TECHNICAL

DOCUMENTATION

SYNCHRO COMPACT

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DESCRIPTION

PRESENTATION

COMPACT RANGE

SYNCHRONIZING AND LOAD SHARING, PROTECTION CONTROLLERS

SYNCHRO COMPACT   **ILS COMPACT**   **PMS COMPACT**

The **COMPACT RANGE** offers the following single or combined features: synchronizing, active and reactive load sharing, fixed power, fixed frequency or voltage, load dependent start/stop management, and protections. The **COMPACT RANGE** offers flexibility and time saving thanks to its simple wiring, all features included (no option), and easy engineering and programming.

Hardware and Display

The **COMPACT RANGE** is a new Generator controller range available in both switchboard panel mounted version with display, or core base mounted version. The **COMPACT RANGE** is also compatible with **i4Gen** touchscreen color display.

Software

The **COMPACT RANGE** is configurable from its front panel display, remote touchscreen, or through the free **CRE PC** software: *CRE Config Software*.

Control and Management

- Compatible with all engines ECUs in J1939, speed governors, alternators and AVRs/DVRs voltage regulators.
- Isochronous and Iso-voltage active and reactive load sharing. [1]
- Fixed KW/KVAR load or Droop mode. [1]
- Frequency and voltage control compensation for generators with droop governors and/or AVR/DVR. [1]
- Synchronization and dead bus management. [2]
- Static synchronization: generators breakers closing without excitation. [1]
- Dynamic synchronization: Frequency, Phase and Voltage synchronization (Synch display available on screen). Synch check (ANSI 25) + Phase sequence protection. [2]
- New optimized PID loop with exceptional performance in synchronization and load control.
- Unload: Non-essential load control on overload. [1]
- Load dependent start/stop: only the needed numbers of generators are running. [1,2]
- 2 password levels.

Notes:
[1]: Not on **COMPACT SYNCHRO**
[2]: Not on **COMPACT ILS**

FRONT FACE

SYNCHRO COMPACT

PIN	Buttons	Functions
1	SHIFT button	Additional functions.
2	RIGHT button	Navigation button (Right).
3	DOWN button	Navigation button (Down).
4	LEFT button	Navigation button (Left).
5	UP button	Navigation button (Up).
6	ENTER button	Validating entry / **MENU**.
7	ESC button	Cancel entry / escape **MENU**.
8	INFO button	Allows direct access to the current Fault or Alarm display.
9[1]	Generator circuit breaker button	Can only be used in **MAN** mode. Generator circuit breaker control. Press to Open. Press to Close (synchronization & load transfer will be done automatically if Bus is powered & configuration is setup for paralleling operation).
10[1]	Bus circuit breaker button	Can only be used in **MAN** mode. Bus circuit breaker control. Press to Open. Press to Close (synchronization & load transfer will be done automatically if Bus is powered & configuration is setup for paralleling operation).

PIN	Buttons	Functions
11[(1)]	STOP button	Can only be used in **MAN** mode. Stop the Generator. Pressing once this button will set the Generator offload and initiate cooling down sequence.
12[(1)]	START button	Can only be used in **MAN** mode. Start the Generator.
13[(1)]	MAN button	**MAN** mode. The associated LED lights up when the mode is activated.
14[(1)]	TEST button	**TEST** mode. The associated LED lights up if the mode is activated.
15[(1)]	AUTO button	**AUTO** mode. The associated LED lights up when the mode is activated.
16	ALARM indicator	The LED flashes when an alarm appears. The LED is lit when an alarm is acknowledged, but not reseted.
17	DEFAULT indicator	The LED flashes when a Fault occurs. The LED is lit when a Fault is acknowledged, but not reseted.
18	LCD display	Screen size: 40mm x 70mm; Back-light : typical 50cd/m^2, configurable. Type: STN; 64 x 128 pixels.

[(1)] *Not available according to controller type.*

Note: Pressing it twice will set the Generator offload and stop the engine without cooling down sequence.

NAVIGATION KEYS

Keys	Navigation mode	Edition mode
∧ ∨	Scrolling menus.	Modifying parameters values once selected: When up/down keys are used to modify values, holding the key will accelerate the entry scrolling.
< >	Navigating right/left in display.	NA
SHIFT	SHIFT + ∧ ∨ will increase/decrease the brightness of the LCD display. SHIFT + < > will increase/decrease the contrast of the LCD display.	In **MAN** mode, when the Generator is offload, use ∧ ∨ to increase/decrease: ■ The speed when the speed control page is displayed. ■ The voltage when the voltage control page is displayed. *Note: Not available on* ***MASTER COMPACT, MASTER COMPACT 1B*** *and* ***BTB COMPACT***.
ESC	Return to parent menu (press 3 times to return to main screen) or to previous menu.	Cancel setting and return to **Navigation** mode.
ENTER	Accessing a menu / Switching to **Edition** mode.	Validation of the modified parameter and return to **Navigation** mode.

BUTTON INHIBITION

To inhibit front panel buttons, use the **CRE Config Software/System/Button inhibition** page. This page shows the list of front panel buttons, tick the corresponding box to inhibit actions on the button.

Table below shows the 16 bits variable used for remote button inhibition by Modbus, each bit is assigned to a button:

Variable	Label	Description
[3557]	Inhibit key	Each 1-bit inhibits a front panel button.

RELATION BUTTON/INHIBITION BIT [3557]

Inhibition bit	8	7	6	5	4	3	2	1
Key	(i)/⚠	ESC	ENTER	∧	<	∨	>	SHIFT
Inhibition bit		15	14	13	12	11	10	9
Key		AUTO	TEST	MAN	▶	■	O/1	O/1

EXTERNAL BUTTON REQUESTS

It is possible to remotely activate button actions by Modbus TCP, for a remote manual control for example.
If a button action is controlled by Modbus TCP, the last request received (external or from the front panel) is treated in priority and cancel the previous request.

The buttons on the front panel can be replaced by external commands via digital inputs.
Modbus TCP/IP
Modbus mapping

REAR FACE

SYNCHRO COMPACT
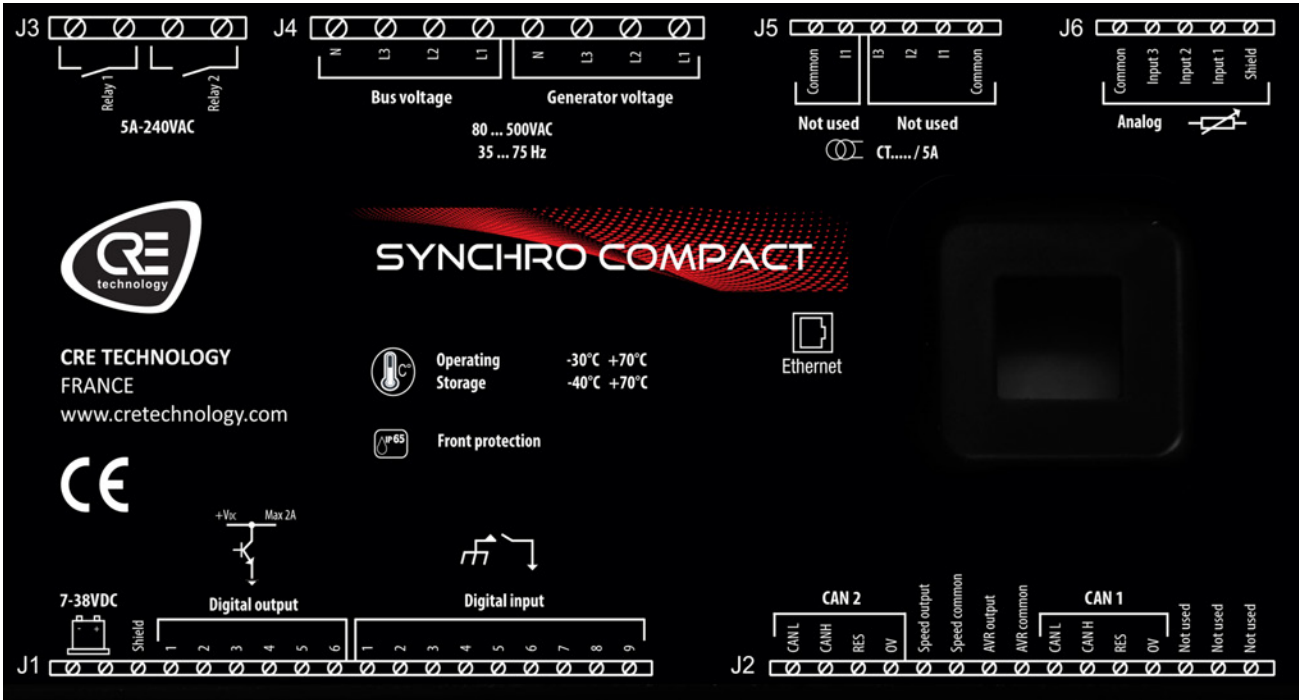
SIMPLIFIED WIRING DIAGRAM
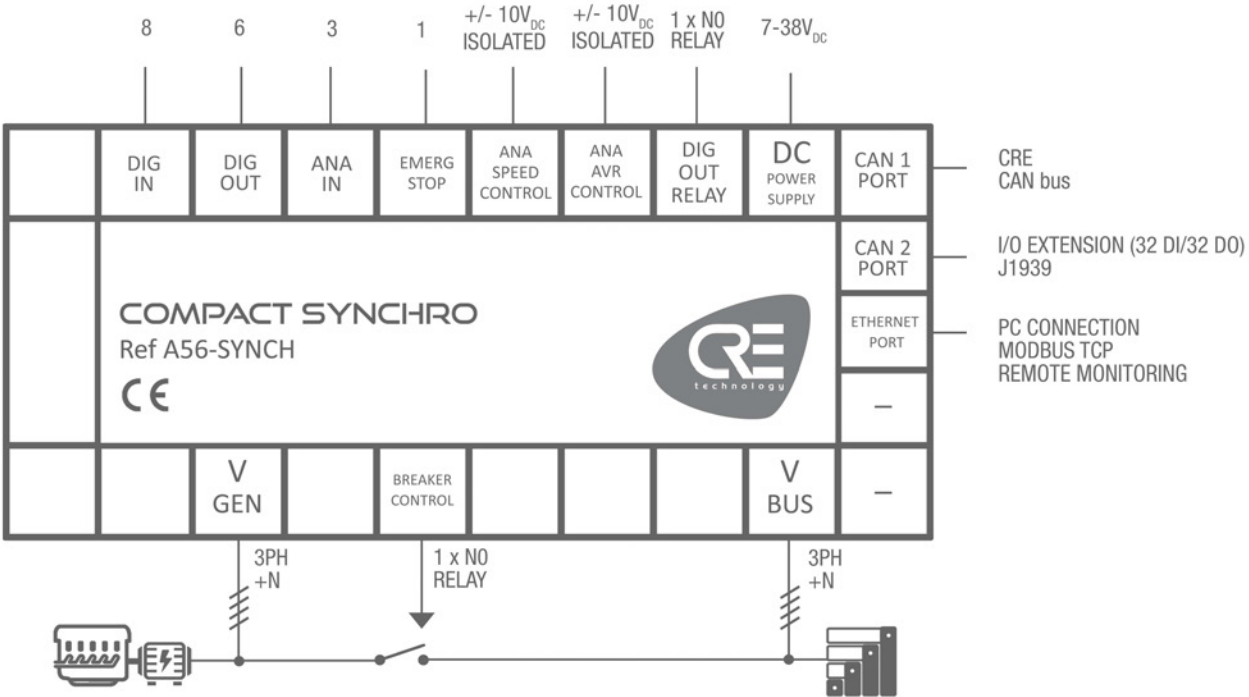
PANEL MOUNTING

The unit is designed for panel mounting, which provides user with access only to the front panel.

⚠ ⚠ **WARNING**
THE UNIT IS NOT GROUNDED
• Take all measures against Electronic Static Discharges.
• Do not try to open the unit.
Failure to follow these instructions may damage the unit.

Environmental requirements:

- Operating temperature: -20…70°C (-4...158°F); LCD display slows down a bit under -5°C (23°F). Avoid direct exposure to the sun.
- Storage temperature: -40...70°C (-40...158°F).
- Altitude: 4000m (13123ft) for a max AC voltage of 480VAC;   5000m (16404ft) for a max AC voltage of 400VAC.

UNPACKING

Make sure the packaging contains:

- The unit.
- Four caps and screws packaged apart.
- A delivery bill.

Unpack and keep the packaging in case of return.
Make sure the unit does not show scratches or visible defaults. Otherwise describe them on the RMA sheet (available on CRE Technology website) and return it with the product to **CRE Technology**.

INSTALLATION

Preparation

- Open type devices to be installed inside a suitable type rated enclosure.
- Torque of mounting brackets: 0.4Nm.
- Cut out the panel to 220x160mm (8.7x6.3in) minimum.
- Make sure the cut-out is smooth and clean.
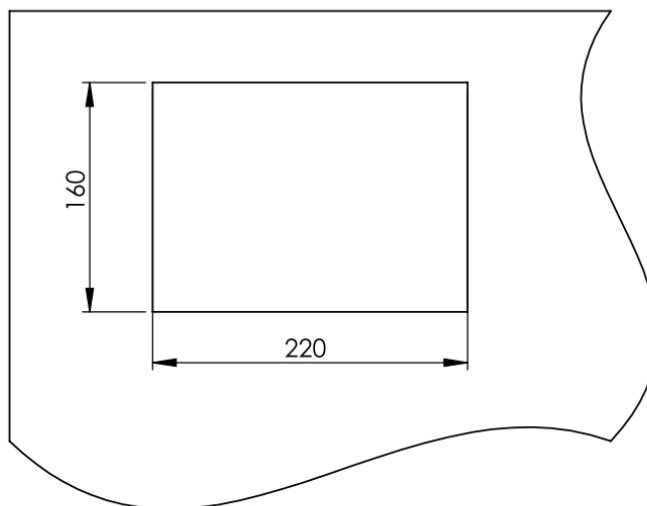
Mounting

0	Tool: cross-heas screwdriver size 1
1	Pass the unit through the mounting surface
2	In the rear, cover each of the four spacers with a cap
3	Screw a cap against the mounting surface
4	Repeat on the diagonally opposite spacer
5	Repeat on the other diagonal and tighten equally (do not overtighten)

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UL REQUIREMENTS

ADVANCED WIRING DIAGRAM
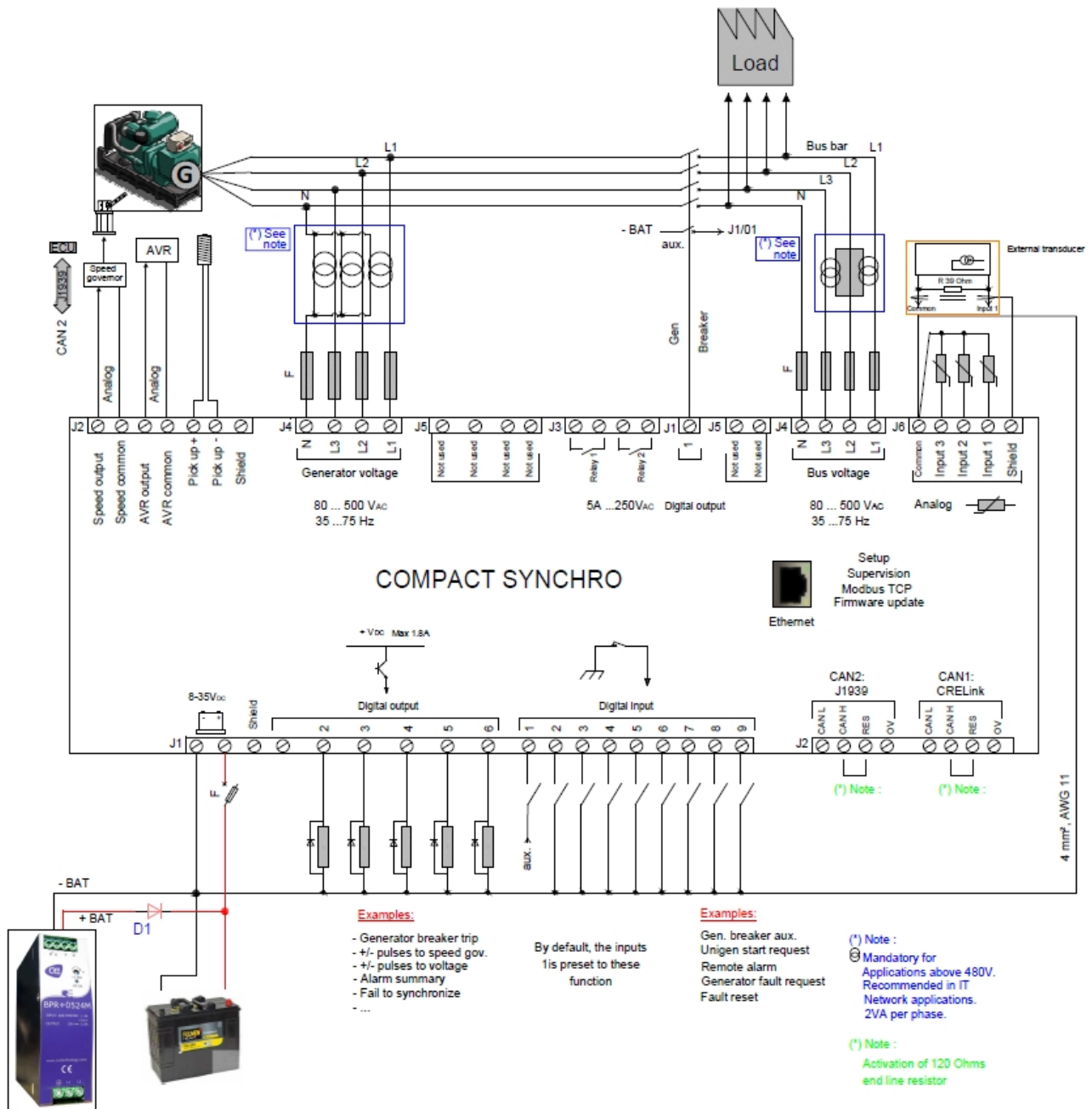
CIRCUIT SEPARATION

The communication, sensor, and/or battery derived circuit conductors shall be separated and secured to maintain at least 1/4" (6mm) separation from the Generator and the Bus connected circuit conductors unless all conductors are rated 600V or greater.

MAINS RATINGS

Over-voltage Category
III, 300VAC system voltage.

Sensing Generator / Bus Voltage Measurement (J4)
300VAC max P-N, 2 phases; 500VAC P-P 3 phases, 35...75Hz.

Current Inputs (J5)
Must be connected through listed or recognized isolating current transformers with secondary rating of 5A max 50/60Hz. (XODW2.8) Instrument transformers (according to IEEE C57.13 series or the equivalent).

Communication Circuits
Must be connected to communication circuits of UL Listed equipment.

Output Pilot Duty (J3)
250VAC, 5A max general purpose, 240VAC, 1/4HP for NO contact, 1/6HP for NC contact Pilot duty: C150, C300.

Digital outputs (J1)
FET: Fuel shutoff: 63VA, 1.8A max current.

OTHER CIRCUITS RATINGS

Block and mark	Description	Note
Breaker commands		Normally open. Breaking capacity: 5A, 240VAC.
Relay 1	Relay 1 +	
	Relay 1 –	
Relay 2	Relay 2 +	
	Relay 2 –	
AC voltage [1]		100...480VAC, 35…75Hz, 100mA max; accuracy: 1% fsd.
N	Generator N	Optional.
L3	Generator L3	These lines must be protected externally with 100mA/600VAC fuses.
L2	Generator L2	
L1	Generator L1	
N	Bus N	Optional.
L3	Bus Phase 3	These lines must be protected externally with 100mA/600VAC fuses.
L2	Bus Phase 2	
L1	Bus Phase 1	
Current inputs[1]		Short-circuit protection available.
Bus common	GND	GND.
Bus current I1	Bus I1	0…5A. Maximum rating: 15A during 10s. Burden: 1VA. Keep the lead length short to preserve accuracy (up to 0.5% full scale deviation). External CT max ratio is 3250 (i.e. 3250:1 or, preferably, 16250:5). On **GENSYS COMPACT PRIME**, this input must be used only for the earth fault protection. On **GENSYS COMPACT MAINS** and **AMF COMPACT**, if Mains power measurement is configured as 20mA, this input can be used as an earth current measurement.
Generator current I3	Generator I3	0…5A. Maximum rating: 15A during 10s. Burden: 1VA. Keep the lead length short to preserve accuracy (up to 0.5% full scale deviation). External CT max ratio is 3250 (i.e. 3250:1 or, preferably, 16250:5).
Generator current I2	Generator I2	
Generator current I1	Generator I1	
Generator common	GND	Optionally connected to CT –.
Analog inputs		0...500Ω.
Common		Connect it to battery -.
Input 3	Available input	
Input 2	Available input	

Block and mark	Description	Note
Input 1	Available input	
Shield	GND	Ground plane.

[1] *Not available according to controller type.*

Block and mark	Description	Notes
7...38VDC		**Not protected against polarity reversal**.
-	Power supply -	2.5mm² (AWG13).
+	Power supply +	7…38VDC, consumed current: 130mA at 24V (standby and operation).
Shield	GND	Ground of the Generator.
Digital outputs		
1		
2		
3	Available outputs	Free solid state output. State 1 at the supply voltage (max: 1.8A). Protected against short circuits. A reactive load is supported. Not isolated from power.
4		
5		
6		
Digital inputs		
1		
2		
3		
4		
5	Available inputs	Free digital input with 10k pull-up. Accepts NO or NC contact to 0V. Not isolated from power.
6		
7		
8		
9		
CAN2: J1939-Extensions		Isolated CAN bus J1939 / CANopen. Twisted pair.
	CAN L	Blue wire.
	CAN H	White wire.
	Resistor -	Strap to CAN H when inner resistor must be inserted (bus ends).
Shield	0V	Connect the cable shield herein.
Speed [1]		Compatible with all analog speed controllers. Isolated from power supply.
Out	Speed output	Analog output ±10V to speed controller.
common	Speed reference	Twisted pair; length. < 5m (16ft) if unshielded, < 50m max if shielded.
AVR [1]		Compatible with most voltage regulators. Isolated from power supply.

Block and mark	Description	Notes
Out	AVR output +	Analog output ±10V to voltage regulator.
Common	AVR output −	Twisted pair; length. < 5m (16ft) if unshielded, < 50m max if shielded.
CAN1 : CRE-Link® [(1)]		Isolated CAN bus, use twisted pair.
	CAN L	White wire with blue strip (when using a **CRE Technology** cable).
	CAN H	Blue wire with white strip (when using a **CRE Technology** cable).
	Resistor -	Strap to CAN H when inner resistor must be inserted (bus ends).
Shield	0V	Connect the cable shield herein.
Pickup [(1)]		100Hz....10kHz. Voltage limits between + and −: 2...40VAC.
	Pickup +	Speed measurement for speed regulation, crank drop out and over-speed. Better option than alternator voltage. An over-speed shutdown device independent of the module is required; the alarm can be generated by ECU or by the module.
	Pickup −	

[(1)] *Not available according to controller type.*

OVERCURRENT PROTECTION (DC SUPPLY AND L1, L2, L3, N)

Installer shall protect DC supply and L1, L2, L3, N by fuse Type: R/C (JDYX2/7), or R/C (JDYX2) and CSA Certified Class 1422-30.
Rating of fuses:

- DC supply to be protected by 5A, 40VDC max.
- L1, L2, L3, N, fuse protection 100mA/600VAC max.

TERMINALS WIRING

Terminal (screw type):

- Tightening Torque: 3.5lb.in (0.4Nm).

Wires :

- 28-14 AWG, Cu, 75°C min.

Conductor protection must be provided in accordance with NFPA 70, Article 240.
Low voltage circuits (35VDC or less) must be supplied from the engine starting battery or an isolated secondary circuit.

ENVIRONMENT

Device must be installed in an unventilated or filtered ventilation enclosure to maintain a pollution degree 2 environment.
Maximum surrounding air temperature rating: 45°C.

INSTALLATION

Preparation

- Open type devices to be installed inside a suitable type rated enclosure.
- Torque of mounting brackets: 0.4Nm.
- Cut out the panel to 220x160mm minimum (8.7x6.3in).
- Make sure the cut-out is smooth and clean.
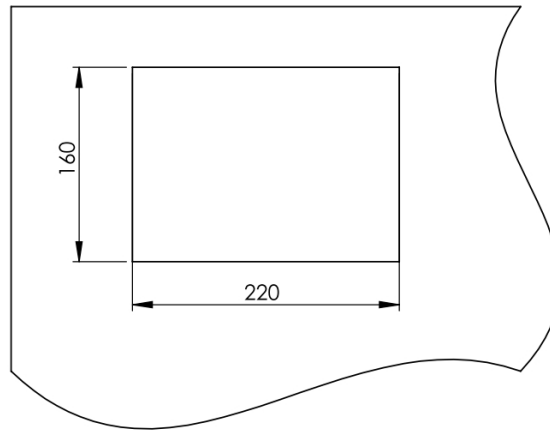
Mounting

0	Tool: cross-heas screwdriver size 1
1	Pass the unit through the mounting surface
2	In the rear, cover each of the four spacers with a cap
3	Screw a cap against the mounting surface
4	Repeat on the diagonally opposite spacer
5	Repeat on the other diagonal and tighten equally (do not overtighten)

USAGE

PASSWORD

ADVICE	
	USEFUL INFORMATION ▪ Adjustment tip ▪ Using the module
Failure to comply with these recommendations may cause the module to malfunction.	

The menus will be automatically locked if no operation is performed during the time set in the System menu (Factory setting: 5 minutes).
The standby screen will be displayed.

The module provides secured password access to protect configuration changes and limit data accessibility:

Level	Default password	Authorization	Accessible pages and items
0	No password. Press ENTER	By default, this level is not password protected, but you can implement one.	**Display** menu pages only.
1	1	User level, settings and commissioning.	**Display**, **Configuration** and **System** menus pages.
2	1234	Used to change advanced settings.	Advanced settings (**CRE Config Software** only).

Passwords can be changed via **CRE PC** software: *CRE Config Software*

To access the **Display** menu, press ENTER .

To access the **Configuration** and **System** menus, the padlock must be released:

1. Press ∨ to select **Configuration** or **System**.

2. Press ENTER to switch to password input mode (as for other settings); the first character is represented by a cursor.

3. Change the character by pressing ∧

4. Move to the next character by pressing >

5. Repeat the operation for each character.

6. Confirm the password by pressing ENTER

LCD

NAVIGATION

Press ESC then ENTER and type in the level 1 password as described above to access the top level menu:
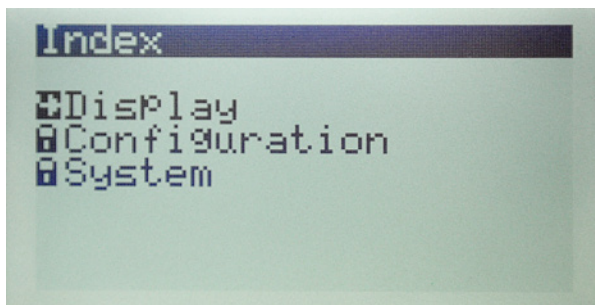
A black pointer spots the currently selected item/setting.
Three main menus are available on the LCD screen and in *CRE Config Software*:

- **Display** gives information on Generator/Bus and displays real-time information/status.
- **Configuration** is used to adjust the settings done previously with *CRE Config Software /Configuration*.
- **System** is used to adjust the settings done previously with *CRE Config Software /System* (Date/Hour, screen features, ...).

To cycle through the menus and menu items, press ∨ or ∧

To cycle through the pages of lists of settings/readings, press > or <

EDITION

To change a setting:

1. Navigate to the setting.
2. Press ENTER to switch to **Edition** mode; the current value blinks.
3. Press ∨ or ∧ to get the new value.
4. Press ENTER to validate the new value, ESC to reject it. Module returns to **Navigation** mode.

It is also possible to change settings using Modbus TCP.

DEDICATED PAGES

Dedicated pages include:

- Active fault and archive pages.
- Active alarm and archive pages.
- The information pages.

At any time, faults/alarms/information can be displayed on the LCD screen by pressing the button .

If a fault is active and has not been acknowledged yet, the active fault page will be displayed.
Otherwise, if an alarm is active and has not yet been acknowledged, the active alarms page will be displayed.
Otherwise the information page will appear.

