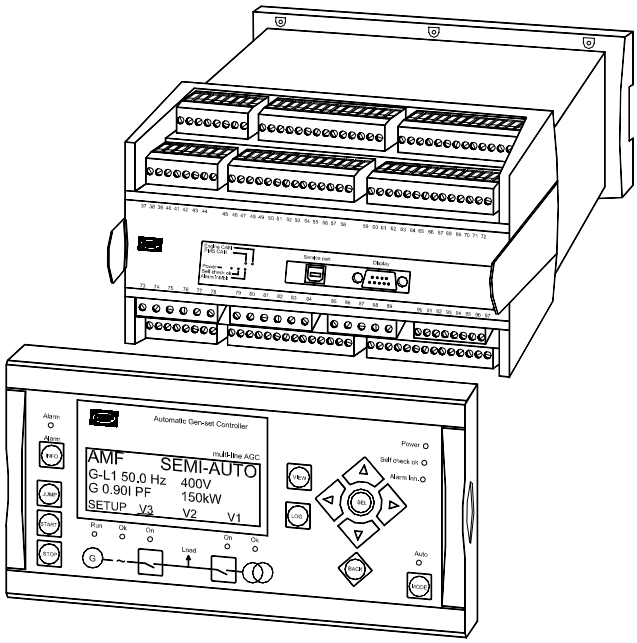
DEIF A/S

Description of options

Option H6, Cummins GCS communication Multi-line 2

4189340445A
SW version 3.0X.X



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1. Warnings and legal information

Legal information and responsibility

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the generator set controlled by the unit, the company responsible for the installation or the operation of the set must be contacted.

The units are not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Electrostatic discharge awareness

Sufficient care must be taken to protect the terminals against static discharges during the installation. Once the unit is installed and connected, these precautions are no longer necessary.

Safety issues

Installing the unit implies work with dangerous currents and voltages. Therefore, the installation should only be carried out by authorised personnel who understand the risks involved in working with live electrical equipment.

Be aware of the hazardous live currents and voltages. Do not touch any AC measurement inputs as this could lead to injury or death.

Definitions

Throughout this document a number of notes and warnings will be presented. To ensure that these are noticed, they will be highlighted in order to separate them from the general text.

Notes

The notes provide general information which will be helpful for the reader to bear in mind.

Warning

The warnings indicate a potentially dangerous situation which could result in death, personal injury or damaged equipment, if certain guidelines are not followed.

2. Description of option

H6 option

Option H6 is a hardware option, and therefore a separate PCB is installed in slot #8 in addition to the standard-installed hardware.

ANSI numbers

Function	ANSI no.
Serial engine communication	-

Terminal description

Engine side modbus connections

The PCB for the ECM communication module is placed in slot #8.

Term.	Function	Description
133	DATA + (A)	Modbus RTU, RS485, Cummins Engine Interface Communication
132	GND	
131	DATA - (B)	
130	Not used	
129	DATA + (A)	
128	Not used	
127	DATA - (B)	
126	Not used	

Terminals 129 and 133 are internally connected.
Terminals 127 and 131 are internally connected.

External modbus connections

The PCB for the modbus card is placed in slot #2, if the controller unit is equipped with option H2 (modbus).

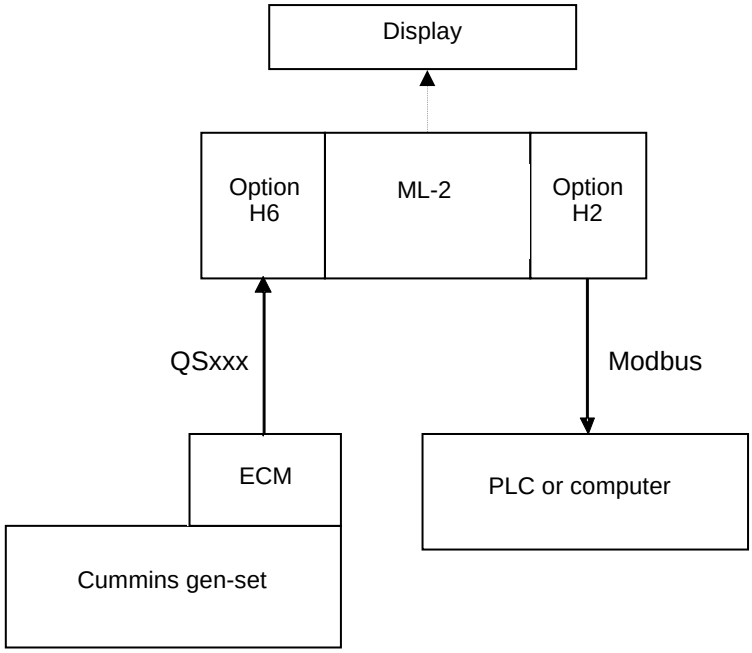
Term.	Function	Description
29	DATA + (A)	Modbus RTU, RS485
30	GND	
31	DATA - (B)	
32	Not used	
33	DATA + (A)	
34	Not used	
35	DATA - (B)	
36	Not used	

Terminals 29 and 33 are internally connected.
Terminals 31 and 35 are internally connected.

