MURPHY®

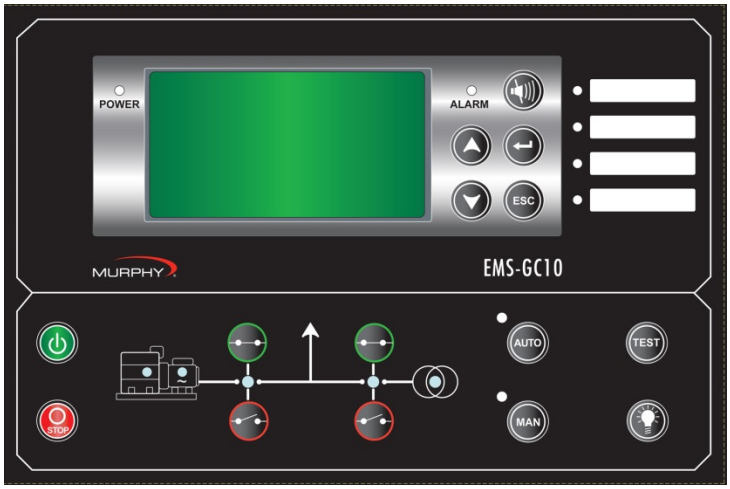
by ENOVATION CONTROLS

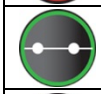
Genset Controller Unit
Model EMS -GC10

Operator's Manual

00-02-0878
Section 75
2013-03-07

Push-Buttons



	Normal display: Scrolls the display down once. Programming: Decreases setpoint value.
	Normal display: Scrolls the display up once. Programming: Increases setpoint value.
	Resets horn relay. Extra function: Press and hold button 2 seconds to see alarm list.
	Enter menus/enter value/acknowledges alarm.
	Jumps from parameter settings to display. Removes pop-up messages.
	Initiates the test sequence.
	Lamp test. One push will illuminate all LEDs for 3 seconds.
	Manual/Block running mode selector. Press MAN twice to activate Block mode.
	AUTO running mode selector.
	Open breaker.
	Closed breaker.
	Stop engine (Manual, not auto) running mode.
	Start engine (Manual, not auto) running mode.

Functional Descriptions

Standard Functions

This chapter includes functional descriptions of standard functions as well as illustrations of the relevant application types. Flowcharts and single-line diagrams will be used in order to simplify the information.

The standard functions are listed in the following paragraphs.

Operation Modes

- Automatic Mains Failure (AMF)
- Island operation (Island)
- Load takeover (LTO)

Engine Control

- Start/stop sequences
- Run and stop coil
- Multi-inputs (binary, 4-20 mA or VDO)
- Digital inputs

Generator Protection (ANSI)

- Reverse power (32)
- Overload (32)
- Overcurrent (50/51)
- Overvoltage (59)
- Undervoltage (27)
- Over-/underfrequency (81)
- Current/voltage unbalance (60)

Busbar Protection (ANSI)

- Overvoltage (59)
- Undervoltage (27)
- Overfrequency (81)