It is then possible to navigate through these dedicated pages using the arrow buttons.

To return to the previous page, press [ESC] or [⚠] .

EVENTS

Up to 15 active events and 30 archived events can be displayed on the screen.

Each event is time-stamped as follows:
jj/mm/yy   hh:mn:ss   protec. label   On (or Off).

To reset events, press [SHIFT] **+** [⚠]

Note: Correct the condition that triggered the protection before performing a reset; if necessary, the protection will trip again.

INFORMATION

These pages allow to display the power and engine current state with the associate elapsed time in this state.
Power [4000] displays the unit current state regarding power management.
Custom variables: to display any variable, enter the code of the variable to be displayed.

WIRING

Tool: insulated screwdriver Ø2.5 mm (0.1 in), tightening torque: 0.8 Nm (7 lb-in) max.

Accessories: 4, 5, 6, 8, 15 & 18-terminal cable connectors, protective gloves, carpet if the floor is wet.

⚠ **WARNING**
THE UNIT IS NOT PROTECTED

• Use external fuses:
    ▪ Generator and Bus phases: 100mA/600VAC
    ▪ Battery positive: 5A/40VDC
• Install the fuses as near as possible to the unit, in a place easily accessible to the user.
• The disconnection device must NOT be fitted in a flexible cord.

Failure to follow these instructions may damage the unit.

	DANGER
	RISK OF ELECTRIC SHOCK, EXPLOSION OR ARCING
	▪ The module may only be installed and maintained by qualified electricians. ▪ Use personal protective equipment (PPE) ▪ Follow good safety practices for electrical work. ▪ Turn off the power before installing or replacing a fuse, and before installing the module. ▪ Use equipment adapted to the potential voltages to check the absence of voltage. ▪ Do not use a resettable fuse.
	Failure to follow these recommendations may result in death or serious injury.

GENERAL PROCEDURE

1. Make sure the cable connectors are not plugged.
2. Take on protective gloves.
3. Connect the wires on each cable connector in accordance with the National Wiring Regulations.
4. Plug each cable connector onto the related connector.
5. Plug a direct Ethernet cord (RJ45, male-male, 100m max., 100Ω; a crossover cable such as 3-m long A53W1 is OK as long as your switch uses auto MDI/MDIX technology or if the link to PC is direct) and lock the rear door.

RECOMMENDATIONS

Wires section: 2.5mm² (AWG13).
To avoid ElectroMagnetic Interferences, shield cables appropriately; for CAN bus, see CAN bus good practices.
Isolation: keep the power cable separate from the CAN bus cables. The latter can be installed in the same duct as the low level DC I/O wires (under 10V).

If power and communication cables have to cross each other, do it at right angles to avoid crosstalk:
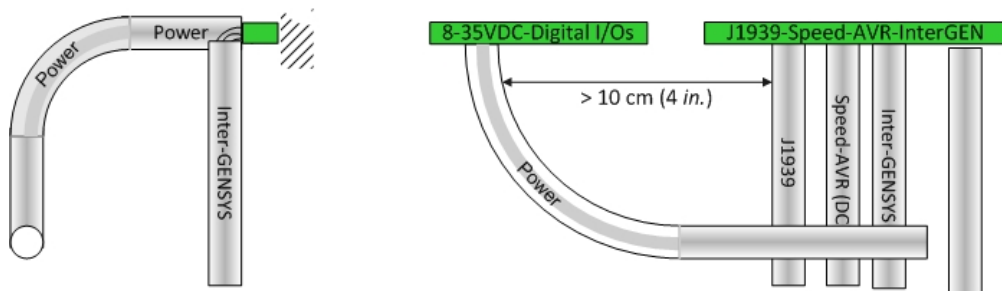
CONNECTION DIAGRAMS

These diagrams show that the PT (Potential Transformers) can be connected in various ways.

- Star (wye) on Generator side (1 insulated high-voltage terminal per PT); the ratio is for example:

$$\frac{Unom/\sqrt{3}}{100}$$

- See on Bus side (2 insulated high-voltage terminals per PT); the ratio is for example:

$$\frac{Unom}{100}$$
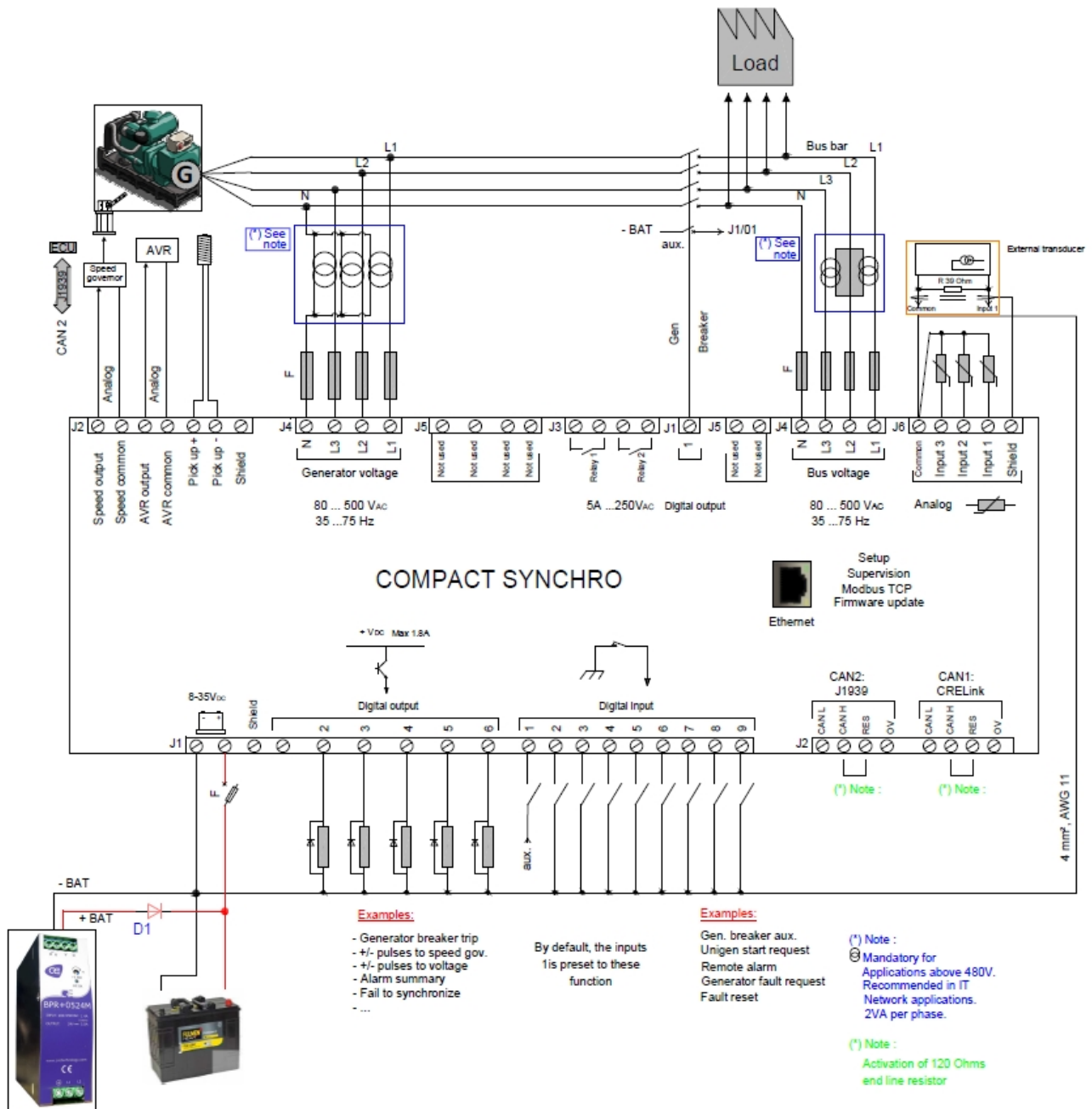
UPPER BLOCKS

DANGER	
EXPOSED TERMINALS	
	Do not touch L1, L2, L3 terminals nor use non-insulated tools near them. These terminals are unprotected and will expose the user to dangerous voltages.
	Failure to follow this instruction may result in death, serious injury or equipment damage.

Block and mark	Description	Note
Breaker commands		Normally open. Breaking capacity: 5A, 240VAC.
Relay 1	Relay 1 +	
	Relay 1 –	
Relay 2	Relay 2 +	
	Relay 2 –	
AC voltage [1]		100...480VAC, 35…75Hz, 100mA max; accuracy: 1% fsd.
N	Generator N	Optional.
L3	Generator L3	These lines must be protected externally with 100mA/600VAC fuses.
L2	Generator L2	
L1	Generator L1	
N	Bus N	Optional.
L3	Bus 3	These lines must be protected externally with 100mA/600VAC fuses.
L2	Bus 2	
L1	Bus 1	
Current inputs [1]		Short-circuit protection available.
Bus common	GND	Connect to the ground.
Bus current I1	Bus I1	0…5A. Maximum rating: 15A during 10s. • Burden: 1VA. Keep the lead length short to preserve accuracy (up to 0.5% full scale deviation). • External CT max ratio is 3250 (i.e. 3250:1 or, preferably, 16250:5). • On **GENSYS COMPACT PRIME**, this input must be used only for the earth fault protection. • On **GENSYS COMPACT MAINS** and **AMF COMPACT**, if Mains power measurement is configured as 20mA, this input can be used as an earth current measurement.
Generator current I3	Generator I3	0…5A. Maximum rating: 15A during 10s. • Burden: 1VA. Keep the lead length short to preserve accuracy (up to 0.5% full scale deviation). • External CT max ratio is 3250 (i.e. 3250:1 or, preferably, 16250:5).
Generator current I2	Generator I2	
Generator current I1	Generator I1	

Block and mark	Description	Note
Generator common	GND	Optionally connected to CT –. For a 2-CT setup, see further.
Analog inputs		0...500Ω.
Common		Connect it to battery -.
Input 3	Available input	
Input 2	Available input	
Input 1	Available input	
Shield	GND	Ground plane.

[1] *Not available according to controller type.*

LOWER BLOCKS

⚠ **WARNING**
RISK OF EQUIPMENT DAMAGE
• As a protection against polarity reversal, install a 6A fuse between battery positive plug and terminal 8...35VDC +.   • Connect battery negative to the module terminal 8...35VDC− with 2.5mm² (AWG13) cable.
Failure to follow this instruction can damage the controller.

Block and mark	Description	Notes
7...38V$_{DC}$		**Not protected against polarity reversal** .
-	Power supply -	2.5mm² (AWG13).
+	Power supply +	7...38VDC, consumed current: 130mA at 24V (standby and operation).
Shield	GND	Connect to the ground.
Digital outputs		
1		
2		
3		Free solid state output. State 1 at the supply voltage (max: 1.8A). Protected against short circuits. A reactive load is
4	Available outputs	supported. Not isolated from power.
5		
6		
Digital inputs		
1		
2		
3		
4		Free digital input with 10k pull-up. Accepts NO or NC
5		contact to 0V. Not isolated from power.
6	Available inputs	
7		
8		
9		
CAN2: J1939-Extensions		Isolated CAN bus J1939/CANopen. Twisted pair.

Block and mark	Description	Notes
	CAN L	Blue wire.
	CAN H	White wire.
	Resistor -	Strap to CAN H when inner resistor must be inserted (bus ends).
Shield	0V	Connect the cable shield herein.
Speed [1]		Compatible with all analog speed controllers. Isolated from power supply.
Out	Speed output	Analog output ±10V to speed controller.
common	Speed reference	Twisted pair; length. < 5m (16ft) if unshielded, < 50m max if shielded.
AVR [1]		Compatible with most voltage regulators. Isolated from power supply.
Out	AVR output +	Analog output ±10V to voltage regulator.
Common	AVR output –	Twisted pair; length. < 5m (16ft) if unshielded, < 50m max if shielded.
CAN1 : CRE-Link® [1]		Isolated CAN© bus, use twisted pair.
	CAN L	White wire with blue strip (when using a **CRE Technology** cable).
	CAN H	Blue wire with white strip (when using a **CRE Technology** cable).
	Resistor -	Strap to CAN H when inner resistor must be inserted (bus ends).
Shield	0V	Connect the cable shield herein.
Pickup [1]		100Hz...10kHz. Voltage limits between + /–2...40VAC. Speed measurement for speed regulation, crank drop out and over-speed. Better option than alternator voltage. An over-speed shutdown device independent of the module is required; the alarm can be generated by ECU or by the module.
	Pickup +	
	Pickup –	

[1] *Not available according to controller type.*

⚠ **WARNING**
RISK OF EQUIPMENT DAMAGE
Switch off the unit before plugging or unplugging the CAN bus connector or disconnecting wires.
Failure to follow this instruction can damage the CAN transmitter/receiver.

Note: On loss of power supply, the unit survives for 70ms at 24V, and 20ms at 12V.

OTHER SYSTEMS OF VOLTAGE

If bi-phase 180° is selected in *CRE Config Software*, connect voltages and currents to L1-L3 terminals (and N). The same logic applies for I1-I3 (and common).
If mono phase is selected, connect voltages and currents to the terminals L1-N. The same logic applies for I1 and common.

DIGITAL INPUTS

ADVICE	
	USEFUL INFORMATION
	■ Adjustment tip ■ Using the module
	Failure to comply with these recommendations may cause the module to malfunction.

Note: If a digital input changes a piece of data also to be written by Modbus, the latest request takes over the other. If two digital inputs are assigned to one function, the latest change is taken into account.

Several parameters can be configured from the **CRE Config Software**:

- **Label**
- **Validity**
- **Direction**
- **Delay**
- **Function**

LABEL

This is the name you give to the input. The name will be shown in the info, alarm, and fault screens if programmed accordingly.

VALIDITY

Validity indicates when the input is taken into account. It can take four values:

Value	Validity	Description
2330	Never	Never active: must be selected if you do not use the input.
2329	Always	Always active: input is monitored as long as the module is powered.
2192	Post-start	Input is monitored by the end of the "Safety on delay" [2004]. [1]
2331	Stabilized	Input is monitored when the Generator is ready for use.

[1] *Configure the protection inhibition time in **CRE Config Software/Configuration/Time-outs and Delays**.*

DIRECTION

For each input, two options are available:

Value	Label	Function
0	Normally open	Contact pair is open when input is in a de-energized state.
1	Normally closed	Contact pair is closed when input is in a de-energized state.

DELAYS

For each input, two delays can be defined in 100ms steps between 0 and 6553s:
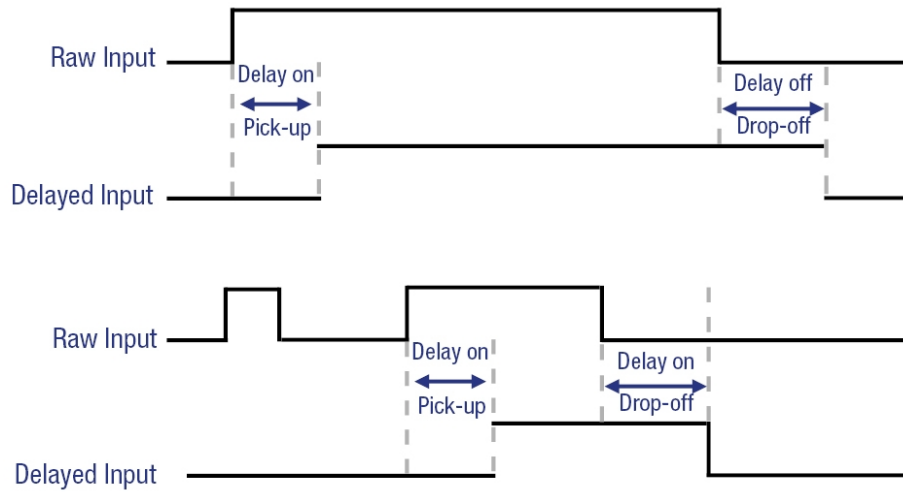
FUNCTIONS

Each input can be configured using **CRE Config Software**.
Function list is available in Software variables.

DIGITAL OUTPUTS

Each output is tagged with a label defined in *CRE Config Software/Configuration*, and features several attributes set in the **Configuration** menu:

- **Direction**
- **Pulse length: 0 means no pulse**
- **Function**

DIRECTION

Each output can be:

- **NE**: normally energized; the output is de-energized when its function is activated.
- **ND**: normally de-energized; the output is energized when its function is activated.

PULSE LENGTH

Each digital output can be configured to act as a pulse. The pulses lengths are defined with the parameters [2761] to [2766].
Set to 0 in order to have a continuous output (no pulse).
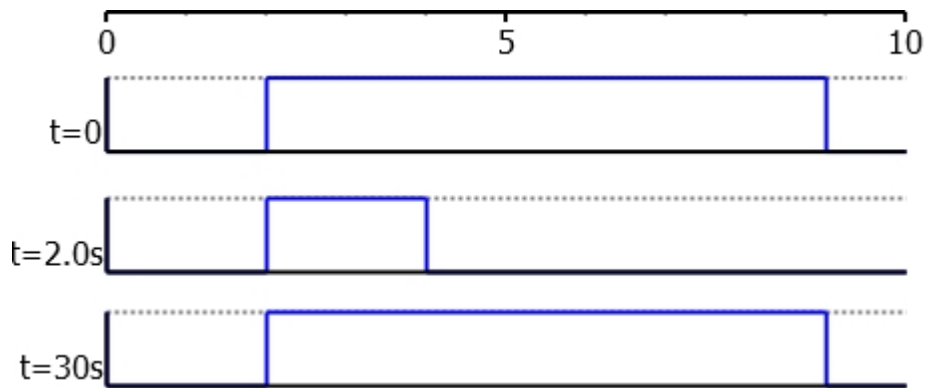
FUNCTIONS

Each output can be configured using *CRE Config Software*.
Function list is available in Software variables.

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ANALOG INPUTS

In addition to the speed and electrical currents and voltages, three analog inputs are available. They measure a resistance 0…500 . However, they can serve as digital inputs or 20 mA transducer input.

INPUT

Each input is tagged with a name and preset to a function. It features several attributes preset in *CRE Config Software/Configuration/Inputs/Analog inputs*:

- **Accuracy** (number of digits after decimal point)**:** set to 0.1.
- **Unit:** among No unit, V, KV, mA, A, KA, Hz, KW, KWh, KVAR, KVARh, rpm, %, Bar, mbar, KPa, psi, °, °C, °F, L, Gal, s, h, days, Hz/s, m3/h, L/h, Gal/h.
- **Calibration:** measure value according to resistor value in .

CALIBRATION

Calibration is used to estimate a reading from a resistance value by interpolation between 2 wrapping resistance values. Negative values are supported for readings. Enter a table in *CRE Config Software / Configuration / Inputs / Analog inputs*.

Enter the limits of reading according to the sensor calibration; generally the lower limit is 0 and the slope is Range/Rating. Calculate and enter the intermediary readings to get a linear distribution.

PROTECTIONS

The input threshold features several attributes preset in *CRE Config Software/Configuration/Protections/Engine/battery protections/Analog inputs protection:*

- Level (LV): limit value in units; it can be a low or high threshold.
- Delay (TM): time after which the protection is triggered.
- Validation (CT): protection type to which the signal contributes (8 potential values).
- Direction (SS): threshold polarity (0 = low, 1 = high).

Note: Do not confuse Validation with Validity (engine state that validates a digital input).

SUMMARY

The attributes are shown in *CRE Config Software*:

	Protections				
	Threshold	**Timer**	**Control**	**Direction**	**Function**
AI 1 level 1	2600	2601	2602	2606	2607
AI 1 level 2	2603	2604	2605		
AI 2 level 1	2608	2609	2610	2614	2615
AI 2 level 2	2611	2612	2613		
AI 3 level 1	2616	2617	2618	2622	2623
AI 3 level 2	2619	2620	2621		

USE OF AN ANALOG INPUT AS A DIGITAL INPUT

To act as a digital input, connect the input to power through a switch, and select the function to implement in the list *CRE Config Software/Configuration/Inputs/Analog inputs/Function*.
Then set the delay, validity and polarity.

USE OF AN ANALOG INPUT AS A TRANSCEIVER INPUT

To act as a 20mA input, connect the input with a 39 resistor between the analog input and the analog common, and select the function 20mA transceiver in the list *CRE Config Software / Configuration/Inputs / Analog inputs / Function*. The non-linearity of the sensor can be corrected through a curve. Select the tweaking grade – the resolution in actual value – in accordance with the sensor accuracy.

HOW TO CONNECT ANALOG OR DIGITAL SENSORS

You can use 1 or 2-wire analog sensors, or 1-wire or 2-wire logical sensors.

CRE RECOMMANDATION: In each case you must always connect the "common" J6 to the "- Power Supply" J1 and also connect it to the engine block in the case of 1-wire sensor.

You must use the following wiring (Incorrect wiring of the analog inputs can cause damage to the module, or cause a wrong measurement):

A-1 : Analog Sensor 2 Wires
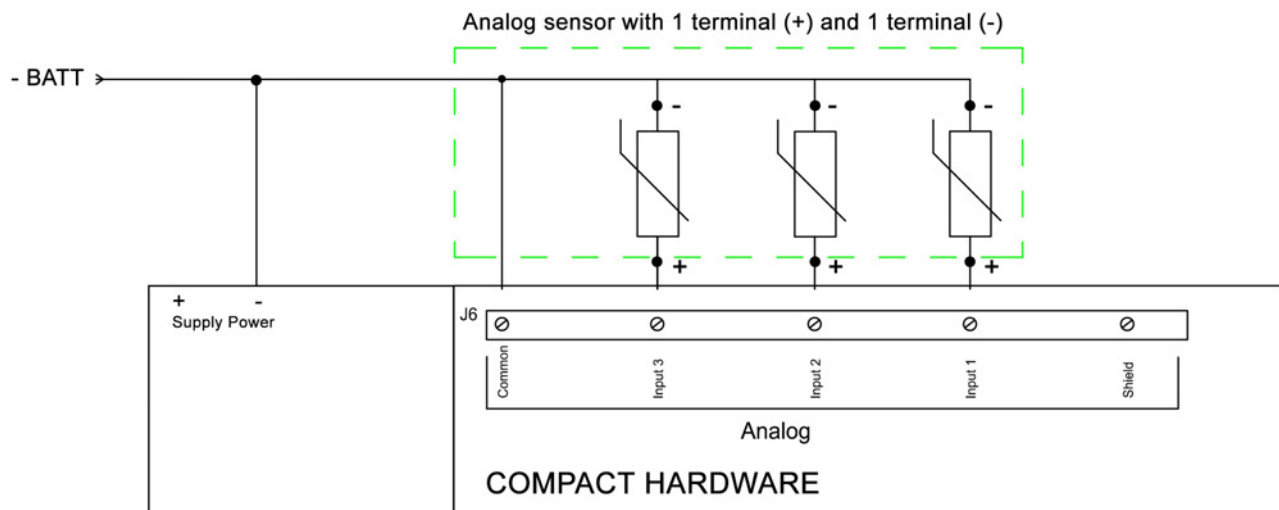
A-2 : Analog Sensor 1 Wire
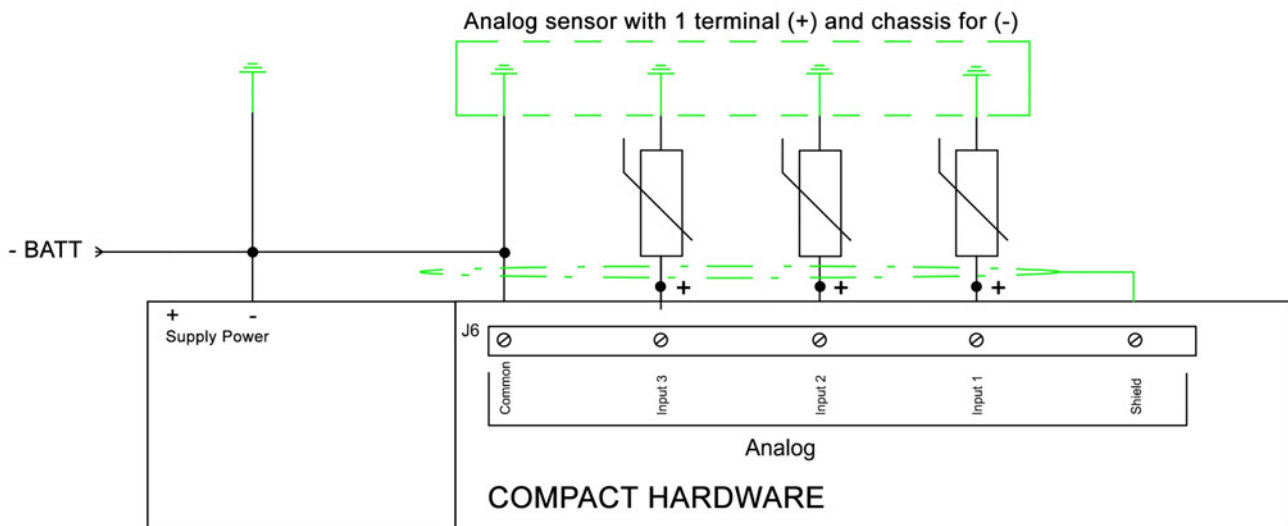
B-1 : Digital Sensor 2 Wires

Digital sensor with 2 terminal contact

- BATT

Supply Power + −

J6

Common | Input 3 | Input 2 | Input 1 | Shield

Analog

COMPACT HARDWARE

B-2 : Digital Sensor 1 Wire

Digital sensor with 1 terminal contact and chassis

- BATT

Supply Power + −

J6

Common | Input 3 | Input 2 | Input 1 | Shield

Analog
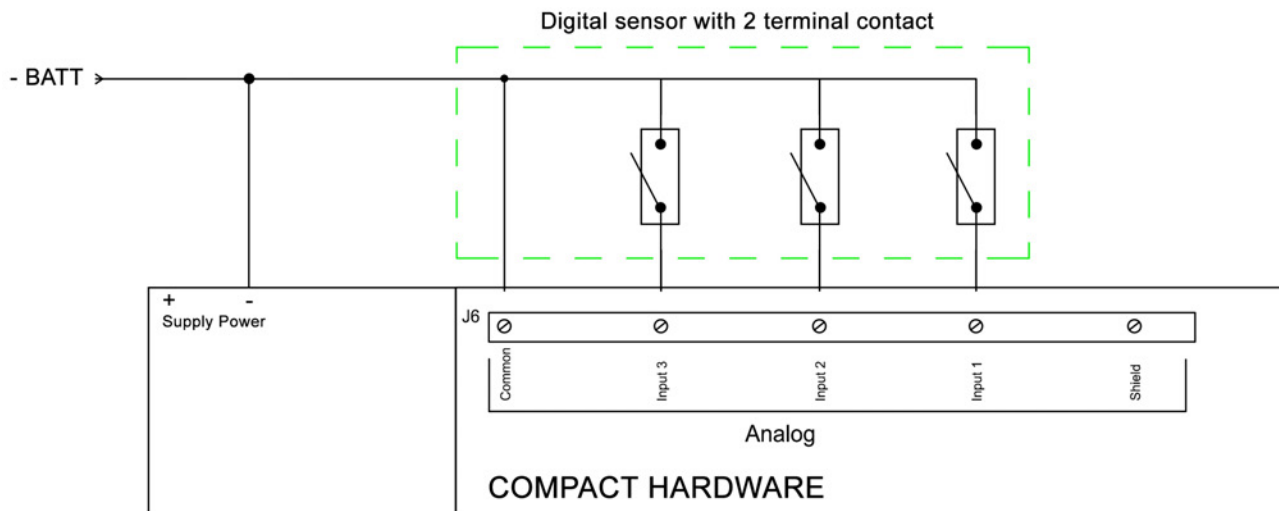
COMPACT HARDWARE
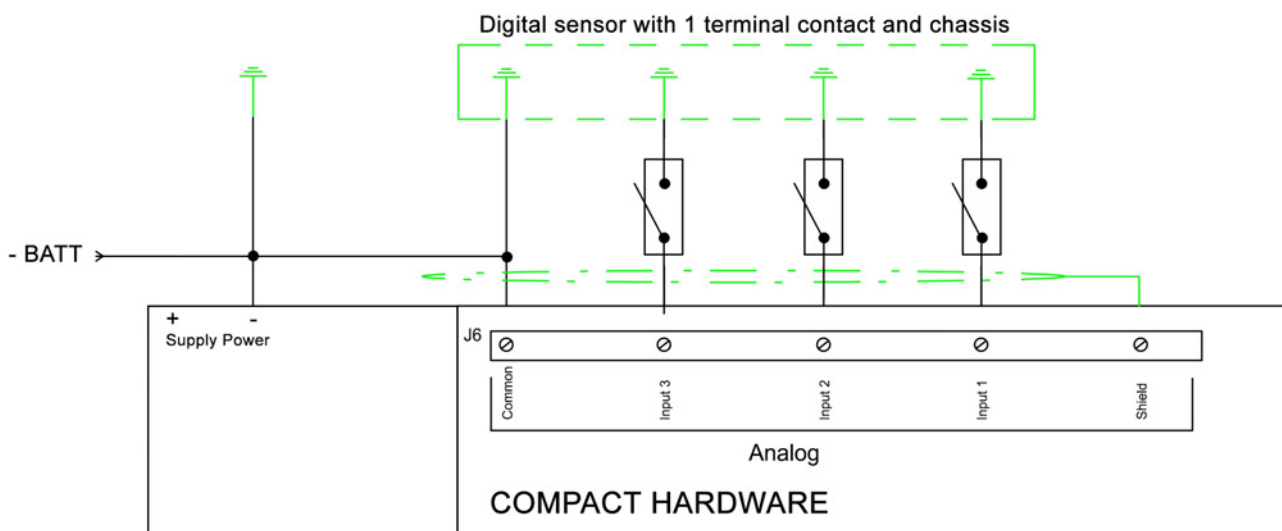
⚠ WARNING

The warranty will be void if the manufacturer's instructions are not respected.

