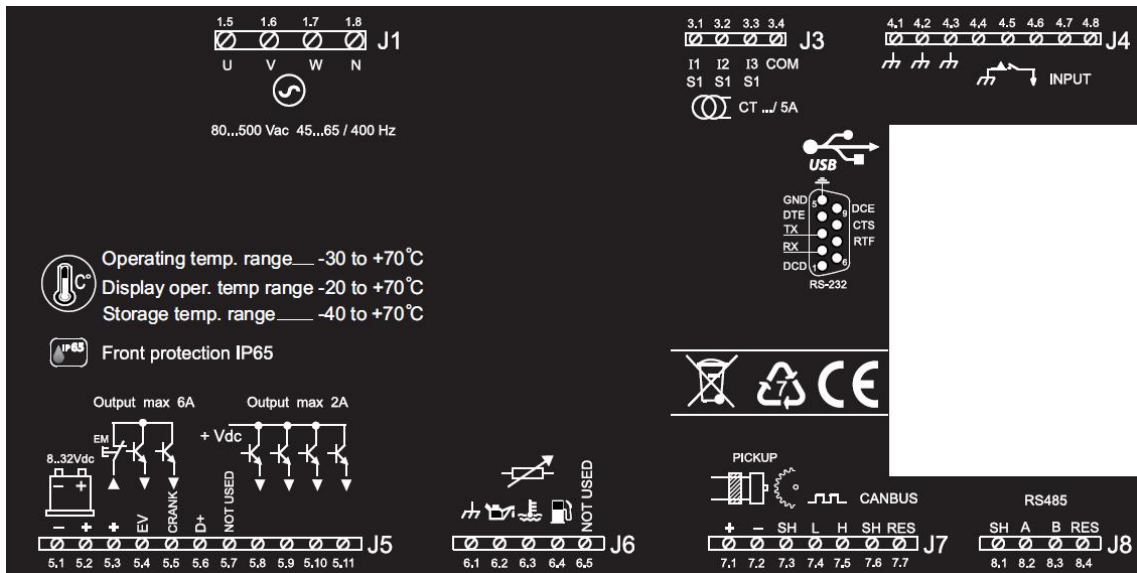
1- 4.1 Drawing



Warning! before inserting the plugs make sure that the connections strictly comply with the wiring diagram below. For more information about programmable inputs/outputs, see par. 2-9.



1-4.2 Connections



J1 – Genset AC voltage

- 1.1 – Not used
- 1.2 – Not used
- 1.3 – Not used
- 1.4 – Not used
- 1.5 - Genset voltage phase 1
- 1.6 - Genset voltage phase 2
- 1.7 - Genset voltage phase 3
- 1.8 - Neutral

J3 – Genset AC current

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

J4 – Digital inputs

- 4.1 - Gnd
- 4.2 - Gnd
- 4.3 - Gnd
- 4.4 – Programmable digital input (default – Low oil pressure alarm)
- 4.5 – Programmable digital input (default – High temperature alarm)
- 4.6 – Programmable digital input (default – Low fuel level)
- 4.7 – Programmable digital input (default – Remote start)
- 4.8 – Programmable digital input (default - Low coolant level)

J5 – Supply and Outputs

- 5.1 - Battery negative
- 5.2 - Battery positive
- 5.3 - Common positive for fuel valve and start output (Default - Emergency stop alarm input)
- 5.4 - Fuel valve output
- 5.5 - Start engine output
- 5.6 - Battery charger alternator output (D+)
- 5.7 - Not used
- 5.8 - Programmable output (default – Global alarm #1)
- 5.9 – Programmable output (default – Glow plugs)
- 5.10 – Programmable output (default – Siren)
- 5.11 – Programmable output (default – Electro solenoid)

J6 – Digital / Analog inputs

- 6.1 - Gnd
- 6.2 - Oil pressure digital / analog (programmable, default – Oil pressure analog)
- 6.3 – High engine temperature digital / analog (programmable, default – Engine temperature analog)
- 6.4 – Fuel level percentage digital / analog (programmable, default – Fuel level percentage analog)
- 6.5 – Not used

J7 – Rpm and Canbus

- 7.1 - Pickup input positive
- 7.2 - Pickup input negative
- 7.3 - Pickup shield
- 7.4 - Canbus Low
- 7.5 - Canbus High
- 7.6 - Canbus
- 7.7 - Canbus termination resistor (bridge with J7-7.5)

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

Automatic mode

The engine automatically starts in case of remote start input or test activation (with automatic management of KG, if one output is programmed as KG ON), the engine is stopped when the remote start is removed or at the end of the test procedure. During the starting phase it is possible to stop the engine with the STOP button. At the end of this phase the button is disabled. Use the RESET button to stop the engine. Push the AUT button to select this functioning mode.

Manual mode

The engine can be started and stopped manually by pressing start and stop key buttons; it is also possible to use the test button to start the engine for the programmed time. Push the MAN button to select this functioning mode.

Test mode

Manual test: Press the TEST button: the engine starts immediately to test the Genset for a programmable time. The engine is stopped after the time at parameter M4.3-C. To manually stop the engine without waiting the time, pass to manual mode and press the STOP button, or press reset to go to reset mode.

Automatic test: If you programmed an automatic test (see par 2-5.3), it will run only if you are in automatic mode.

Reset mode

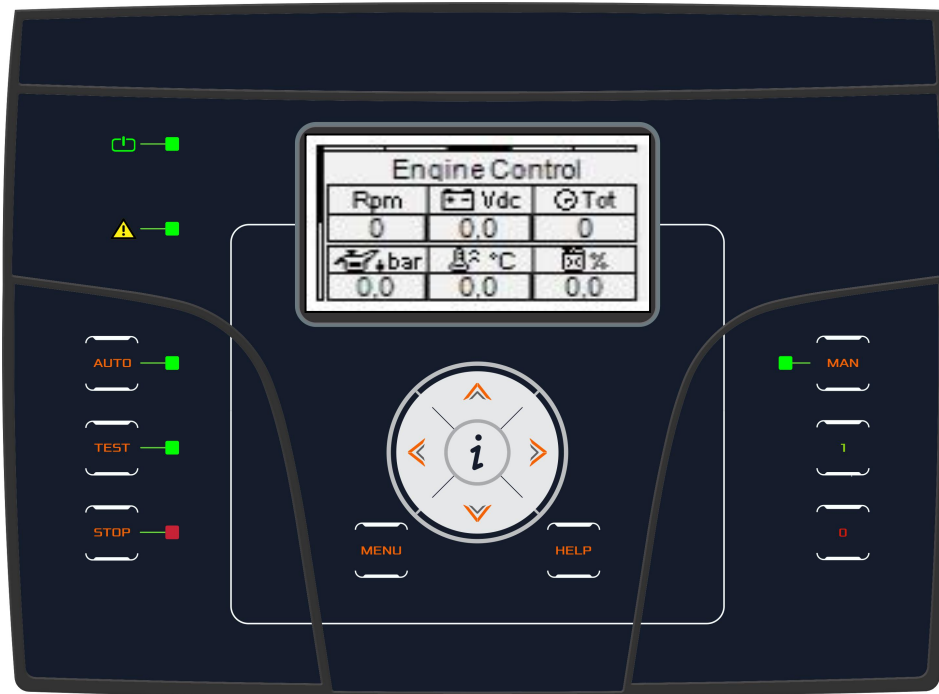
The engine cannot work. If you select Reset mode, the alarms are reset and the engine stops immediately if it is working. If the cause of the alarm remains, the alarm will probably appear again. Push the RESET button to select this functioning mode.

Alarms

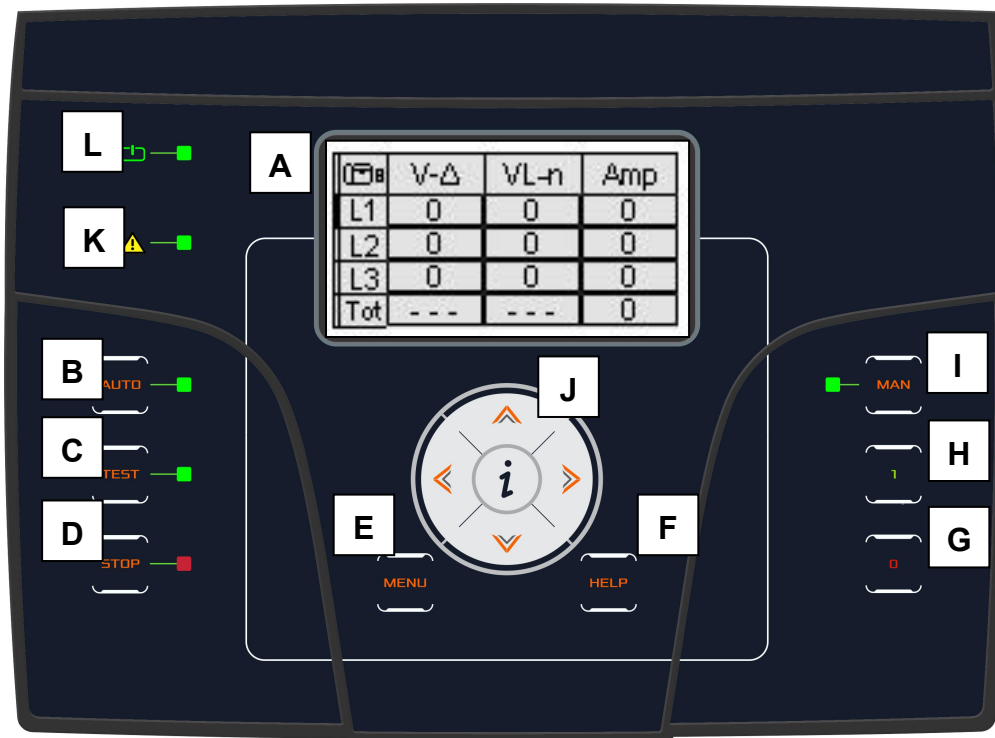
In case of alarm, the display shows its description. If more different alarms are detected, they appear individually in sequence. For each alarm it is available a message that can help to identify the source of the problem. The alarm reset can be made by pressing the RESET button; by this, the alarm 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.

First installation

The Genset can be powered either be 12 or 24Vdc with automatic detection. You must set or verify menu parameters about ALTERNATOR (CT ratio, type of connection, rated voltage and frequency) and the Starting Menu inside "Engine setup", according to the type of engine used.