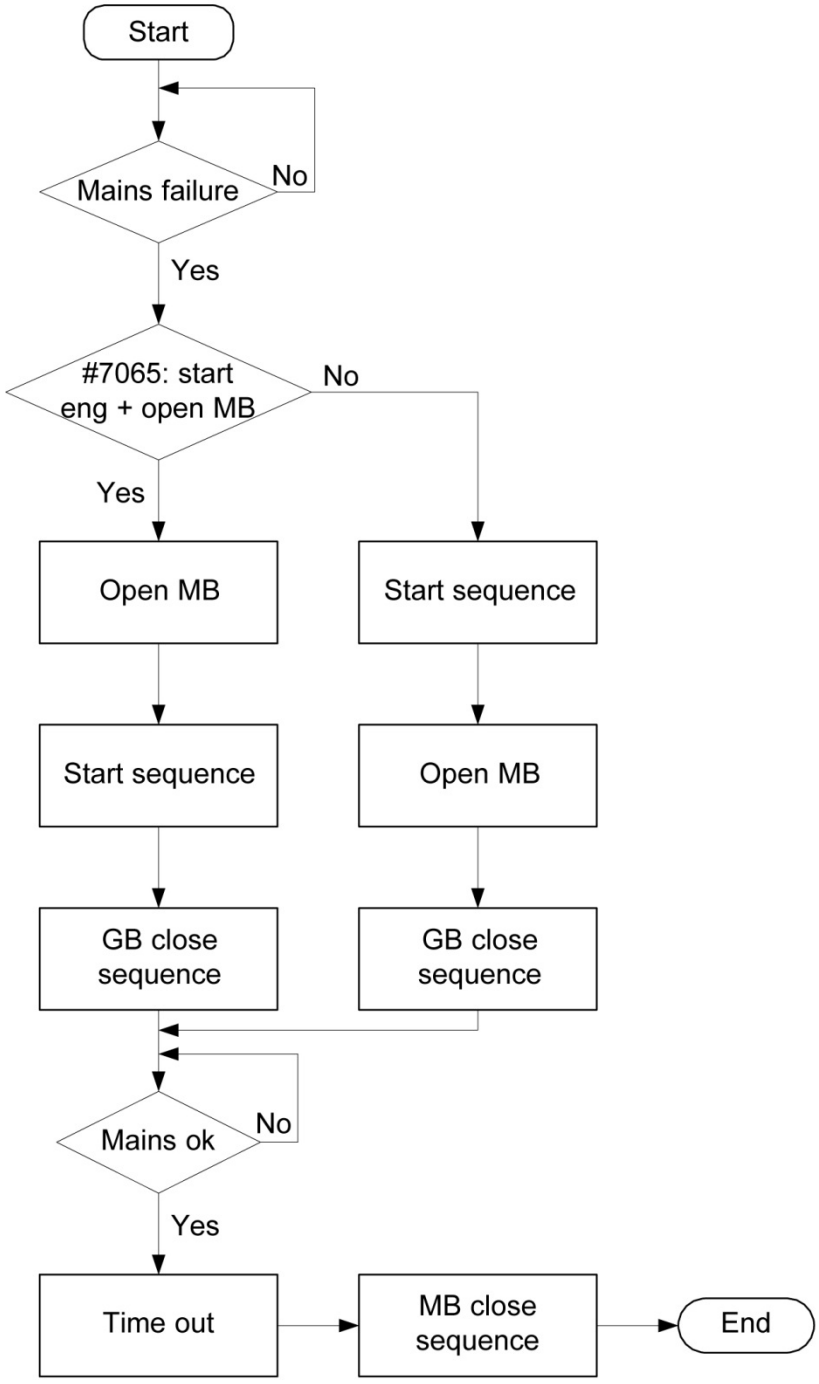
Flowcharts

Using flowcharts, the principles of the most important functions will be illustrated in the next sections. The functions included are:

- Mode shift
- MB open sequence
- GB open sequence
- Stop sequence
- Start sequence
- MB close sequence
- GB close sequence
- Load takeover (without synchronizing)
- Island operation
- Automatic Mains Failure
- Test sequence

> **NOTE:** The flowcharts on the following pages are for guidance only. For illustrative purposes, the flowcharts are simplified in some extent.

Automatic Mains Failure (AMF)



AMF MB Opening (Parameters 7060–7066 U Mains Failure)

It is possible to select the functionality of the mains breaker closing function. This is necessary if the unit operates in Automatic Mains Failure (AMF).

The possibilities are:

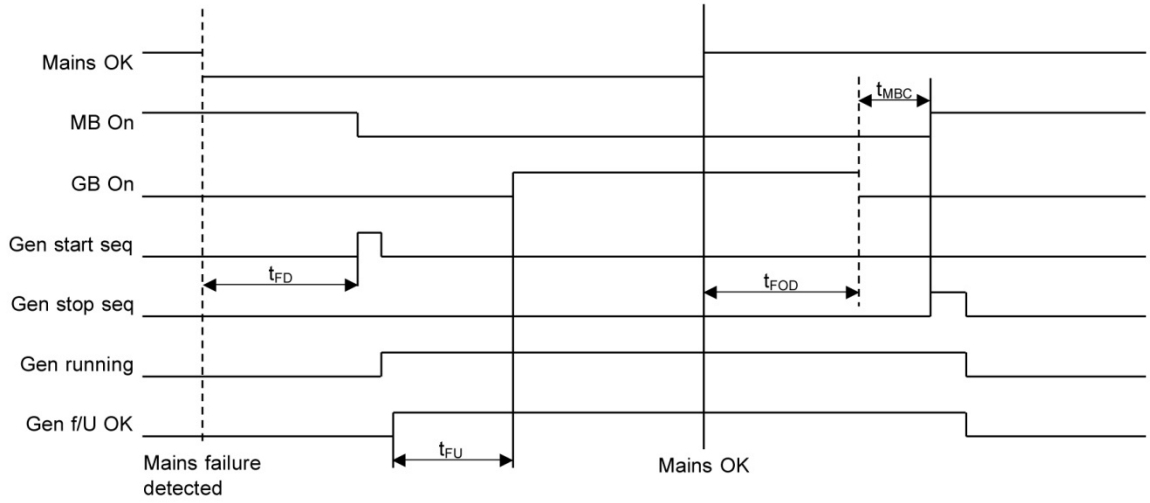
Selection	Description
Start engine and open mains breaker	When a mains failure occurs, the mains breaker opens, and the engine starts at the same time.
Start engine	When a mains failure occurs, the engine starts. When the generator is running and the frequency and voltage are OK, the MB opens and the GB closes.

AMF Timers

The time charts describe the functionality at a mains failure and at mains return. The timers used by the AMF function are indicated in the table below:

Timer	Description	Parameter Number
^{t}FD	Mains failure delay	7070–7074 f mains failure 7060–7066 U mains failure
^{t}F/U	Frequency / Voltage OK (^{t}V/F, Voltage / Frequency/ OK)	6220 Hz/V OK
^{t}FOD	Mains failure OK delay	7070–7074 f mains failure 7060–7066 U mains failure
^{t}GBC	GB ON delay	6230–6232 GB control
^{t}MBC	MB ON delay	7080–7085 MB control

Example 1:
Parameter 7065 Mains fail control: Start engine and open MB



> **NOTE:** The Terms: ^{t}F/U (Frequency / Voltage) and ^{t}V/F (Voltage / Frequency) represent the same value.

Breaker Feedback

Whether breaker feedbacks are necessary or not depends on which type of breaker is selected in the application configuration of the utility software (USW) .

Continuous NE and Continuous ND
This type of breaker does not require feedback.

Pulse
Because of the pulse signal, it is required that at least one feedback is configured for each breaker.

Compact
This type of breaker signal requires that at least one feedback is configured for each breaker.

Breaker Spring Load Time

To avoid breaker close failures in situations where breaker ON command is given before the breaker spring has been loaded; the spring load time can be adjusted for GB and MB.

The following describes a situation where you risk getting a close failure:

- The genset is in auto mode, the auto start/stop input is active, the genset is running and the GB is closed.
- The auto start/stop input is deactivated, the stop sequence is executed and the GB is opened.
- If the auto start/stop input is activated again before the stop sequence is finished, the GB will give a GB close failure as the GB needs time to load the spring before it is ready to close.

Idle Running

The purpose of the idle run function is to change the start and stop sequences to allow the genset to operate under low temperature conditions.

It is possible to use the idle run function with or without timers. Two timers are available. One timer is used in the start sequence, and one timer is used in the stop sequence.

The mains purpose of the function is to prevent the genset from stopping. The timers are available to make the function flexible.

> **NOTE:** The speed governor must be prepared for the idle run function if this function is to be used.

The function is typically used in installations where the genset is exposed to low temperatures which could generate starting problems or damage the genset.

Description

The function is enabled and configured in parameters 6290–6295 Idle running. It has to be noted that the governor itself must handle the idle speed based on a digital signal from the unit (see the principle diagram below).