SETTINGS

SPEED/VOLTAGE CONTROL

INTRODUCTION

The module allows speed or voltage control with the following possibilities:

- Correction with two analog signals (speed and voltage) +/- 10VDC with amplitude and adjustable offset.
- Correction with pulses output (+speed/-speed and +V/-V).
- Correction with J1939 frames only for speed.

[4405] is the speed/KW correction applied to speed governor (value given in percent).
[4411] is the voltage/KVAR correction applied to voltage regulator (value given in percent).

Follow carefully the configuration procedures (amplitude and offset adjustment) in this chapter in order to obtain efficient synchronization, load sharing and droop mode.

ANALOG OUTPUT FOR SPEED CONTROLLER

The speed output sends the required frequency set-point to the speed controller during synchronization and KW control (load sharing, ramp up/down). The voltage output -10V...10VDC must be adjusted in amplitude and offset to allow the module to vary the speed regulator set-point in a proper range; in order to control the speed in a band of +/- 2.5Hz around the nominal frequency.

1. On the module, connect **Speed Common** terminal only.

2. In *Configuration/Engine*, set the amplitude and offset.

3. Start the Generator in **MAN** mode by pressing ⌂MAN and then ▶.

4. Adjust the speed value on the speed governor to get the nominal frequency 50Hz (or 60Hz).

5. On the module, connect the speed output terminal. The frequency should change. If so, adjust the offset parameter to obtain a frequency of 50Hz (or 60Hz).

6. Increase manually the engine speed at its maximum (100%) by pressing SHIFT + ∧, then adjust the amplitude to obtain a frequency of 52.5Hz (or 62.5Hz).

7. Return to a 0% speed correction by pressing SHIFT + ∨, then adjust the offset again if necessary to obtain a 50Hz (or 60Hz) frequency.

8. Change the speed correction to minimum (-100%) by pressing SHIFT + ∨ and check that the frequency is 47.5Hz (or 57.5Hz).

9. Return to 0% speed correction by pressing SHIFT + ∧.

10. Press ■ to stop the Generator.

The appendix Analog speed regulation gives the parameters to be set for several controller models. To use the module with other models, adjust the amplitude and offset according to the manufacturer's documentation and/or contact **CRE Technology** technical support.

ANALOG OUTPUT FOR VOLTAGE REGULATOR

The voltage output sends the required voltage set-point to the voltage regulator during voltage synchronization and reactive load sharing. The voltage range -10V...10V must be adjusted in amplitude and offset to allow the module to vary the voltage regulator set-point in a correct range; in order to control the voltage in a band of +/-30V around the nominal phase-phase voltage:

1. On the module, connect **AVR** Common terminal only.

2. In **Configuration/Generator**, set the amplitude and offset.

3. Start the Generator in **MAN** mode by pressing the ⎡MAN⎤ then ▶ buttons.

4. Adjust the voltage value on the voltage regulator to get a nominal phase-phase voltage of 400V (or 480V).

5. On the module, connect the AVR output terminal. The voltage should have changed. If so, adjust the offset to obtain a voltage of 400V.

6. Increase manually the Generator voltage at its maximum (+100%) by pressing SHIFT + ⋀ then adjust the amplitude to obtain a voltage of 430V (or 510V).

7. Return to a 0% voltage correction, then adjust the offset again if necessary to obtain a voltage of 400V.

8. Change the voltage correction to minimum (-100%) by pressing SHIFT + ⋁ to check that the voltage is 370V (or 450V).

9. Return to 0% voltage correction.

10. Press ⬛ to stop the Generator.

The appendix Analog voltage regulation (AVR) gives the parameters to be set for several AVR models. To use the module with other models, adjust the amplitude and offset according to the manufacturer's documentation and/or contact **CRE Technology** service.

SPEED/VOLTAGE CONTROLLED BY CONTACTS/PULSES

When digital outputs are connected to the speed governor and/or AVR, the PID controllers increment/decrement speed/voltage by changing the state of these outputs:
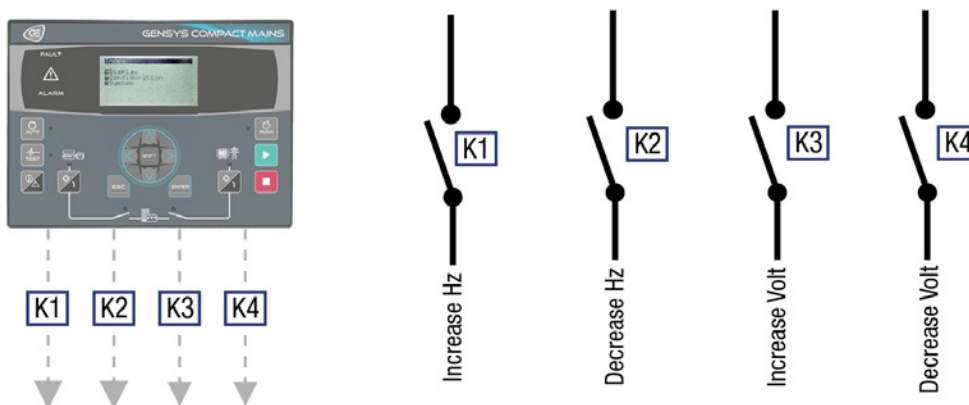
A digital potentiometer converting pulses into analog values can be used. A digital potentiometer has its own parameters: ∆U0 (fsd) and timer.

In **CRE Config Software/Configuration/Outputs/Digital outputs/relays**, set the respective functions (increase/decrease speed by pulse and increase/decrease voltage by pulse) to the desired +Speed/-Speed and +V/-V outputs. When the logic outputs are set to control the speed/voltage by pulses, the pulse configuration parameters are displayed in **Configuration/Engine** and **Configuration/Generator** menu.

A pulse is generated when the absolute value of the correction applied exceeds the dead band. The larger the correction signal ([4405] for speed and [4411] for voltage), the longer the pulses are and the shorter the time between each pulse is. The **pulse divider** parameter is used to reduce or increase the pulse length for the same correction value.

The correction applied depends on the setting of the PID controllers.

ADJUSTMENT

1. Adjust the speed/voltage regulator to its nominal value (unless the controller module connection is direct).
2. If the Generator makes too much or too little correction during an active phase (synchronization, load sharing...), the pulse width is not adapted:
    - Decrease [3652] to reduce the action on the regulator.
    - Increase [3652] to increase the action on the regulator.
3. If the Generator oscillates around the set-point or fails to reach the set-point, the dead band is not adapted:
    - Decrease the dead band [3650] to improve accuracy around set-point.
    - Increase the dead band [3650] if the Generator oscillates in frequency or power.
4. If a digital potentiometer is connected between the module and the controller, set   U (fsd) and the delay time; if the compensation is not as expected, check the following points:
    - Is the potentiometer active when the module sends a signal ?
    - Is the range managed by the potentiometer sufficient ?

Note: If each pulse causes overcompensation, the potentiometer engine may have continued to run even in the absence of a pulse. A shunt resistor on the potentiometer input can correct this problem by forcing a low level on the input in the absence of pulse.

VERIFICATION

1. In the *Configuration/Engine* and *Configuration/Generator* menus, check that the speed excursion (+/- 2.5Hz) and the voltage excursion (+/-30V) are correct using `SHIFT` + ∧ and `SHIFT` + ∨ .
2. Press ▢ to stop the Generator.

SYNCHRONIZATION

FUNCTIONING

The module starts an automatic synchronization when a remote start [4579] is activated. The nominal voltage and frequency must be between the under frequency/voltage protection ([2403] and [2409]) and the over frequency/voltage protection ([2400] and [2403]) in order for the synchronization to work. These parameters can be set in *CRE Config Software/Configuration/Protections/General protections/Over/under frequency* and *CRE Config Software/Configuration/Protections/General protections/Over/under voltage*.Busbar provides at least 80% of the nominal voltage. It manages a correction on frequency and voltage to go and stay on the acceptance windows (can be handled in *Synchronization)*. When the Generator voltage and the Bus voltage are synchronized, the module allows to close the circuit breaker.

In case of synchronization fails, the action can be set with the variable [2804] in *Configuration/Synchronization*.

CONDITION

Voltage acceptance [2800].
Frequency acceptance [2801].
Phase angle acceptance [2802].
C2S dwell time (Synchronization dwell time before authorizing to close the breaker) [2809].

VISUALIZING

Label	Description	Variables
Phase sequence match	Phase sequence match to close the circuit breaker.	[306]
Voltage match	Voltage match difference to close the circuit breaker.	[307]
Frequency match	Frequency match deviation to close the circuit breaker.	[308]
Phase match	Phase match deviation to close the circuit breaker.	[309]
Authorization to close breaker	Authorization to close the circuit breaker.	[310]

CHRONOGRAM

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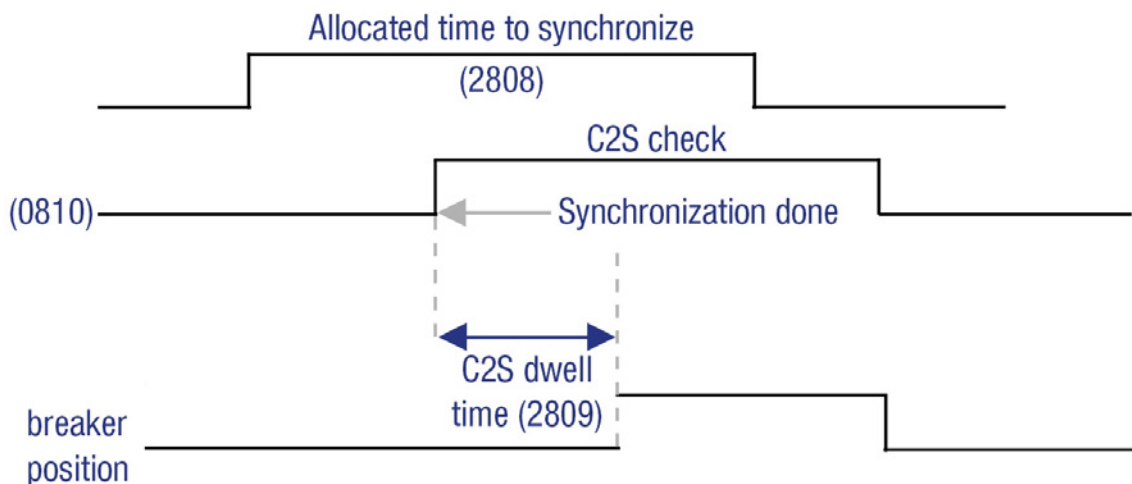
ADJUSTMENTS

Prerequisite: The speed and voltage outputs control must be set as described in Speed/voltage control.
The voltage and the frequency of the Bus must be in their nominal value.
The PID parameters can be set using *CRE Config Software/Configuration/Control Loop*.

ADJUSTMENT PROCEDURE

DANGER
RISK OF ELECTRIC SHOCK, EXPLOSION OR ARCING
- The module may only be installed and maintained by qualified electricians.   - Use personal protective equipment (PPE)   - Follow good safety practices for electrical work.   - Turn off the power before installing or replacing a fuse, and before installing the module.   - Use equipment adapted to the potential voltages to check the absence of voltage.   - Do not use a resettable fuse.
Failure to follow these recommendations may result in death or serious injury.

1. Disconnect the circuit breaker control output on the module.
2. Make sure that there is some voltage on the Bus side. The Bus LED should be lit.
3. Check the *Display/Synchronization* page and activate a remote start [3751].
4. The Generator synchronizes within 5s; otherwise, isolate the cause (voltage, frequency or phase). Depending on the source of the issue (voltage, frequency or phase) change the corresponding PID parameters available in *Configuration/Control loops*:
    - Modify the proportional gain in order to get closer to the set-point.
    - Modify, if needed, the integral gain in order to reach the set-point faster.

VERIFICATION

1. Disconnect the circuit breaker control output on the module.
2. Make sure that there is voltage on the Bus side. The Bus/Mains LED should be lit.
3. Activate a remote start [3751].
4. Press ⓘ⚠ to go to the Information page and check if the module is in synchronizing mode.
5. Go to *Display/synchronization* and check the phase difference. When the phase difference is 0° follow the instructions bellow:
    - Check the rotating fields and the concordance of the phases upstream and downstream of the circuit breaker.
    - Check the wiring of the Generator and Bus voltage references.
    - Check the potential difference between Ph1 Gen and Ph1 Bus/Mains. The potential difference must be bellow 10% of the nominal voltage. Check the potential difference between Ph2 Gen and Ph2 Bus/Mains as well.
6. Deactivate the remote start [3751].
7. Reconnect the circuit Generator breaker control.
8. Activate a remote start [3751]. The Generator should synchronize and then close its Generator breaker.

CONTROL ON DEAD BUS MANAGEMENT

In case of an emergency start of the Power plant (no voltage on the common Bus-bar), the units communicate through **CRE-Link®** to elect a module which will close first its circuit breaker on the Bus-bar: it is the arbitration procedure, to avoid closing 2 circuit breakers at the same time, when the generators are not synchronized.

In case of an emergency start of the Power plant (no voltage on the common Bus-bar), with a failure of the **CRE-Link®** communication, the units switch on a safe mode to protect the circuit breaker closing procedure.
Each closing commands will be delayed depending on the number of the unit.

Formula:

Generator #n will close its circuit breaker after ([2306]/10) + (7 * n) seconds.
[2306]: Delay to close breaker if there is a CAN bus fault. Default value: 15.0s.

PROTECTIONS

FUNCTIONING

The protections are triggered by an internal or external event (alarms, faults, logic inputs, CAN bus loss, etc.). Two actions can be associated to each event:

- An alarm; warning can be viewed on the LCD screen; a report can be retrieved.
- A fault; warning can be viewed on the LCD screen; a report can be retrieved.

Value	Type	Action	Description
0	–	Off (no action)	–
1	Fall-back	Generator electrical fault	The protection opens the Generator circuit breaker and tries to re-synchronize again after the timer [2806]. The number of resynch attempts is set by variable [2807], it means that if the fault that has tripped the Generator circuit breaker is happening again after each attempt, the Generator will be stopped. The number of attempts is reset with the reset function.
3	Alarm	Alarm	Notice as alarm on front panel, displayed information only, no action.

These actions have to be configured with *CRE Config Software*. List of potential alarms/faults can be downloaded via *CRE Config Software/System/PC transmit/receive: List of actions on alarms-faults*.

A digital output can be configured to indicate that the protection is active.

All the protections available for the product are explained in the protection chapter Software variables. **Specific protections are explained below.**

COMMUNICATION

Alarm/Fault	Description	Setting
CANopen	Communication error on CANopen.	[3058]

For **CRE-Link®** errors, check CRE-Link®.

AUDIBLE OR VISUAL WARNING DEVICE

To trigger an external alarm when a protection trips, connect the alarm to a logic output configured as a "**Horn**".
The signal duration is configurable by [2478] (0 means that the alarm will be activated until manual shutdown); alternatively, an input can be configured as "**Horn Off**" to manually stop the horn:
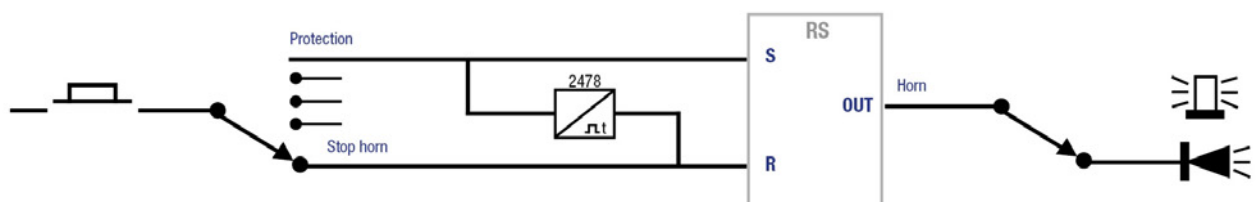
ALARM/FAULT RESET

To perform an alarm/fault reset:

- Locally:

- Remote: use the "**Reset faults**" input function.

CONTROL LOOP PID

EMPIRICAL PID GAIN TUNING

1. Set all the gains to 0 (except G gain).
2. Increase the P gain until you have a stable oscillation.
3. Increase the D gain until the oscillation is canceled.
4. Repeat steps 2 and 3 until the D gain can't cancel the oscillation caused by the P gain.
5. Go back to the previous values of the P and D gains where the D gain cancels the oscillation caused by the P gain.
6. Increase the I gain in order to correct the error between the actual value and the set-point. Warning: A too high I gain might cause oscillations to the system. The I gain must correct the static error rapidly without oscillations (or small oscillations in order to gain some response time).

ADVANCED FUNCTIONS

SCHEDULER

PRESENTATION

The Scheduler can activate any function that can be controlled by logic input. These functions can be activated once or repeatedly.

FUNCTIONING

The Scheduler is presented in table form. Each row in this table corresponds to an event. There are 2 types of events

One-time Event

1. Function active during the event.
2. The event is punctual.
3. Date on which the event will take effect.
4. Time at which the event will activate. 24-hour format.
5. The length of time the event is active. Accuracy per minute.

Repeated Events

Daily

1. Function active during the event.
2. The event is repeated.
3. The event will be repeated every day (or every X day according to the parameter "every").
4. Allow to skip days.
5. Time at which the event will activate. 24-hour format.
6. The length of time the event is active. Accuracy per minute.

Weekly

1. Function active during the event.
2. The event is repeated.
3. The event will be repeated every week (or every X week according to the parameter "every").
4. Day of the week on which the event will take effect.
5. Allow to skip weeks.
6. Time at which the event will activate. 24-hour format.
7. The length of time the event is active. Accuracy per minute.

Monthly

1. Function active during the event.
2. The event is repeated.
3. The event will be repeated every month (or every X month according to the parameter "every").
4. Day of the month on which the event will take effect.
5. Allow to skip months.
6. Time at which the event will activate. 24-hour format.
7. The length of time the event is active. Accuracy per minute.

ALTERNATIVE SELECTIONS

PRESENTATION

The **Alternative selections** function allows one or more parameters to be switched between two values via a digital input.

FUNCTIONING

This function can be set using the *CRE Config Software/Configuration/Alternative selections*.

Each line is composed as follows:

1. Selection of the parameter using the search engine.
2. First value the parameter can take. This value is assigned to the parameter when the associated digital input is inactive.
3. Second value that the parameter can take. This value is assigned to the parameter when the associated digital input is active.
4. Variable to toggle between the 2 values. This variable must be assigned to a digital input. Using the same variable on several lines allows several parameters to be modified with one digital input.

SEARCH ENGINE

To select a variable, click on the orange box to display the search engine. The **Filter** button allows you to quickly find the desired parameter:

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EXAMPLE

Page *Configuration/Alternative selections*:

Variable number 1	PT ratio (V2100)	Value 1	300	Value 2	200	Control with	Alternative selection 1
Variable number 2	Nominal Frequency	Value 1	50	Value 2	60	Control with	Alternative selection 1
Variable number 3	Under frequency thr	Value 1	45	Value 2	55	Control with	Alternative selection 2

Page *Configuration/Digital inputs*:

Digital inputs	Label	T ON	T OFF	Validity	Direction	Function
Input 1	Sel. altern.1	0 s	0 s	Always	Normally open	Alternative selection 1
Input 2	Sel. altern.2	0 s	0 s	Always	Normally open	Alternative selection 2

In the example above, digital input 1 allows you to modify the PT ratio and the Nominal Frequency parameters, and digital input 2 allows you to modify the **Under frequency threshold** parameter:

- Digital input 1 inactive: PT ratio = 300 and Nominal Frequency = 50Hz.
- Digital input 1 active: PT ratio = 200 and Nominal Frequency = 60Hz.
- Digital input 2 inactive: Under frequency threshold = 45Hz.
- Digital input 2 active: Under frequency threshold = 55Hz.

EASY FLEX®

PRESENTATION

Easy Flex® offers a simple and innovative way of programming, allowing you to adapt the controller to your needs.

FUNCTIONING

Easy Flex® is presented in the form of a table. Each line of this table corresponds to an operation between 2 values. There are 2 types of operator.

CALCULATION OPERATOR

1. The first value of the operation can be a variable or a constant.
2. Transaction between value 1 and value 2. A calculation operator returns any type of value.
3. The second value of the operation can be a variable or a constant.
4. The result of the operation is stored in the selected parameter.
5. By default an operation is always executed (100ms cycle). The execution of the line can be conditioned by various variables. This mechanism allows the realization of an "if/else" condition.

Overflow

When the operation between value 1 and value 2 is outside the range of the selected output parameter, the module will raise an alarm.

The number of the concerned line is indicated. The result of the operation is limited by the minimum or maximum value of the output parameter.

COMPARISON OPERATOR

1. The first value of the operation can be a variable or a constant.
2. Transaction between value 1 and value 2. A comparison operator always returns 0 or 1.
3. The second value of the operation can be a variable or a constant.
4. The result of the operation is stored in the selected parameter. Only boolean parameters can be selected.
5. Forward: 1 when the operation is right / 0 when the operation is wrong. Reverse: 0 when the operation is right / 1 when the operation is wrong.
6. The output changes to 1 (or 0 if **Reverse** is selected), if the operation is valid for X seconds (adjustable parameter). Default setting: no delay is applied.
7. An operation is always executed (100ms cycle). The execution of the line can be conditioned by various variables. This mechanism allows the realization of an "if/else" condition.

SEARCH ENGINE

To select a variable, click on the orange box to display the search engine. The **Filter** button allows you to quickly find the desired parameter.
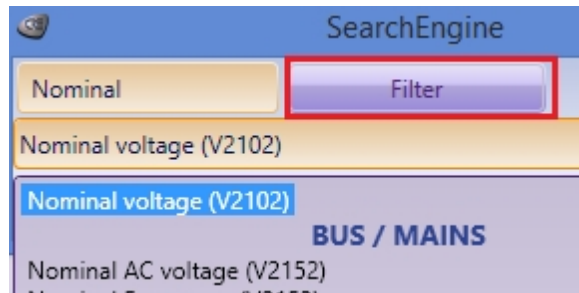
USER VARIABLES

To allow intermediate result storage, "**User variables**" are available. These variables can be used to:
- Perform calculations between more than 2 variables.
- Store a test to perform an if/else on the following lines.
- Store a result for reading by Modbus TCP.

EXAMPLE

Realization of a hysteresis:

WARNING EASY FLEX®

Variable [4214] provides more information about the **Easy Flex®** Warning alarm.

Here is how variable 4214 is calculated:
[4214] = (100 * Line concerned) + Error type

Here are the different types of errors:
1 : Operand 1 or 2 is invalid.
2 : Unknown operator.
3 : The variable "result" is 0.
4 : The variable "result" is read-only.
5 : The result is outside the allowed range of the target variable.
6 : Exceeding on at least one equation.
7 : Division by 0.

MODBUS TCP MAPPING

CONFIGURABLE BLOCK

To create your own blocks, use the variables [10000]…[10299] in *CRE Config Software/Configuration/Modbus redirection*.

There are two ways to configure these blocks:
1. Configuration in *CRE Config Software/Configuration/Modbus redirection*: enter the codes of the variables to read; the readings on the registers [10000]…[10299] will be the pointed values.
2. Configuration by an external device; this device must request the following:
   o Write 1 to [3016] to enter into the configuration mode.
   o Write the codes to the desired registers ([10000]…[10299]).
   o Write 0 to [3016] to enter into the read mode.

Then to read your own block, you just need to read by Modbus TCP the register [10000]...[10299].

Example:
If the configuration is as follows [10000] = 14; [10001]=15; [10002]=16, the reading by Modbus TCP of the 3 registers will give to you the hours/minutes/seconds of the module.

Modbus redirection variables

Modbus redirection variables			
000:Hours	14	025:GE freq	75
001:Minutes	15	026:GE f(%)	76
002:Seconds	16	027:GE Phase	77

LOGGER

The **Logger** tool is used to track value or status changes up to 10 variables at the user's choice. Power status variable is always recorded as long as the logger is not set to Off. This function is available in *CRE Config Software/Configuration/Logger*.

Additional Functions

For each variable you can set a log period down to tenth of a second (example: 0.1s).
To use this function, select **Interval** in **Log on** box.
The **Erase logger** button will delete all recorded variables from the module.

Logger			
Log on/off	☐ No		
1: (?)	0	Log1 period 0 s	Log on Value change ▼
2: (?)	0	Log2 period 0 s	Log on Value change ▼
3: (?)	0	Log3 period 0 s	Log on Value change ▼
4: (?)	0	Log4 period 0 s	Log on Value change ▼
5: (?)	0	Log5 period 0 s	Log on Value change ▼
6: (?)	0	Log6 period 0 s	Log on Value change ▼
7: (?)	0	Log7 period 0 s	Log on Value change ▼
8: (?)	0	Log8 period 0 s	Log on Value change ▼
9: (?)	0	Log9 period 0 s	Log on Value change ▼
10: (?)	0	Log10 period 0 s	Log on Value change ▼

Notice: Power State (4000) and Engine Mode (4001) are always logged
To inhibit a log variable; set the value to 0
If you set a wrong variable number; an question mark will be displayed and the corresponding log variable will be inhibited

Erase logger   [Erase]

Warning: Log erase will delete all archived data; including alarms and faults

A lot of variables can be recorded, (see Software variable appendix to select the needed variable).

COMMUNICATIONS
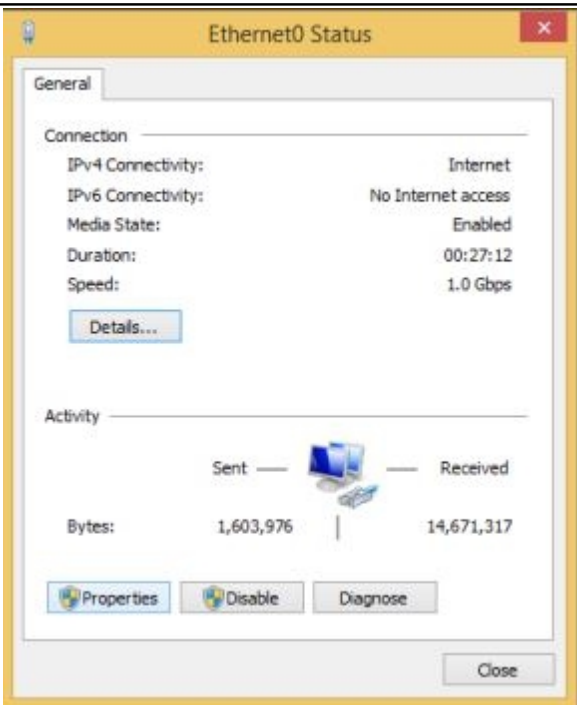
NETWORK

SETTING UP YOUR PC CONNECTION

Materials required:

- A CAT 5 cross Ethernet cable (marked CROSSOVER CABLE along its sheath) for direct connection to the module from your computer.
- The CAT 5 straight Ethernet cable (marked PATCH CABLE or STRAIGHT-THROUGH CABLE along its sheath) can only be used with an Ethernet switch.