1-6 Equipment Overview

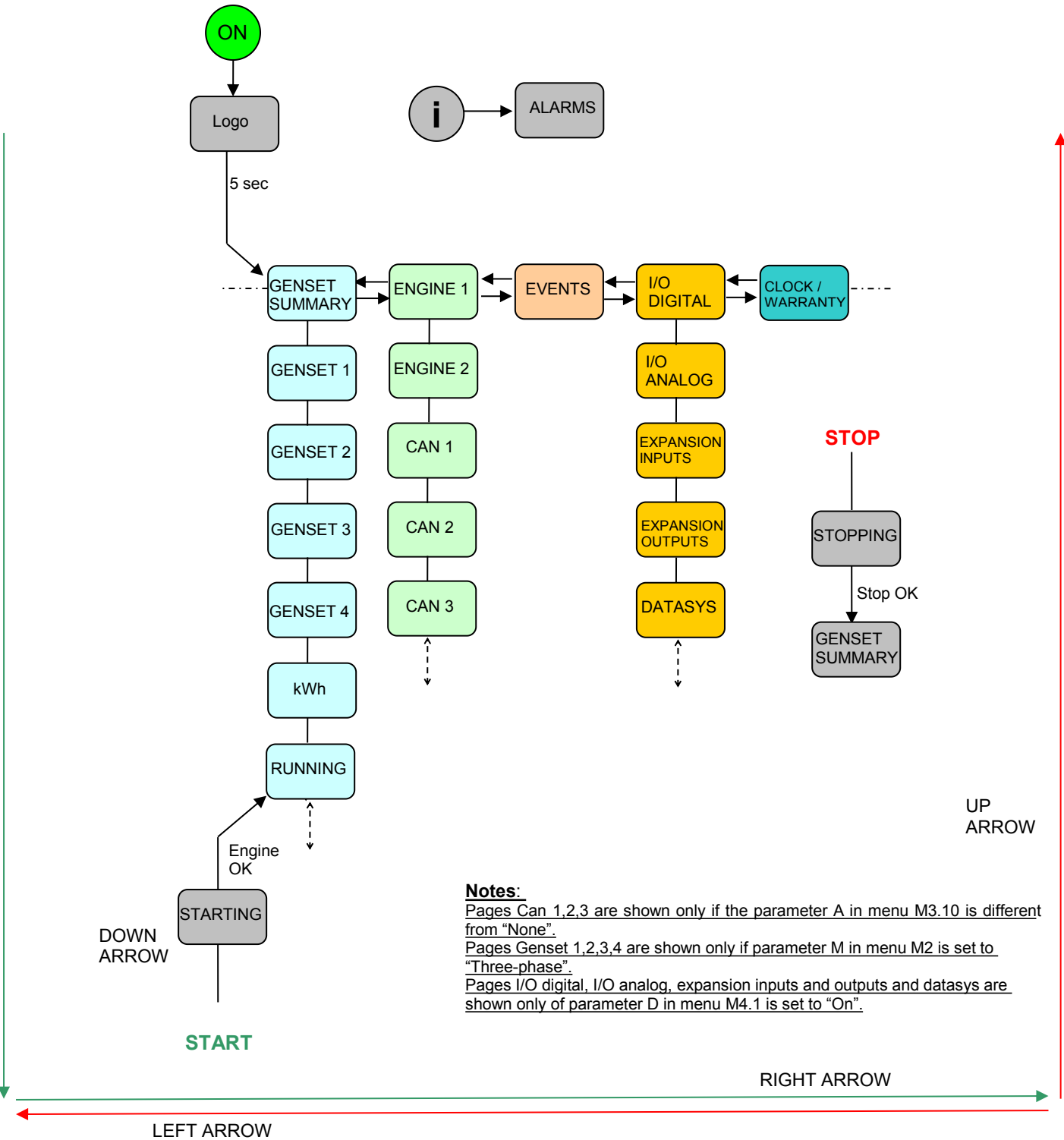


POS.	NAME	DESCRIPTION
A	Display	Back lighted display shows all functions, measures and alarms about the generator. Automatically the back light turns off, and it turns on again when you press a button.
B	AUT	Button to select the automatic mode.
C	TEST	Button to select the test mode.
D	RESET	To activate reset/OFF mode. In this operative mode the engine is stopped without cooling and the alarms are deleted. If the cause of the alarm persists, the alarm will appear again.
E	Menu	To enter the programming menu. Inside the menus, it's used as a button "back" or "esc".
F	Help	It permits you to better understand the parameters and symbols in the actual page.
G	STOP	To stop the generator immediately. Active only in manual mode.
H	START	To start the generator. Active only in manual mode.
I	MAN	Button to select the manual mode.
J	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 programming 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 for more information about the navigation through the display pages, and paragraph 2-2 for more information about the navigation through the menus.
K	General alarm led	It blinks if a stopping alarm is present. It remains ON if an alarm enabled as global alarm 1 is present.
L	Battery state led	It turns on when the board is supplied.

1-7 Display pages

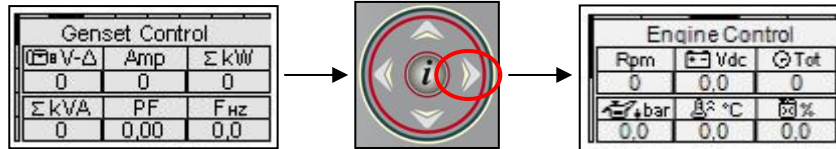
1-7.1 Navigation diagram

When you turn on the board, you will see the logo page. Then you will be in the genset summary page. When you start the generator, you will go in the starting page, that will disappear when the start is completed, and redirects you to the running page. When you stop the engine, you will see a stopping page, then you will return automatically to the genset summary. 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. Pressing the HELP button, you can see more indication about the measures if available.

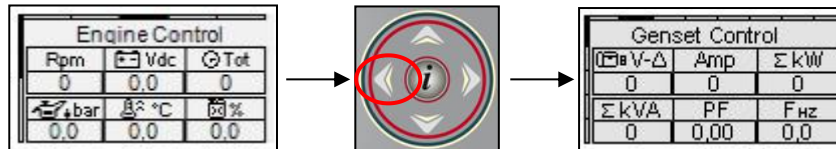


Notes:
 Pages Can 1,2,3 are shown only if the parameter A in menu M3.10 is different from "None".
 Pages Genset 1,2,3,4 are shown only if parameter M in menu M2 is set to "Three-phase".
 Pages I/O digital, I/O analog, expansion inputs and outputs and datasys are shown only if parameter D in menu M4.1 is set to "On".

1- 7.2 Navigation cursors and first activation



- 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.



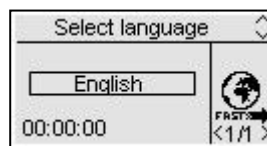
- The left arrow button allows to return back to the previous section: in this case from the engine pages to the generator pages.



- 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 genset measure #1 to genset measure #2.



- With up arrow button you can return to the previous page of the section, in this case from fuel genset measure #2 to genset measure #1. Inside the main page there is also the horizontal cursor which means that the left and right arrow buttons are available to change section.



- 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 startup.

1- 7.3 Display pages - Genset

1- 7.3.1 Genset summary

A	B	C
Genset Control		
<input type="checkbox"/> 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- 7.3.2 Genset 1

(shown only in case of 3-phase system)

A	B	C
<input type="checkbox"/> V-Δ	VL-n	Amp
L1	0	0
L2	0	0
L3	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- 7.3.3 Genset 2

(shown only in case of 3-phase system)

A	B	C
<input type="checkbox"/> kVA	kW	kVAR
L1	0	0,0
L2	0	0,0
L3	0	0,0
Tot	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- 7.3.4 Genset 3

(shown only in case of 3-phase system)

A	B	C
<input type="checkbox"/> kVA	kW	PF
L1	0	0,00
L2	0	0,00
L3	0	0,00
Tot	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- 7.3.5 Genset 4

(shown only in case of 3-phase system)

A	B	C
<input type="checkbox"/> kVA	kVAR	PF
L1	0	0,00
L2	0	0,00
L3	0	0,00
Tot	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- 7.3.6 Genset control kWh

Genset Control		A
kWh	0	B
€tot	0	C
€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- 7.3.7 Running page diesel

After the engine has started, you will see directly this Running page, if the system is set for diesel engine:

A	B	C	D
GE running ...			
V-Δ	Amp	Σ kW	Σ kVA
0	0	0	0
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	F(Hz)
0,0	0,0	0,0	0,0
E	F	G	H

- A) Generator Vac voltage L1
- B) Generator current L1
- C) Total kW
- D) Total kVA
- E) Oil pressure
- F) Engine temperature
- G) Fuel level percentage
- H) Generator frequency

1- 7.3.8 Running page gasoline

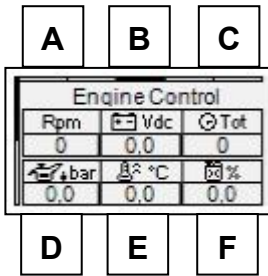
If the system is set for gasoline engine, the running page is:

A	B	C
GE running ...		
V-Δ	Amp	F(Hz)
0	0	0,0
Σ kW	Σ kVA	<input type="checkbox"/>
0	0	0,0
D	E	F

- A) Generator Vac voltage L1
- B) Generator current L1
- C) Generator frequency
- D) Total kW
- E) Total kVA
- F) Fuel level percentage

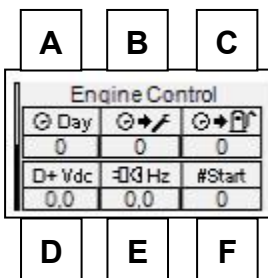
1- 7.4 Display pages - Engine

1- 7.4.1 Engine 1



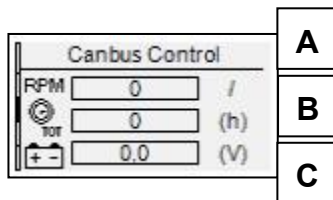
- A) Rpm value
- B) Engine battery voltage
- C) Work hours
- D) Oil pressure analog (Off if 6.2 input is not analog)
- E) Engine temperature (Off if 6.3 input is not analog)
- F) Fuel level percentage (Off if 6.4 input is not analog)

1- 7.4.2 Engine 2



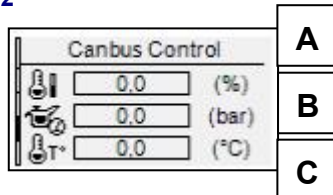
- A) Partial/Daily work hours (this value is reset when you turn off the controller or when the day changes)
- B) Work hours to the next service
- C) Autonomy hours
- D) D+ voltage (Vdc)
- E) Pickup frequency (Hz)
- F) Total start attempts

1- 7.4.3 Canbus 1



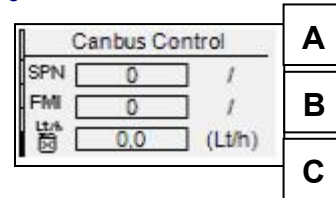
- A) RPM indicator from Canbus
- B) Total work hours from Canbus
- C) Battery voltage from Canbus - If engine ECU is not supplied, this value is 0,0.

1- 7.4.4 Canbus 2



- A) Coolant level percentage from Canbus
- B) Oil pressure from Canbus
- C) Engine temperature from Canbus

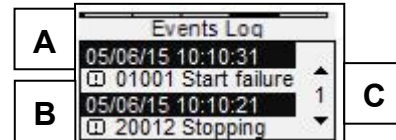
1- 7.4.5 Canbus 3



- A) SPN - Parameter code to identify ECU failure
- B) FMI - Failure mode indicator to perform a preliminary diagnosis of ECU failure
- C) Instant fuel consumption (Lt/h)

1- 7.5 Display pages - Events log

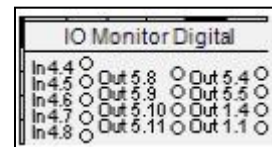
The events log page shows you the last alarms with the date and time.



- 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).

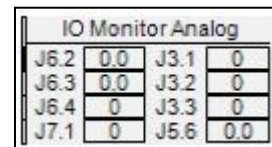
1- 7.6 Display pages - System

1- 7.6.1 I/O digital



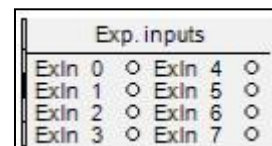
In this page you can see the state of all the 5 digital inputs (from J4.4 to J4.8) and outputs KG (J1.4), KR (J1.1), plus 6 programmable outputs (from J5.8 to J5.11, J5.4 and J5.5).

1- 7.6.2 I/O analog



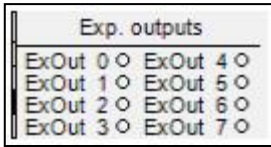
In this page you can see the state of 8 analog inputs.

1- 7.6.3 Expansion inputs



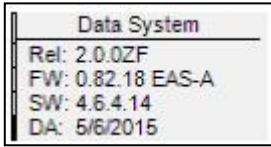
Here you can see the state of the 8 digital inputs of the expansion board (only with expansion enabled).

1- 7.6.4 Expansion outputs



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

1- 7.6.5 Data info



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- 7.7 Clock and warranty



- A) Clock: date and time
- B) Controller warranty expiry date detected automatically by controller after 2 working hours

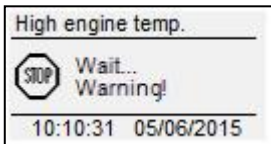
1- 7.8 Display pages - Start and stop

1- 7.8.1 Stopping page

When the engine is stopping, you will see this page that indicates that the engine is stopping.

If the cooling procedure is active, you will see the text "cooling", otherwise you will see the text "stopping".

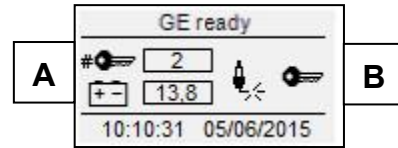
If you see the "warning" indication, it means that the stop is commanded by an alarm. Ready means the end of stop phase.



1- 7.8.2 Starting page

When you start the generator you will see this page with number of start attempts and battery voltage that disappears after the starting, and redirects you to the Running page.