When the function is enabled, two digital inputs are used for control purposes:

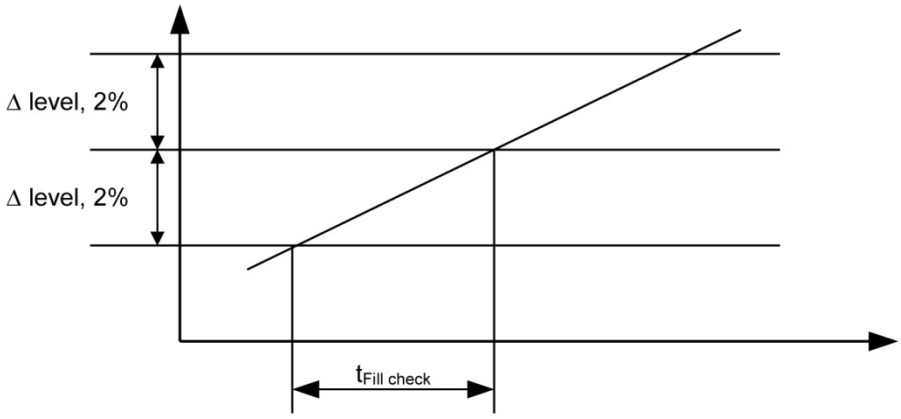
No.	Input	Description
1	Low speed input	This input is used to change between idle speed and nominal speed. This input does not prevent the genset from stopping - it is only a selection between idle and nominal speed or ratio speed.
2	Temperature control input	When this input is activated, the genset will start. It will not be able to stop as long as this input is activated.

> **NOTE:** If the idle run function is selected by means of the timer, the low speed input is overruled.
>
> **NOTE:** The input must be configured through the PC software (USW) at commissioning.

Full to Fuel Fill Check

The fuel pump logic includes a Fuel fill check function.

When the fuel pump is running, the fuel level must increase by 2% within the fuel fill check timer set in parameter 6553. If the fuel level does not increase by 2% within the adjusted delay time, then the fuel pump relay deactivates and a Fuel Fill Alarm occurs.



NOTE: The level of increase is fixed at 2% and cannot be changed.

Fail Class

All activated alarms must be configured with a fail class. The fail classes define the category of the alarms and the subsequent alarm action.

Seven different fail classes can be used. The tables below illustrate the action of each fail class when the engine is running or stopped.

Functional Description—Output

1. Status OK

2. Run Coil
The relay configured to Run coil will be closed the entire time the engine is supposed to run.

3. Stop Coil
This relay will close to stop the engine, and when no running feedback is present, it will stay closed in the external stop time (parameter 6212).

4. Prepare
This function will close the relay as the first thing in the start sequence. The relay will be closed for the time programmed in parameter 6181. This function is used for preheating the engine or for pre-lubrication.

5. Starter (Crank)
The relay configured to starter will be closed for the time selected in parameter 6183 in the start sequence.

6. Horn
The horn relay is a common alarm output. This means that every time an alarm state appears, the horn relay will close for the time configured in the parameter 6130 Alarm horn, regardless of fail class. If 6130 is set to 0 seconds, it will be on until the reset horn push-button is activated or the alarm(s) has (have) been acknowledged.

7. GB on
The function will close the generator breaker

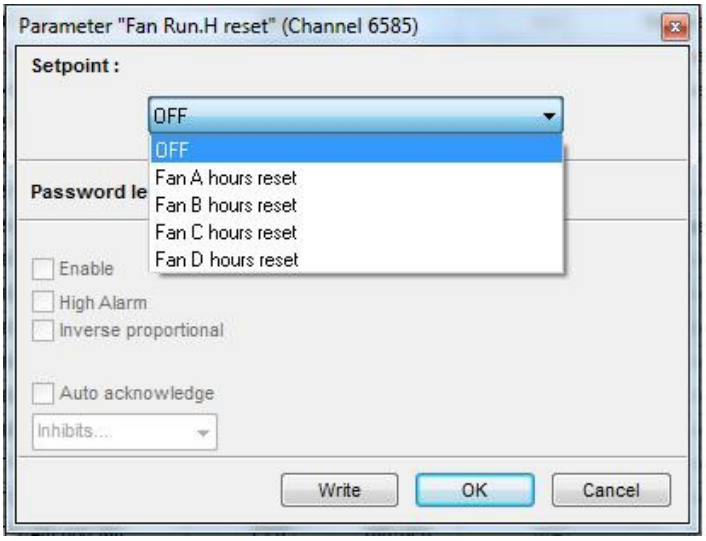
8. GB off
This function will open the generator breaker