CONFIGURING THE COMPUTER IP ADDRESS

Connect the module with a 100 Ethernet cord	Direct connection to PC: use a crossover cord. Connection through a switch: you can use either a direct or a crossover cable such as 3-m long A53W1, as long as your switch uses auto MDI/MDIX technology.
Power up the module using a stabilized power supply.	
Open Windows control panel	
Open **Network** and **Sharing Center** / Change **adapter settings** / (Connection to) LAN / **Properties** (Windows 7 & 8 & 10).	

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Click on **Properties** (Windows 7 or 8 or 10).	
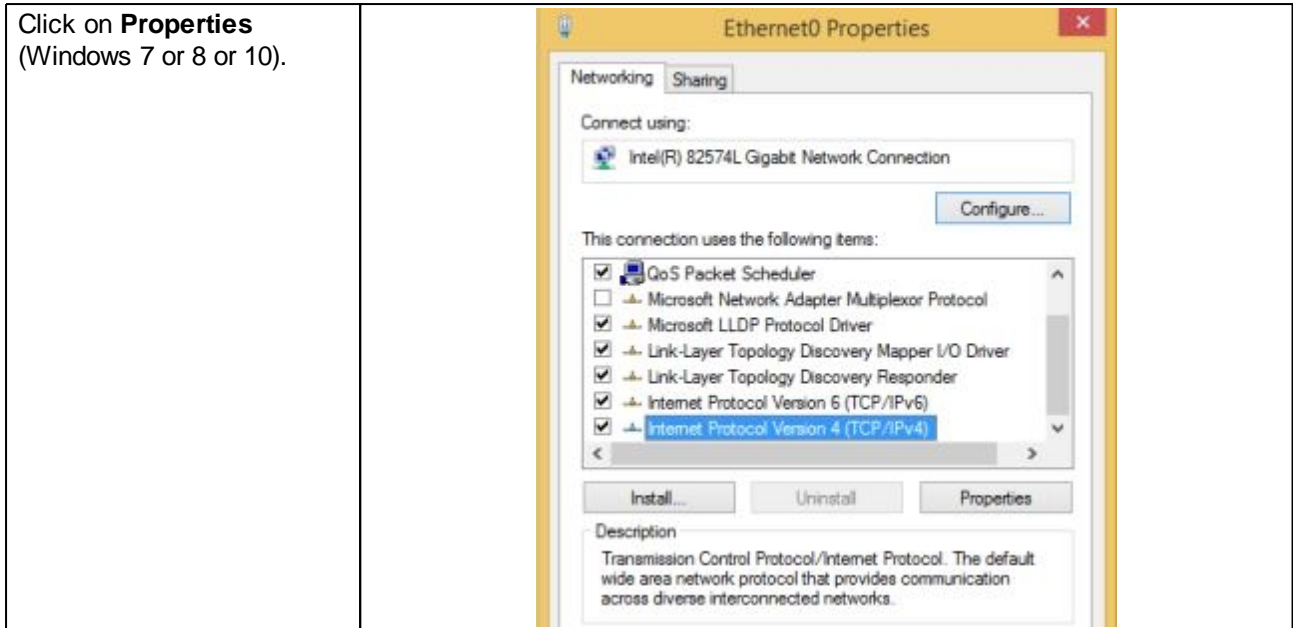
CHANGE THE IP ADDRESS OF THE MODULE

Using **CRE Config Software** (or LCD display), in the **System/Network Configuration** menu.
The module supports DHCP: in this case, the module must be connected to a network equipped with a DHCP server.
On power-up, the module obtains an IP address from the DHCP Server.
If the DHCP protocol fails, the fixed IP address of the module is used (Factory setting: 192.168.11.1).

On core module, you can reset the IP address (192.168.11.1) by holding the button on the rear face when the module is powered.

Note: Contact your network administrator to configure your router and/or the units according to your needs.

HOSTNAME

It is possible to assign a device name to the module in relation to its IP address;
You can then use this device name in **CRE Config Software** to connect to the module.
The device name can be change in **CRE Config Software/System/Network Configuration** menu.
Maximum length: 16 characters.
In Windows, the last character defines the type of service (0 is the usual value).
Allowed characters: reduced ANSI set;"-" and"." are allowed except as first and last characters.

MODBUS TCP/IP

ABILITIES

The complete list of variables is described in Software variables.
Through Ethernet communication where the module acts as a Modbus slave, you can:
- Upload many readings and module internal variables.
- Download values for many module internal variables.

Type	Range	Fault access right
Readings (measurements, states,..).	[0000] … [1999]	Read only.
Parameters.	[2000] … [3999]	Read/Write.
Modes, statuses, settings,...	[4000] … [9999]	Read.
Readings associated with digital inputs.	[4500] … [4649]	Write (subject to activation).

SUPPORTED FUNCTIONS

In addition, the following functions are supported:
- Reading bit-fields, listed in a dedicated tab of the file and organized in 16-bit words. These variables are listed in Software variables.
- Reading contiguous configurable data block.

Those functions allow a significant performance gain and help reducing the load on an Ethernet network.

CONFIGURATION

To communicate through Modbus TCP, define the following settings:
- Module IP address set in **System/Ethernet.**
- Modbus TCP port [3014], generally 502, set in **System/Ethernet.**
- Modbus TCP rights: see further.

The module handles up to 4 simultaneous connections. This can be used for multiple HMIs for example.
For more details on the Ethernet configuration, see Network.

FUNCTIONS

The module supports the following Modbus functions:

Functions	Description
01, 02	Read logical data (Coil status, discrete input status).
03, 04	Read holding/input registers (16 bit).
05	Write logical value (single coil).
06	Write single register (16-bit variable).
15 (0x0F)	Write multiple logical values (multiple coils).
16 (0x10)	Write multiple registers.

All module variables are 16-bit registers. Yet it might be useful to consider them as logical values (if they are only set to 0 or 1) to simplify Modbus TCP communication with some external PLC. If function 01 or 02 is used to read an internal register that is different from 0, then returned value will be 1.
The module registers start from address 0. Depending on your Modbus TCP client equipment-software, you may need to use an offset of 1 when reading/writing registers as addresses may start from address 1. In this case, request address/register number 1 to access variable 0000 inside the module.

The 32-bit variables can only be written using 0x10 function.
If a digital input modifies a piece of data also to be written by Modbus, the latest request takes over the other.

Data [10000]…[10299] can be read by block (see further).

ACCESS RIGHTS

The access rights depend on the parameter type and on Modbus access permissions. To manage access rights, set to 1 the corresponding bits in the word [3015]:

Description	Bit #	Default value
Writing to date/ time	0	0
Writing to Engine counters	1	0
Not used	2	0
Writing to digital input function register	3	1
Not used	4	0
Not used	5	0
Not used	6	0
Not used	7	0
Reading via Modbus TCP	8	1
Writing via Modbus TCP	9	1

Using *CRE Config Software/System/Network configuration/Modbus TCP access rights*, you can tick check-boxes to set those:

Bit #	Label	Use
0	Writing to date/ time	Module time synchronization.
1	Writing to Engine counters	Manual counter adjustment (see following table).
3	Writing to digital input function register	Opens the possibility to activate a digital input function using Modbus TCP.
8	Reading using Modbus TCP	Opens the possibility to grant reading individual permissions.
9	Writing using Modbus TCP	Opens the possibility to grant writing individual permissions.

The counters, encoded on 32 bits, include:

Meters (MSB|LSB)	Label
0080|0079	Generator KWh
0082|0081	Generator KVARh
0084|0083	Engine running hours

BITFIELDS

Bit-fields are meant for decreasing communication bus load. They pack up to 16 logic variables inside a single register. This way, a single Modbus TCP request can be used to read a chunk of information. Each variable contains the current value of 16 logic variables such as breaker positions, faults, alarms…

They are listed out in Software variables.
The bit-fields [0956]…[0969] have latched values: a reset is required for them to return to 0.

*Note: Available data are related only to faults that occurred after the latest power up sequence. Events that occurred before the module has been power cycled are listed in the **FAULT** pages but not among the variables.*

MODBUS COMMUNICATION EXAMPLE

The table below shows a Modbus TCP client sending a reading request (function 04) of 6 registers starting from variable [0079].

Client request		Module server response	
Field	Value	Field	Value
Function code	04	Required function.	04
Starting Register (MSB)	00	Data bytes (=2*Nb of registers requested).	6
Starting Register (LSB)	79	Value of register 0079 (MSB).	D0
Count of registers (MSB)	00	Value of register 0079 (LSB).	D1
Count of registers (LSB)	06	Value of register 0080 (MSB).	D2
		Value of register 0080 (LSB).	D3
		Value of register 0081 (MSB).	D4
		Value of register 0081 (LSB).	D5

CRE-LINK ®

PRESENTATION

This CAN bus is used as a communication means between units of a single Power plant, featuring:

- Active and reactive load sharing.
- Automatic load/unload.
- Static paralleling.
- Dead bus management.
- Segments and Power plant management.
- Other data exchange.

Standard CAN bus rules apply here. Refer to CAN bus good practices to connect units properly on CAN bus.

CAN BUS ALARMS/FAULTS

CAN communication between **CRE Technology** units is continuously checked by each unit on the CAN bus. The count of units connected to CAN bus must be the same as the count of units declared inside each unit. In case of a problem on the bus, alarms or faults can occur:

- Missing product: One or several **GENSYS COMPACT PRIME** are missing on the **CRE-Link®**.
- Missing master: One or several **MASTER COMPACT**/**BTB COMPACT**/**MASTER 1B COMPACT** are missing on **CRE-Link®.**
- Isolated product: The communication with the other products is lost. Check that the 120   termination resistors are used correctly (see CAN bus good practices). Check that CAN bus cable is properly connected.
- Unknown product: An incompatible product is connected on the CAN bus. The module will not start the Generator.
- Mismatch version: A module with an incompatible version is connected on the CAN bus. The module will share the load using droop.

Note: Problems can occur if two or more unit have the same Generator number.

For **Missing product**, **Missing master** and **Isolated product**, you can configure the behavior to be adopted in case of a CAN fault.

CANOPEN

CANopen extension modules can be used to increase the number of digital inputs and outputs of the module. Overall max. count of added inputs/outputs: 32 I and 32 O. They are read/written every 100ms.

CONFIGURATION

Setting	Label	Value	Description
[3151]	CANopen config	1 2 3 4	8 inputs + 8 outputs of coupler ID# 1 16 inputs + 16 outputs of coupler ID# 1 32 inputs + 32 outputs of coupler ID# 1 Custom configuration, defined by more settings.
[3153]	CANopen ID# 1	0 … 255	Identifier of the first coupler.
[3154]	CANopen IN 1	0 … 32	Count of inputs on the first coupler.
[3155]	CANopen OUT 1	0 … 32	Count of outputs on the first coupler.
[3156]	CANopen ID# 2	0 … 255	Identifier of the second coupler.
[3157]	CANopen IN 2	0 … 32	Count of inputs on second coupler.
[3158]	CANopen OUT 2	0 … 32	Count of outputs on the second coupler.
[3159]	CANopen ID# 3	0 … 255	Identifier of the third coupler.
[3160]	CANopen IN 3	0 … 32	Count of inputs on the third coupler.
[3161]	CANopen OUT 3	0 … 32	Count of outputs on the third coupler.
[3162]	CANopen ID# 4	0 … 255	Identifier of the fourth coupler.
[3163]	CANopen IN 4	0 … 32	Count of inputs on the fourth coupler.
[3164]	CANopen OUT 4	0 … 32	Count of outputs on the fourth coupler.

The assignment of I/Os is done in the order of couplers and the lower variable number is associated to the lower message number configured.

The CANopen inputs and outputs have the same attributes as regular inputs and outputs except the delay on drop-off of inputs:

Setting	Attribute
Digital inputs 1 … 32	
[3200] … [3231]	Function
[3232] … [3263]	Delay on pick-up
[3264] … [3295}	Validity
[3296] … [3327]	Direction
Digital outputs 1 … 32	
[3350] … [3381]	Function
[3382] … [3413]	Mode (direction): 0: Normally de-energized 1: Normally energized

On power-up, the configuration is automatically launched. The status [3150] turns to 1.
The error time-out [3152] is 10.0s by default.

VARIABLE MAPPING AND INPUTS/OUTPUTS

CANopen inputs and outputs are accessed by their code:

- Inputs: [0800]...[0831]
- Outputs: [4751]...[4782]

SAE J1939

PRESENTATION

J1939 is a CAN protocol used by "electronic" motors, which include an ECU (or ECM, EMS). It allows you to read engine and alternator data (measurements, positions, binary values), and send commands (start, stop, speed control…).

The ECU can detect faults and send them to the module. Protections can be assigned to these faults (see further).
Bit rate: 250kbit/s.

To use J1939 communication:
1. Enter the *CRE Config Software/Configuration/Engine/J1939* page
2. In the list, select the manufacturer [3100]
3. Select the ECU type [3101]
4. Assign the alarms/faults to a protection (see bellow)
5. Connect the engine ECU and the module J1939 port

The pair manufacturer-ECU determines the following settings:
- Module address on the CAN bus.
- ECU address on CAN bus.
- Speed control: through J1939 or by analog output/pulses.
- Start-stop control: through J1939 or by crank and fuel digital outputs.
- Speed, oil pressure, coolant temperature measured by J1939.

Note: if needed, it is possible to measure speed, oil pressure and water temperature by analog input instead of J1939. To do so, use switch selection in **CRE Config Software/Configuration/Engine/Control Settings**.

The module can communicate with a large number of J1939 engines. As the engine list accrues, please contact **CRE Technology** or your local distributor if your engine is not mentioned in this document.
In any case, if your ECU does not belong to the following list, try:

1. To select the generic ECU from your manufacturer.

2. To select the module manufacturer, then modify the module [3103] and ECU [3102] addresses according to the ECU documentation (Modification by variable number).

MEASUREMENTS AND POSITIONS

The next table lists out the measuring points whose values are conveyed over **CRE-Link**® and taken into account by the module. The J1939 standard assigns each of them an SPN (Suspect Parameter Number), as it will be used to label the alarms.
Refer further to the three schematics and tables for description and location.

Legend:

P	Δp	T	L	FR	Q	Tq	V	W
Pressure	Diff. pressure	Temperature	Thre shol d	Flow (Flow-Rate)	Consumption	Torque	Voltage	Power

To be conveyed, they are grouped in frames; each frame is identified by a PGN (Parameter Group Number).

Note: For more information on the J1939 protocol and the exact definition of each SPN and PGN, refer to the norm.

FUEL CIRCUIT AND ECU
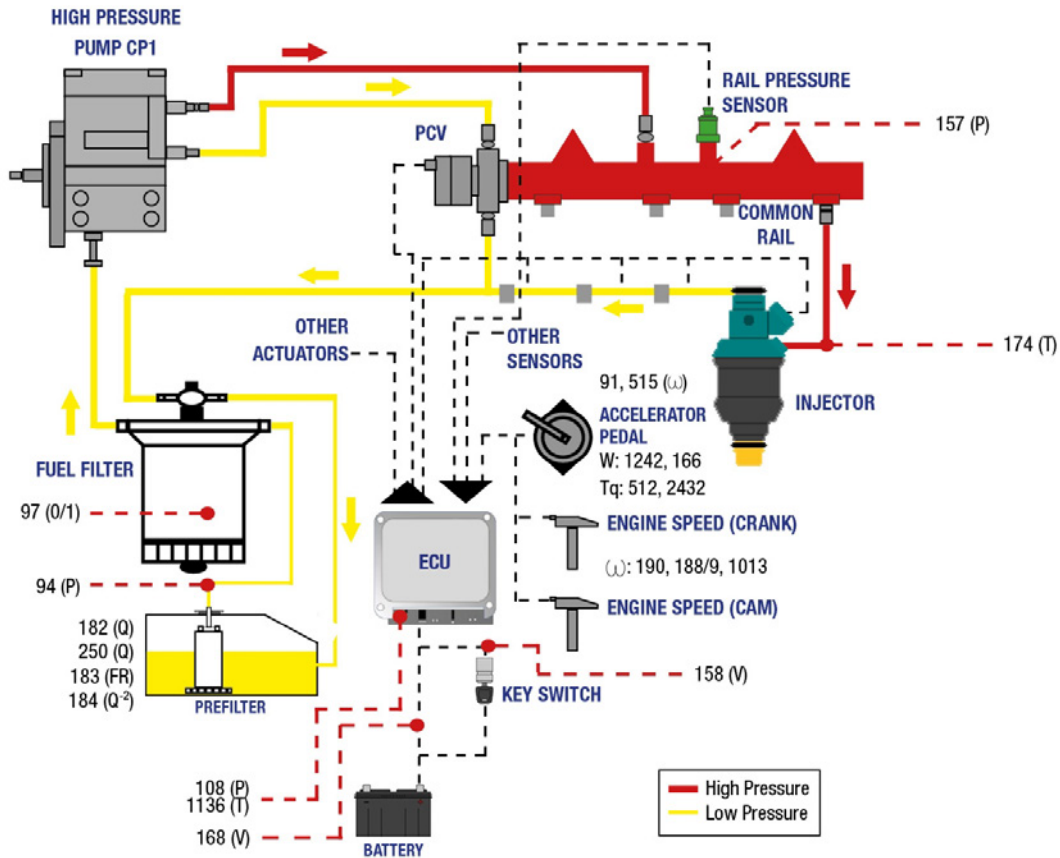
SPN	Description	PGN
91	Accelerator pedal position 1 (run in %).	F003
1242	Instantaneous estimated brake power.	FE92
512	Driver's demand engine - Percent torque related to maximum engine torque.	F004
515	Engine's desired operating speed. Indication of optimal speed for the current conditions. May include the torque generated to accommodate power demands and exclude dynamic commands from smoke/shift.	FEDF
2432	Engine demand - percent torque.	F004
190	Engine speed.	F004
188	Engine idle speed.	FEE3
189	Engine rated speed (max. rotational velocity of engine crankshaft under full load conditions).	FEBE
166	Engine rated power (net brake power at rated speed).	FEBE
1013	Trip maximum engine speed since latest trip reset.	FEB7
171	Ambient air temperature.	FEF5
182	Engine trip fuel (fuel consumed during all or part of a run).	FEE9
250	Engine total fuel used.	FEE9
183	Engine fuel rate.	FEF2
184	Engine instantaneous fuel economy (covered distance/fuel consumption).	FEF2
94	Engine fuel delivery pressure (as delivered by supply pump to high pressure pump).	FEEF
97	Water in fuel indicator (binary signal).	FEFF
157	Engine injector metering rail 1 pressure.	FEDB
174	Engine fuel temperature 1 (at injector inlet).	FEEE
168	Battery potential /Power input1.	FEF7
158	Key switch supply potential (alternative to 168).	FEF7
1136	ECU temperature.	FEA4

108	Barometric pressure.	FEF5
1387	Pressure auxiliary sensor #1	FE8C
1388	Pressure auxiliary sensor #2	FE8C
247	Engine total hours of operation.	FEE5

AIR, EXHAUST AND ALTERNATOR
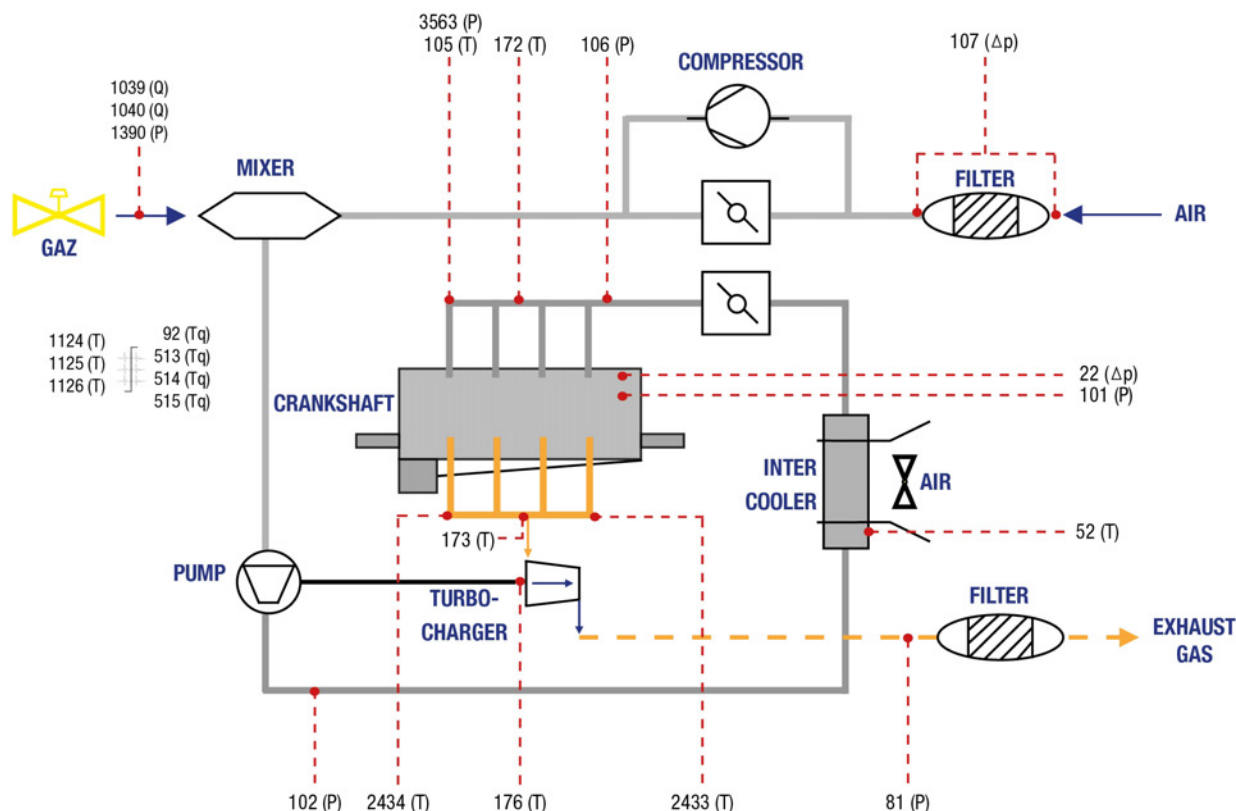
SPN	Description	PGN
107	Air inlet filter #1 differential pressure (first or sole filter).	FEF6
52	Inter-cooler temperature.	FEEE
106	Air inlet pressure (at inlet to intake manifold or air box).	FEF6
102	Intake manifold #1 pressure (boost pressure measured downstream of turbo compressor).	FEF6
3563	Intake manifold #1 absolute pressure.	FDD0
105	Intake manifold #1 temperature.	FEF6
172	Air inlet temperature.	FEF5
22	Extended crankcase blow-by pressure (differential pressure across a venturi).	FEEF
101	Crankcase pressure.	FEEF
1039	Trip Fuel (gaseous) (fuel consumed during all or part of a run).	FEAF
1040	Total Fuel used (gaseous) over the engine life.	FEAF
1390	Fuel valve 1 inlet absolute pressure.	FE8B
2433	Exhaust gas temperature - Right manifold.	FE07
2434	Exhaust gas temperature - Left manifold.	FE07
173	Exhaust gas temperature (alternative to 2433 + 2434).	FEF6
176	Turbocharger oil temperature.	FEEE
81	Diesel particulate filter (trap) inlet pressure.	FEF6
92	Engine percent load at current speed. The ratio of actual engine percent torque (indicated) to maximum indicated torque available at the current engine speed, clipped to zero torque during engine braking .	F004
513	Actual percent torque. The calculated output torque of the engine. The data is transmitted in indicated torque as a percent of reference engine torque. The engine percent torque value is not negative and includes the torque developed in the cylinders required to overcome friction.	F004
514	Nominal friction (percent of reference torque). Torque that compensates the engine and pumps losses.	FEDF
1124	Alternator winding 1 temperature.	FEA7

1125	Alternator winding 2 temperature.	FEA7
1126	Alternator winding 3 temperature.	FEA7

OIL AND COOLANT CIRCUITS
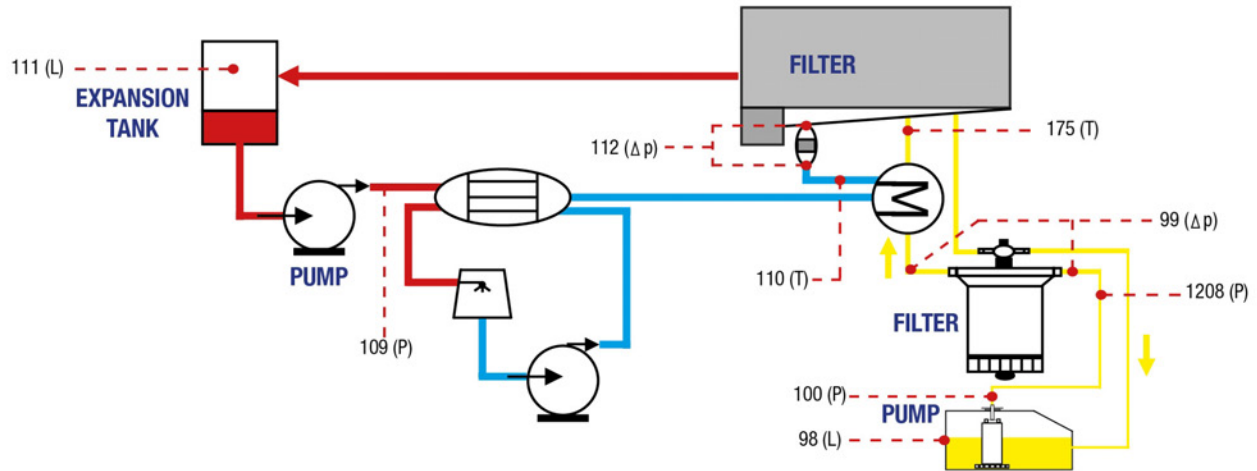
SPN	Description	PGN
98	Oil level (ratio of sump current volume to required volume).	FEEF
99	Oil filter differential pressure.	FEFC
100	Oil pressure.	FEEF
175	Oil temperature 1.	FEEE
1208	Oil pressure (upstream the pre-filter).	FE92
109	Coolant pressure.	FEEF
110	Coolant temperature	FEEE
111	Coolant level (ratio of current volume to total volume).	FEEF
112	Coolant filter differential pressure.	FEF6

These measurements are shown in **CRE Config Software/Scada/Engine meters**. A measurement not sent by the ECU is shown as "…":

Note: To get the measurements through Modbus TCP, refer to Modbus TCP/IP.

FAULTS

The module can monitor diagnostic messages (DM1) from the ECU. Only relevant diagnostic messages are taken into account and used in the module fault/alarm system. The module can understand and interpret messages for display, process, and protection.

When you activate the internal module RESET (**[SHIFT+INFO]** button or remote reset), the module sends a reset message (DM3) to the ECU. If the diagnostic message is not sent by the ECU for more than 3s, the corresponding fault/alarm is automatically reset to Off.

Each of the following J1939 messages/alarms can be configured to trigger one of the module protections:

J1939 message	Control in CRE Config Software		Message description (ECU internal threshold)
High speed	[3104]	CT speed +	Engine speed above least severe high threshold.
Very high speed	[3105]	CT speed ++	Engine speed above the most severe high threshold.
High water temperature	[3106]	CT Cool Temp. +	Coolant temperature above least severe high threshold.
Very high water temperature	[3107]	CT Cool Temp ++	Coolant temperature above the most severe high threshold.
Low oil pressure	[3108	CT Oil Press -	Oil pressure below least severe low threshold.
Very low oil pressure	3109	CT Oil Press --	Oil pressure below the most severe low threshold.
Malfunction "lamp"	3110	CT Malfunction	Message in presence of an emission-related trouble
Protection "lamp"	3111	CT Protection	Trouble is most probably not electronic subsystem related. E.g., coolant temp. may exceed temp. range.
Amber "lamp"	3112	CT Amber	Trouble where the engine need not immediate stop.
Red "lamp"	3113	CT Red	Severe enough trouble for the engine to stop.