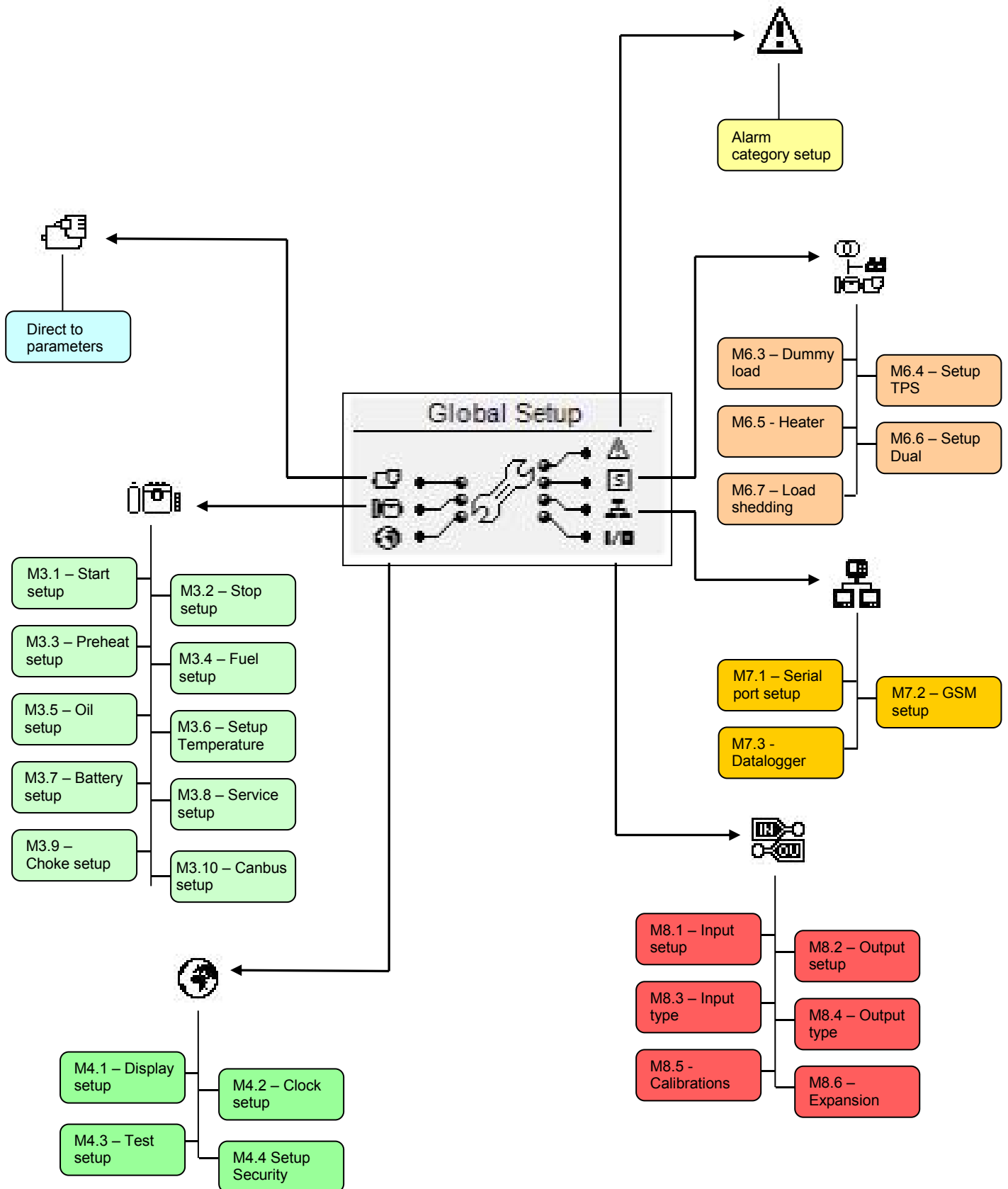
The upper part of this screen shows the actual phase of the engine (preheating, starting, etc...).



- A) Attempt number indicator and battery voltage
- B) Start phase indicator: glow plug means preheat phase while key means cranking phase

2- PROGRAMMING MENUS

2- 1 Navigation chart - Global Setup



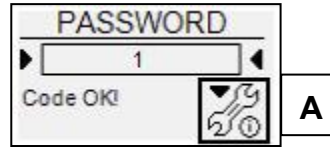
2-2 Navigation instructions

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.

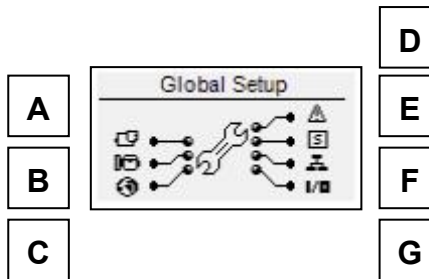
The correct password is, by default, 1

Note: the password that you insert will remain in memory until you turn-off the controller.



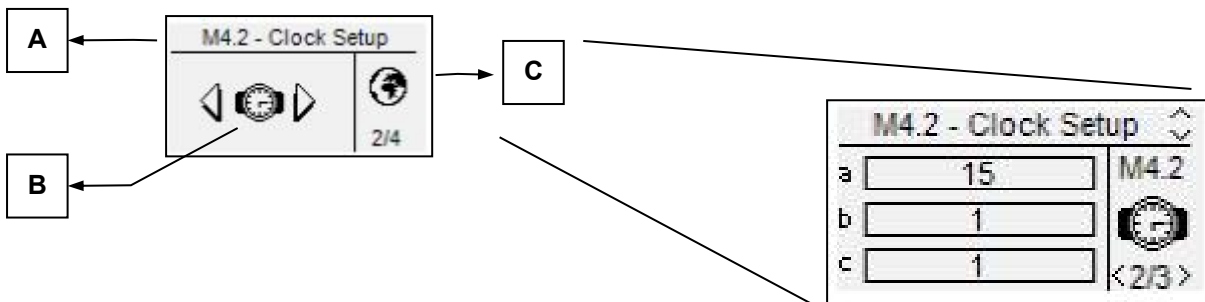
From the main page you can choose 8 different menus:

- A) Alternator setup
- B) Engine setup
- C) General setup
- D) Alarms setup
- E) Special functions
- F) Connectivity
- G) 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, in which you will see directly the programming parameters). This screen is composed by 3 parts:

- A) The name of the sub menu
- B) The icon of the sub menu
- C) The page and the icon of the menu that contains the sub menu



Press "i" to confirm and enter, or press the left or right arrows to see the next sub menu, or press "menu" to return to the previous screen. In the sub menus, 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 M2 - Alternator setup

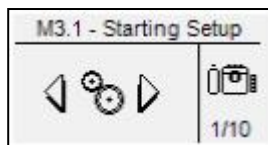
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	GE rated V	Rated voltage of the generator.	0-600 [VAC]	400
B	GE high V	You can set the high threshold voltage; if the voltage measured is higher than this value (% of the rated voltage), the generator is considered faulty and Genset shows the "high 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 is counted after the delay at parameter K.	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 after the time at parameter J.	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 asymmetry 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 filtering) 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	Max load %	Maximum load percentage over which the kW overload alarm is activated	0-255 [%]	90
U	Rated PF [x100]	Rated power factor value, used to calculate the 100% load value and evaluate the kw overload.	0-100	80

2-4 M3 - Engine setup

The engine setup is composed by 11 sub menus:

- A) Start setup: Sub menu that contains all the parameters about the starting, like thresholds and times
- B) Stop setup: Sub menu for the settings of the stop procedure, like modalities, times and setting of the cooling
- C) Preheat setup: Sub menu for the settings of the preheating procedure, the modalities, times and types
- D) Fuel setup: Sub menu with all the parameters about the fuel control and management of the wastes
- E) Oil setup: Sub menu with all the parameters about the oil pressure, with the choice of the instrument and the thresholds
- F) Temperature setup: Sub menu with all the parameters about the temperature, with the choice of instrument and thresholds
- G) Battery setup: Sub menu where you can set the parameters about the battery, like the thresholds and time to battery service
- H) Service: Sub menu that allows the setting of the parameters and hours about the services and warranty
- I) Choke setup: dedicated setup for the choke function on gasoline engines
- J) Can Bus: Submenu with the parameters for the CanBus communication

2-4.1 M3.1 - Starting setup



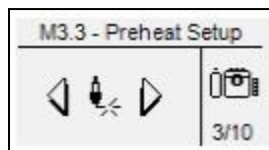
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Digital pressure signal	Permits to detect engine running status by the digital oil pressure sensor. It works only if connected to input J4.8.	On/Off	Off
B	D+ threshold	Permits to set the voltage of D+ of a battery-charger alternator, over which the engine is considered started. Set to Off to disable the D+ threshold.	0-9999 [V]	Off
C	W Threshold signal / pickup /	You set the frequency value measured on a permanent by a pickup or a "W" tachometric sensor, over which the engine is considered started. <u>Note: The pickup input range is 1-36V. So it's not recommended to connect a device, that normally has higher voltages.</u>	0-9999 [Hz]	Off
D	GE volt. ON	You set the voltage (% of the nominal voltage, see alternator menu) value measured of the power alternator, over which the engine is considered started.	0-100 [%]	20
E	GE freq. ON	You set the frequency (% of the nominal frequency, see alternator menu) value measured of the power alternator, over which the engine is considered started.	0-100 [%]	20
F	Oil pressure	Threshold on analog oil pressure input to detect engine running.	Off-10 [bar]	Off
G	Attempts number	You set the number of start attempts; when expired, the "starting failure" alarm is activated.	1-10	5
H	Attempt time	It is the maximum duration time of each starting attempt. When the engine is detected running, the crank output is de-activated.	1-30 [s]	5
I	Delay attempts	It is the time between a failed starting attempt and the next one.	1-10 [s]	5
J	RPM constant	This value multiplied with the frequency value of the engine gives you the RPM value.	0.00-100.00	30.00
K	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
L	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
M	Dec. delay	Time during which the output programmed for decelerator remains active at the starting of the generator after the detection of engine running. At the stopping, that output is active during the whole cooling phase and the stopping phase. It's also the time after the detection of engine running after which the output programmed for accelerator is activated.	Off-99 [s]	Off
N	High RPM	You set the maximum value over which the alarm for high engine rpm appears.	0-200 [%]	120
O	Low RPM	You set the minimum value beyond which the alarm for low engine rpm appears.	0-100 [%]	80
P	RPM nominal	It is the nominal speed of the engine, used also as reference to set the limits on points N and O.	0-10000	1500

2- 4.2 M3.2 - Stop setup



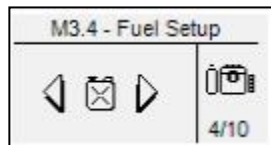
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Stop time	You set the maximum time of the stop phase, after which the engine must be completely stopped. It also coincides with the maximum time of supplying power to the stop electromagnet, to avoid problems due to permanent power supply.	0-99 [s]	8
B	Cooling time	<u>Active only if one output is programmed for generator contactor (see menu M8 for output programming).</u> It sets the cooling time after which the engine is stopped: after the generator contactor opening, the engine continues to run for the set time, to cool down without load. <u>It works only in automatic mode.</u>	0-255 [s]	30

2- 4.3 M3.3 - Preheat setup



POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Preheat time	You set the glow plugs time before starting.	0-99 [s]	5
B	Preheat with EV	If ON, during preheating is also supplied the fuel electro valve output. If OFF, during the preheating the fuel electro valve output is not supplied.	On-Off	Off
C	Skip preheat	You can set the value of the engine temperature above which the preheat procedure is skipped, because the engine is already considered "warm".	-999 a 999 [°C]	70
D	Preheat type	You can select the type of procedure: Before start: the glow plugs output is active only before each starting attempt. During start: the glow plugs output is active before and during each starting attempt. During attempts: the glow plugs output is active before starting, during the starting and also during the pause between attempts.	- Before start - During start - During attempts	Before start

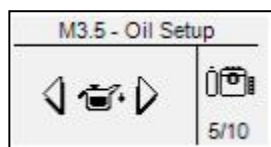
2- 4.4 M3.4 - Fuel setup



The fuel setup contains all the parameters (shown in the table) about the fuel management. See Appendix A for the table of the most common sensors.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Analog tool type	You select the type of transmitter used.	Vdo-Veglia -Datcon-Custom	Vdo
B	Low fuel level	Value beyond which the display shows a warning message that normally does not stop the generator.	0-100 [%]	20
C	Lack of fuel	Value beyond which the display shows an alarm message that normally shuts down the generator.	0-100 [%]	10
D	Refueling enable	This parameter allows you to activate (On) or deactivate (Off) one of the programmable outputs designed to control a pump for the automatic refilling of fuel. This automatic refilling can be activated in automatic only, or in manual and automatic, depending by the parameter I.	On-Off	Off
E	Start refuel	It sets the fuel level below which the automatic fuel refilling starts.	0-100 [%]	20
F	Start delay	It 's a time delay on the refilling starting detection to avoid false signals due to possible movements of fuel sensor in the tank.	0-59 [s]	10
G	Stop refuel	It sets the fuel level that, when reached, stops the automatic refilling.	0-100 [%]	80
H	Stop timer	You set a time limit after which the filling pump output is stopped, although the stop level was not reached. In this case an alarm (refueling timeout) will be displayed and the refueling function is stopped.	0-99 [min]	5
I	Refueling mode	You set the type of management for refueling pump: <ul style="list-style-type: none"> • Auto mode means that refueling pump will be activated with analog percentage level only in auto mode • Auto+Man means that refueling pump will be activated with analog percentage level in both manual and auto mode • Digital inputs means that refueling pump will be activated only with start pump input and stopped only with stop pump input (or full fuel tank input). This option is activated only in automatic mode 	Auto mode - Auto+Man - Digital inputs	Auto mode
J	Refueling with engine On	If On, the refueling pump will be activated only with engine running.	Off-On	Off
K	Tank capacity	You set the capacity of the tank. Necessary for the fuel management.	0-20000 [Lt]	100
L	Cons. 75% L	You can set the hourly consumption of the engine declared by the manufacturer with 75% load. It is necessary for the calculation of autonomy time.	0.0-1000.0 [Lt/h]	8.0
M	Offset fuel	Adjust for the fuel level measure.	-10 – +10 [%]	0
N	Cost for MWh	Set the cost for every Mega Watt per hour supplied by generator	1-999999	100
O	Min. autonomy	If the autonomy level is under this value, the autonomy alarm appears.	0-1000 [h]	5

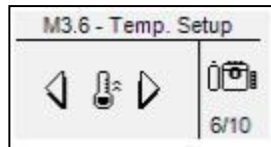
2- 4.5 M3.5 - Oil pressure setup



The oil setup contains all the parameters (shown in the table) about the lubricant system management. See Appendix B for the table of the most common sensors.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Analog tool type	You select the type of transmitter used.	Vdo-Veglia – Datcon-Custom	Vdo
B	Oil pres. Pre alarm	Value beyond which the display shows a warning message that normally doesn't stop the generator.	1.0-400.0 [bar]	3.0
C	Low oil pres.	Value beyond which the display shows an alarm message that normally stops the generator.	1.0-400.0 [bar]	2.0

2- 4.6 M3.6 - Temperature setup



The oil setup contains all the parameters (shown in the table) about the coolant system management. See Appendix C for the table of the most common sensors.