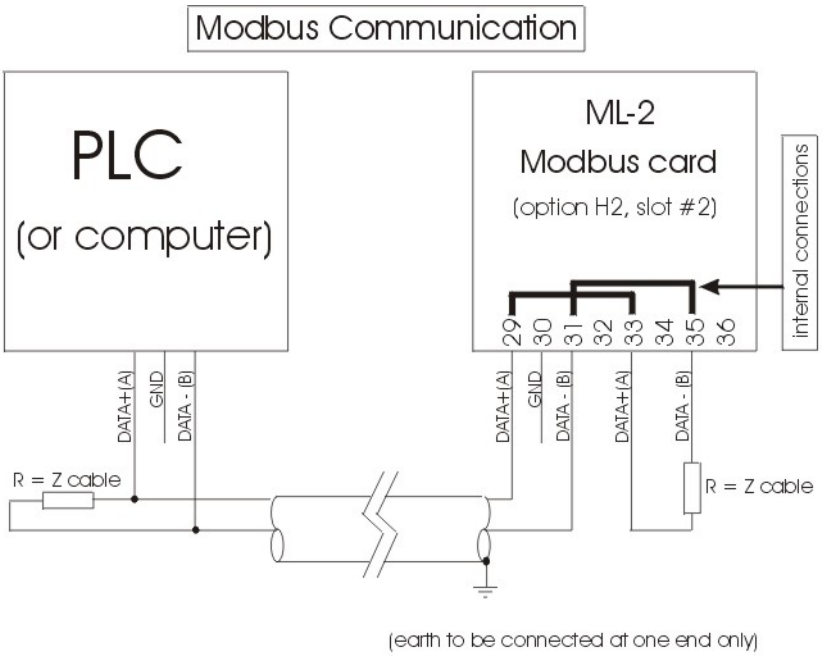
Only modbus can be used to transmit the data to the PLC. Profibus cannot be used.

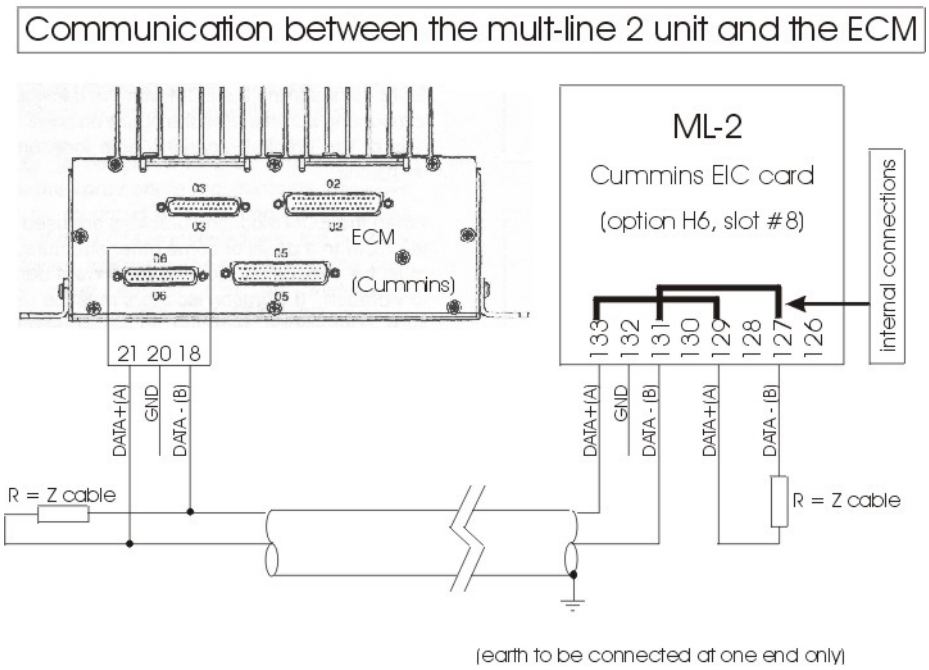
Wirings

Principle diagram:



Connection diagram





3. Functional description

This communication extracts information from the Electronic Control Module (ECM) of a Cummins engine equipped with the ECM module. The values can be used as display values, alarms/shutdown alarms and values to be transmitted through modbus.

Engine type

The Cummins Engine Interface Communication (EIC) supports two protocols depending on the Generator drive Control System (GCS).

It is possible to read data from the engine types QSX15, QSK45 and QSK60. The specific engine type can be set up via the display or via the PC utility software.

The PC Utility Software (USW) can be downloaded free of charge on www.deif.com.