All thresholds are those set in the ECU. In addition of these known diagnostic messages, the module shows the latest five unmanaged SPN (what is wrong)/FMI (Failure Mode Identifier, i.e. error type) combinations it has received with the diagnostic message (DM1). These SPN/FMIs are backed up in registers:

Register		Description
0664 0665 0666	J1939 SPN LO 1 J1939 SPN HI 1 J1939 FMI 1	Latest NSP/IMF received by the module.
0667 0668 0669	J1939 SPN LO 2 J1939 SPN HI 2 J1939 FMI 2	Second latest NSP/IMF received by the module.
0670 0671 0672	J1939 SPN LO 3 J1939 SPN HI 3 J1939 FMI 3	Third latest NPS/IMF received by the module.
0673 0674 0675	J1939 SPN LO 4 J1939 SPN HI 4 J1939 FMI 4	Fourth latest NPS/IMF received by the module.
0676 0677 0678	J1939 SPN LO 5 J1939 SPN HI 5 J1939 FMI 5	Fifth latest NPS/IMF received by the module.

SPN LO corresponds to LSB, SPN HI to MSB

Note: In any case, a fault/alarm is activated on reception of an unknown SPN/FMI if the Red [3113]/ Amber [3112] control has been set. It is deactivated by Reset.

CONTROLS

S P N	Description	Details	P G N
89 8	Requested speed	Engine speed which the engine is expected to operate at if the speed control mode is active.	0
97 0	Start-Stop	Engine shutdown switch.	F0 01
28 81	Frequency selection	Ability to switch the rated speed. Switched on a state transition while engine speed is 0. 50/60Hz (CM570 and PGI) or sources given through a nibble (e.g. see ECU8 section in Appendices/ECU J1939/MTU).	F D C B

CAN BUS GOOD PRACTICES

This chapter describes rules to be used to ensure reliable CAN communication. These rules must be applied to all CAN communications, including **CRE-Link®** and ECU/remote I/O CAN bus.

In an EMI environment, use a shielded cable to connect CAN bus. The table below lists the DB9 CAN standard wiring:

Terminal	Standard CAN	Mandatory
1	Reserved	
2	*CAN L*	X
3	CAN GND	X
4	Reserved	
5	CAN SHLD (optional)	
6	GND (optional)	
7	*CAN H*	X
8	Reserved	
9	CAN V+ (optional)	
SHIELD		X

CABLES

⚠ **WARNING**
RISK OF EQUIPMENT DAMAGE
Switch off the unit before plugging or unplugging the CAN bus connector or disconnecting the wires.
Failure to follow this instruction can damage the CAN transmitter/receiver.

Cables used must be selected to respond to CAN bus specificities. Always use shielded twisted wire pairs. Deploy the CAN bus (no mesh, ring or star topology) as shown below:

Bus   **Mesh**   **Ring**   **Star**
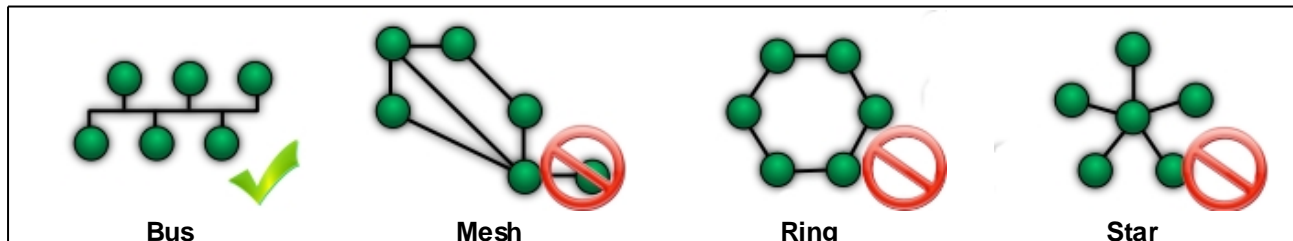
Both ends of the CAN bus must be terminated with a 120 resistor. The module has a 120 resistor for this purpose. Wiring the terminal RES to CAN H will link CAN L and CAN H with a resistor.

The next figure gives the example of three units connected through a CAN bus. Do NOT install any resistor nor link the terminal RES and CAN H together in the middle unit.
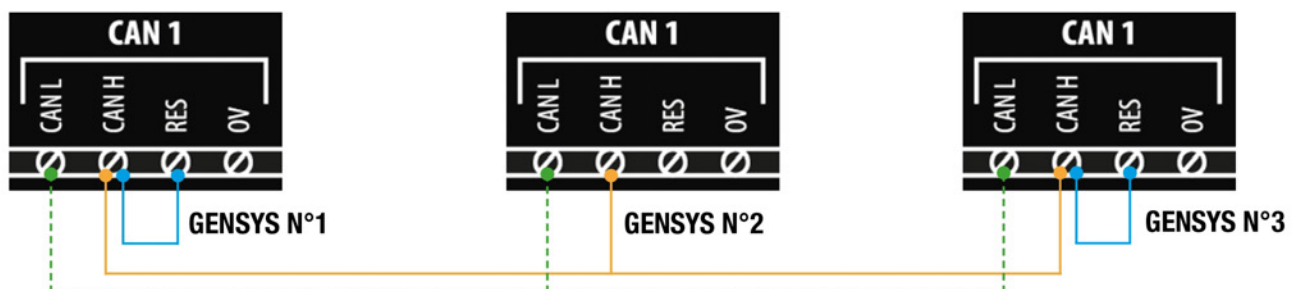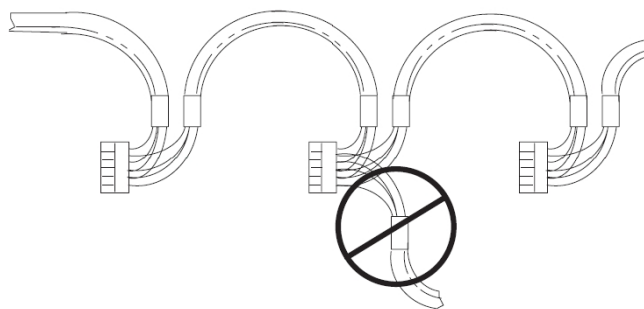
> **CRE Technology** provides a complete range of products aimed at installing your CAN bus (cords, wires, connectors…).
> Please contact your local **CRE Technology** distributor to help you to choose equipment that fits your needs.

MAXIMUM LENGTH & BIT RATE

The maximal length of a CAN bus depends mostly on the communication speed, but also on the quality of wires and connectors used.

The following table shows the maximal length of a CAN bus depending on the bit rate:

Bit rate (Kbits/s)	10	20	50	125	250	500	800
Maximal length (m)	5000	2500	1000	500	250	100	50

The next table lists the standard bit rate of each CAN protocol that can be used by a **CRE Technology** unit:

Bus	Protocol	Bit rate (Kbits/s)	Note
CAN1	**CRE-Link®**	125	Fixed.
CAN2	CANopen	125 (default)	Can be selected between 125/250/500/1000kbit/s (By *CRE Config Software* or modification by variable number).
	J1939	250 (default)	Switch automatically to the right speed when selecting an ECU type.

WEBSITE

ACCESS

MENU TREES

During navigation on the PC, press the **ESC** button to return to the parent menu of the page displayed in the browser.
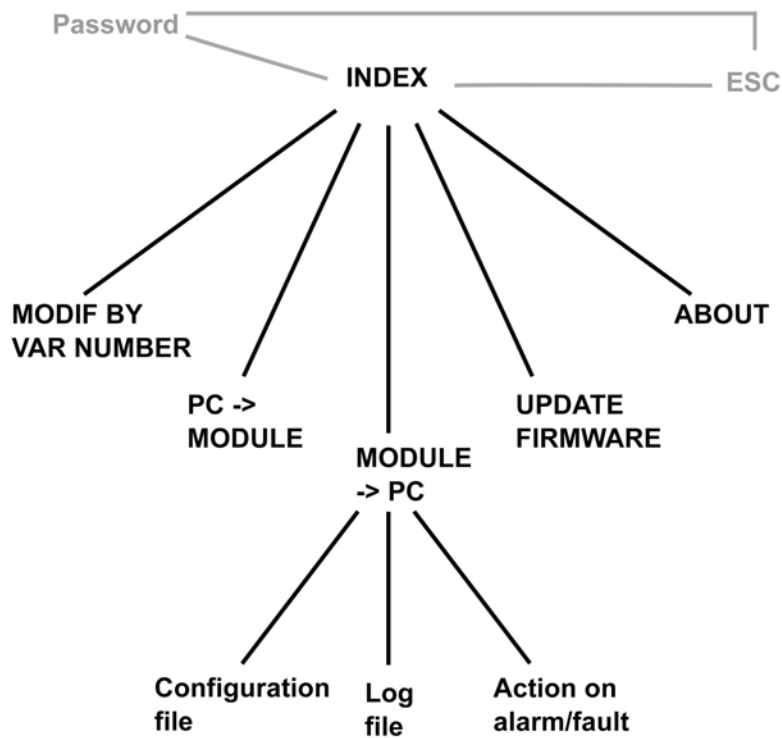
ACCESS TO THE WEBSITE

1. Connect a PC to the module via an Ethernet connector.
2. Use a web browser such as Firefox or Internet Explorer for example.
3. Enter the IP address (factory setting: http://192.168.11.1), or the module Hostname.
4. Enter the module password when the **Password** page appears (see chapter Password).

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FILE TRANSFER

ADVICE	
	USEFUL INFORMATION
	■ Adjustment tip ■ Using the module
	Failure to comply with these recommendations may cause the module to malfunction.

File transfer is only possible when the engine is stopped.

These files can be transferred from or to the module.
For this, use *CRE Config Software* or the embedded website.
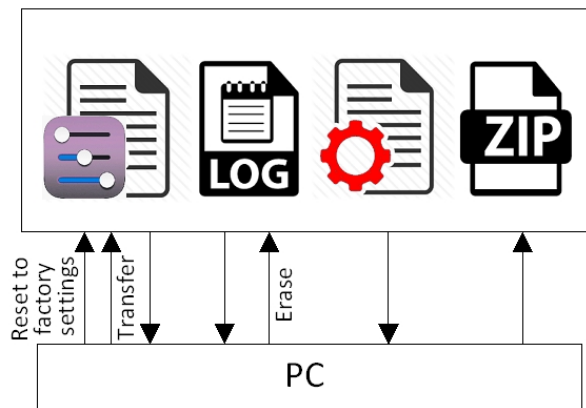
Note: CRE Technology strongly recommend using CRE Config Software to edit module settings to prevent any kind of error with manual editing in the configuration file.

FILE TRANSFER MODULE → PC

This page allows to download a file from the module to the PC:

- Configuration file.
- Log file.
- List of actions on alarms/faults.

Configuration File

To view the current module configuration in a web browser, select **Configuration File**.
In the browser, save this file in.txt format.

Data Backup File (log)

To display the module log in a web browser, select **Log file** and save this file in .txt format.

List of Actions on Alarms/Faults

By selecting "**Alarm/fault effect**", a file containing all potential alarms and faults and their usage is downloaded.

Example:

```
S/N:0114A0001
Type:A56Z0
Version:v1.00
Bootversion:v1.00
Date:28/06/15
Hour:12h25m21s


***** Alarm/fault effect *****

0 : Desactive
1 : Defaut Gen electrique
2 : Defaut Bus electrique
3 : Alarme
4 : Defaut non critique
5 : Defaut critique
6 : Help+Defaut non crit
7 : Help+Defaut Gen.Elec
8 : Statisme


Potentiel Alarm./Def.       Parametre actuel  ANSI C37-2
V00600 Etat CAN1            <-- V03052 = 8
V00602 CAN2 etat           <-- V03053 = 0
V04200 Survitesse          <-- V02352 = 3                 12
V04201 Sous vitesse        <-- V02355 = 0                 14
......
```

FILE TRANSFER PC → MODULE

This page allows you to send a configuration file, or a language file.
When the transfer operation is complete, the transfer result is displayed on the screen.

Note:

- *Before making a change to the module configuration, it is recommended to save the current configuration. File transfer is only possible when the Generator is stopped (The module must be in the "**Waiting**" power state).*

- *Reset to factory settings must be done using **CRE Config Software** (password level 2 mandatory).*

FIRMWARE UPDATE

PREREQUISITES

1. Upgrading software is done via an Ethernet connection. It is mandatory to have a PC connected to the module (Use an Ethernet cable from module to PC without using LAN).
2. Stop the Generator (The module must be in the **Waiting power** state).
3. Save the current configuration as a text file. Otherwise the default settings will be enforced (except for the Ethernet settings).
4. Disconnect all terminals, except the power supply and Ethernet connections.

Note: Be sure there is no Modbus request on the module during upgrading.

START UPGRADE

1. Connect to *CRE Config Software/System/PC transmit/receive* or to module website.
2. Select *Update firmware* and browse the archive.
3. Click on the *Update* button.
4. Alarm/fault LEDs blink and state is displayed on LCD screen.
5. Wait until *Update firmware successful* shows.
6. If needed, restore the settings from the text file previously saved.

*Note: The module will restart during the update process. Please wait for the "**Update firmware successful**" message before starting to use the module (about 2 minutes).*

APPENDICES

ANALOG VOLTAGE REGULATION (AVR)

AEM

Model	Amplitude	Offset	AVR output	AVR common	Note
R16	-	0V	8	7	AVR COMMON terminals 7 & 9/10.

BASLER ELECTRIC

Model	Amplitude	Offset	AVR output	AVR common	Note
AEC 63-7 AVC 63-4(A)	-	-	6	7	Remove the shunt between terminals 6 & 7 of the AVR.
AVC 63-12	1.0V	0V	2	3	
DECS32-15-xxx DECS63-15-xxx DECS125-15-xxx DECS300	Uses control to integrate into DECS.				

CATERPILLAR

Model	Amplitude	Offset	AVR output	AVR common	Note
DVR KVAR/PF			7	45	
VR6	1.0V	0V	3	2	
CDVR	4.5V	0V	P12.3	P12.6	

CUMMINS

Model	Amplitude	Offset	AVR output	AVR common	Note
Cosimat N	4.5V	4.5V	Mn	n	
MA329			A2(+)	A1(-)	

KIA

Model	Amplitude	Offset	AVR output	AVR common	Note
K65-12B K125-10B	1.0V	0V	2	3	

LEROY SOMER

Model	Amplitude	Offset	AVR output	AVR common	Note
D510	10V	0V	Depending on the configuration (0-10V or +/-10V)		
R230/438/448/449	1.0V	0V	Pot input +	Pot input –	Delete the shunt
R610 3F	4.5V	0V	22	23	-

MAGNELLI MOTORI

Model	Amplitude	Offset	AVR output	AVR common	Note
M40FA640A	0.35V	0V	8	6	
M40FA644A	3.0V	1.5V			

MARATHON ELECTRIC

Model	Amplitude	Offset	AVR output	AVR common	Note
DVR2010	-	-	-	-	
DVR2000E	1.5V ±10% 3V ±30%	0V	A	B	

MECC ALTE SPA

Model	Amplitude	Offset	AVR output	AVR common	Note
UVR6	2.0V	−4.5V	Pot +	Pot −	

SINCRO

Model	Amplitude	Offset	AVR output	AVR common	Note
FB			EXTPOT+	EXTPOT−	AVR potentiometer V fully counterclockwise. Delete shunt.

STAMFORD

Model	Amplitude	Offset	AVR output	AVR common	Note
MX321			A1	A2	
MX341			A1	A2	Adjust the AVR V potentiometer fully clockwise..
SX440			A1	A2	

ECU J1939

CATERPILLAR

Manufacturer [3100]	ECU [3101]	Air + Exhaust + Alternator	Oil and coolant
[8]	GENERIC [0]		
	A4E2 (C4.4 C6.6)[1]	91 515 250 157 183 168 158 247	102 105 106 172 92 513

ECU [3101]	Speed	Start/Stop	Speed selection
GENERIC [0]	x	-	-
ADEMA4E2 (C4.4 & C6.6) [1]	x	-	-

CUMMINS

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[6] $^{(1)}$	GENERIC [0]			
	QSX15G8(CM570) [1]	157 175 183 168 108	102 105 513	
	CM850 [2]			
	QSB5 (PGI 1.1) [3]	91^a 1242^b 512^a 515^a 2432^b 157^b	102 105 92^a 513 514^a	100 1208^b 110 111b
	QSB7 (PGI 1.1) [4]	174^a 182-3-4^a 247-50 168 108 97		
	QSL9 (PGI 1.1) [5]	Id+ 512^{b}515^b 184^{b}94^b 174^{b}1136^b	Id + 92^b 101^b 173^b 514^b	Id + 175^b 109^b
	QSM11 (PGI 1.1) [6]	91^a 1242^b 512^a 515^a 2432^b 175 182 250 183 168 108 97^b 247	102 105 92^a 513 514^a	100 1208^b 110 111b
	QSX15 [7]	91^a 512^a 515^a 175 182^a 250^a 183 168 108 247^a	102 105 92^a 513^a 514^a	100 110
	QSK19 (PGI 1.1) [8]	91^a 1242^b 512^{a}515^a 2432^b 94 97^b 157^{b}174^{b}182^b-3-4^{a}247-50^{b}168 108	102 105 101 92^a 513 514^a 22^a	100 1208^b 110 111b109
	QSK38 (PGI 1.1) [9] QSK50 (PGI 1.1) [10] QSK60 (PGI 1.1) [11]	91^a 1242^b 512^a 515^a 2432^b 157^b 174 175^b 94 182^{b}250^b 183 184^a 168 108 97^b	102 105 101 513 514^a 22^a 92^a	100 1208^b 110 111b 109

1. ECU Cummins can contain different firmwares depending on their source:
    a) Industrial model only
    b) G Drive only

2. Cummins 109G ECU may not support J1939 speed control. ECU with Cummins G Drive firmware should support J1939 speed control.

ECU [3101]	Speed	Start/Stop	Speed selection
GENERIC [0]	x	x	x
QSX15-G8 (CMS570) [1]	x	x	x
CM850 [2]	x	-	x
QSB5 (PGI 1.1) [3]	x	-	x
QSB7 (PGI 1.1) [4]	x	-	x
QSL9 (PGI 1.1) [5]	x	-	x
QSM11 (PGI 1.1) [6]	x	-	x
QSX15 (CMS570) [7]	x	x	x
QSK19 (PGI 1.1) [8]	x	-	x
QSK38 (PGI 1.1) [9]	x	-	x
QSK50 (PGI 1.1) [10]	x	-	x
QSK60 (PGI 1.1) [11]	x	-	x

DETROIT DIESEL

Manufacturer [3100]	ECU [3101]	Fuel and ECU	Air + Exhaust + Alternator	Oil and coolant
[11]	GENERIC [0]			
	DDEC III [1]			
	DDEC IV [2]	91 512-5 188-9 174 94 157 171 182 247-50 183-4 166-8 108 158	52 102 22 101 105 106 172 107 173 176 92 513 514	98 99 100 175 109 110 111 112
	DDEC X [3]	91 512 2432 188 189 166 174 94 97 157 171 182 250 183 18 168 1136 108 158 247		

ECU [3101]	Speed	Start/Stop	Change speed
GENERIC [0]	-	-	-
DDEC III [1]	-	-	-
DDEC IV [2]	-	-	-
DDEC X [3]	-	-	-

DEUTZ FAHR

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[9]	GENERIC [0]			
	EMR [1]	91 512 188 183 247	102 92 513	100 110
	EMR2 [2]	91 512 183-4-8 174 158 108 247	102 105 92 513	98 100 110 111
	EMR3 [3]	91 512 2432 183 174 94 111 158 108 247	107 102 105 92 513 514	100 110 111

ECU [3101]	Speed	Start/Stop	Speed change
GENERIC [0]	x	-	-
EMR [1]	x	-	-
EMR2 [2]	x	-	-
EMR3 [3]	x	-	-

IVECO

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[4]	GENERIC [0]			
	NEF (EDC) [1]	91 512-5 2432 183-4 250 97 174 158 108 247	102 105 173 81 92 513 514	100 175 110 100 110
	CURSOR [2]			
	CURSOR9 (EDC) [3]			
	CURSOR11 [4]			

ECU [3101]	Speed	Start/Stop	Speed change
GENERIC [0]	x	-	-
NEF (EDC) [1]	x	-	-
CURSOR [2]	x	-	-
CURSOR9 (EDC) [3]	x	-	-
CURSOR11 [4]	x	-	-

JOHN DEERE

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[7]	GENERIC [0]			
	JDEC [1]	91 512 515 2432 182 250 183 184 94 157 174 158 247	107 52 106 102 105 101 173 176 81 92 513 514	98 100 175 109 110 111 112

ECU [3101]	Speed	Start/Stop	Speed change
GENERIC [0]	x	-	-
JDEC [1]	x	-	-

MTU

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[10] Voir Appendice MTU	GENERIC [0]			
	ADEC-2000 [1]	94 158 247 171 174 188 189 166 1136 1387 1388 247	52 102 2433 2434 1124-5-6	100 110 175
	ADEC-4000 [2]			
	ECU8 Smart conn [3]	515 94 158-66 182-3-8-9 247-50 1136	105 3563	100 109 110
	ECU8 + SAM [4]			

ECU [3101]	Speed	Start/Stop	Speed adjustment
GENERIC [0]	-	x	x
ADEC-2000 [1]	-	x	x
ADEC-4000 [2]	-	x	x
ECU8 + Smart Connect [3]	x	x	x
ECU8 + SAM [4]	-	x	x

ADEC

The SAM (Service and Automation module) is associated with the ADEC 2000 or ADEC 4000. The set is referred to as the ECU7.

Disconnect X13 to turn off the power. Insert the CCB2 card into SAM slot #3.

The ADEC ECU, SAM and the module communicate via 2 CAN buses: a CAN bus between the SAM and the ADEC with a proprietary protocol, a CAN bus between the module and the SAM with the J1939 protocol. The SAM includes a termination resistor.
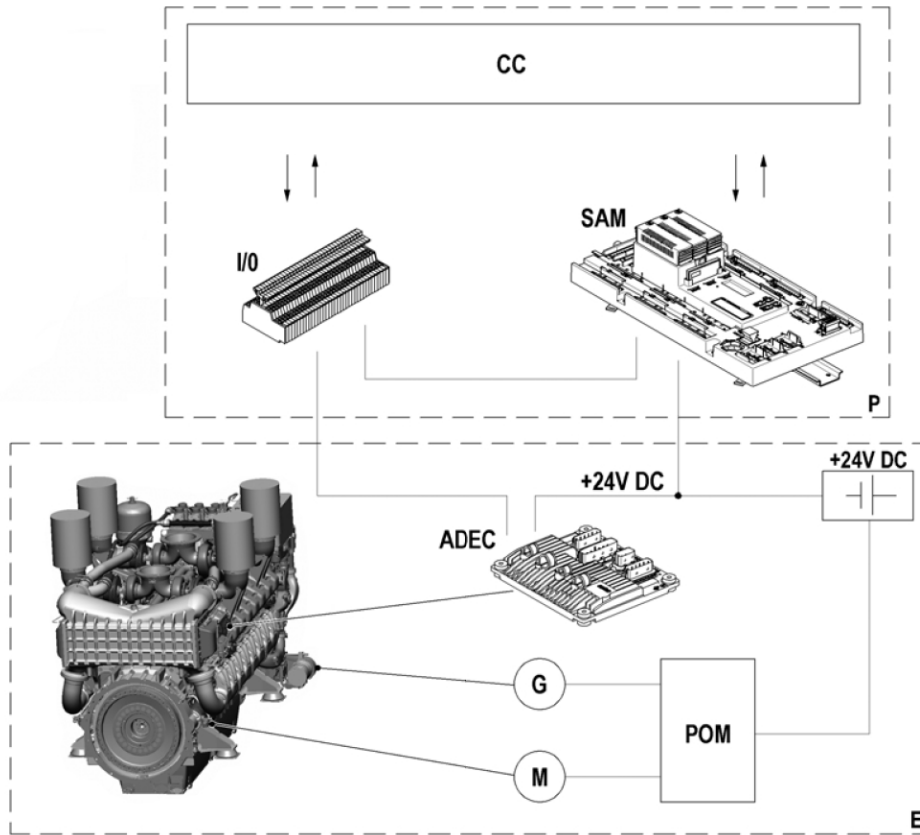
The ADEC controls, among other things, the engine speed.

Typical ADEC and SAM connection:

Signal	ADEC X1	Cabinet	SAM X23 connecteur
CAN High	33	X7-2	2
CAN Low	18	X7-1	1
CAN ground	34	X7-3	3
Speed out +		X2-	
Speed out –		X2-	

ECU8

Smart Connect is used for:

- select the origin of the speed control via an 8 position selector
- set droop frequency and slope
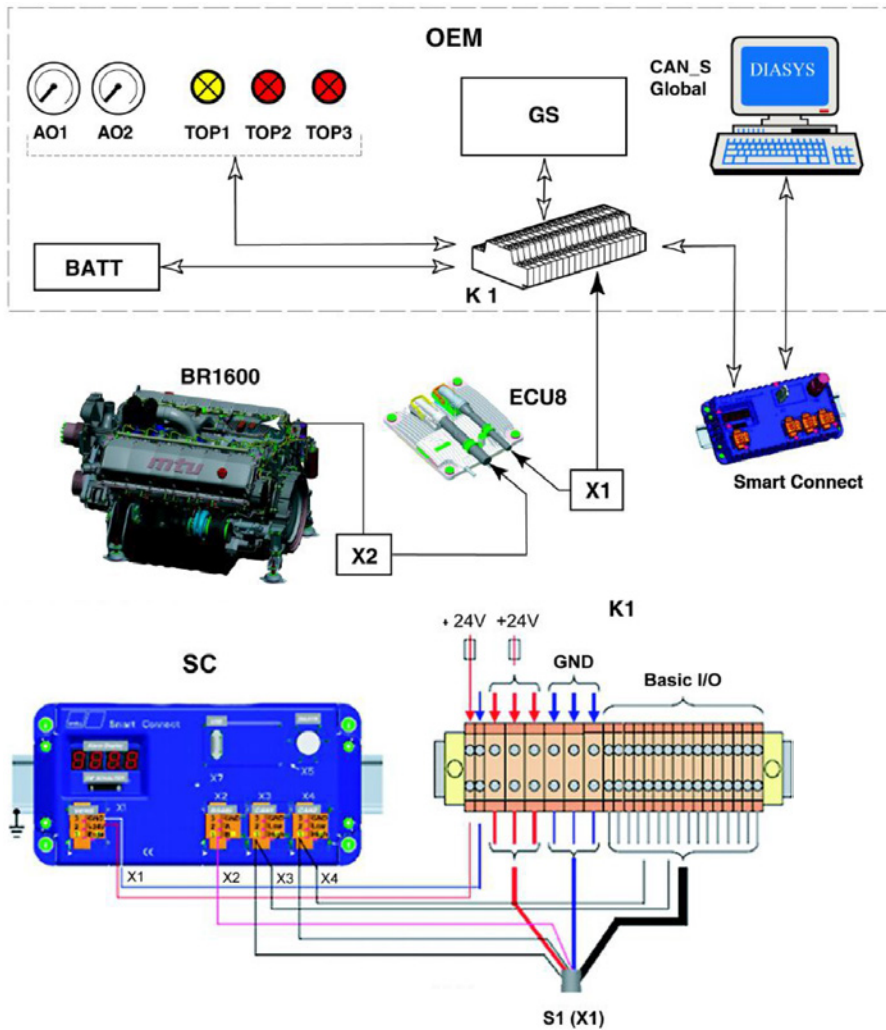
Via the K1 connection box, the ECU8, the Smart Connect and the module are connected: a CAN bus between the Smart Connect and the ECU8 with a proprietary protocol, a CAN bus between the Smart Connect and the module with the J1939 protocol. X4 is the connector supporting the J1939 to connect to the module.
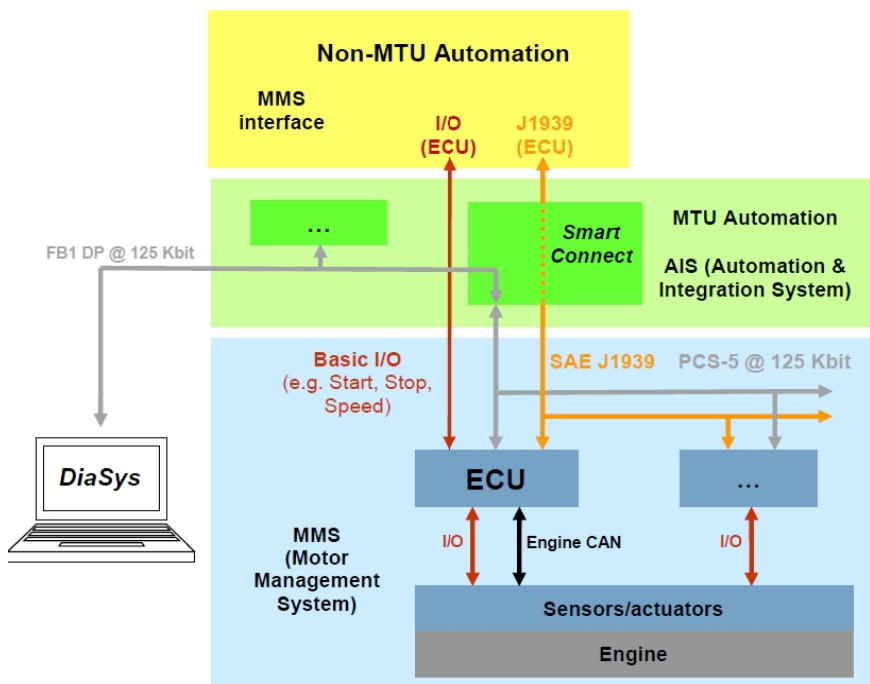
PERKINS