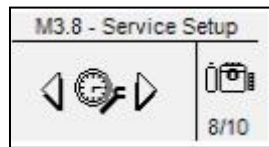
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Analog tool type	You select the type of transmitter used.	Vdo-Veglia –Datcon- Custom	Vdo
B	Temp. Pre alarm	Value over which the display shows a warning message that normally does not stop the generator.	40-999 [°C]	90
C	High temp.	Value over which the display shows an alarm message that normally stops the generator.	40-999 [°C]	100

2- 4.7 M3.7 - Battery setup



POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	High Vdc	It sets the percentage of maximum battery voltage over rated value; if the battery value measured is higher than this value, the "High battery alarm" is shown.	100-200 [%]	130
B	Low Vdc	It sets the percentage of minimum battery voltage over rated value; if the battery value measured is lower than this value, the "Low battery alarm" is shown.	0-100 [%]	80
C	Rated Vdc	This parameters is programmed automatically by the controller at system startup.	12-24	-
D	Battery efficiency	You set the maximum voltage dropout during cranking to measure battery efficiency. If the battery voltage is detected lower than this value, an alarm will occur after engine start.	1-255 [V*10]	70

2- 4.8 M3.8 - Service setup

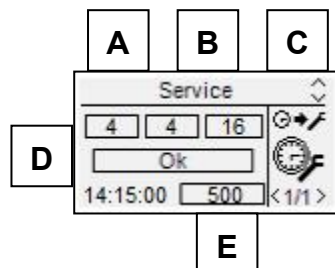


POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Enable service	If Off, all service management will be disabled, inside navigation pages "hours to service" indicator will be 0. Service alarm will not be activated. If On, service management will be activated using parameters inside this menu. Inside navigation pages, "hours to service" indicator will show the hours to the next service calculated from running work hours. Service alarm will be activated when running hours will reach the service hours or by date if service type is "hours+date".	Off-On	Off
B	Service type	If Work hours, the service alarm will be activated only by running hours. If Hours + date, the service alarm will be also activated by programmed date limit.	Work hours - Hours+Date	Work hours
C	Next service	Confirm this option to upgrade service limits to the programmed ones.	-	Ok
D	Next service (h)	Set the hours for the next services. Every time a service upgrade is performed, this value will be the hours to the next one.	0-65535 [h]	250
E	Year	If Service type is "hours+date", this value will be stored during service upgrade procedure to give service alarm by date	1 - 99	15
F	Month	If Service type is "hours+date", this value will be stored during service upgrade procedure to give service alarm by date	1 - 12	1
G	Initial work hours	It is the starting value of generator working hours. Normally you can change this value when the controller is mounted on a generator that has already worked.	0-2000 [h]	0
H	Restore hours	By drive, you can confirm it to reset the working hours to the "initial work hours" value at point G.	-	Ok
I	Reset start #	It permits to reset the number of the engine start counter	-	Ok

2- 4.8.1 - Fast Service upgrade

To upgrade service hours and date without entering system setup, follow this procedure:

- 1) If service alarm is active on display press RESET to activate OFF mode.
- 2) In OFF mode keep pressed START button for 10 seconds.
- 3) Fast service upgrade page will appear.



POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Next service (h)	Set the hours for the next services. Every time a service upgrade is performed, this value will be the hours to the next one. Same parameter as M3.8 - D.	0-65535 [h]	250
B	Month	If Service type is "hours+date", this value will be stored during service upgrade procedure to give service alarm by date	1 - 12	1
C	Year	If Service type is "hours+date", this value will be stored during service upgrade procedure to give service alarm by date	1 - 99	15
D	Next service	Confirm this option to upgrade service limits to the programmed ones.	-	Ok
E	Hours to next service	Shows the hours for the next service after upgrade	-	-

Note: to scroll the parameters, use the down and up arrows.

After service upgrade, press MENU to esc to the normal pages.

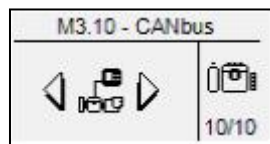
2- 4.9 M3.9 - Choke setup



POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Choke type	Choose the logic of activation of the choke output: Continuous: the choke output can be commanded during every starting attempt, in accordance with parameters B-C-D. Alternate: the choke output can be commanded only during the odd starting attempts, in accordance with parameters B-C-D.	Continuous - Alternate	Continuous
B	Choke time	It is the maximum time during which the Choke output is activated during the starting.	0-255 [s]	3
C	Threshold	Voltage threshold that must be reached at the starting to deactivate automatically the choke output.	Off-500 [V]	100
D	Temp. Inhibit	When a starting procedure is commanded, if the temperature is higher than this value, the choke output is not activated.	Off-255 [°C]	Off
E	Gasoline pages	If On, if one output is set for "choke", the display pages are set properly for gasoline system. If Off, the display pages remain the standard ones.	On-Off	On

Notes: Remember to set one output for the choke function (see menu M8.2). This output is activated 2 seconds before the cranking output, and remains active until the value at parameter C is reached, or until the time at parameter B has passed. If the engine is not provided with a temperature sensor, our advice is to install a thermal circuit breaker in series with the control of the choke magnet. It's also necessary to set a weekly test with minimum length of 5 minutes. For this function, see menu M4.3.

2- 4.10 M3.10 - Canbus setup

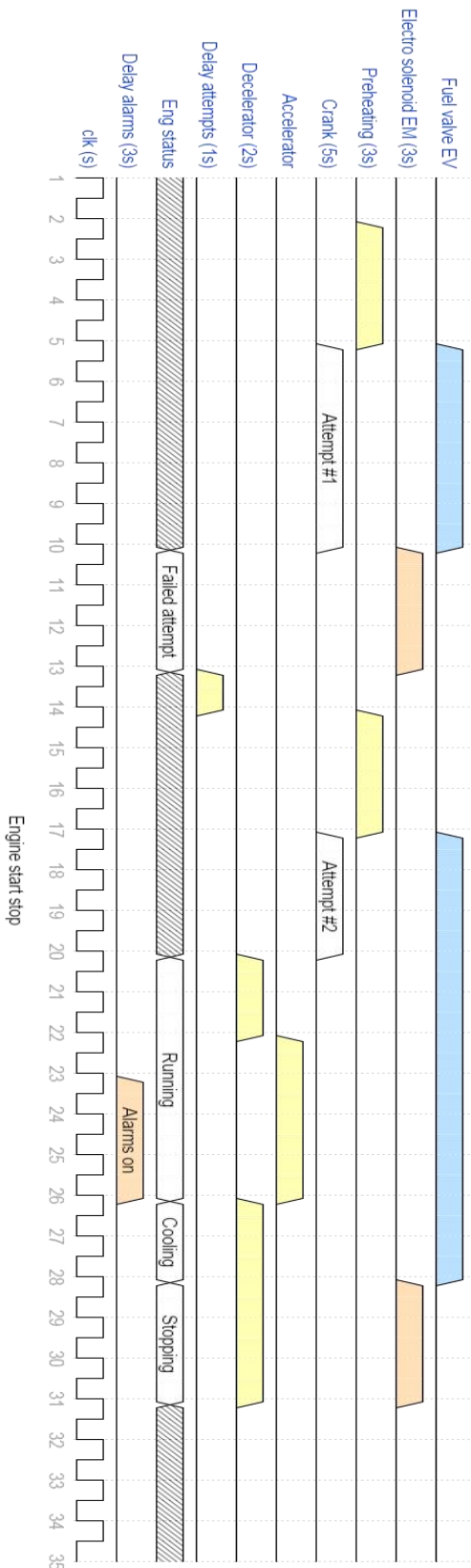


POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Canbus Protocol	Set the communication protocol of for engine canbus communication. Protocols available are: <ul style="list-style-type: none"> - J1939 - SCANIA EMS - SCANIA EMS6 (Start/Stop) - SCANIA EMS8 (Start/Stop) - VOLVO EMS - VOLVO EMS2 (Start/Stop) - VOLVO EDC4 - PERKINS ECM - JOHN DEERE JDEC - DEUTZ EMR1 - IVECO NEF / CURSOR - CUMMINS CM850 - MTU ECU7 (Start/Stop) - MTU ECU8 (Start/Stop) - DEUTZ EMR2 (Start/Stop) - JCB TIER2 - TE80x TE80x is a proprietary can protocol which allows the communication between different devices of Genset controller family. If set to "None", the display pages about the CanBus are not shown. Protocols marked with "Start/Stop" allow to activate and shout down the engine directly from CANBUS communication. To start engine properly through CANBUS communication M3.1B needs to be programmed as "OFF" if no D+ signal is connected to Genset.	None-TE80x	None
B	CAN baud-rate	Communication speed in bits per second for Canbus port	100 to 1000 [kbps]	250
C	ECU delay	This is the time during which the ECU output (if one output is programmed for ECU) remains active after the turn-on of the controller or after the stopping of the generator. Set to Off to leave the output always active. The output activates also at the starting of the generator and remains active during the functioning, regardless of the programming of this parameter.	Off to 59 [min]	1

2- 4.11 Diesel and gasoline engine start/stop charts

DIESEL

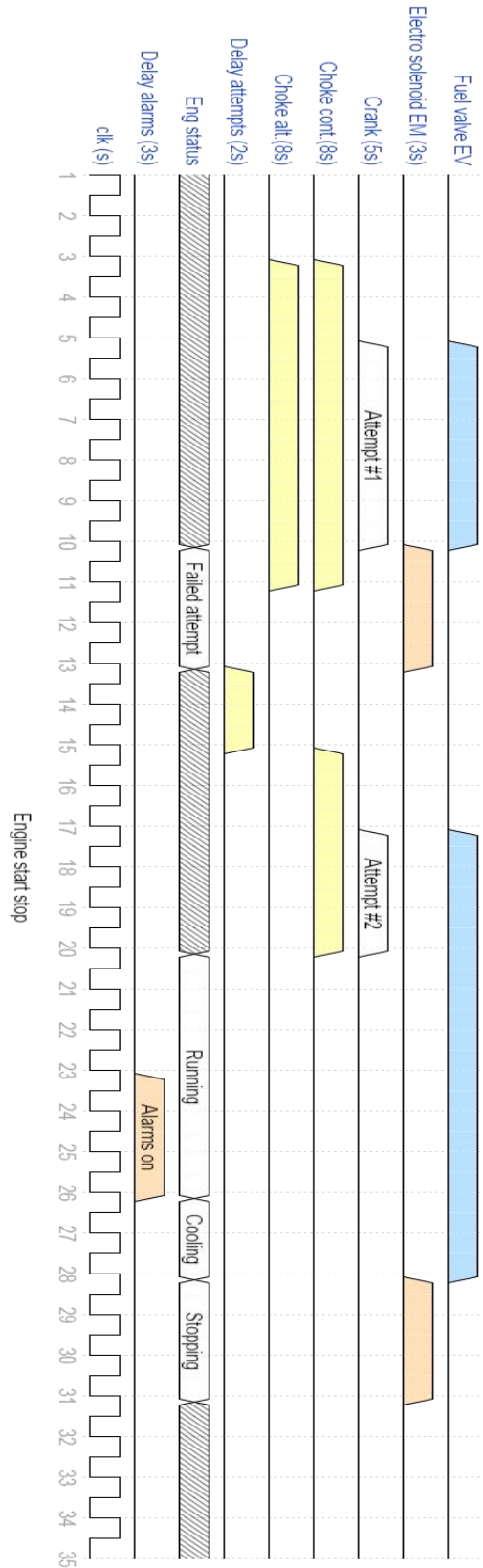
The chart below describes the logical activation of EV, EM, preheating, start, accelerator, decelerator outputs during starting procedure of diesel engine in auto mode. The first attempt is not successful, after the delay time between attempts, a second successful starting procedure is performed. After 6s with engine running the engine is stopped for example by remote stop activation.