9. MB on
This function will close the mains breaker.

10. MB off
This function will open the mains breaker.

Condition	Comment	Note
MAINS FAILURE IN ###s	Frequency or voltage measurement is outside the limits	The timer shown is the Mains failure delay. Text in mains units
MAINS U OK DEL ####s	Mains voltage is OK after a mains failure	The timer shown is the Mains OK delay
MAINS f OK DEL ####s	Mains frequency is OK after a mains failure	The timer shown is the Mains OK delay
Hz/V OK IN ###s	The voltage and frequency on the genset is OK	When the timer runs out it is allowed to operate the generator breaker
COOLING DOWN ###s	Cooling-down period is activated	
COOLING DOWN	Cooling-down period is activated and infinite	Cooling down timer is set to 0.0 s
GENSET STOPPING	This info is shown when cooling down has finished	
EXT. STOP TIME ###s		
EXT. START ORDER	A planned AMF sequence is activated	There is no failure on the mains during this sequence
QUICK SETUP ERROR	Quick setup of the application failed	
MOUNT CAN CONNECTOR	Connect the power management CAN line	
ADAPT IN PROGRESS	The EMS-GC10 is receiving the application that it has just been connected to	
SETUP IN PROGRESS	The new EMS-GC10 is being added to the existing application	
SETUP COMPLETED	Successful update of the application in all EMS-GC10 units	
REMOVE CAN CONNECTOR	Remove the power management CAN lines	
PREPARING ENGINE IF	Preparing engine IF	
PROGRAMMING M-LOGIC	Downloading M-Logic to the unit	

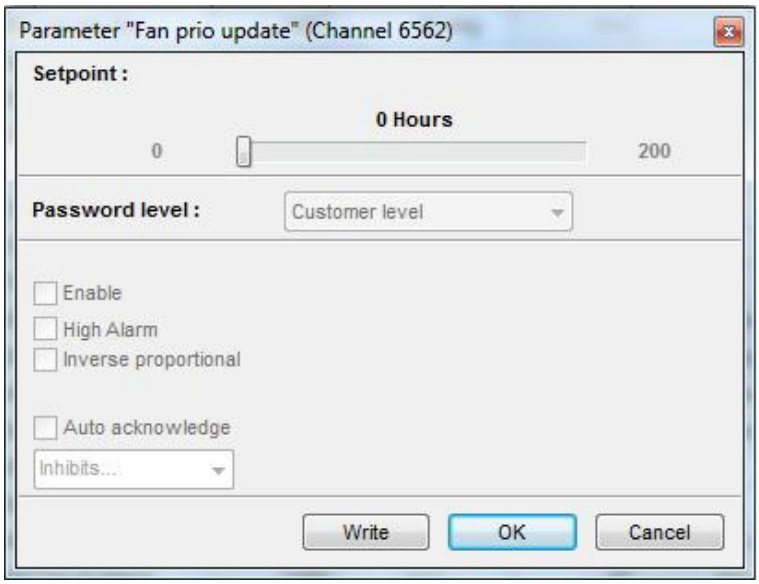
The running hour can be reset by entering parameter 6585 and then selecting the desired fan hours to be reset.



> **NOTE:** Only reset is possible. It is not possible to add an offset to the run hour counter.

Fan Priority Update

In parameter 6562 the priority update rate (hours between priority rearrange) is selected:



If the fan priority update is set to 0 hours, the order of priority will be fixed at: Fan A, fan B, fan C and fan D.

Configuration of the User View

This configuration is done in the PC Utility Software (USW) by pressing the User View icon in the horizontal toolbar.