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[3]	GENERIC [0]			
	1100 A4E	91 515 188 174 250 183 247	102 105 92 513	100 110

ECU [3101]	Speed	Start/Stop	Speed change
GENERIC [0]	x	-	-
1100 (A4E)	x	-	-

SCANIA

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
	GENERIC [0]			
	S6 (DC16-45A) [1]	91 512 188 183 184 247	102 105 92 513 514	100 110 111

ECU [3101]	Speed	Start/Stop	Speed selection
GENERIC [0]	x	x	-
S6 (DC16-45A) [1]	x	x	-

VOLVO PENTA

Manufacturer [3100]	ECU [3101]	Fuel & ECU	Air + Exhaust + Alternator	Oil and coolant
[2]	GENERIC [0]			
	EMS2 [1]	94 182 250 247	102 172	100 175 110
	EDC4 [2]	Same as Deutz EMR2	Same as Deutz EMR2	Same as Deutz EMR2
	94xGE [3] 124xGE [4]	91 512 188 1013 182 94 250 183 97 158 247	102 105 92 513	100 175 110 111
	1640-2GE [5]	91 512 188 1013 182 94 250 183 158 247	102 105 92 513	100 175 110 111
	1643GE [6]	91 512 188 1013 182 94 250 183 158 247	102 106 107 173 92 513 514	100 175 110 111
	D6 [7] D7 [8]	91 512 188 1013 182 94 250 183 97 158 247	102 105 92 513	100 110 111
	D13GE-Tier3 [9]	91 512 188 1013 182 94 250 183 97 158 247	102 105 92 513	100 175 110 111

ECU [3101]	Speed	Start/Stop	Speed change
GENERIC [0]	x	-	-
EMS2 [1]	x	x	x (Multi-speed engine)
EDC4 [2]	x	-	-
94xGE [3]	x	x	x
124xGE [4]	x	x	-
1640-2GE [5]	x	x	x
1643GE [6]	x	x	x
D6 [7]	x	x	-
D7 [8]	x	x	-
D13GE-Tier3 [9]	x	x	x

ANALOG SPEED REGULATION

BARBER COLMAN

Model	Amplitude	Offset	Speed output	Speed common	Note
With analog input	0.5V	0V	ILS input	4V	
DPG 2201	0.5V	0V	ILS signal	ILS+2.5V	The parameters Amplitude and offset depend on the connection
			ILS signal	Digital supply(+5V)	
			ILS signal	BAT-	

CUMMINS

Model	Amplitude	Offset	Speed output	Speed common	Note
ECM for QSK23 / QSK40 / QSK45 / QSX15 / QSK 60	2.5V	0V	11 [1]	06 (5V)	
EFC	1.5V	0V	8	9	See diagram below
ECM (QST30)			18	15 (7,75V)	

[1] *Barber Colman frequency bias input.*

The very high sensitivity of the Cummins EFC model, requires connecting it to the module as shown below. The resistors must be as close as possible to the regulator terminals. This way, the module will have a better speed control.
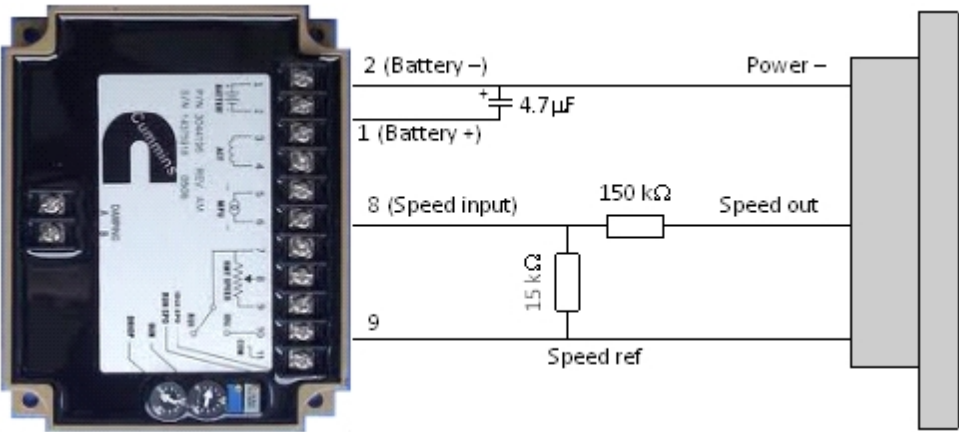
DEUTZ FAHR

Model	Amplitude	Offset	Speed output	Speed common	Note
EMR	2V	2.5V	24	25	+/- 1.5 Hz not to reach the overspeed of the EMR

HEINZMANN

Model	Amplitude	Offset	Speed output	Speed common	Note
E6			B3		
KG6 / System E6	2.5V	2.5V	E3	A3	
PANDAROS DC6	2V	2.5V	B3	A3	

JOHN DEERE

Model	Amplitude	Offset	Speed output	Speed common	Note
JDEC[1]	2V	2.5V	L	C	2 differents wiring for the same controller
			G2	5V[2]	

[1] LEVEL III [2] (ref. speed) 999.

MTU

Model	Amplitude	Offset	Speed output	Speed common	Note
MDEC	4V	0V	8	36 & 7 (5V)	

PERKINS

Model	Amplitude	Offset	Speed output	Speed common	Note
ECM 1300	2V	2.5V	30	5V	Connect Terminal 2 and 12 to activate external control

VOLVO PENTA

Models	Amplitude	Offset	Speed output	Speed common	Notes
EDC IV EDC III	1.5V	3V	Pot. signal		

WOODWARD

WOODWARD

Model	Amplitude	Offset	Speed output	Speed common	Note
- 2301A/D ILS+speed - (Without U&I)	0V -	3V -	10 25	11 26	Shunt 14-16 Shunt 26 (com) on 0V
2301D	-	-	-	-	
2301A Speed only	4.5V	2.5V	15	16	16 connected on 0V
EPG System P/N 8290-189 P/N 8290-184	2.5V	0V	11 (0.6V)	nc	Remove shunt between Terminal 11 and 12

TROUBLESHOOTING

To get a history of alarms-faults, stop the Generator, connect to *CRE Config Software/System/PC transmit/receive/Download log file from module*, and click **Download**.

To restore factory settings into *CRE Config Software*, navigate to *CRE Config Software/System/PC transmit/receive/Reset factory settings*, and click **Reset**.

Message "Sensor lost" fault on start
In *Configuration/Engine/Control settings*, check that the speed measurement origin is accurate (Speed measure = magnetic or alternator or J1939).
If it originates in the alternator, check the voltage presence on terminals Gen L1, L2, L3, N.
If it originates in a magnetic pick-up, check that the engine speed increases up to 1500rpm.
If the speed does not reach this value on time (the engine stops), increase the "sensor lost" time-out [4203] (default value 5.0s). This time-out is set in *CRE Config Software/Configuration/Time-out and delays*.

Message "Oil pressure" fault on start
Check the related connections.
Check the related settings: mainly, delays and directions of digital/analog inputs.

Message "Isolated product"
Check the related connections, including the one of internal resistor (jumper).
Check the related settings: count of generators, number of each Generator.

Message "Missing product"
Check the other products. One of them is not supplied or disconnected.

Message "Missing master"
Check the **MASTER COMPACT**/**MASTER 1B COMPACT**/**BTB COMPACT** products. One of them is not supplied or disconnected.

Message "Unknown product"
Check the other products. One of them is not compatible.

Message "Mismatch version"
Check the other products. One of them uses a version which is not compatible.

No J1939 communication
Check that the ECU is powered.
Check that the configuration correspond to the engine/ECU.
Check that the wiring is correct.
Power cycle module and ECU.
Check that the ECU and its settings are consistent with the J1939 standard.
Note: Some ECUs do not provide information if the engine is stopped. Try starting the engine.

Message "Breaker" fault
Check the type of breaker against the selection in *CRE Config Software/Configuration/Outputs*.
Stop the other generators.
Make sure the digital input Gen breaker feedback is connected.

Start the generators in **MAN** mode (or just press [TEST]). Make sure the breaker LED turns on (green);

otherwise, increase the "breaker feedback" time-out [2304] (default value 5.0s).

The engine starts but runs above/below nominal speed.
Check the wiring.
Check the fuel supply.
Check the speed output.

Cannot connect with PC
Consider deactivating the firewall and adding an Anti-virus exception.
Check the network wiring, see Network.

Error Messages When Transferring a File to the Module

Note: "…" indicate a variable number, a label number or a text number according the error message. It will help you to locate your error in your configuration file.

ERROR 001: Only when GENSET is STOP

File transfer between computer and the unit should be done only when all conditions below are met i.e. when engine is stopped.

ERROR 002: Unknown file type

The file type sent is unknown. Check the selected file.

ERROR 004: Write data or checksum error

ERROR 008: Update failed. Please restart update.

Writing memory error during update process. Restart module update.

ERROR 011: No write right on variable ….

Access to this variable is not allowed. Only parameter can be modified.

ERROR 012: No write right on label ….

Access to this label is not allowed. Check your configuration file.

ERROR 013: Text …. doesn't exist.

Access to this text is not possible because it does not exist. Check compatibility of the version/type of the module and the configuration file.

ERROR 014: No write right on …. Unit

Access to this unit is not allowed. Check your configuration file.

ERROR 015: Need password 2 to write on …. Variable

Actual password is not sufficient to access such configuration/control level.

ERROR 017: Configuration not allowing …. variable value

The actual setting of the module does not allow modifying this parameter with this value. Check your configuration file and the value of the parameter before sending again your configuration file.

ERROR 018: Variable …. out of range

The value of the parameter is out of range. Check your configuration file before sending again.

ERROR 019: Wrong value for …. variable

An unexpected value has been detected on this parameter. Check the value of the parameter before sending again.

Ex: a text character has been detected instead of a number.

ERROR 020: Unknown language file

The language file sent does not correspond to a language file for the module. Check the selected language file.

ERROR 021: Too many languages already downloaded

The maximum number of language supported by the module has been reached.

ERROR 022: Wrong language file version

The language file version is above the module version. Upgrade your module with the latest version available or catch the language file compatible with your module version.

ERROR 023: Label …. does not exist.

Modifying this label is not allowed. Check the label number before sending the configuration file again.

ERROR 024: Unit …. does not exist.

Modifying this unit is not allowed. Check the unit number before sending the configuration file again.

ERROR 025: Wrong accuracy value on …. (0,1,2 or 3)

The value of the accuracy is out of range. The value must be between 0 and 3.

ERROR 026: Wrong unit value on …. (from 0 to xxx)

The value of the unit is out of range. The value must be between 0 and xxx.

ERROR 027: No header in language file

No header or wrong header of the language file. Check the selected language file before send it again.

ERROR 028: No filename found or too long

No filename or filename is too long. The maximum size of a filename is 40 characters. Rename file and send it again.

ERROR 029: Wrong accuracy on parameter ….

The value of the modified parameter has not the right accuracy. Check the value of your parameter before sending again your configuration file.
Ex: Below, it is missing the digit a the tenth 5.0**0**
V02205   5.0_   ESG amplitude +000.00+010.00V

*ERROR 030: Data out of range in **Easy Flex**®*

The result of the operation is outside the range value of the output variable.

ERROR 031: Invalid TXT file version

The TXT file is not valid because it comes from a non-compatible firmware.

For example: TXT file from 1.xx version are only compatible with product using 1.xx version. TXT file from 2.xx version are only compatible with product using 2.xx version. Etc...

Warning

Warnings do not prevent the module to work but inform the user of a potential problem in its configuration file.

WARNING 001: Wrong size of label ….

WARNING 002: Wrong character entered in label ….

WARNING 003: Wrong size of text ….

WARNING 004: Wrong character entered in text ….

These advices indicate that entered labels/texts are too long or that a character is not supported by the module.

Invalid characters will be replaced by "?". The valid characters are the followings:

> *0123456789.-*
>
> *ABCDEFGHIJKLMNOPQRSTUVWXYZ*
>
> *!#$()*+/:;=[]^_?*
>
> *abcdefghijklmnopqrstuvwxyz*

The maximum size of a label is 14 characters and 28 characters for a text.

Modify labels/texts according to the rules above.

WARNING 005: Too many errors...

All errors/warnings messages could not be displayed. There are probably other problems in your configuration file. Solve displayed problems and send your configuration file again in order to display the additional error/warning messages.

WARNING 006: No unit specify on unit ….

WARNING 007: No value specify on parameter ….

WARNING 008: No text specify on text ….

WARNING 009: No label specify on label ….

These warnings indicate that no value has been filled inside the configuration file for a unit/parameter/text or label. The values will stay unchanged.

WARNING 011: Variable …. does not exist.

The parameter does not exist. Check compatibility of the version/type of the module and the configuration file.

STANDARDS FOR GENERATOR

ISO 8528-1 CLASSES AND POWER DESIGNATIONS

Various load-duration profiles are defined. Here is the correspondence between classes and powers:

Run	ISO designation	Conditions	Power designation	Conditions	Controller
Unlimited # of hours	PRIME RATING	Allowable average power output over a 24-hour period is 70% of the prime rating. 10% overload.	Prime Running Power (changing load).	Overload: max: 1 h over a 12-h period total: 25 h/ year.	**GENSYS COMPACT PRIME**
	CONTINUOUS RATING (base load rating)		Continuous operating power.	Fixed load.	**ACGEN2.0** (no paralleling)
Limited # of hours	STANDBY RATING	Maximum 200 hours per year. Allowable average power output over a 24-hour period is 70% of the standby rating. No overload.	Emergency stand-by power (changing load).	25h/ year at 100%. No overload 200 h/year at 80%	**TCGEN2.0** (no paralleling)
	MISSION-CRITICAL RATING	Maximum 500 hours per year. Allowable average power output is 85% of the nameplate rating.	Limited-time running power.	Fixed load.	

ISO 3046

- Part 1: Power: DBR (intermittent) and MCR (Max Continuous Rating).
  The **COMPACT RANGE** offers the possibility to activate air conditioning and a cooling fan.
- Part 4: Speed governor

Governor performance classes	G1	G2	G3	G4
Speed droop	8%	5%	3%	By agreement
Regulation stages	P, PI or PID	P, PI or PID	PI or PID	PI or PID

NEC700 AND NFPA110

Start in static paralleling to meet the 10s time limit (NEC700). Type 10 as per NFPA110.
According to NFPA110, Black start is where the stored energy system has the capability to start the prime mover without using energy from another source. Such a Generator can be used to start a turbine.
NFA110 defines classes according to fuel tank autonomy; it requires that emergency power supply has
a manual remote stop (A5.6.5.6). NFA110 fault list includes 15 signals (warning or shut-down).

CERTIFICATIONS

DECLARATION OF CONFORMITY

A56_SYNCH_90020-E-EN

$C \in$ DECLARATION UE DE CONFORMITE
EU DECLARATION OF CONFORMITY

Cette Déclaration de Conformité est conforme à la norme européenne EN17050-1 :2004 "Critères généraux pour les déclarations de conformité des fournisseurs".	This Declaration of Conformity is suitable to the European Standard EN 17050-1:2004 "General criteria for supplier's declaration of conformity".

Nous, We, CRE Technology

Adresse du fabricant :
Manufacturer's Address: 130, Allée Charles Victor NAUDIN
Zone des Templiers - Sophia Antipolis
06410 BIOT
FRANCE

déclarons sous notre seule responsabilité, que les produits délivrés:
declare under our sole responsibility that the products as originally delivered:

Nom du produit :
Product Name: SYNCHRO Compact HMI
SYNCHRO Compact CORE

Référence produit :
Regulatory Model: A56-SYNCHRO-00-x (HMI)
A56-SYNCHRO-10-x (CORE)

Version(s) produit :
Product Version: All

satisfont aux exigences essentielles des Directives Européennes ci-dessous et portent en conséquence le marquage CE :
Comply with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:
    Low Voltage Directive 2014/35/EU
    EMC Directive 2014/30/EU

CEM/EMC	Standard	Date	Description
	EN61326-1 CISPR11 EN55011 EN55022	2013 2010 + A1 (2011) 2012	EMC general requirements – Industrial environment - class A
	EN61000-4-2	2009	Electrostatic Discharges
	EN61000-4-3	2006 + A2 (2010)	Radiated, RF, electromagnetic field immunity test
	EN61000-4-4	2013	Electrical Fast Transients
	EN61000-4-5	2014	Surge immunity test
	EN61000-4-6	2014	Conducted disturbances immunity
	EN61000-6-2	2006	Generic standards. Immunity for industrial environments
	EN61000-6-4	2010	Generic standards. Emissions for industrial environments
Sécurité/Safety	Standard	Date	Description
	EN60950	2013	Information technology equipment. Safety. General requirements

Cette Déclaration de Conformité s'applique aux produits listés ci-dessus et placés sur le marché après le:
This DoC applies to above-listed products placed on the market after:

June 28, 2018

SIGNATURE

BIOT – France for CRE technology
Responsable Qualité
Quality Manager

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ISO CERTIFICATE - 2015

afaq
AFNOR CERTIFICATION

Certificat
Certificate

N° 2009/33725.3

AFNOR Certification certifie que le système de management mis en place par :
AFNOR Certification certifies that the management system implemented by:

CRE TECHNOLOGY

pour les activités suivantes :
for the following activities:

CONCEPTION, FABRICATION, FORMATIONS ET SERVICES ASSOCIES
A LA COMMERCIALISATION DE PRODUITS DE CONTROLES ET DE PROTECTION
POUR LES GROUPES ELECTROGENES.

*DESIGN, MANUFACTURING, TRAINING & SERVICES RELATED TO THE SALE
OF CONTROL AND PROTECTION PRODUCTS FOR POWER GENERATORS.*

a été évalué et jugé conforme aux exigences requises par :
has been assessed and found to meet the requirements of:

ISO 9001 : 2015

et est déployé sur les sites suivants :
and is developed on the following locations:

130 Allée Charles Victor Naudin   Sophia Antipolis   FR-06410 BIOT

Ce certificat est valable à compter du (année/mois/jour)   **2017-12-12**   Jusqu'au   **2020-12-11**
This certificate is valid from (year/month/day)   *Until*

Franck LEBEUGLE
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SOFTWARE VARIABLES

SOFTWARE

VARIABLES

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List of variables

A56_SYNCHRO_90020-E-EN

Configuration

Power plant

General power plant

Variable	Number of generator (2000)
Unit	-
Min	1
Max	32
Init	1
Description	Number of generator on the power plant. This parameter is used for the CAN communication between products.

Variable	My number (2001)
Unit	-
Min	1
Max	32
Init	1
Description	Generator number. This parameter is the ID of the product used for the CAN communication between products. It must be different on each product of the power plant.

Variable	Dead bus management (2002)
Unit	-
Min	0
Max	1
Init	1
Description	Deab bus management (0 : Off, 1 : On). If this parameter is disabled, the product will close the breaker immediately if there is no voltage on the bus bar. If this parameter is enabled, the product will "discuss" with the others products (CAN communcation) to avoid a simultaneously closure of the breakers.

Variable	Voltage system (2003)
Unit	-
Min	0
Max	2
Init	2
Description	This setpoint is used to select the alternator voltage architecture. 3 setpoints can be used : - Single phase (value 0) : Connection of 1 active phase wiring and 1 neutral wiring for generator and for Mains. - biphases 180° (value 1) : Connection of 2 active phases wiring and 1 neutral wiring for generator and for Mains. - three phases 180° (value 1) : Connection of 3 active phases wiring and 1 neutral wiring for generator and for Mains. If the neutral wiring is not connected , the product will internally recalculate a virtual one.

A56_SYNCHRO_90020-E-EN

Variable	Phase control (2805)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint is used to select a protection if the module detects a wrong voltage apply on the product, if triphase system is set, and you apply a biphase system, this protection will detect it. Internally, it is a phase voltage detection. 6 setpoints can be used : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.

Generator

Generator

Variable	Nominal voltage (2102)
Unit	V
Min	0
Max	65 535
Init	400
Description	This setpoint adjusts the nominal voltage U (for phase-phase value). All the electrical protections for U on % will be calculated around this nominal value. For low voltage application (400VAC, 440VAC, 480VAC,etc...) or High Voltage application (20.000 VAC, 33.000VAC, etc ..), this setpoint must be adapted.

Variable	PT ratio (2100)
Unit	-
Min	0.00
Max	655.35
Init	100
Description	This setpoint adjusts the PT ratio to adapt alternator voltage measurement on the module. This setpoint is calculated with Bus Voltage / voltage measurement on the controller. Example : Voltage on bus 20.000Vac / voltage on controller 100 Vac : value of PT ratio = 20.000/100 = 200. This PT ratio can be calculated or indicated on the step down measurement transformer.

AVR control

Variable	AVR signal output inversion (2254)
Unit	-
Min	0
Max	1
Init	0
Description	This setpoint adjusts the "AVR signal output inversion". For most of AVR brand connection : - The module increase the AVR output signal to increase the alternator voltage (Voltage external setpoint). - 0 to +10Vdc : increase the altenator voltage. With the variable : "AVR signal output inversion" activated, the correction will be in opposite action : - 0 to +10Vdc : decrease the altenator voltage.

Variable	AVR Amplitude (2251)
Unit	V
Min	0.00
Max	10.00
Init	1000
Description	This setpoint adjusts the "AVR amplitude". This setpoint is used in case of analog voltage control. This amplitude must be set to obtain a maximum and linear amplitude of 8% (correction until 432Vac for 400Vac application). 10% set on the product is equivalent of a correction of 1Vdc from controller to AVR.

Variable	AVR Offset (2252)
Unit	V
Min	−10.00
Max	10.00
Init	0
Description	This setpoint adjusts the "AVR offset". This setpoint is used in case of analog voltage control. This offset must be set to obtain the nominal voltage at the alternator, in case of no correction. 10% set on the product is equivalent of a correction of 1Vdc from controller to AVR.

Variable	Dead Band (3651)
Unit	%
Min	0.00
Max	100.00
Init	100
Description	This setpoint adjusts the "Dead Band" in case of voltage control by pulses. This dead band in % determinated the area around nominal voltage, with no actions regarding +/- pulses output. If nominal voltage 400Vac, dead band 1 %. No pulse output between 396Vac to 404Vac

Variable	Pulse Divider (3653)
Unit	-
Min	0
Max	100
Init	5
Description	This setpoint adjusts the "pulse divider" in case of voltage control by pulses. This pulse divider is able to change the response time of voltage control by pulses. If you increase the value of pulse divider, you will decrease the time of pulse active.

Bus

Mains

Variable	PT ratio (2150)
Unit	-
Min	0.00
Max	655.35
Init	100
Description	This setpoint adjusts the PT ratio to adapt voltage measurement on the module. This setpoint is calculated with Voltage / voltage measurement on the controller. Example : Voltage on bus/Mains/source 20.000Vac / voltage on controller 100 Vac : value of PT ratio = 20.000/100 = 200. This PT ratio can be calculated or indicated on the step down measurement transformer.

Variable	Nominal voltage (2152)
Unit	V
Min	0
Max	65 535
Init	400
Description	This setpoint adjusts the bus/mains nominal voltage U (for phase-phase value). All the electrical protections for U on % will be calculated around this nominal value. For low voltage application (400VAC, 440VAC, 480VAC,etc...) or High Voltage application (20.000 VAC, 33.000VAC, etc ..), this setpoint must be adapted.

Variable	Nominal Frequency (2153)
Unit	Hz
Min	0.00
Max	100.00
Init	5000
Description	This setpoint adjusts the bus/mains nominal frequency. All the electrical protections for F on % will be calculated around this nominal value. For industrial application, 50 or 60 Hz, this setpoint must be adapted.

Prime mover

Speed setting

Speed measure

Variable	Number of poles pair (2202)
Unit	-
Min	0
Max	20
Init	2
Description	pole pair number of your alternator. It will be used to measure the speed of your engine.

Variable	Speed setpoint (2207)
Unit	RPM
Min	0
Max	10 000
Init	1500
Description	Enter the instruction of speed has to respect. The Engine do not exceed this set point. For an electricity network of 50Hz put 1500 rpm and for a electricity network of 60Hz put 1800 rpm.

Speed governor control

Variable	Speed output inversion (2212)
Unit	-
Min	0
Max	1
Init	0
Description	Speed output inversion. Allow a reversing of wiring (not physical).

Variable	Amplitude (2205)
Unit	V
Min	0.00
Max	10.00
Init	1000
Description	ESG gain (speed output).

Variable	Offset (2206)
Unit	V
Min	−10.00
Max	10.00
Init	0
Description	ESG offset (speed output). When the engine is at nominal speed, the offset need to be parameter to have 50Hz or 60Hz (It depends on your electrical installation).

Variable	Dead band (3650)
Unit	%
Min	0.00
Max	100.00
Init	100
Description	This setpoint adjusts the "Dead Band" in case of speed control by pulses. This dead band in % determinated the area around nominal frequency with no actions regarding +/- pulses output. If nominal frequency 50Hz, dead band 1 %. No pulse output between 49,5Hz to 50,5Hz

Variable	Pulse divider (3652)
Unit	-
Min	0
Max	100
Init	5
Description	This setpoint adjusts the "pulse divider" in case of speed control by pulses. This pulse divider is able to change the response time of speed control by pulses. If you increase the value of pulse divider, you will decrease the time of pulse active.

J1939

J1939 Prime mover selection

Variable	Manufacturer (3100)
Unit	-
Min	0
Max	32
Init	0
Description	Choose the Manufacturer of you engine. If the manufacturer is not in the list, choose "Generic".

Variable	ECU type (3101)
Unit	-
Min	0
Max	32
Init	0
Description	Choose the model of your ECU. If your ECU is not in the list, choose "Generic".

Protections

Generator protections

Over/Under frequency

Over frequency protection

Variable	Threshold (2400)
Unit	%
Min	0.0
Max	200.0
Init	1050
Description	Over-frequency Generator Protection Threshold

Variable	Timer (2401)
Unit	s
Min	0.0
Max	999.9
Init	300
Description	Timer acceptance before protection activation when Generator Frequency has reached the over-frequency protection threshold

Variable	Control (2402)
Unit	-
Min	0
Max	7
Init	1
Description	Control selection when Generator Over-frequency protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Under frequency protection

Variable	Threshold (2403)
Unit	%
Min	0.0
Max	200.0
Init	900
Description	Under-frequency Generator Protection Threshold

Variable	Droop (frequency) (2204)
Unit	%
Min	0
Max	20
Init	2
Description	Droop (frequency). The steeper the slope, the more the frequency will drop on an increase in kW A slope that is too shallow, on the other hand, will give an imprecise distribution.

Variable	Amplitude (2205)
Unit	V
Min	0.00
Max	10.00
Init	1000
Description	ESG gain (speed output).