CHOKE

The chart below describes the logical activation of EV, EM, choke, start outputs during starting procedure of gasoline engine in auto mode. The first attempt is not successful, after the delay time between attempts, a second successful starting procedure is performed. During the second attempt with choke in alternate mode, the choke output is not activated. After 6s with engine running the engine is stopped for example by remote stop activation.

Note: the temperature and the voltage threshold have not been considered.



2- 5 M4 - General setup

The general setup is composed by 4 sub menus:

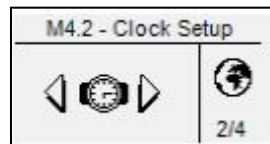
- A) Display setup: Submenu that contains all the parameters settings of the screen: language, contrast, etc
- B) Clock setup: Submenu with the general settings about the clock: date, time and day of the week
- C) Test setup: Submenu with the settings of the test operation mode, like the length and day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

2- 5.1 M4.1 - Display setup



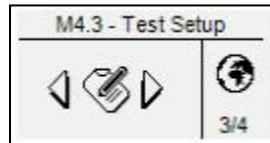
POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Language	You select the language. On board are available the following languages: English, Italian and French. Another language can be inserted by request in the "custom" position. The controller at the turn-on will ask the settings of the language 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	5-15	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- 5.2 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- 5.3 M4.3 - Test setup



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 eventual KG output is closed	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.

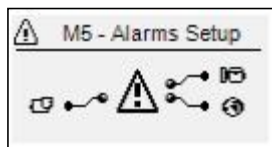
2- 5.4 M4.4 - Security setup



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 generator and engine ones.	70
D	User password	Parameter not used in this version of the controller.	-
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- 6 M5 - Alarms list

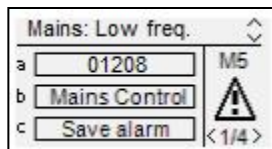


The alarms setup is composed by 4 different alarm groups:

- a) Generator alarms
- b) Engine alarms
- c) 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- 6.1 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	Generator	1201	GE: low freq.			<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
2	Generator	1202	GE: high freq.			<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
3	Generator	1205	GE: phase seq.	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
4	Generator	1206	GE: short circuit			<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
5	Generator	1207	GE: lmax overload			<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
6	Generator	1214	GE: V asymmetry			<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
7	Generator	20007	Ground protection	<input checked="" type="checkbox"/>			2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
8	Generator	20032	Emergency stop	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
9	Generator	20033	KG feedback	<input checked="" type="checkbox"/>			5	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
10	Generator	20036	User alarm 1	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
11	Generator	20037	User alarm 2	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
12	Generator	20038	User alarm 3	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
13	Generator	20062	GE: low voltage			<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
14	Generator	20063	GE: high voltage			<input checked="" type="checkbox"/>	5	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
15	Generator	20066	Dual mode on	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
16	Generator	20069	Kw overload			<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
17	Engine	01001	Start failure	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
18	Engine	01003	Mechanical fault			<input checked="" type="checkbox"/>	10	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
19	Engine	01101	Temp. pre alarm		<input checked="" type="checkbox"/>		2				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
20	Engine	01102	High engine temp. A		<input checked="" type="checkbox"/>		2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
21	Engine	01104	Fuel pre alarm		<input checked="" type="checkbox"/>		30				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
22	Engine	01105	Low fuel level A		<input checked="" type="checkbox"/>		30				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
23	Engine	01107	Oil press. pre alarm		<input checked="" type="checkbox"/>		2	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
24	Engine	01108	Low oil pressure A		<input checked="" type="checkbox"/>		2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
26	Engine	01112	High RPM			<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
27	Engine	01113	Low RPM		<input checked="" type="checkbox"/>		5	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
28	Engine	20005	Low oil level	<input checked="" type="checkbox"/>			2	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
29	Engine	20006	Low coolant level	<input checked="" type="checkbox"/>			2	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
30	Engine	20015	Stop engine failure		<input checked="" type="checkbox"/>		0	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
31	Engine	20019	Service	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
32	Engine	20020	Refueling timeout	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
33	Engine	20024	Faulty D+		<input checked="" type="checkbox"/>		5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
34	Engine	20028	High GE temp. D			<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
35	Engine	20029	Low fuel level D	<input checked="" type="checkbox"/>			5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
36	Engine	20030	Low oil pres. D			<input checked="" type="checkbox"/>	2	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
37	Engine	20039	Autonomy low		<input checked="" type="checkbox"/>		10				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
38	Engine	20042	Clogged filter	<input checked="" type="checkbox"/>			5	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
39	Engine	20043	Tank full	<input checked="" type="checkbox"/>			5				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
40	Engine	20051	No oil sensor		<input checked="" type="checkbox"/>		60				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
41	Engine	20057	Low battery voltage	<input checked="" type="checkbox"/>			15				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
42	Engine	20058	High battery voltage	<input checked="" type="checkbox"/>			15				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
43	Engine	20064	Water in fuel	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
44	Engine	20065	High coolant temperature	<input checked="" type="checkbox"/>			3	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
45	Engine	20068	Battery efficiency	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
46	General	20008	Test active	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
47	General	20012	Stopping...	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
48	General	20013	Start phase	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
49	General	20021	Remote start	<input checked="" type="checkbox"/>			1				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
50	General	20022	Remote stop	<input checked="" type="checkbox"/>			1		<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
51	General	20026	EJP	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
52	General	20027	Failed test	<input checked="" type="checkbox"/>			0	<input checked="" type="checkbox"/>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
53	General	20045	GE running...	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
54	General	20046	GE ready...	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
55	General	20055	Refueling	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
56	General	20059	TPS mode on	<input checked="" type="checkbox"/>			0				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>			
57	General	20067	Master com error	<input checked="" type="checkbox"/>			15				<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				

Note: The delay of Alarm 20015 "Stop engine failure" must remain 0.

2- 6.2 M5 - Alarms description

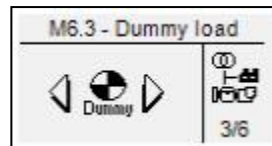
N.	Alarm code	Alarm name	Alarm description	Menu / Parameter
1	1201	GE: low freq.	Frequency values are under the programmed limits	M2-F
2	1202	GE: high freq.	Frequency values are over the programmed limits	M2-E
3	1205	GE: phase seq.	Indicates wrong generator voltages sequence	M2-O
4	1206	GE: short circuit	Indicates an instantaneous current higher than the programmed limits for short circuit	M2-I
5	1207	GE: lmax overload	Indicates an instantaneous current higher than the programmed limits for overload	M2-H
6	1214	GE: V asymmetry	Indicates that the difference between the higher and the lower genset voltages is too high	M2-P
7	20007	Ground protection	Ground protection digital input alarm	M8
8	20032	Emergency stop	It indicates that the input programmed as "emergency button" is active	M8
9	20033	KG feedback	If KG contactor output status is not equal to input status	M8
10	20036	User alarm 1	Alarm that is present when the digital input programmed as user alarm 1 is active	M8
11	20037	User alarm 2	Alarm that is present when the digital input programmed as user alarm 2 is active	M8
12	20038	User alarm 3	Alarm that is present when the digital input programmed as user alarm 3 is active	M8
13	20062	GE: low voltage	Voltage values are under the programmed limits	M2-C
14	20063	GE: high voltage	Voltage values are over the programmed limits	M2-B
15	20066	Dual mode on	Alarm active during stop by dual standby mode.	M6.6
16	20069	kW overload	Alarm active if the actual kW is over the % threshold set inside alternator setup	M2-T
17	01001	Start failure	Indicates that the engine is not detected running after the start attempts in automatic mode	M3.1
18	01003	Mechanical fault	Indicates that all engine running detection signals are lost without a command from the controller to stop the engine	M3.1
19	01101	Temp. pre alarm	Indicates analog engine temperature higher than programmed pre-alarm threshold	M3.6-B
20	01102	High engine temp. A	Indicates analog engine temperature higher than programmed alarm threshold	M3.6-C
21	01104	Fuel pre alarm	Indicates analog fuel level lower than programmed pre-alarm threshold	M3.4-B
22	01105	Low fuel level A	Indicates analog fuel level lower than programmed alarm threshold	M3.4-C
23	01107	Oil press. pre alarm	Indicates analog oil pressure lower than programmed pre alarm threshold	M3.5-B
24	01108	Low oil pressure A	Indicates analog oil pressure lower than programmed alarm threshold	M3.5-C
26	01112	High RPM	Indicates an engine speed value higher than programmed value	M3.1-N
27	01113	Low RPM	Indicates an engine speed value lower than programmed value	M3.1-O
28	20005	Low oil level	Oil level digital input alarm	M8
29	20006	Low coolant level	Coolant level digital input alarm	M8
30	20015	Stop engine failure	Indicates that the engine is still detected running after a stop phase	M3.2
31	20019	Service	Indicates that service timer has expired	M3.8
32	20020	Refueling timeout	Indicates that the engine is still detected running after a stop phase	M3.2
33	20024	Faulty D+	Indicates an alternator D+ voltage under 4Vdc with engine running	-
34	20028	High GE temp. D	High temperature digital input alarm	M8
35	20029	Low fuel level D	Low fuel level digital input alarm	M8
36	20030	Low oil pres. D	Low oil pressure digital input alarm	M8
37	20039	Autonomy low	If autonomy hours calculated with load percentage, fuel consumption and fuel level are lower than the programmed value, the alarm will be shown	M3.4
38	20042	Clogged filter	"Clogged air filter" digital input alarm	M8
39	20043	Tank full	"Fuel tank full" digital input alarm	M8
40	20051	No oil sensor	Indicates that the oil pressure digital sensor is open with engine not running	-
41	20057	Low battery voltage	Indicates a battery voltage higher than programmed value	M3.7-A
42	20058	High battery voltage	Indicates a battery voltage lower that programmed value	M3.7-B
43	20064	Water in fuel	Water in fuel alarm by digital input	M8
44	20065	High coolant temperature	High coolant temperature alarm by digital input	M8
45	20068	Battery efficiency	Indicates high battery voltage dropout during cranking phase	M7
46	20008	Test active	Signalization active during test procedure	M4.3
47	20012	Stopping...	Indicates an active stop procedure	-
48	20013	Start phase	Indicates an active start procedure	-
49	20021	Remote start	Indicates remote start function from digital input	M8
50	20022	Remote stop	Indicates remote stop function from digital input	M8
51	20026	EJP	Indicates that the the remote start input (if programmed as EJP) is active	M6.1
52	20027	Failed test	Indicates an unsuccessful test: in manual if mode the engine has not started after the attempts number; in automatic mode if a stopping alarm occurs during test procedure	M4.3
53	20045	GE running...	Indication that is active when the generator is detected running	-
54	20046	GE ready...	Indication that the generator is not running and without blocking alarms	-
55	20055	Refueling	Indicates refueling conditions active, if refueling pump output is programmed, the connected output is activated.	M3.4
56	20059	TPS mode on	Indicates acivation of TPS timed programmable start/stop mode.	M6.4
57	20067	Master com error	Indicates RS485 master-slave communication error if dual standby mode is enabled.	M6.6

2- 7 M6 - Special functions

The Genset permits 6 special functions active only in automatic mode: Dummy load, TPS, Heater, Dual standby. The relative parameters can be set in this menu. Here you can also set the type of use of all the programmable inputs and outputs. The sub menus are the following:

- A) Dummy Load - only auto mode
- B) TPS (timer programmable start stop) - only auto mode
- C) Heater - only auto mode
- D) Dual standby - only auto mode

2- 7.1 M6.3 - Dummy load

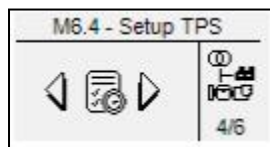


Function that allows to activate from 1 to 4 programmable outputs, according to the maximum and minimum thresholds programmable on load consumption. If the load consumption is lower than the DUMMY ON for a period of time longer than the ON DELAY, the board activates the output DL stage 1; then, after the On delay, if the load is again under the DUMMY ON value, the output DL stage 2 is activated, and so on; (see par. 2-9 for the programming of the outputs). When the value of load consumption is higher than the DUMMY OFF at least for the OFF DELAY time, the last dummy output is deactivated (for example output DL stage 4 in case of 4 stages); then, after the OFF DELAY, if the load is again over the DUMMY OFF threshold, another sequential dummy output is deactivated, and so on until all the outputs are deactivated. To activate this function, you have to set at least one of the programmable outputs for dummy load (see par. 2-9), 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), an output programmed as "dummy load" is 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 an output is 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), an output programmed as "dummy load" is 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 an output is deactivated.	0-255 [s]	5
F	Stages	It permits to set the number of outputs to be activated or deactivated for dummy load function	1-4	4

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 and the type of the system selected.