Activation of Auto Views

The extra view lines are displayed if the parameter 7564 is switched to “ON” and the engine CAN bus is active. Note that it might be necessary to start the engine before switching 7564 to “ON”. The setting automatically returns to “OFF”.

To deactivate the Auto View function, please follow the steps below:

1. Adjust Engine I/F type to “OFF” (parameter 7561).
2. Adjust EIC AUTOVIEW to “ON” (parameter 7564).
3. Adjust EIC AUTOVIEW to “OFF” (parameter 7564).
   (The parameter is not reset automatically when no engine is selected).

Verification of J1939 Objects

To verify the communication, various CAN PC tools can be used. Common for these are that they must be connected to the CANbus between the EMS-GC10 unit and the engine controller. When the tool is connected, it is possible to monitor the communication between the two units. For use of the CAN tool, please refer to the manual for the product used.

As an example, you may see the following telegram:

0xcf00400 ff 7d 7d e0 15 ff f0 ff
DATA BYTE: 1 2 3 4 5 6 7 8

-0xc is the priority
-f004 is the PGN number (61444 in decimal value)
-The 8 bytes following the CAN ID (Oxcf00400) are data, starting with byte 1

The priority needs to be converted to decimal. Note that the 3 priority bits in this case are displayed in the CAN id (You see Oxcf00400 instead of 0x0cf00400). In other cases you may read (e.g., 0x18fef200 [PGN 65266]).

The formula to find the priority number (P) is to divide by 4: **0xc = 12 (Dec) => Priority 3**

Priority	DecID	DecID
1	4d	0x4
2	8d	0x8
3	12d	0xc
4	16d	0x10
5	20d	0x14
6	24d	0x18

Cummins After Treatment

If Cummins After Treatment equipment is installed in the exhaust line and the system is connected to the ECU then indicators from the treatment system can be read over the J1939 link and some regeneration can be controlled.

The table shows lamps and status indicators from the after treatment. The states can be reached through M-logic and can be shown on a FW Murphy display unit.

Status indicator State	Diesel particulate filter regeneration status	Diesel particulate filter status	Particulate filter lamp	High exhaust system temp.	Regenera - tion disabled
OFF	-	-	x	x	-
ON solid	-	-	x	x	-
ON fast blink	-	-	x	-	-
Inhibited	-	-	-	-	x
Not inhibited	-	-	-	-	x
Not Active	x	-	-	-	-
Active	x	-	-	-	-
Regeneration needed	x	-	-	-	-
Regeneration not needed	-	x	-	-	-
Regeneration lowest level	-	x	-	-	-
Regeneration moderate level	-	x	-	-	-
Regeneration highest level	-	x	-	-	-

Besides the lamp and status indicators two after treatment switches for control of the regeneration are available. These can be reached through M-logic in the command group.

1. Cummins particulate filter manual (non-mission) regeneration initiate.
2. Cummins particulate filter regeneration.

Write Commands to Engine Controller

None.

Scania EMS (J1939)

Warning/Shutdown

None.

Write Commands to Engine Controller

None.

Scania EMS 2 S6 (J1939)

Scania EMS 2 S6 (J1939)

> **NOTE:** Scania EMS 2 S6 does not use the J1939 SPN/FMI (Suspect parameter Number/Failure Mode Indicator) system for alarm handling. Instead the DNL2 system is used. For this reason, the alarm handling is also different.

Warnings and Shutdowns (DNL2 Alarms)

Below is a list of warnings and shutdowns that can be shown on the display. They will be shown as an alarm in the alarm window. The alarms can be acknowledged from the display, but they will be visible until the alarm disappears in the ECM module.

Warning/shutdown list	DNL2 warning	DNL2 shutdown
EMS warning	X	-
Low oil pressure	X	-
High coolant temp	X	-
Stop limit exceeded	-	X
Charge 61	X	-
EIC yellow lamp	X	-
EIC red lamp	-	X
EIC malfunction	X	-
EIC protection	X	-

> **NOTE:** DNL2 indication "-" means that the alarm in question is not supported.
>
> **NOTE:** Handling of alarms is only active when the engine is running.