Over frequency protection 2

Variable	Threshold (2436)
Unit	%
Min	0.0
Max	200.0
Init	1100
Description	Over-frequency Generator Protection Threshold 2

Variable	Timer (2437)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer 2 acceptance before protection activation when Generator Frequency has reached the over-frequency protection threshold

Variable	Control (2438)
Unit	-
Min	0
Max	7
Init	0
Description	Control 2 selection when Generator Over-frequency protection become active.The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Under frequency protection 2

Variable	Threshold (2439)
Unit	%
Min	0.0
Max	200.0
Init	900
Description	Under-frequency Generator Protection Threshold 2

Variable	Timer (2440)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer 2 acceptance before protection activation when Generator Frequency has reached the Under-frequency protection threshold

Variable	Control (2441)
Unit	-
Min	0
Max	7
Init	0
Description	Control 2 selection when Generator Under-frequency protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Over/under voltage

Over voltage protection

Variable	Threshold (2406)
Unit	%
Min	0.0
Max	200.0
Init	1100
Description	Over-voltage Generator Protection Threshold

Variable	Timer (2407)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer acceptance before protection activation when Generator voltage has reached the over-voltage protection threshold

Variable	Control (2408)
Unit	-
Min	0
Max	7
Init	1
Description	Control selection when Generator Over-voltage protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Under voltage protection

Variable	Threshold (2409)
Unit	%
Min	0.0
Max	200.0
Init	900
Description	Under-voltage Generator Protection Threshold

Variable	Timer (2410)
Unit	s
Min	0.0
Max	999.9
Init	200
Description	Timer acceptance before protection activation when Generator voltage has reached the Under-voltage protection threshold

Variable	Control (2411)
Unit	-
Min	0
Max	7
Init	0
Description	Control selection when Generator Under-voltage protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Over voltage protection 2

Variable	Threshold (2442)
Unit	%
Min	0.0
Max	200.0
Init	1100
Description	Over-voltage Generator Protection Threshold 2

Variable	Timer (2443)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer 2 acceptance before protection activation when Generator voltage has reached the over-voltage protection threshold

Variable	Control (2444)
Unit	-
Min	0
Max	7
Init	0
Description	Control 2 selection when Generator Over-voltage protection become active.The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Under voltage protection 2

Variable	Threshold (2445)
Unit	%
Min	0.0
Max	200.0
Init	900
Description	Under-voltage Generator Protection Threshold 2

Variable	Timer (2446)
Unit	s
Min	0.0
Max	999.9
Init	200
Description	Timer 2 acceptance before protection activation when Generator voltage has reached the Under-voltage protection threshold

Variable	Control (2447)
Unit	-
Min	0
Max	7
Init	0
Description	Control 2 selection when Generator Under-voltage protection become active.The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Voltage unbalance

Voltage unbalance

Variable	Threshold (2486)
Unit	%
Min	0.0
Max	200.0
Init	50
Description	Voltage Unbalance Generator Protection Threshold

Variable	Timer (2487)
Unit	s
Min	0.0
Max	999.9
Init	30
Description	Timer acceptance before protection activation when Generator voltage has reached the Voltage Unbalance protection threshold

Variable	Control (2488)
Unit	-
Min	0
Max	7
Init	0
Description	Control selection when Generator Voltage Unbalance protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Voltage unbalance 2

Variable	Threshold (2489)
Unit	%
Min	0.0
Max	200.0
Init	100
Description	Voltage Unbalance Generator Protection Threshold 2

Variable	Timer (2490)
Unit	s
Min	0.0
Max	999.9
Init	30
Description	Timer 2 acceptance before protection activation when Generator voltage has reached the Voltage Unbalance protection threshold

Variable	Control (2491)
Unit	-
Min	0
Max	7
Init	0
Description	Control 2 selection when Generator Voltage Unbalance protection become active.The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Analog inputs protections

Analog input 1 protection

Variable	AN1 min/max (Customisable) (4206)
Unit	-
Min	0
Max	3
Init	-
Description	This value is to customize the label of analog input 1 protection. The maximum number of caracters is of 14. This protection use the analog input 1 set in the "Analog inputs" chapiter (variable 150).

Variable	Threshold (2600)
Unit	-
Min	$-32\,767$
Max	$32\,767$
Init	0
Description	This setpoint adjusts the threshold level for analog input 1 protection. The setting of this setpoint is according to the unit selected for the analog input 1 (variable 150).

Variable	Timer (2601)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the threshold level for analog input 1 detection. This setpoint can be set from 0s to 999,9s. If the threshold's analog input 1 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2602) will be activated. If the threshold's analog input 1 is no more detected during the delay, then the delay will be reset.

Variable	Validation (2602)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the threshold level for analog input 1 is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. -+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Threshold (level 2) (2603)
Unit	-
Min	−32 767
Max	32 767
Init	0
Description	This setpoint adjusts the second threshold level for analog input 1 protection. The setting of this setpoint is according to the unit selected for the analog input 1 (variable 150).

Variable	Timer (level 2) (2604)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the second threshold level for analog input 1 detection. This setpoint can be set from 0s to 999,9s. If the second threshold's analog input 1 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2605) will be activated. If the second threshold's analog input 1 is no more detected during the delay, then the delay will be reset.

Variable	Validation (level 2) (2605)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the second threshold level for analog input 1 is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. -+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Direction (2606)
Unit	-
Min	0
Max	1
Init	0
Description	This setpoint define if the both threshold level for analog input 1 are minimum or maximum limit.
	If the setpoint is on "Minimum" then the action of vaiables 2602 and 2605 will activate from thresholds level set and below.
	If the setpoint is on "Maximum" then the action of vaiables 2602 and 2605 will activate from thresholds level set and above.

Analog input 2 protection

Variable	AN2 min/max (Customisable) (4207)
Unit	-
Min	0
Max	3
Init	-
Description	This value is to customize the label of analog input 2 protection.
	The maximum number of caracters is of 14.
	This protection use the analog input 2 set in the "Analog inputs" chapiter (variable 151).

Variable	Threshold (2608)
Unit	-
Min	$-32\,767$
Max	$32\,767$
Init	0
Description	This setpoint adjusts the threshold level for analog input 2 protection.
	The setting of this setpoint is according to the unit selected for the analog input 2 (variable 151).

Variable	Timer (2609)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the threshold level for analog input 2 detection.
	This setpoint can be set from 0s to 999,9s.
	If the threshold's analog input 2 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2610) will be activated.
	If the threshold's analog input 2 is no more detected during the delay, then the delay will be reset.

Variable	Validation (2610)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the threshold level for analog input 2 is detected until the end of the set delay.
	Possible actions are :
	- Unused : no action.
	- Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807.
	- Mains electrical fault : The protection opens the Mains breaker.
	- Alarm : Notice as alarm on front panel.
	- Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop.
	- Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.
	-+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Threshold (level 2) (2611)
Unit	-
Min	$-32\,767$
Max	$32\,767$
Init	0
Description	This setpoint adjusts the second threshold level for analog input 2 protection.
	The setting of this setpoint is according to the unit selected for the analog input 2 (variable 151).

Variable	Timer (level 2) (2612)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the second threshold level for analog input 2 detection.
	This setpoint can be set from 0s to 999,9s.
	If the second threshold's analog input 2 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2613) will be activated.
	If the second threshold's analog input 2 is no more detected during the delay, then the delay will be reset.

Variable	Validation (level 2) (2613)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the second threshold level for analog input 2 is detected until the end of the set delay.
	Possible actions are :
	- Unused : no action.
	- Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807.
	- Mains electrical fault : The protection opens the Mains breaker.
	- Alarm : Notice as alarm on front panel.
	- Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop.
	- Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.
	-+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Direction (2614)
Unit	-
Min	0
Max	1
Init	0
Description	This setpoint define if the both threshold level for analog input 2 are minimum or maximum limit.
	If the setpoint is on "Minimum" then the action of vaiables 2610 and 2613 will activate from thresholds level set and below.
	If the setpoint is on "Maximum" then the action of vaiables 2610 and 2613 will activate from thresholds level set and above.

Analog input 3 protection

Variable	AN3 min/max (Customisable) (4208)
Unit	-
Min	0
Max	3
Init	-
Description	This value is to customize the label of analog input 3 protection.
	The maximum number of caracters is of 14.
	This protection use the analog input 3 set in the "Analog inputs" chapiter (variable 152).

Variable	Threshold (2616)
Unit	-
Min	$-32\,767$
Max	$32\,767$
Init	0
Description	This setpoint adjusts the threshold level for analog input 3 protection.
	The setting of this setpoint is according to the unit selected for the analog input 3 (variable 152).

Variable	Timer (2617)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the threshold level for analog input 3 detection.
	This setpoint can be set from 0s to 999,9s.
	If the threshold's analog input 3 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2618) will be activated.
	If the threshold's analog input 3 is no more detected during the delay, then the delay will be reset.

Variable	Validation (2618)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the threshold level for analog input 3 is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. -+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Threshold (level 2) (2619)
Unit	-
Min	−32 767
Max	32 767
Init	0
Description	This setpoint adjusts the second threshold level for analog input 3 protection. The setting of this setpoint is according to the unit selected for the analog input 3 (variable 152).

Variable	Timer (level 2) (2620)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	This setpoint adjusts the delay of the second threshold level for analog input 3 detection. This setpoint can be set from 0s to 999,9s. If the second threshold's analog input 3 is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2621) will be activated. If the second threshold's analog input 3 is no more detected during the delay, then the delay will be reset.

Variable	Validation (level 2) (2621)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if the second threshold level for analog input 3 is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. -+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Variable	Direction (2622)
Unit	-
Min	0
Max	1
Init	0
Description	This setpoint define if the both threshold level for analog input 3 are minimum or maximum limit.
	If the setpoint is on "Minimum" then the action of vaiables 2618 and 2621 will activate from thresholds level set and below.
	If the setpoint is on "Maximum" then the action of vaiables 2618 and 2621 will activate from thresholds level set and above.

Battery protection

Maximum battery voltage protection

Variable	Threshold (2359)
Unit	V
Min	0.0
Max	35.0
Init	300
Description	This setpoint adjusts the warning level for battery overvoltage protection.
	This protection is mainly electrical protection.
	This setpoint can be set from 0V to 35V.

Variable	Timer (2360)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	This setpoint adjusts the delay of the battery overvoltage detection.
	This setpoint can be set from 0s to 999,9s.
	If the overvoltage is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2361) will be activated.
	If the overvoltage is no more detected during the delay, then the delay will be reset.

Variable	Validation (2361)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if a battery overvoltage is detected until the end of the set delay.
	Possible actions are :
	- Unused : no action.
	- Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807.
	- Mains electrical fault : The protection opens the Mains breaker.
	- Alarm : Notice as alarm on front panel.
	- Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop.
	- Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.

Minimum battery voltage protection

Variable	Threshold (2356)
Unit	V
Min	0.0
Max	35.0
Init	180
Description	This setpoint adjusts the warning level for battery undervoltage protection. This protection is mainly electrical protection. This setpoint can be set from 0V to 35V.

Variable	Timer (2357)
Unit	s
Min	0.0
Max	999.9
Init	600
Description	This setpoint adjusts the delay of the battery undervoltage detection. This setpoint can be set from 0s to 999,9s. If the undervoltage is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2358) will be activated. If the undervoltage is no more detected during the delay, then the delay will be reset.

Variable	Validation (2358)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if a battery undervoltage is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.

Maximum battery voltage protection 2

Variable	Threshold (2377)
Unit	V
Min	0.0
Max	35.0
Init	320
Description	This setpoint adjusts the warning level for battery 2 overvoltage protection. This protection is mainly electrical protection. This setpoint can be set from 0V to 35V.

Variable	Timer (2378)
Unit	s
Min	0.0
Max	999.9
Init	50
Description	This setpoint adjusts the delay of the battery 2 overvoltage detection.
	This setpoint can be set from 0s to 999,9s.
	If the overvoltage is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2361) will be activated.
	If the overvoltage is no more detected during the delay, then the delay will be reset.

Variable	Validation (2379)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if a battery 2 overvoltage is detected until the end of the set delay.
	Possible actions are :
	- Unused : no action.
	- Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807.
	- Mains electrical fault : The protection opens the Mains breaker.
	- Alarm : Notice as alarm on front panel.
	- Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop.
	- Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information.
	-+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Minimum battery voltage protection 2

Variable	Threshold (2374)
Unit	V
Min	0.0
Max	35.0
Init	150
Description	This setpoint adjusts the warning level for battery 2 undervoltage protection.
	This protection is mainly electrical protection.
	This setpoint can be set from 0V to 35V.

Variable	Timer (2375)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	This setpoint adjusts the delay of the battery 2 undervoltage detection.
	This setpoint can be set from 0s to 999,9s.
	If the undervoltage is still detected at the end of the delay, then the action of the parameter "Validation" (variable 2358) will be activated.
	If the undervoltage is no more detected during the delay, then the delay will be reset.

Variable	Validation (2376)
Unit	-
Min	0
Max	7
Init	0
Description	This setpoint define the action which will be activated if a battery 2 undervoltage is detected until the end of the set delay. Possible actions are : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. -+Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it

Boost battery

Variable	Low threshold (2386)
Unit	V
Min	0.0
Max	35.0
Init	200
Description	This setpoint adjusts the low threshold level to activate the boost battery output. This setpoint can be set only if the variable 2388 is activated. This setpoint can be set from 0V to 35V.

Variable	High threshold (2387)
Unit	V
Min	0.0
Max	35.0
Init	280
Description	This setpoint adjusts the high threshold level to deactivate the boost battery output. This setpoint can be set only if the variable 2388 is activated. This setpoint can be set from 0V to 35V. This threshold have to be higher than the low threshold (variable 2386).

Other protections

Max/Min speed output protection

Variable	Timer Min Max Speed output (2389)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer acceptance before alarm for speed output signal to speed governor to stay at Minimum or Maximum signal correction

Variable	Control Min Max Speed output (2390)
Unit	-
Min	0
Max	7
Init	3
Description	Control selection when speed output signal protection become active. The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Max/Min AVR output protection

Variable	Timer Min Max AVR output (2391)
Unit	s
Min	0.0
Max	999.9
Init	100
Description	Timer acceptance before alarm for voltage output signal to AVR/DVR regulator to stay at Minimum or Maximum signal correction

Variable	Control Min Max AVR output (2392)
Unit	-
Min	0
Max	7
Init	3
Description	Control selection when AVR output signal protection become active.The selections are the following : - Unused : no action. - Generator electrical fault : The protection opens the generator breaker and tries to re-synchronize again. Count of attemps set by variable 2807. - Mains electrical fault : The protection opens the Mains breaker. - Alarm : Notice as alarm on front panel. - Fault (softShutDown) : Generator breaker opens allowing the engine to cool down of load for the duration of the cool down timer, then stop. - Security (hardShutDown) : Generator breaker opens and engine stops immediatly without cooling down : "serious fault" shows as information. - +Help means the faulty generator will ask another genset to start through inter-module Buscan to replace it.

Inputs

Digital inputs

UNIGEN control

Variable	UNIGEN activation configuration (3751)
Unit	-
Min	0
Max	1
Init	1
Description	UNIGEN activation configuration (0 : Automatic / 1 : Manual)

Digital inputs

Variable	Timer ON Digital Input 1 (2709)
Unit	s
Min	0.0
Max	6553.5
Init	0
Description	Digital Input 1 activation timer

Variable	Timer OFF Digital Input 1 (2718)
Unit	s
Min	0.0
Max	6553.5
Init	0
Description	Digital Input 1 desactivation timer

Variable	Polarity NO/NC on DI 1 (2736)
Unit	-
Min	0
Max	1
Init	0
Description	Direction of Digital Input 1 (0=Normaly Open/1=Normaly Close)

Variable	Function configured on DI 1 (2700)
Unit	-
Min	0
Max	65 535
Init	4501
Description	Digital Input 1 associated function (Default value : Generator breaker feedback)

Hysteresis

Variable	Hysteresis 1 enable for DI (2769)
Unit	-
Min	0
Max	1
Init	0
Description	Enable hysteresis 1 on digital inputs functions

Variable	Timer (2777)
Unit	s
Min	0.0
Max	999.9
Init	0
Description	Timer at activation on digital input of Hysteresis 1

Variable	Direction (2785)
Unit	-
Min	0
Max	1
Init	0
Description	Direction Hysteresis 1 : 0 = Set on low thresh. - Reset on high thresh. / 1 = Set on high thresh. - Reset on low thresh.

Analog inputs

Analog inputs

Variable	Analog Input 1 function if use in DI (2607)
Unit	-
Min	0
Max	65 535
Init	0
Description	Function associated to Analog input 2 if used as Digital input.

Variable	Analog Input 1 Calibration point 1 (2624)
Unit	-
Min	−32 767
Max	32 767
Init	0
Description	Analog 1 :calibration point 1

Variable	Analog Input 1 Calibration point 2 (2625)
Unit	-
Min	−32 767
Max	32 767
Init	500
Description	Analog 1 :calibration point 2

Variable	Analog Input 1 Calibration point 3 (2626)
Unit	-
Min	−32 767
Max	32 767
Init	1000
Description	Analog 1 :calibration point 3

Variable	Analog Input 1 Calibration point 4 (2627)
Unit	-
Min	−32 767
Max	32 767
Init	1500
Description	Analog 1 :calibration point 4

Variable	Analog Input 1 Calibration point 5 (2628)
Unit	-
Min	−32 767
Max	32 767
Init	2000
Description	Analog 1 :calibration point 5

Variable	Analog Input 1 Calibration point 6 (2629)
Unit	-
Min	−32 767
Max	32 767
Init	2500
Description	Analog 1 :calibration point 6

Variable	Analog Input 1 Calibration point 7 (2630)
Unit	-
Min	−32 767
Max	32 767
Init	3000
Description	Analog 1 :calibration point 7

Variable	Analog Input 1 Calibration point 8 (2631)
Unit	-
Min	−32 767
Max	32 767
Init	3500
Description	Analog 1 :calibration point 8

Variable	Analog Input 1 Calibration point 9 (2632)
Unit	-
Min	−32 767
Max	32 767
Init	4000
Description	Analog 1 :calibration point 9

Variable	Analog Input 1 Calibration point 10 (2633)
Unit	-
Min	−32 767
Max	32 767
Init	4500
Description	Analog 1 :calibration point 10

Variable	Analog Input 1 Calibration point 11 (2634)
Unit	-
Min	−32 767
Max	32 767
Init	5000
Description	Analog 1 :calibration point 11

Hysteresis

Variable	Activating Hysteresis on Analog Input 1 (2657)
Unit	-
Min	0
Max	1
Init	0
Description	Enable hysteresis on analog input 1 with thresholds E2660(Low Level) & E2663(High Level)

Variable	Low level threshold (2660)
Unit	-
Min	0
Max	65 535
Init	0
Description	Low level threshold for digital output activation on hysteresis (analog input 1)

Variable	Timer on low level threshold (2666)
Unit	s
Min	0.0
Max	999.9
Init	30
Description	Timer before set/reset digital output on hysteresis low threshold (analog input 1)

Variable	High level threshold (2663)
Unit	-
Min	0
Max	65 535
Init	0
Description	High level threshold for digital output activation on hysteresis (analog input 1)

Variable	Timer on high level threshold (2669)
Unit	s
Min	0.0
Max	999.9
Init	30
Description	Timer before set/reset digital output on hysteresis high threshold (analog input 1)

Variable	Hysteresis Direction on Analog Input 1 (2672)
Unit	-
Min	0
Max	1
Init	0
Description	Hysteresis Direction on Analog Input 1 (0 : Set on low thresh. - Reset on high thresh. / 1 : Set on high thresh. - Reset on low thresh)

Outputs

Digital outputs/relays

Digital outputs

Variable	Function configured DO 1 (2745)
Unit	-
Min	0
Max	65 535
Init	4675
Description	Output 1 Associated function

Variable	Polarity NE/ND DO 1 (2751)
Unit	-
Min	0
Max	1
Init	0
Description	Polarity (0=Normaly De-energized / 1=Normaly Energized) Digital output 1

Variable	Pulse Lenght DO 1 (2761)
Unit	s
Min	0.0
Max	6553.5
Init	0
Description	Digital ouput 1 pulse timer (0 = no pulse, continous activation)

Relays

Variable	Output function Relay 1 (2757)
Unit	-
Min	0
Max	65 535
Init	0
Description	Relay 1 Associated function

Variable	Direction NO/NC Relay 1 (2759)
Unit	-
Min	0
Max	1
Init	0
Description	Relay 1 Direction (0=Normaly Open / 1=Normaly Closed)

Variable	Pulse Lenght R 1 (2767)
Unit	s
Min	0.0
Max	6553.5
Init	0
Description	Relay ouput 1 pulse timer (0 = no pulse, continous activation)

CANopen

CANopen

CANopen

Variable	Configuration (3151)
Unit	-
Min	0
Max	5
Init	4
Description	CANOPEN configuration 8 I/O - 16 I/O - 32 I/O or client configuration

Variable	Coupler ID # 1 (3153)
Unit	-
Min	0
Max	255
Init	1
Description	Coupler identifier, In client Config mode, we can add several couplers and for each coupler a unique identifier is dedicated by the client

Variable	CANopen baud rate (3051)
Unit	-
Min	0
Max	65 535
Init	125
Description	CAN bus 2 baud speed (J1939/CANopen)

Variable	Error timer (3152)
Unit	s
Min	0.0
Max	6553.5
Init	100
Description	CANopen error timer

CANopen customer configuration

Variable	Coupler ID # 1 (3153)
Unit	-
Min	0
Max	255
Init	1
Description	Coupler identifier, In client Config mode, we can add several couplers and for each coupler a unique identifier is dedicated by the client

Variable	CANopen IN 1 (3154)
Unit	-
Min	0
Max	32
Init	0
Description	Each coupler is associated with an input number

Variable	CANopen OUT 1 (3155)
Unit	-
Min	0
Max	32
Init	0
Description	Each coupler is associated with output number

Inputs

Inputs

Variable	CANopenVal I1 (3264)
Unit	-
Min	0
Max	3
Init	1
Description	Logic input usage mode Never / Always / Post starting / Stabilized

Variable	CANopenTM I1 (3232)
Unit	s
Min	0.0
Max	6553.5
Init	0
Description	Function execution delay, user can add execution delay after logic input status change

Variable	CANopenDir I1 (3296)
Unit	-
Min	0
Max	1
Init	0
Description	Direction of logic input Normally open or Normally closed

Variable	CANopenFuncI1 (3200)
Unit	-
Min	0
Max	65 535
Init	0
Description	selection of the function, which will be executed when the logic input changes state . (see functions on logic inputs for more details about functions)

Outputs

Variable	CANopenModeO1 (3382)
Unit	-
Min	0
Max	1
Init	0
Description	selection of the direction of the logic output, normally energized or de-energized

Variable	CANopenFuncO1 (3350)
Unit	-
Min	0
Max	65 535
Init	0
Description	Status change of the open or closed logic output, depending on the selected function

Time-outs and delays

Time-outs and delays

Variable	Stabilisation (Speed and Voltage) (3469)
Unit	s
Min	0.0
Max	999.9
Init	50
Description	Speed and voltage stabilization time

Variable	Horn Timer (2478)
Unit	s
Min	0.0
Max	6553.5
Init	10
Description	Trigger time Horn. 0 means the horn will buzz until being manually stopped.

Synchronization

Synchronization

Variable	Voltage acceptance (2800)
Unit	%
Min	0.0
Max	12.0
Init	50
Description	Voltage acceptance for synchronization between gensets (or genset/mains)

Variable	Frequency acceptance (2801)
Unit	Hz
Min	0.00
Max	0.20
Init	10
Description	Frequency acceptance for synchronization between gensets (or genset/mains)

Variable	Phase Angle acceptance (2802)
Unit	°
Min	0
Max	30
Init	10
Description	Phase Angle acceptance for synchronization between gensets (or genset/mains)

Variable	Fail to synchronize timer (2803)
Unit	s
Min	0.0
Max	999.9
Init	1200
Description	Timer max for synchronisation

Variable	Control on fail to synchronize (2804)
Unit	-
Min	0
Max	7
Init	3
Description	Validation fail to synch (Default value=Alarm)

Control loops

Synchronization (breaker open)

Variable	Proportional Gain for Synchro Frequency (2901)
Unit	-
Min	0
Max	100
Init	7
Description	Proportional value adjusts the response of the system to a static, instant error, it increases the precision and speed. A too high setting has the effect of generating an oscillation of the system,

Variable	Integral Gain for Synchro Frequency (2902)
Unit	-
Min	0
Max	100
Init	10
Description	The Integral value set the final value of the system without error. It fixes a small mistake which is prolonged. It increases the final accuracy. A too high setting has the effect of generating an oscillation of the system

Variable	Derivate Gain for Synchro Frequency (2903)
Unit	-
Min	0
Max	100
Init	0
Description	Derivate value change the increasing time to reach the set point. It increases stability and speed.

Variable	Proportional Gain for Syncho Phase (2905)
Unit	-
Min	0
Max	100
Init	30
Description	Proportional value to adjust the response of the system to a static, instant error, it increases the precision and speed. A too high setting has the effect of generating an oscillation of the system,

Variable	Integral Gain for Syncho Phase (2906)
Unit	-
Min	0
Max	100
Init	10
Description	The Integral value set the final value of the system without error. It fixes a small mistake which is prolonged. It increases the final accuracy. A too high setting has the effect of generating an oscillation of the system

Variable	Derivate Gain for Syncho Phase (2907)
Unit	-
Min	0
Max	100
Init	0
Description	Derivate value change the increasing time to reach the set point. It increases stability and speed.

Variable	Proportional Gain for Synchro Volt (2951)
Unit	-
Min	0
Max	100
Init	20
Description	Proportional value to adjust the response of the system to a static, instant error, it increases the precision and speed. A too high setting has the effect of generating an oscillation of the system,

Variable	Integral Gain for Synchro Volt (2952)
Unit	-
Min	0
Max	100
Init	15
Description	The Integral value set the final value of the system without error. It fixes a small mistake which is prolonged. It increases the final accuracy. A too high setting has the effect of generating an oscillation of the system

Variable	Derivate Gain for Synchro Volt (2953)
Unit	-
Min	0
Max	100
Init	0
Description	Derivate value change the increasing time to reach the set point. It increases stability and speed.

Logger

Logger

Variable	Log on/off (3610)
Unit	-
Min	0
Max	3
Init	0
Description	Archiving mode OFF = NEVER / ALWAYS / POST STARTING / STABILIZED, event archiving can be activated depending on engine status. Warning : erase will delete all faults, alarms and archived data.