2- 7.2 M6.4 - TPS

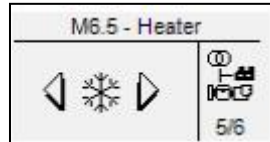


This function similar to automatic test is used to program up to two working intervals which activate the generator at chosen clock time and stop it at a chosen clock time. It's also possible to program if the working time is with or without load, with or without remote stop and which are the days allowed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

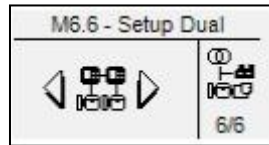
2- 7.3 M6.5 - Heater



This function is used to configure heater output inside M8.2 setup. The output is used to activate an heater device by the measured environmental temperature values. Please note: to use properly this function we suggest to use a PT100 sensor to measure engine temperature. This type of sensor can give low temperature values below zero and not only the high temperature working ones.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Heater enable	If On, enable heater output activation.	On / Off	Off
B	On temperature (°C)	Set the temperature threshold to activate heater output.	-50 + 50 [°C]	0
C	Off temperature (°C)	Set the temperature threshold to deactivate heater output.	0 - 50 [°C]	30
D	Max time (m)	Set the maximum time with heater output active, if Off, there is no maximum activation time.	Off - 255 [m]	Off

2- 7.4 M6.6 - Setup Dual



This function is used to activate dual mode mutual standby between two Genest Controller. The communication channel is by RS485 connection between the first one (Modbus master protocol) and the second (modbus slave protocol ID=1 with the same serial speed as master controller).

If Dual mode is enabled on master controller, and the slave is not connected or the serial port speed is not correct, an alarm will appear on the master device.

When both controllers are in auto mode, the dual mutual standby is activated by working hours difference between generator master and slave. If the working hours difference is lower than the programmed value, the master generator will start. After some working hours, the slave generator will be started and when it will be ready to close KG, the master generator will open KG and begin cooling and stop procedure.

When the remote start signal is removed, the dual standby will keep stopped the generator with more working hours at the next remote start activation.

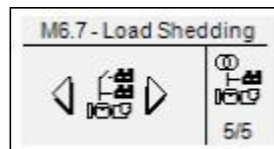
If a shutdown alarm occurs on the running generator, the other one will be started to take the load, in this case the dual standby cycle is interrupted until alarm generator is restored. The cycle can be interrupted also by one or more of these conditions:

1. Master not in auto mode
2. Slave not in auto mode
3. Master disabled (M6.6 - a = Off)
4. Slave disabled (M6.6 - a = Off)

By programmable inputs setup M8.1, is possible to assign "Priority" function to one of the inputs. When priority input is activated, the correspondent generator will be the one in charge even if running hours are greater than the other generator. If both master and slave priority input is activated, the master generator will be the one in charge.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Dual enable	If On, enable the dual standby between master and slave controller on RS485. Use serial setup M7.1 to define which controller is master and which one slave. The serial speed must be the same on both controllers, the ID for the slave controller must be 1.	On / Off	Off
B	Dual work (h)	Set maximum working hours difference between master and slave controller; when the currently running generator reaches the hours, the other one is started.	1-100 [h]	10
C	Dual delay (s)	Set the delay time between the dual stop conditions and the beginning of stop procedure.	1 - 255 [s]	10

2- 7.5 M6.7 - Load shedding



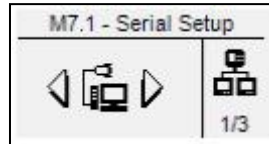
Function that allows to activate from 1 to 4 programmable outputs, according to the maximum and minimum thresholds programmable on load consumption. If the load consumption is higher than the KW ON for a period of time longer than the ON DELAY, the board activates the output LS stage 1; then, after the KW ON DELAY, if the load is again over the KW ON value, the output LS stage 2 is activated, and so on; (see par. 2-9 for the programming of the outputs). When the value of load consumption is lower than the KW OFF at least for the KW OFF DELAY time, the last load shedding output is deactivated (for example output LS stage 4 in case of 4 stages); then, after the OFF DELAY, if the load is again lower the KW OFF threshold, another sequential load shedding output is deactivated, and so on until all the outputs are deactivated. To activate this function, you have to set at least one of the programmable outputs for load shedding (see par. 2-9), then you have to set the following parameters.

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	LS enable	If ON the function is enabled, if OFF the function is disabled.	On / Off	Off
B	kW On	Load supplied by generator: if the power consumption is lower than this value (at least for the "On delay" at point C), an output programmed as "dummy load" is activated.	0-255 [%]	60
C	kW 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 an output is activated.	0-255 [s]	5
D	kW 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), an output programmed as "dummy load" is deactivated.	0-255 [%]	30
E	kW 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 an output is deactivated.	0-255 [s]	5
F	Stages	It permits to set the number of outputs to be activated or deactivated for dummy load function	1-4	4

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 and the type of the system selected.

2- 8 M7 - Connectivity

2- 8.1 M7.1 - Serial port setup



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. Genset: custom slave protocol.	None Modbus Master Modbus Slave Gsm modem Genset	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. Genset: custom slave protocol.	None Modbus Master Modbus Slave Gsm modem Genset	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 programming 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

2- 8.2 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 conditions will trigger a SMS info message	On-Off	Off-On
E 1-2	Engine stopping - Stopping ok	If enabled, the activation of this conditions will trigger a SMS info message	On-Off	Off-On
F 1-2	KG active - Remote stop	If enabled, the activation of this conditions will trigger a SMS info message	On-Off	On-On
G 1-2	Auto mode - Test mode	If enabled, the activation of this conditions will trigger a SMS info message	On-Off	On-Off
H 1-2	Off mode - Man mode	If enabled, the activation of this conditions will trigger a SMS info message	On-Off	On-On
I	-	Not used	-	-
J	-	Not used	-	-
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: <i>PWD=[XXXXXX] [Command]</i> For example if password is 1-0-2-A-z-X, the SMS command to start the engine must be composed this way: <i>PWD=102AzX START</i>	[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- 8.2.1 - 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
M000,000,000,00.0
G237,237,232,49.9
A003.0,000.0,000.0
B=14.1V,h=00000
T=99%,U=00
GC=ON,Z=00
E0000,A000
#41001,Start failure
    