Active Diagnostic Codes (DM2/SPN)		
Addr.	**Content**	**Description**
1434	SPN diagnostic no. 1	Lo word
1435	SPN diagnostic no. 2	Lo word
1436	SPN diagnostic no. 3	Lo word
1437	SPN diagnostic no. 4	Lo word
1438	SPN diagnostic no. 5	Lo word
1439	SPN diagnostic no. 6	Lo word
1440	SPN diagnostic no. 7	Lo word
1441	SPN diagnostic no. 8	Lo word
1442	SPN diagnostic no. 9	Lo word
1443	SPN diagnostic no. 10	Lo word
1444	SPN diagnostic no. 1	Hi word
1445	SPN diagnostic no. 2	Hi word
1446	SPN diagnostic no. 3	Hi word
1447	SPN diagnostic no. 4	Hi word
1448	SPN diagnostic no. 5	Hi word
1449	SPN diagnostic no. 6	Hi word
1450	SPN diagnostic no. 7	Hi word
1451	SPN diagnostic no. 8	Hi word
1452	SPN diagnostic no. 9	Hi word
1453	SPN diagnostic no. 10	Hi word
1454-1465	Not used	Reserved

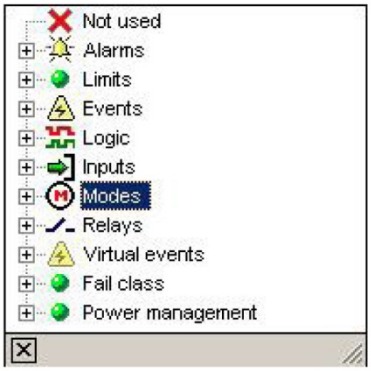
Alarm, status and measurement table (read only) function code 04h.

Addr.	Content	Type
1020	EIC alarms	Bit 0 EIC 7570 communication error
		Bit 2 EIC 7590 shutdown
		Bit 3 EIC 7600 overspeed
		Bit 4 EIC 7610 coolant water temperature 1
		Bit 5 EIC 7620 coolant water temperature 2
		Bit 6 EIC oil pressure 1
		Bit 7 EIC 7640 oil pressure 2
		Bit 8 EIC 7650 oil temp. 1
		Bit 9 EIC 7660 oil temp. 2
		Bit 10 EIC 7670 coolant level 1
		Bit 11 EIC 7680 coolant level 2
1022	EIC alarms, engine controller	Bit 0 EIC ECU power supp voltage LoLo
		Bit 1 EIC Fuel high temp
		Bit 2 EIC Exhaust A high temp
		Bit 3 EIC Exhaust B high temp
		Bit 4 EIC Pressure 1 high (Aux 1)
		Bit 5 EIC Pressure 2 high (Aux 2)
		Bit 6 EIC Day tank high level
		Bit 7 EIC Day tank low level
		Bit 8 EIC Run-up speed not reached
		Bit 9 EIC Idle speed not reached

Events A, B, and C

> **Note:** For each event, the function “NOT” can be selected to get an inverted function.

When opening the roll-down window of the events, this window appears.



Alarm	Use an alarm to activate.
Limits	Same as alarms, only with no time delay on binary inputs.
Events	Events that are not alarms, for example, "Engine Running".
Static Sync. Type	Selected static sync. Functionality.
Command Timers	If the activating (triggering) event is required to be a pulse, these can be used (1 sec. pulse).
CAN inputs	Status of M-logic functions broadcasted on the power management CAN line.
Logic	Can be TRUE or FALSE. TRUE means always, FALSE means never.
Inputs	Direct activation of a binary input. The availability of binary inputs is option-dependent.
Modes	Running modes and plant modes, e.g. "AUTO".
Relays	Activation when a relay activates. The availability of relay outputs is option-dependent.
Virtual Events	A number of internal (virtual) events that can be activated from another logic line. By using these virtual events, the number of activating (triggering) events can be expanded from the three available in each logic line to, in theory, an unlimited number of events.
Fail Class	The event activates upon activation of any alarm with the chosen fail class, for example, "Shut-down".
EIC Events	Events that are related to engine communication.