Variable	Log Var 1 (3600)
Unit	-
Min	0
Max	65 535
Init	0
Description	Logger of the variable to archive

Variable	Log1 period (3612)
Unit	s
Min	0
Max	9999
Init	0
Description	Time in second of interval between each archiving

Modbus redirection

Modbus variables 0-99

Modbus redirection variables

Variable	Modbus 000 (10000)
Unit	-
Min	0
Max	65 535
Init	0
Description	Modbus redirection variable, allows to redirect a variable to the modbus address 10,000

List of inputs/outputs - Bitfields

List of inputs

Variable	Generator breaker feedback (4501)
Description	Generator breaker aux

Variable	Fault reset (4506)
Description	Fault reset request

Variable	Generator fault request (4507)
Description	Fault genset request

Variable	Increase speed in manual mode (4514)
Description	+Hz in manual mode

Variable	Decrease speed in manual mode (4515)
Description	-Hz in manual mode

Variable	Increase voltage in manual mode (4516)
Description	+Volt in manual mode

Variable	Decrease voltage in manual mode (4517)
Description	-Volt in manual mode

Variable	Remote alarm (4527)
Description	Remote alarm

Variable	Stop horn (4530)
Description	Remote stop horn

Variable	Speed setpoint 2 selection (4535)
Description	Speed setpoint 2 selection

Variable	UNIGEN activation digital input (4579)
Description	UNIGEN activation digital input

Variable	Alternative selection DI 1 (4594)
Description	Digital input 1 for alternative selection

Variable	Alternative selection DI 2 (4595)
Description	Digital input 2 for alternative selection

Variable	Alternative selection DI 3 (4596)
Description	Digital input 3 for alternative selection

Variable	Alternative selection DI 4 (4597)
Description	Digital input 4 for alternative selection

Variable	Alternative selection DI 5 (4598)
Description	Digital input 5 for alternative selection

Variable	Alternative selection DI 6 (4599)
Description	Digital input 6 for alternative selection

Variable	Alternative selection DI 7 (4600)
Description	Digital input 7 for alternative selection

Variable	Alternative selection DI 8 (4601)
Description	Digital input 8 for alternative selection

Variable	Alternative selection DI 9 (4602)
Description	Digital input 9 for alternative selection

Variable	Alternative selection DI 10 (4603)
Description	Digital input 10 for alternative selection

Variable	Alternative selection DI 11 (4604)
Description	Digital input 11 for alternative selection

Variable	Alternative selection DI 12 (4605)
Description	Digital input 12 for alternative selection

Variable	Alternative selection DI 13 (4606)
Description	Digital input 13 for alternative selection

Variable	Alternative selection DI 14 (4607)
Description	Digital input 14 for alternative selection

Variable	Alternative selection DI 15 (4608)
Description	Digital input 15 for alternative selection

Variable	Alternative selection DI 16 (4609)
Description	Digital input 16 for alternative selection

Variable	Low threshold DI1 (4614)
Description	Digital input : Low threshold 1

Variable	Low threshold DI2 (4615)
Description	Digital input : Low threshold 2

Variable	Low threshold DI3 (4616)
Description	Digital input : Low threshold 3

Variable	Low threshold DI4 (4617)
Description	Digital input : Low threshold 4

Variable	Low threshold DI5 (4618)
Description	Digital input : Low threshold 5

Variable	Low threshold DI6 (4619)
Description	Digital input : Low threshold 6

Variable	Low threshold DI7 (4620)
Description	Digital input : Low threshold 7

Variable	Low threshold DI8 (4621)
Description	Digital input : Low threshold 8

Variable	High threshold DI1 (4622)
Description	Digital input : High threshold 1

Variable	High threshold DI2 (4623)
Description	Digital input : High threshold 2

Variable	High threshold DI3 (4624)
Description	Digital input : High threshold 3

Variable	High threshold DI4 (4625)
Description	Digital input : High threshold 4

Variable	High threshold DI5 (4626)
Description	Digital input : High threshold 5

Variable	High threshold DI6 (4627)
Description	Digital input : High threshold 6

Variable	High threshold DI7 (4628)
Description	Digital input : High threshold 7

Variable	High threshold DI8 (4629)
Description	Digital input : High threshold 8

Variable	Digital output 1 forced (4630)
Description	Digital output 1 forced

Variable	Digital output 2 forced (4631)
Description	Digital output 2 forced

Variable	Digital output 3 forced (4632)
Description	Digital output 3 forced

Variable	Digital output 4 forced (4633)
Description	Digital output 4 forced

Variable	Digital output 5 forced (4634)
Description	Digital output 5 forced

Variable	Digital output 6 forced (4635)
Description	Digital output 6 forced

Variable	Relay 1 forced (4950)
Description	Relay 1 forced

Variable	Relay 2 forced (4951)
Description	Relay 2 forced

List of outputs

Variable	Generator electrical faults summary (4656)
Description	Generator fault

Variable	Alarms summary (4658)
Description	Alarm

Variable	Horn (4663)
Description	Horn

Variable	Default LED (4664)
Description	Default LED

Variable	Alarm LED (4665)
Description	Alarm LED

Variable	Generator LED (4669)
Description	Generator LED

Variable	Generator ready (4670)
Description	Genset ready

Variable	Generator voltage present (4671)
Description	Generator voltage present i.e 3 phases > 10% of nominal voltage

Variable	Generator stop (4673)
Description	Genset is stopped

Variable	Generator breaker close (4675)
Description	Generator breaker closing

Variable	Increase speed by pulse (4699)
Description	Output +Hz

Variable	Decrease speed by pulse (4700)
Description	Output -Hz

Variable	Increase voltage by pulse (4701)
Description	Output +Volt

Variable	Decrease voltage by pulse (4702)
Description	Output -Volt

Variable	Bus/Mains voltage presence (4703)
Description	Bus/Mains voltage presence

Variable	End state (4705)
Description	End state : Restart the engine or press reset

Variable	Battery boost DO (4709)
Description	Battery boost digital output

Variable	Set on analog 1 threshold (4710)
Description	Analog 1 digital output

Variable	Set on analog 2 threshold (4711)
Description	Analog 2 digital output

Variable	Set on analog 3 threshold (4712)
Description	Analog 3 digital output

Variable	Digital output activation on DI1 (4713)
Description	Digital output activation on digital input 1

Variable	Digital output activation on DI2 (4714)
Description	Digital output activation on digital input 2

Variable	Digital output activation on DI3 (4715)
Description	Digital output activation on digital input 3

Variable	Digital output activation on DI4 (4716)
Description	Digital output activation on digital input 4

Variable	Digital output activation on DI5 (4717)
Description	Digital output activation on digital input 5

Variable	Digital output activation on DI6 (4718)
Description	Digital output activation on digital input 6

Variable	Digital output activation on DI7 (4719)
Description	Digital output activation on digital input 7

Variable	Digital output activation on DI8 (4720)
Description	Digital output activation on digital input 8

Bitfields

SYSTEM INFO (E00950)	
Bit	Description
15	-
14	-
13	-
12	-
11	-
10	-
9	-
8	-
7	-
6	-
5	-
4	Engine running
3	Alarm exist : Alarm LED is on
2	Fault exist : Fault LED is on
1	New alarm occured : Alarm LED is blinking
0	New fault occured : Fault LED is blinking

KEY INHIBITION STATUS (E00951)	
Bit	Description
15	-
14	Auto
13	Test
12	Man
11	Start
10	Stop
9	Generator(AMF/MAINS/PRIME)/bus(MASTER/BTB) open/close breaker
8	Mains(AMF/MAINS/MASTER/MASTER 1 B only) open/close breaker
7	Fault/Alarm/info
6	Esc
5	Enter
4	High arrows
3	Left arrows
2	Low arrows
1	Right arrows
0	Shift

LED STATUS (E00952)	
Bit	Description
15	-
14	-
13	-
12	-
11	-
10	-
9	-
8	Generator (AMF/MAINS/PRIME/SYNCHRO) /bus (MASTER/MASTER 1B) voltage
7	Alarm
6	Generator (AMF/PRIME/MAINS) /bus (BTB/MASTER) breaker
5	TEST
4	Mains breaker (AMF/MAINS/MASTER/MASTER 1B only)
3	MAN
2	AUTO
1	Bus voltage (SYNCHRO/PRIME/BTB) / Mains voltage (AMF/MAINS/MASTER/MASTER 1B)
0	Fault

Digital input raw (E00953)	
Bit	Description
15	-
14	-
13	-
12	-
11	Analog 3 setup as digital input
10	Analog 2 setup as digital input
9	Analog 1 setup as digital input
8	Digital input 9 on hardware
7	Digital input 8 on hardware
6	Digital input 7 on hardware
5	Digital input 6 on hardware
4	Digital input 5 on hardware
3	Digital input 4 on hardware
2	Digital input 3 on hardware
1	Digital input 2 on hardware
0	Digital input 1 on hardware

E00954 (Processed)	
Bit	Description
15	-
14	-
13	-
12	-
11	Analog input 3 setup as digital input
10	Analog input 2 setup as digital input
9	Analog input 1 setup as digital input
8	Digital input 9
7	Digital input 8
6	Digital input 7
5	Digital input 6
4	Digital input 5
3	Digital input 4
2	Digital input 3
1	Digital input 2
0	Digital input 1

E00955 (Processed)	
Bit	Description
15	CANopen digital Input 16
14	CANopen digital Input 15
13	CANopen digital Input 14
12	CANopen digital Input 13
11	CANopen digital Input 12
10	CANopen digital Input 11
9	CANopen digital Input 10
8	CANopen digital Input 9
7	CANopen digital Input 8
6	CANopen digital Input 7
5	CANopen digital Input 6
4	CANopen digital Input 5
3	CANopen digital Input 4
2	CANopen digital Input 3
1	CANopen digital Input 2
0	CANopen digital Input 1

E00956 (Processed)	
Bit	Description
15	CANopen digital Input 32
14	CANopen digital Input 31
13	CANopen digital Input 30
12	CANopen digital Input 29
11	CANopen digital Input 28
10	CANopen digital Input 27
9	CANopen digital Input 26
8	CANopen digital Input 25
7	CANopen digital Input 24
6	CANopen digital Input 23
5	CANopen digital Input 22
4	CANopen digital Input 21
3	CANopen digital Input 20
2	CANopen digital Input 19
1	CANopen digital Input 18
0	CANopen digital Input 17

E00957 (Processed)	
Bit	Description
15	-
14	-
13	-
12	-
11	-
10	-
9	-
8	-
7	Relay 2
6	Relay 1
5	Digital output 6
4	Digital output 5
3	Digital output 4
2	Digital output 3
1	Digital output 2
0	Digital output 1

E00958 (Processed)	
Bit	Description
15	CANopen digital Output 16
14	CANopen digital Output 15
13	CANopen digital Output 14
12	CANopen digital Output 13
11	CANopen digital Output 12
10	CANopen digital Output 11
9	CANopen digital Output 10
8	CANopen digital Output 9
7	CANopen digital Output 8
6	CANopen digital Output 7
5	CANopen digital Output 6
4	CANopen digital Output 5
3	CANopen digital Output 4
2	CANopen digital Output 3
1	CANopen digital Output 2
0	CANopen digital Output 1

E00959 (Processed)	
Bit	Description
15	CANopen digital Output 32
14	CANopen digital Output 31
13	CANopen digital Output 30
12	CANopen digital Output 29
11	CANopen digital Output 28
10	CANopen digital Output 27
9	CANopen digital Output 26
8	CANopen digital Output 25
7	CANopen digital Output 24
6	CANopen digital Output 23
5	CANopen digital Output 22
4	CANopen digital Output 21
3	CANopen digital Output 20
2	CANopen digital Output 19
1	CANopen digital Output 18
0	CANopen digital Output 17

RESET MAINTENANCE & METERS (E10400)	
Bit	Description
15	Meters : Generator total kWh
14	Meters : Generator total kVARh
13	Meters : Mains total kWh
12	Meters : Mains total kVARh
11	Meters : Engine running hours
10	Meters : Number of attempts to start
9	Maintenance cycle 5 in days
8	Maintenance cycle 4 in days
7	Maintenance cycle 3 in days
6	Maintenance cycle 2 in days
5	Maintenance cycle 1 in days
4	Maintenance cycle 5 in hours
3	Maintenance cycle 4 in hours
2	Maintenance cycle 3 in hours
1	Maintenance cycle 2 in hours
0	Maintenance cycle 1 in hours

RESET MAINTENANCE & METERS 2 (E10401)	
Bit	Description
15	-
14	-
13	-
12	-
11	-
10	-
9	-
8	-
7	-
6	-
5	-
4	-
3	-
2	-
1	Override hours
0	Generator auxiliary run hours

KEY INHIBITION (E8102)	
Bit	Description
15	-
14	Auto
13	Test
12	Man
11	Start
10	Stop
9	Generator(AMF/MAINS/PRIME)/bus(MASTER/BTB) open/close breaker
8	Mains(AMF/MAINS/MASTER/MASTER 1 B only) open/close breaker
7	Fault/Alarm/info
6	Esc
5	Enter
4	High arrows
3	Left arrows
2	Low arrows
1	Right arrows
0	Shift

MODBUS ACCESS (E3015)	
Bit	Description
15	-
14	-
13	-
12	-
11	-
10	-
9	Writing using Modbus/tcp
8	Reading using Modbus/tcp
7	-
6	-
5	-
4	-
3	Writing to input functions
2	-
1	Writing to engine meters
0	Writing to date/time

E00960 (Alarm)		
Bit	Var	Description
15	4171	Bus breaker close suddently
14	4159	Bus breaker open suddently
13	4158	Fail to open bus breaker
12	4157	Fail to close bus breaker
11	4205	Engine maximum water temperature level 2
10	4205	Engine maximum water temperature level 1
9	4204	Engine minimum oil pressure level 2
8	4204	Engine minimum oil pressure level 1
7	4203	Engine battery max volt level 2
6	4203	Engine battery max volt level 1
5	4202	Engine battery min volt level 2
4	4202	Engine battery min volt level 1
3	4201	Engine under speed level 2
2	4201	Engine under speed level1
1	4200	Engine overspeed level2
0	4200	Engine overspeed level1

E00961 (Fault)		
Bit	Var	Description
15	4171	Bus breaker close suddently
14	4159	Bus breaker open suddently
13	4158	Fail to open bus breaker
12	4157	Fail to close bus breaker
11	4205	Engine maximum water temperature level 2
10	4205	Engine maximum water temperature level 1
9	4204	Engine minimum oil pressure level 2
8	4204	Engine minimum oil pressure level 1
7	4203	Engine battery max volt level 2
6	4203	Engine battery max volt level 1
5	4202	Engine battery min volt level 2
4	4202	Engine battery min volt level 1
3	4201	Engine under speed level 2
2	4201	Engine under speed level1
1	4200	Engine overspeed level2
0	4200	Engine overspeed level1

E00962 (Alarm)		
Bit	Var	Description
15	4257	Generator/Power plant minimum kVAR level2
14	4257	Generator/Power plant minimum kVAR level1
13	4256	Generator/Power plant reverse kW level2
12	4256	Generator/Power plant reverse kW level1
11	4255	Generator/Power plant maximum kW level2
10	4255	Generator/Power plant maximum kW level1
9	4254	Generator/Power plant minimum kW level2
8	4254	Generator/Power plant minimum kW level1
7	4253	Generator/Power plant under voltage level2
6	4253	Generator/Power plant under voltage level1
5	4252	Generator/Power plant over voltage level2
4	4252	Generator/Power plant over voltage level1
3	4251	Generator/Power plant under frequency level 2
2	4251	Generator/Power plant under frequency level1
1	4250	Generator/Power plant over frequency level2
0	4250	Generator/Power plant over frequency level1

E00963 (Fault)		
Bit	Var	Description
15	4257	Generator/Power plant minimum kVAR level2
14	4257	Generator/Power plant minimum kVAR level1
13	4256	Generator/Power plant reverse kW level2
12	4256	Generator/Power plant reverse kW level1
11	4255	Generator/Power plant maximum kW level2
10	4255	Generator/Power plant maximum kW level1
9	4254	Generator/Power plant minimum kW level2
8	4254	Generator/Power plant minimum kW level1
7	4253	Generator/Power plant under voltage level2
6	4253	Generator/Power plant under voltage level1
5	4252	Generator/Power plant over voltage level2
4	4252	Generator/Power plant over voltage level1
3	4251	Generator/Power plant under frequency level 2
2	4251	Generator/Power plant under frequency level1
1	4250	Generator/Power plant over frequency level2
0	4250	Generator/Power plant over frequency level1

E00964 (Alarm)		
Bit	Var	Description
15	4267	Earth fault level 2
14	4267	Earth fault level 1
13	4112	Last trip out
12	4266	Uneven voltage
11	4265	Uneven speed
10	4264	Uneven kVAR
9	4263	Uneven kW
8	4262	Generator overcurrent
7	4261	Generator maximum neutral current level2
6	4261	Generator maximum neutral current level1
5	4260	Generator maximum current level2
4	4260	Generator maximum current level1
3	4259	Generator/Power plant reverse kVAR level2
2	4259	Generator/Power plant reverse kVAR level1
1	4258	Generator/Power plant maximum kVAR level2
0	4258	Generator/Power plant maximum kVAR level1

E00965 (Fault)		
Bit	Var	Description
15	4267	Earth fault level 2
14	4267	Earth fault level 1
13	4112	Last trip out
12	4266	Uneven voltage
11	4265	Uneven speed
10	4264	Uneven kVAR
9	4263	Uneven kW
8	4262	Generator overcurrent
7	4261	Generator maximum neutral current level2
6	4261	Generator maximum neutral current level1
5	4260	Generator maximum current level2
4	4260	Generator maximum current level1
3	4259	Generator/Power plant reverse kVAR level2
2	4259	Generator/Power plant reverse kVAR level1
1	4258	Generator/Power plant maximum kVAR level2
0	4258	Generator/Power plant maximum kVAR level1

E00966 (Alarm)		
Bit	Var	Description
15	4307	Bus/Mains minimum kVAR level2
14	4307	Bus/Mains minimum kVAR level1
13	4306	Bus/Mains reverse kW level2
12	4306	Bus/Mains reverse kW level1
11	4305	Bus/Mains maximum kW level2
10	4305	Bus/Mains maximum kW level1
9	4304	Bus/Mains minimum kW level2
8	4304	Bus/Mains minimum kW level1
7	4303	Bus/Mains under voltage level2
6	4303	Bus/Mains under voltage level1
5	4302	Bus/Mains over voltage level2
4	4302	Bus/Mains over voltage level1
3	4301	Bus/Mains under frequency level 2
2	4301	Bus/Mains under frequency level1
1	4300	Bus/Mains over frequency level2
0	4300	Bus/Mains over frequency level1

E00967 (Fault)		
Bit	Var	Description
15	4307	Bus/Mains minimum kVAR level2
14	4307	Bus/Mains minimum kVAR level1
13	4306	Bus/Mains reverse kW level2
12	4306	Bus/Mains reverse kW level1
11	4305	Bus/Mains maximum kW level2
10	4305	Bus/Mains maximum kW level1
9	4304	Bus/Mains minimum kW level2
8	4304	Bus/Mains minimum kW level1
7	4303	Bus/Mains under voltage level2
6	4303	Bus/Mains under voltage level1
5	4302	Bus/Mains over voltage level2
4	4302	Bus/Mains over voltage level1
3	4301	Bus/Mains under frequency level 2
2	4301	Bus/Mains under frequency level1
1	4300	Bus/Mains over frequency level2
0	4300	Bus/Mains over frequency level1

E00968 (Alarm)		
Bit	Var	Description
15	661	J1939 : DM1 malfunction
14	660	J1939 : DM1 red
13	659	J1939 : DM1 amber
12	658	J1939 : DM1 protect
11	657	J1939 : High overspeed
10	656	J1939 : Overspeed
9	655	J1939 : Very low oil pressure
8	654	J1939 : Low oil pressure
7	653	J1939 : Very high coolant temeprature
6	652	J1939 : High coolant temeprature
5	4311	Df/dt (Rocof)
4	4310	Vector jump
3	4309	Bus/Mains reverse kVAR level2
2	4309	Bus/Mains reverse kVAR level1
1	4308	Bus/Mains maximum kVAR level2
0	4308	Bus/Mains maximum kVAR level1

E00969 (Fault)		
Bit	Var	Description
15	661	J1939 : DM1 malfunction
14	660	J1939 : DM1 red
13	659	J1939 : DM1 amber
12	658	J1939 : DM1 protect
11	657	J1939 : High overspeed
10	656	J1939 : Overspeed
9	655	J1939 : Very low oil pressure
8	654	J1939 : Low oil pressure
7	653	J1939 : Very high coolant temeprature
6	652	J1939 : High coolant temeprature
5	4311	Df/dt (Rocof)
4	4310	Vector jump
3	4309	Bus/Mains reverse kVAR level2
2	4309	Bus/Mains reverse kVAR level1
1	4308	Bus/Mains maximum kVAR level2
0	4308	Bus/Mains maximum kVAR level1

E00970 (Alarm)		
Bit	Var	Description
15	4478	Fail to stabilize voltage
14	4477	Fail to stabilize speed
13	4170	Generator breaker close suddently
12	4156	Generator breaker open suddently
11	4155	Fail to open generator breaker
10	4154	Fail to close generator breaker
9	4208	Minimum/maximum analog measure 3 (level2)
8	4208	Minimum/maximum analog measure 3 (level1)
7	4207	Minimum/maximum analog measure 2 (level2)
6	4207	Minimum/maximum analog measure 2 (level1)
5	4206	Minimum/maximum analog measure 1 (level2)
4	4206	Minimum/maximum analog measure 1 (level1)
3	-	-
2	600	CAN1 isolated product
1	77	Phase mesure discordance
0	4051	Fail to synchronize

E00971 (Fault)		
Bit	Var	Description
15	-	-
14	-	-
13	4170	Generator breaker close suddently
12	4156	Generator breaker open suddently
11	4155	Fail to open generator breaker
10	4154	Fail to close generator breaker
9	4208	Minimum/maximum analog measure 3 (level2)
8	4208	Minimum/maximum analog measure 3 (level1)
7	4207	Minimum/maximum analog measure 2 (level2)
6	4207	Minimum/maximum analog measure 2 (level1)
5	4206	Minimum/maximum analog measure 1 (level2)
4	4206	Minimum/maximum analog measure 1 (level1)
3	-	-
2	600	CAN1 isolated product
1	77	Phase mesure discordance
0	4051	Fail to synchronize

E00972 (Alarm)		
Bit	Var	Description
15	-	-
14	859	Maintenance days n°5
13	858	Maintenance days n°4
12	857	Maintenance days n°3
11	856	Maintenance days n°2
10	855	Maintenance days n°1
9	854	Maintenance hours n°5
8	853	Maintenance hours n°4
7	852	Maintenance hours n°3
6	851	Maintenance hours n°2
5	850	Maintenance hours n°1
4	19	Overload microcontroler
3	4108	Trip alarm (non essential load)
2	4153	Breaker alarm
1	650	J1939 alarm
0	4750	CANopen alarm

E00973 (Fault)		
Bit	Var	Description
15	-	-
14	-	-
13	-	-
12	-	-
11	-	-
10	-	-
9	650	J1939 fault
8	4750	CANopen fault
7	4152	Breaker fault
6	4451	Sensor lost
5	4475	Fail to start
4	4473	Generator not ready
3	4472	Fail to stop
2	4505	Emergency stop
1	4504	Coolant temperature fault
0	4503	Oil pressure fault

E00974 (Alarm)		
Bit	Var	Description
15	607	CAN1 mismatch protocole version
14	-	-
13	605	CAN1 missing product
12	4212	Maximum AVR output
11	4211	Minimum AVR output
10	4210	Maximum speed output
9	4209	Minimum speed output
8	4213	Overflow in equation
7	4314	Mains voltage unbalance (level2)
6	4314	Mains voltage unbalance (level1)
5	4269	Generator current unbalance (level2)
4	4269	Generator current unbalance (level1)
3	4268	Generator/bus voltage unbalance (level2)
2	4268	Generator/bus voltage unbalance (level1)
1	4316	Bus measure error
0	608	CAN1 missing MASTER

E00975 (Fault)		
Bit	Var	Description
15	-	-
14	606	CAN1 unknown product
13	605	CAN1 missing product
12	4212	Maximum AVR output
11	4211	Minimum AVR output
10	4210	Maximum speed output
9	4209	Minimum speed output
8	-	-
7	4314	Mains voltage unbalance (level2)
6	4314	Mains voltage unbalance (level1)
5	4269	Generator current unbalance (level2)
4	4269	Generator current unbalance (level1)
3	4268	Generator/bus voltage unbalance (level2)
2	4268	Generator/bus voltage unbalance (level1)
1	-	-
0	608	CAN1 missing MASTER

CRE TECHNOLOGY

Based in Sophia Antipolis, **CRE Technology** is a French manufacturer, ISO 9001 certified, employs nearly 25 employees, all experts in their field.

CRE Technology offers electronic products and electrical solutions dedicated to the control and the protection of industrial and marine generators: battery chargers, Generator sets controllers and synchronizing and paralleling equipments.

We are known for our skills, expertise and value-added solutions but also highly appreciated for our pre/after sales services.

CRE Technology's product development is focused on innovation.

The key to our strategy is the availability of our products with a large stock capacity.

Our company is highly recognized for technical achievements with over 1500 paralleling solutions sold each year, 35 years of experience, and partners in 27 countries.

10% of our annual turnover is reinvested in R&D and we offer 7 new products per year and have the best flexibility/price ratio on the market.

The next few years will see the expansion of our distribution network and our innovative product portfolio.

A WORLDWIDE DISTRIBUTION NETWORK
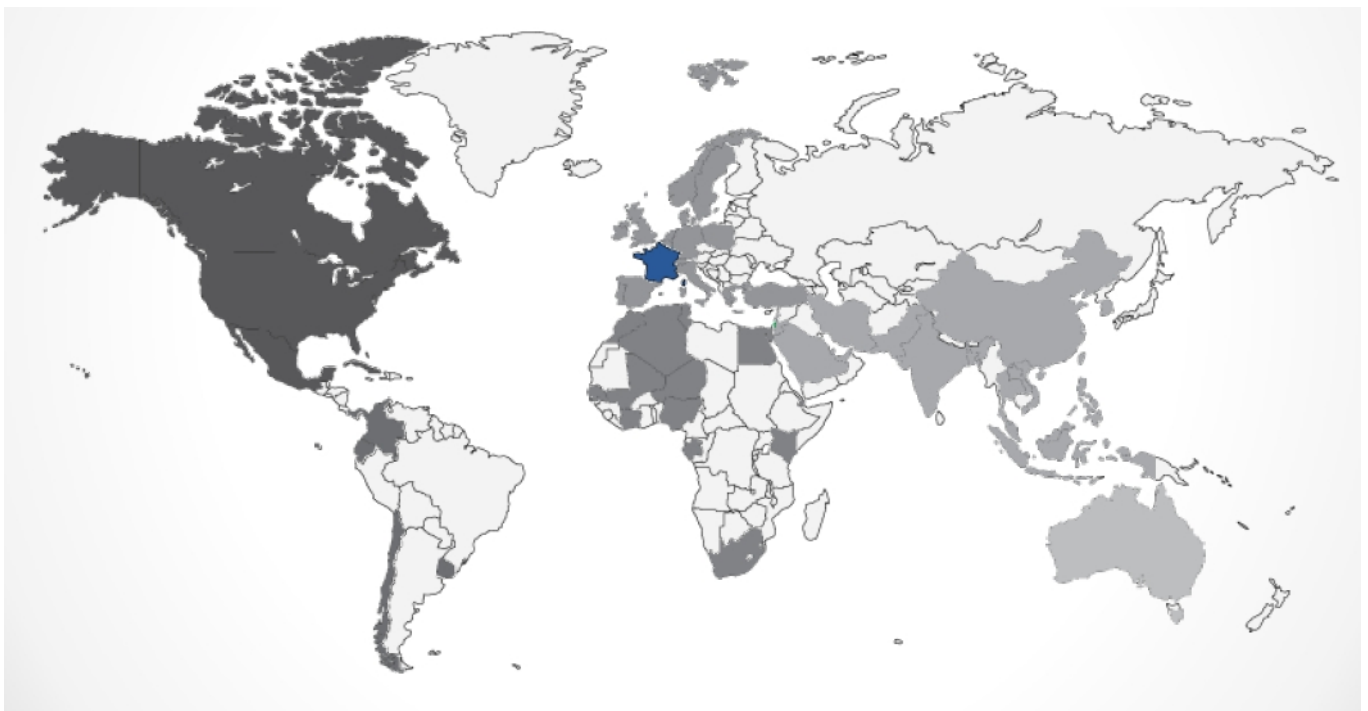
Consult the complete list of our worldwide distributors on our website https://www.cretechnology.com/en/cre-distributors.

THE COMPANY AT A GLANCE

1983
CRE TECHNOLOGY is born. At the time, the company is a custom-product manufacturer. We enlarge our product range and services to high standard technical units, particularly in the paralleling sector. Today with 35 years of experience, this custom expertise and our passion for technical challenges are still the company's best assets.

2002

GENSYS is launched. It will become **CRE TECHNOLOGY** s best-seller and the basis of its notoriety.
Today, **CRE TECHNOLOGY** provides 3000 paralleling solutions each year. Most of them are ordered directly by OEMs which appreciate our technical efficiency.

2006

CRE TECHNOLOGY, a member of the **DSF** Engineering and Distribution Generator, becomes independent from **DSF** Technologies. The company realizes its ambitions: to develop new ranges and expand its distribution network. **CRE TECHNOLOGY** now provides an extensive range of products in the genset control and paralleling market. Its worldwide network grows continuously, covering lots of new countries every year. **CRE TECHNOLOGY** now provides an extensive range of products in the genset control and paralleling market.

2009

CRE TECHNOLOGY is ISO 9001 certified with the 2008 version. DNV certification is added to the other **GENSYS MARINE** approvals: Lloyds and BV.

2010
CRE TECHNOLOGY diversifies its ranges of products by introducing a wide range of battery chargers within its range.

2012
CRE TECHNOLOGY keeps developing new products in accordance with the market. The paralleling range now includes the **GENSYS 2.0** core and the RDM 2.0, as well as the marine range with the **GENSYS 2.0 MARINE** (DNV approved).

2015
The new **GENSYS COMPACT** is in the range, and fully available for success, Lloyds Register marine approvals on **GENSYS2.0** marine, with the exisiting DNV-GL marine approval.

2017
The new **UNIGEN 2.0** has been added to the range, to extend our offer on parallel and solutions. The global range is constantly improved with a new PLC Solutions in order to customize even more our outcomes. A new **AVR COMPACT** is being added to our catalog to extend our capabilities.

TOMORROW

New products, new members in the distribution network, and new exciting projects to build and win with you!

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