```

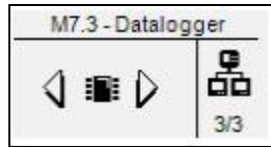
SMS SECTION	FORMAT DESCRIPTION	# DATA CHARACTERS	DATA DESCRIPTION
EAS	[Message type]	3	Message header for Genset
=-----	= [Generator name]	16	Name of the generator
O=AUTO	O= [Program]	4	Operative mode active ("OFF"-"MAN"-"AUTO"-"TEST")
,P=000	,P= [Active power kW]	3	Total active power
M237	M [Mains voltage line 1]	3	Mains L1-n voltage: always 0 in RI809G
,237	, [Mains voltage line 2]	3	Mains L2-n voltage: always 0 in RI809G
,232	, [Mains voltage line 3]	3	Mains L3-n voltage: always 0 in RI809G
,49.9	, [Mains frequency]	4	Mains frequency: always 0 in RI809G
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=14.1	B= [Battery voltage]	4	Battery voltage
V,h=00000	V,h= [Work hours]	5	Total work hours
T=99%	T= [Fuel level]	2	Fuel level percentage
%,U=00	%,U= [Oil pressure]	2	Oil pressure
MC=ON	[Contactor status]	5	Contactors status: <ul style="list-style-type: none"> GC=ON means generator contactor ON C=OFF means both contactors OFF
,Z=00	,Z= [Engine temperature]	5	Engine temperature
E0	E [Input I4.4 status]	1	Status of input I4.4
0	[Input I4.5 status]	1	Status of input I4.5
0	[Input I4.6 status]	1	Status of input I4.6
0	[Input I4.7 status]	1	Status of input I4.7
,A0	,A [output O5.8 status]	1	Status of output 5.8
0	[output O5.9 status]	1	Status of output 5.9
0	[output O5.10 status]	1	Status of output 5.10
#41001	# [message ID]	5	Message ID without alarms: <ul style="list-style-type: none"> 00250 = Power on 00201 = Generator ready 00202 = Engine running 00203 = Engine stopping 00204 = Engine stop successful 00205 = KG on 00219 = Remote stop 00207 = Auto mode 00208 = Test mode 00209 = Off mode 00210 = Man mode 00222 = System info Message ID with alarms, the first digit is the alarm gravity: <ul style="list-style-type: none"> 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: $[Emergency_stop_alarm_code] = (4*10^5)+(20032-17000) = 43032$ Otherwise "autonomy low" alarm which is not a shutdown alarm but is a global alarm #1 will be advised with this code: $[Autonomy_low_alarm_code] = (1*10^5)+(20039-17000) = 13039$ "Engine temperature pre alarm" is not a shutdown alarm but is a global alarm #1 with code lesser than 20000, will be advised with this code: $[temperature_pre_alarm_code] = (1*10^5)+(1101) = 11101$
,Start failure	, [message text]	16	Message text

2- 8.2.2 - 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
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 0-999, for instance if i want to set parameter 300 to 10, the text sent will be: SET:300 10	Set an enabled parameter of remote device
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.
SERVICE	SERV	Command to remove service alarm and upgrade service hours on remote device.
SYSTEM INFO	INFO	Command to request info to the remote device.

2- 8.3 M7.3 - Data logger



POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS																																																
A	Enable datalog	Enable automatic datalog. 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:	Off-On	Off																																																
		<table border="1"> <thead> <tr> <th>Sample time (s)</th> <th>Hours to full memory</th> <th>Days to full memory</th> <th>Samples per day</th> </tr> </thead> <tbody> <tr><td>10</td><td>4,41</td><td>0,18</td><td>8640,00</td></tr> <tr><td>60</td><td>26,47</td><td>1,10</td><td>1440,00</td></tr> <tr><td>300</td><td>132,33</td><td>5,51</td><td>288,00</td></tr> <tr><td>600</td><td>264,67</td><td>11,03</td><td>144,00</td></tr> <tr><td>1800</td><td>794,00</td><td>33,08</td><td>48,00</td></tr> <tr><td>3600</td><td>1588,00</td><td>66,17</td><td>24,00</td></tr> <tr><td>7200</td><td>3176,00</td><td>132,33</td><td>12,00</td></tr> <tr><td>12400</td><td>5469,78</td><td>227,91</td><td>6,97</td></tr> <tr><td>14400</td><td>6352,00</td><td>264,67</td><td>6,00</td></tr> <tr><td>18000</td><td>7940,00</td><td>330,83</td><td>4,80</td></tr> <tr><td>21600</td><td>9528,00</td><td>397,00</td><td>4,00</td></tr> </tbody> </table>	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		
Sample time (s)	Hours to full memory	Days to full memory	Samples per day																																																	
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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																																																	
B	Sample time (s)	<p>List of logged variables:</p> <ul style="list-style-type: none"> • Generator voltage L1-n (V) • Generator voltage L2-n (V) • Generator voltage L3-n (V) • Generator 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) • Fuel level percentage (%) • Battery voltage (Vdc) • Engine speed (Rpm) • Oil pressure (Bar) • Engine temperature (°C) • Work hours (h) • Shutdown alarm • Global alarm • Last alarm ID 	[5-65535]	12400																																																
C	Memory status	If Ok the memory is not full, if Full, you can select it to erase memory.	Ok	-																																																

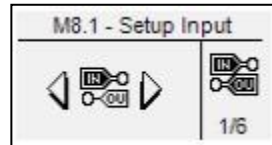
2- 9 M8 - IO setup

The IO setup is composed by 6 sub menus:

- 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) Measures: Submenu to adjust voltage and current measures with a programmable offset.
- F) Expansion: Submenu to configure expansion outputs

Important: if a digital input function is associated to an analog / digital input (for example: I6.4 fuel level) the input type must be programmed as Digital inside Input type menu. In this case the function associated with analog measure will be unavailable.

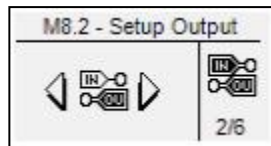
2- 9.1 M8.1 - Input setup



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, I6.2 (digital / analog oil pressure), I6.3 (digital / analog water temperature), I6.4 (digital / analog fuel level), and the digital inputs from the TE6010 expansion board (EXIN0 - EXIN7), can be programmed as:

POS.	NAME	DESCRIPTION	RANGE OF VALUES	DEFAULT SETTINGS
A	Low oil pressure	Low oil pressure alarm from digital contact	None - I4.4 - I4.5 - I4.6 - I4.7 - I4.8 - I6.2 - I6.3 - I6.4 - ExIn_0 ~ ExIn_7	I4.4
B	High engine temperature	High engine temperature from digital contact	Same as parameter A	I4.5
C	Low fuel level	Low fuel level from digital contact	Same as parameter A	I4.6
D	Changeover	Changeover command from digital contact: works in auto mode with remote start and automatic test. If it's activated with generator measures within limits, the eventual KG output is activated.	Same as parameter A	None
E	Remote start	Start the generator in auto mode.	Same as parameter A	I4.7
F	Remote stop	Stop the generator in auto mode even if there are some condition which would start the engine as remote start. It's possible to disable remote stop during normal test or TPS test.	Same as parameter A	None
G	Low coolant level	Low coolant level alarm from digital contact	Same as parameter A	I4.8
H	Clogged air filter	Clogged air filter alarm from digital contact	Same as parameter A	None
I	Low oil level	Low oil level alarm from digital contact	Same as parameter A	None
J	Ground protection	Ground protection alarm from digital contact	Same as parameter A	None
K	Feedback KG	Feedback generator contactor. Is activated if KG output is On but feedback is not and viceversa.	Same as parameter A	None
L	Priority	If activated, during dual standby mode, the generator becomes the active one even if is not its turn by working hours difference.	Same as parameter A	None
M	User alarm 1	Label editable alarm from digital contact	Same as parameter A	None
N	User alarm 2	Label editable alarm from digital contact	Same as parameter A	None
O	User alarm 3	Label editable alarm from digital contact	Same as parameter A	None
P	Refueling On	If refueling mode selected is "Digital inputs", when this input is active, the refueling output is activated.	Same as parameter A	None
Q	Refueling Off	If refueling mode selected is "Digital inputs", when this input is active, the refueling output is deactivated. This input have priority over Refueling On input.	Same as parameter A	None
R	Tank full	Fuel tank full alarm from digital contact. If refueling pump output is On, is deactivated.	Same as parameter A	None
S	Off mode	Activates Off mode.	Same as parameter A	None
T	High coolant temperature	High coolant temperature alarm from digital contact.	Same as parameter A	None
U	Water in fuel	Water in fuel alarm from digital contact	Same as parameter A	None

2- 9.2 M8.2 - Output setup



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 crank and O5.4 EV can be programmed as:

- Start: the output is used to command the start.
- Fuel valve (EV): the output is used to command the stop with EV.
- Electro solenoid (EM): the output is used to command the stop with EM.
- Glow plugs: the output is used to command the preheating function, with modality that you can set in the preheat setup.
- 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.
- Refueling pump: the output is used to command the start and stop of a refueling pump. The parameters about the refilling functions can be set in the fuel menu.
- Auto mode: indicates that the controller is in automatic 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 ON: indicates that the generator 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
- Choke: output that is activated for the starting of Gasoline engines, with time and limits settable in the choke setup
- ECU: output that is active during the functioning of the generator, and for a programmable time after the stopping of the generator and the turn-on of the controller. See paragraph 2-5.10 for more information.
- Decelerator: the output is activated for a programmable time (M3.1 – parameter P) after the detection of engine running. This output is also active during all the cooling phase and the stop phase.
- Accelerator: the output is activated after a programmable time at the starting (M3.1 – parameter P), and it is de-activated at the beginning of the cooling/stop phase.
- Heater: the output is activated by Heater feature programmed in M6.5.
- DL stage 1: first output activated for the dummy load function (see menu M6.3 for more information)
- DL stage 2: second output activated for the dummy load function (see menu M6.3 for more information)
- DL stage 3: third output activated for the dummy load function (see menu M6.3 for more information)
- DL stage 4: fourth output activated for the dummy load function (see menu M6.3 for more information)
- LS stage 1: first output activated for the load shedding function (see menu M6.7 for more information)
- LS stage 2: second output activated for the load shedding function (see menu M6.7 for more information)
- LS stage 3: third output activated for the load shedding function (see menu M6.7 for more information)
- LS stage 4: fourth output activated for the load shedding function (see menu M6.7 for more information)

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
A	O5.8	Start – EV – EM – Glow plugs – Siren – Global alarm 1 – Engine running – Test active – Refueling pump – Dummy load – Auto mode – Global alarm 2 – Global alarm 3 – KG ON – Alarm A - Alarm B - Alarm C - Choke - ECU - Decelerator - Accelerator - Heater – DL stage 1 – DL stage 2 – DL stage 3 – DL stage 4 – LS stage 1 – LS stage 2 – LS stage 3 – LS stage 4	Global alarm 1
B	O5.9	Same as parameter A	Glow plugs
C	O5.10	Same as parameter A	Siren
D	O5.11	Same as parameter A	Electro solenoid (EM)
E	O5.5 Start	Same as parameter A	Start
F	O5.4 EV	Same as parameter A	EV
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.

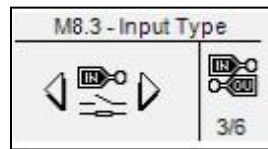
Configuration example:

- 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 11
- M8.2 - h programmed to 18
- M8.2 - i programmed to 23

With this configuration output O5.9 will be activated with "Ge: low voltage" alarm, output O5.10 will be activated with "Emergency stop" and output 5.11 will be activated with "Start failure" alarm.

1	Not used
2	Not used
3	Not used
4	Not used
5	Not used
6	Not used
7	Not used
8	Not used
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: I _{max}
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	Mechanical fault
25	Temp. pre alarm
26	High eng. Temp.
27	Fuel pre alarm
28	Low fuel level
29	Oil pressure prealarm
30	Low oil pressure
31	Low oil level
32	Low coolant level
33	Stop engine failure
34	Service
35	Refueling timeout
36	Faulty D+
37	High GE temp. D
38	Low fuel level D
39	Low oil pressure D
40	Autonomy low
41	Clogged filter
42	Tank full
43	No oil sensor
44	Low battery voltage
45	High battery voltage
46	Test fail
47	Low RPM
48	High RPM
49	Water in fuel
50	High coolant temp
51	Master comm error
52	Battery Efficiency
53	kW Overload
54-64	Free

2- 9.3 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

The inputs I6.2, can be programmed as:

- Disabled: the input is not active
- Pressure: the input is programmed for analog oil pressure
- Level: the input is programmed for secondary analog fuel level percentage (only custom application)
- Temperature: the input is programmed for analog external temperature (only custom application)
- Digital NO: the input is digital type normally open
- Digital NC: the input is digital type normally closed

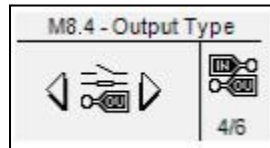
The inputs I6.3, I6.4 can be programmed as:

- Disabled: the input is not active
- Analog: the input is analog for a specific measure programmed by tool configuration
- Digital NO: the input is digital type normally open
- Digital NC: the input is digital type normally closed

The parameter “Analog source” permits to choose if the oil pressure, engine temperature and battery voltage sources are directly from Genset or via Canbus; the alarms are the same for both analog sources.

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
F	I6.2-Oil	Disabled – Analog – Digital NO – Digital NC	Analog
G	I6.3-Temperature	Disabled – Analog – Digital NO – Digital NC	Analog
H	I6.4-Fuel	Disabled – Analog – Digital NO – Digital NC	Analog
I	Analog source	Board - Canbus	Board
J	RPM source	<p>Frequency – Pickup – Canbus</p> <p>If programmed as “Frequency”, the engine speed is calculated from alternator frequency multiplied by rpm constant parameter (M3.1j) which by default is 30. If M3.1j is programmed as 1, it becomes 30 when “Frequency” option is selected.</p> <p>If programmed as “Pickup”, the engine speed is calculated from pickup frequency input (J7.1) multiplied by rpm constant parameter (M3.1j). To find the correct rpm correction factor, use Autoset RPM parameter (M8.3k).</p> <p>If programmed as “Canbus”, the engine speed is calculated from Canbus frequency multiplied by rpm constant parameter (M3.1j) which will be automatically fixed at 1.</p>	Frequency
K	Autoset RPM (only if M8.3J = pickup)	<p>Detect</p> <p>Start the generator and speed up to match rated speed 1500 rpm. If the frequency detected by pickup is greater than 10Hz, you can press “Detect” button to find the correct conversion factor for your pickup sensor.</p>	-
L	Engine speed (only if M8.3J = pickup)	It show the actual value of engine speed.	-

2- 9.4 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 can be programmed as:

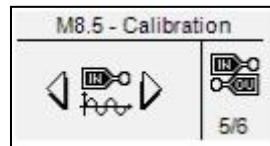
- Disabled: the output is not active
- Digital NO: the output is digital type normally open
- Digital NC: the output is digital type normally closed

The output O5.5 Start and O5.4 Ev can be programmed as:

- Disabled: the output is not active
- Digital NO: the output is digital type normally open

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 Ev	Disabled – Digital NO	Digital NO
F	O5.5 Start	Disabled – Digital NO	Digital NO

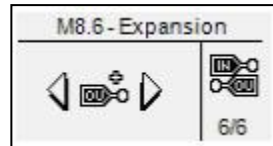
2- 9.5 M8.5 - Calibration



The measures setup allows to adjust the measured values for genset 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	IL1	50.0 – 150.0 (%)	100
E	IL2	50.0 – 150.0 (%)	100
F	IL3	50.0 – 150.0 (%)	100

2- 9.6 M8.6 - Expansion



The Expansion setup permits to select the type of use of the programmable outputs of an eventual RI6010 expansion board.

The outputs from ExOut_1 to ExOut_7 can be programmed as:

- None: no function associated to the output
- 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.
- Refueling pump: the output is used to command the start and stop of a refueling pump. The parameters about the refilling functions can be set in the fuel menu.
- 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 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 ON: indicates that the generator 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
- GE ready: the output is activated when the generator is ready to take the load.
- Oil alarm: indicates that one alarm about the oil pressure is active
- Fuel alarm: indicates that one alarm about the engine temperature is active
- Temperature alarm: indicates that one alarm about the fuel level is active

All the parameters available in the Expansion setup are:

POS.	NAME	RANGE OF VALUES	DEFAULT SETTINGS
a	Enable EXP_A	On – Off On permits to enable the communication with Expansion Board (ten I/O) or similar Note : You can use all the ten outputs from ExOut_0 to ExOut_9	Off
b	Enable EXP_B	On – Off On permits to enable the communication with expansion boards with max. eight I/O Note : You can use all the eight outputs from ExOut_0 to ExOut_7. If you are using an expansion board with five relay output, the five outputs are from ExOut_0 to ExOut_4.	Off
c	ExOut_0	None – Siren – Global alarm 1 – Engine running – Test active – Refueling pump – Dummy load – Reset mode – Auto mode – Man mode – Global alarm 2 – Global alarm 3 – KG ON – Alarm A - Alarm B - Alarm C - GE ready - Oil alarm (cumulative) – Fuel alarm (cumulative) – Temperature alarm (cumulative)	None
d	ExOut_1	Same as parameter a	None
e	ExOut_2	Same as parameter a	None
f	ExOut_3	Same as parameter a	None
g	ExOut_4	Same as parameter a	None
h	ExOut_5	Same as parameter a	None
i	ExOut_6	Same as parameter a	None
j	ExOut_7	Same as parameter a	None
k	ExOut_8	Same as parameter a	None
l	ExOut_9	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- 10 - Modbus RTU

2- 10.1 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 RI809 has 2 ports that can be used for the Modbus communication: 1 RS232 and 1 RS485.

2- 10.2 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 D is set to **Modbus Slave**. Then set parameter E to the desired speed of communication, and parameter A that is the address of the device.

2- 10.3 Modbus commands available

It's possible to send 2 different types of requests to the Genset. A reading requests to 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 RI809.

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
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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
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The function 06-Preset Single Register permits to set one register of the RI809 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
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Answer (identical message retransmitted 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
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First measures registers which can be read with a single read holding register function of 44 registers starting from address 696 (695 if zero based modbus):

Var.Name - FIRST PACK	Var.Visual	Var.Type	ID	R/W	Scale
Active program Mode of operation GENSET: 0=Manual 1=Automatic 2=Reset	DT_NUMERIC	MW2756	40696	R	1
Fuel level percentage	DT_NUMERIC	MW2758	40697	R	10
Rpm	DT_NUMERIC	MW2760	40698	R	1
Oil pressure	DT_NUMERIC	MW2762	40699	R	10
Engine temperature	DT_NUMERIC	MW2764	40700	R	1
Not used	DT_NUMERIC	MW2766	40701	R	1
Not used	DT_NUMERIC	MW2768	40702	R	1
Not used	DT_NUMERIC	MW2770	40703	R	1
Not used	DT_NUMERIC	MW2772	40704	R	1
Not used	DT_NUMERIC	MW2774	40705	R	1
Not used	DT_NUMERIC	MW2776	40706	R	1
Not used	DT_NUMERIC	MW2778	40707	R	10
Not used	DT_NUMERIC	MW2780	40708	R	1
Generator Line voltage L1-L2	DT_NUMERIC	MW2782	40709	R	1
Generator Line voltage L2-L3	DT_NUMERIC	MW2784	40710	R	1
Generator Line voltage L3-L1	DT_NUMERIC	MW2786	40711	R	1
Generator phase voltage L1	DT_NUMERIC	MW2788	40712	R	1
Generator phase voltage L2	DT_NUMERIC	MW2790	40713	R	1
Generator phase voltage L3	DT_NUMERIC	MW2792	40714	R	1
Generator frequency	DT_NUMERIC	MW2794	40715	R	10
Generator kWh	DT_NUMERIC	MW2796	40716	R	1
Engine D+ voltage	DT_NUMERIC	MW2798	40717	R	1
Engine Battery voltage	DT_NUMERIC	MW2800	40718	R	10
Start attempts	DT_NUMERIC	MW2802	40719	R	1
Work hours	DT_NUMERIC	MW2804	40720	R	1
Daily work hours	DT_NUMERIC	MW2806	40721	R	1
Service hours	DT_NUMERIC	MW2808	40722	R	1
Test mode on	DT_NUMERIC	MW2810	40723	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= Not used Bit13= Output KG Bit14= Output Start Bit15= Output EV	DT_NUMERIC	MW2812	40724	R	Bin
Load current L1	DT_NUMERIC	MW2814	40725	R	1
Load current L2	DT_NUMERIC	MW2816	40726	R	1
Load current L3	DT_NUMERIC	MW2818	40727	R	1
Total load current	DT_NUMERIC	MW2820	40728	R	1
Total active power	DT_NUMERIC	MW2822	40729	R	1
Total reactive power	DT_NUMERIC	MW2824	40730	R	1
Total apparent power	DT_NUMERIC	MW2826	40731	R	1
Fuel level liters	DT_NUMERIC	MW2828	40732	R	10
Autonomy hours	DT_NUMERIC	MW2830	40733	R	1
Instant consumption	DT_NUMERIC	MW2832	40734	R	10
Average consumption	DT_NUMERIC	MW2834	40735	R	10
Last refilling	DT_NUMERIC	MW2836	40736	R	10
Total power factor	DT_NUMERIC	MW2838	40737	R	100
Not used	DT_NUMERIC	MW2840	40738	R	1
Not used	DT_NUMERIC	MW2842	40739	R	1
Var.Name - SECOND PACK	Var.Visual	Var.Type	ID	R/W	Scale
Active power L1	DT_NUMERIC	MW3022	40788	R	1
Active power L2	DT_NUMERIC	MW3024	40789	R	1
Active power L3	DT_NUMERIC	MW3026	40790	R	1
Apparent power L1	DT_NUMERIC	MW3028	40791	R	1

Apparent power L2	DT_NUMERIC	MW3030	40792	R	1
Apparent power L3	DT_NUMERIC	MW3032	40793	R	1
Reactive power L1	DT_NUMERIC	MW3034	40794	R	10
Reactive power L2	DT_NUMERIC	MW3036	40795	R	10
Reactive power L3	DT_NUMERIC	MW3038	40796	R	10
Power factor L1	DT_NUMERIC	MW3040	40797	R	100
Power factor L2	DT_NUMERIC	MW3042	40798	R	100
Power factor L3	DT_NUMERIC	MW3044	40799	R	100
Not used	DT_NUMERIC	MW3046	40800	R	1
Not used	DT_NUMERIC	MW3048	40801	R	1
Not used	DT_NUMERIC	MW3050	40802	R	1
Not used	DT_NUMERIC	MW3052	40803	R	1
Not used	DT_NUMERIC	MW3054	40804	R	1
Not used	DT_NUMERIC	MW3056	40805	R	1
Rpm (canbus)	DT_NUMERIC	MW3058	40806	R	10
Work hours (canbus)	DT_NUMERIC	MW3060	40807	R	10
Battery voltage (canbus)	DT_NUMERIC	MW3062	40808	R	10
Coolant level (canbus)	DT_NUMERIC	MW3064	40809	R	10
Oil pressure (canbus)	DT_NUMERIC	MW3066	40810	R	10
Engine temperature (canbus)	DT_NUMERIC	MW3068	40811	R	10
Alarm SPN (canbus)	DT_NUMERIC	MW3070	40812	R	10
Alarm FMI (canbus)	DT_NUMERIC	MW3072	40813	R	10
Instant consumption (canbus)	DT_NUMERIC	MW3074	40814	R	10
Not used	DT_NUMERIC	MW3076	40815	R	Dec
Not used	DT_NUMERIC	MW3078	40816	R	Dec
Alarm package 1: Bit0= Not used Bit1= Not used Bit2= Not used Bit3= Not used Bit4= Not used Bit5= Not used Bit6= Not used Bit7= Not used 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: lmax Bit15= Ge: v asymmetry	DT_NUMERIC	MW3080	40817	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	DT_NUMERIC	MW3082	40818	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	DT_NUMERIC	MW3084	40819	R	Bin
Alarm package 4: Bit0= Water in fuel Bit1= High coolant temp Bit2= Master comm error Bit3= Battery Efficiency Bit4= kW overload Bit5= Free Bit6= Free Bit7= Free Bit8= Free Bit9= Free Bit10= Free Bit11= Free Bit12= Free Bit13= Free	DT_NUMERIC	MW3086	40820	R	Bin

Bit14= Free					
Bit15= Free					
RTC clock minutes	DT_NUMERIC	MW3088	40821	R	1
RTC clock hours	DT_NUMERIC	MW3090	40822	R	1
RTC clock seconds	DT_NUMERIC	MW3092	40823	R	1
RTC clock day of the week	DT_NUMERIC	MW3094	40824	R	1
RTC clock day of the month	DT_NUMERIC	MW3096	40825	R	1
RTC clock month	DT_NUMERIC	MW3098	40826	R	1
RTC Clock year	DT_NUMERIC	MW3100	40827	R	1
Expansion board enable	DT_NUMERIC	MW3102	40828	R	Flag
Expansion board input status - High byte	DT_NUMERIC	MW3104	40829	R	Bin
Expansion board outputs - Low byte	DT_NUMERIC	MW3106	40830	R	Bin
Not used	DT_NUMERIC	MW3108	40831	R	1

Var.Name - ALARMS	Var.Visual	Var.Type	ID	R/W	Scale
Out special A	DT_NUMERIC	M5847.6	42269	R	Flag
Out special B	DT_NUMERIC	M5847.7	42270	R	Flag
Out special C	DT_NUMERIC	M5885.0	42271	R	Flag
Not used	DT_NUMERIC	M5885.1	42272	R	Flag
Cumulative alarm generator	DT_NUMERIC	M5885.2	42273	R	Flag
Cumulative alarm pressure	DT_NUMERIC	M5885.3	42274	R	Flag
Cumulative alarm fuel	DT_NUMERIC	M5885.4	42275	R	Flag
Cumulative alarm battery	DT_NUMERIC	M5885.5	42276	R	Flag
Cumulative alarm temperature	DT_NUMERIC	M5885.6	42277	R	Flag
Not used	DT_NUMERIC	M5885.7	42278	R	Flag
Not used	DT_NUMERIC	M5898.0	42279	R	Flag
Not used	DT_NUMERIC	M5898.1	42280	R	Flag
Not used	DT_NUMERIC	M5898.2	42281	R	Flag
Not used	DT_NUMERIC	M5898.3	42282	R	Flag
Not used	DT_NUMERIC	M5898.4	42283	R	Flag
Not used	DT_NUMERIC	M5898.5	42284	R	Flag
Not used	DT_NUMERIC	M5898.6	42285	R	Flag
Ge: low freq.	DT_NUMERIC	M5898.7	42286	R	Flag
Ge: high freq.	DT_NUMERIC	M5899.0	42287	R	Flag
Ge: low voltage	DT_NUMERIC	M5899.1	42288	R	Flag
Ge: high voltage	DT_NUMERIC	M5899.2	42289	R	Flag
Ge: phase seq.	DT_NUMERIC	M5899.3	42290	R	Flag
Ge: short circuit	DT_NUMERIC	M5899.4	42291	R	Flag
Ge: lmax	DT_NUMERIC	M5899.5	42292	R	Flag
Ge: v asymmetry	DT_NUMERIC	M5899.6	42293	R	Flag
Ground protection	DT_NUMERIC	M5899.7	42294	R	Flag
Emergency stop	DT_NUMERIC	M5900.0	42295	R	Flag
KG feedback	DT_NUMERIC	M5900.1	42296	R	Flag
User alarm1	DT_NUMERIC	M5900.2	42297	R	Flag
User alarm2	DT_NUMERIC	M5900.3	42298	R	Flag
User alarm3	DT_NUMERIC	M5900.4	42299	R	Flag
Start failure	DT_NUMERIC	M5900.5	42300	R	Flag
Mechanical fault	DT_NUMERIC	M5900.6	42301	R	Flag
Temp. pre alarm	DT_NUMERIC	M5900.7	42302	R	Flag
High eng. Temp.	DT_NUMERIC	M5901.0	42303	R	Flag
Fuel pre alarm	DT_NUMERIC	M5901.1	42304	R	Flag
Low fuel level	DT_NUMERIC	M5901.2	42305	R	Flag
Oil pressure prealarm	DT_NUMERIC	M5901.3	42306	R	Flag
Low oil pressure	DT_NUMERIC	M5901.4	42307	R	Flag
Low oil level	DT_NUMERIC	M5901.5	42308	R	Flag
Low coolant level	DT_NUMERIC	M5901.6	42309	R	Flag
Stop engine failure	DT_NUMERIC	M5901.7	42310	R	Flag
Service	DT_NUMERIC	M5902.0	42311	R	Flag
Refueling timeout	DT_NUMERIC	M5902.1	42312	R	Flag
Faulty D+	DT_NUMERIC	M5902.2	42313	R	Flag
High GE temp. D	DT_NUMERIC	M5902.3	42314	R	Flag
Low fuel level D	DT_NUMERIC	M5902.4	42315	R	Flag
Low oil pressure D	DT_NUMERIC	M5902.5	42316	R	Flag
Autonomy low	DT_NUMERIC	M5902.6	42317	R	Flag
Clogged filter	DT_NUMERIC	M5902.7	42318	R	Flag
Tank full	DT_NUMERIC	M5903.0	42319	R	Flag
No oil sensor	DT_NUMERIC	M5903.1	42320	R	Flag
Low battery voltage	DT_NUMERIC	M5903.2	42321	R	Flag
High battery voltage	DT_NUMERIC	M5903.3	42322	R	Flag
Test fail	DT_NUMERIC	M5903.4	42323	R	Flag
Low RPM	DT_NUMERIC	M5903.5	42324	R	Flag
High RPM	DT_NUMERIC	M5903.6	42325	R	Flag
Water in fuel	DT_NUMERIC	M5903.7	42326	R	Flag
High coolant temp	DT_NUMERIC	M5904.0	42327	R	Flag
Master comm error	DT_NUMERIC	M5904.1	42328	R	Flag
Battery Efficiency	DT_NUMERIC	M5904.2	42329	R	Flag
KW overload	DT_NUMERIC	M5904.3	42330	R	Flag
Free	DT_NUMERIC	M5904.4	42331	R	Flag
Free	DT_NUMERIC	M5904.5	42332	R	Flag
Free	DT_NUMERIC	M5904.6	42333	R	Flag
Free	DT_NUMERIC	M5904.7	42334	R	Flag
Free	DT_NUMERIC	M5905.0	42335	R	Flag
Free	DT_NUMERIC	M5905.1	42336	R	Flag
Free	DT_NUMERIC	M5905.2	42337	R	Flag
Free	DT_NUMERIC	M5905.3	42338	R	Flag
Free	DT_NUMERIC	M5905.4	42339	R	Flag
Free	DT_NUMERIC	M5905.5	42340	R	Flag

Free	DT_NUMERIC	M5905.6	42341	R	Flag
Last alarm ID	DT_NUMERIC	MW5914	42406	R	Dec

Var.Name - COMMANDS	Var.Visual	Var.Type	ID	R/W	Scale
Manual mode	DT_NUMERIC	M7576.5	40605	W	1
Auto mode	DT_NUMERIC	M7576.6	40610	W	1
Reset mode	DT_NUMERIC	M7576.7	40615	W	1
Start engine	DT_NUMERIC	M7577.0	40620	W	1
Stop engine	DT_NUMERIC	M7577.1	40625	W	1
Test mode	DT_NUMERIC	M7577.2	40630	W	1

APPENDIX

Appendix A: Fuel sensor curves

(Linear interpolation between values)

Fuel level value (%)	VDO-Ohm	VEGLIA-Ohm	DATCON-Ohm
0	10	304	240
16	44	224	187
32	74	151	140
48	103	88	108
60	121	51	89
76	146	21	68
92	170	5	46
105	200	-1	-1

Appendix B: Oil pressure sensor curves

(Linear interpolation between values)

Oil pressure value	VDO-ohm	VEGLIA-ohm	DATACON-ohm
0	10	305	240
2	51	204	174
4	87	114	123
6	122	53	88
8	153	12	62
10	181	12	37
12	181	12	37
14	181	12	37

Appendix C: Temperature sensor curves

(Linear interpolation between values)

Engine temperature value	VDO-ohm	VEGLIA-ohm	DATACON-ohm
0	685	1050	650
40	325	1050	650
60	145	495	345
80	65	245	172
100	35	125	80
120	22	80	49
140	15	50	30
150	-1	-1	-1

USER NOTES