Communication system

The Cummins protocol is based on a modbus system in which the controller unit is the master unit. The Baud rate is fixed by Cummins at 9600 Baud. The Cummins GCS (Generator drive Control System) has a fixed slave address (i.e. ID) at 01. The Baud rate and ID cannot be changed in the controller.

Please refer to the Cummins user manuals for more information about the technical description and details of the Cummins protocol.

Alarm

A number of alarms can be configured. Please refer to the Designer's Reference Handbook for information about this configuration.

The following items can be configured to an alarm:

Menu number	Alarm	Comment
7570	EIC error	
7580	EIC warning	Corresponds to the Cummins bit data 'Common warning lamp/driver command'
7590	EIC shutdown	Corresponds to the Cummins bit data 'Common shutdown lamp/driver command'
7600	EIC overspeed	Actual RPM
7610/7620	EIC coolant t. (2 levels)	Actual temperature
7630/7640	EIC oil press. (2 levels)	Actual pressure

If the alarm must activate a relay output, please notice that the number of configurable relay outputs is option dependent.

Displayed values

The below tables show the messages/values that can be displayed in the view menu.

For information about the menu structure of the ML-2 unit, please see the Designer's Reference Handbook.

The display values corresponding to the engine communication have a description beginning with 'EIC'.

Error messages

The following error messages can occur:

Message	Description
Engine I. value N.A.	The value is not available for the present engine type
Value selected error	The value cannot be read due to sensor error, sub-system or module error
'N.A.'	The available value changes to N.A. due to communication error

Object selection

The view lines can be configured with the available values:

Object	Cummins QSX15	Cummins QSK45/QSK60
EIC Engine speed	Available	Available
EIC Engine coolant temperature	Available	Available
EIC Engine oil pressure	Available	Available
EIC Engine oil temperature	Available	Not available
EIC Fuel temperature	Not available	Available
EIC Air inlet temperature	Available	Available
EIC Fuel rate	Available	Available
EIC Air inlet pressure	Available	Available
EIC Fuel delivery pressure	Available	Available
EIC Coolant pressure	Not available	Available
EIC Blowby flow	Not available	Available
EIC Fuel rail pressure	Not available	Available
EIC Timing rail pressure	Not available	Available
EIC Aftercooler water inlet temp.	Not available	Available

Modbus communication

If the modbus option (H2) is installed, the data can be transmitted to a PLC or a computer.

Please refer to the option H2 technical documentation for more information about our standard external modbus communication from the ML-2 controller unit to an external PLC (or computer).

4. Parameter list

For information about the structure of the parameter descriptions, see the Designer's Reference Handbook.

7560 Engine I/F

No.	Setting		Min. setting	Max. setting	Factory setting
7561	Engine I/F	Engine type	OFF (1)	Cummins QSK45/QSK60 (3)	OFF

Menu 7561 affects the displayed value. This chosen unit does not affect the data readable by the modbus communication (option H2).

7570 EI comm. error

No.	Setting		Min. setting	Max. setting	Factory setting
7571	EI comm. error	Delay	0.0 s	100.0 s	0.0 s
7572	EI comm. error	Relay output A	Not used	Option dependent	Not used
7573	EI comm. error	Relay output B	Not used		Not used
7574	EI comm. error	Enable	OFF	ON	OFF
7575	EI comm. error	Fail class	Warning	Trip MB	Warning

7580 EIC warning

No.	Setting		Min. setting	Max. setting	Factory setting
7581	EIC warning	Delay	0.0 s	100.0 s	0.0 s
7582	EIC warning	Relay output A	Not used	Option dependent	Not used
7583	EIC warning	Relay output B	Not used		Not used
7584	EIC warning	Enable	OFF	ON	OFF
7585	EIC warning	Fail class	Alarm	Trip MB	Warning

Corresponds to the Cummins bit data 'Common Warning Lamp/Relay Driver Command'.

7590 EIC shutdown

No.	Setting		Min. setting	Max. setting	Factory setting
7591	EIC shutdown	Delay	0.0 s	100.0 s	0.0 s
7592	EIC shutdown	Relay output A	Not used	Option dependent	Not used
7593	EIC shutdown	Relay output B	Not used		Not used
7594	EIC shutdown	Enable	OFF	ON	OFF
7595	EIC shutdown	Fail class	Alarm	Trip MB	Shutdown

Corresponds to the Cummins bit data 'Common Shutdown Lamp/Relay Driver Command'.

7600 EIC overspeed

No.	Setting		Min. setting	Max. setting	Factory setting
7601	EIC overspeed	Set point	0 RPM	2000 RPM	1600 RPM
7602	EIC overspeed	Delay	0.0 s	100.0 s	2.0 s
7603	EIC overspeed	Relay output A	Not used	Option dependent	Not used
7604	EIC overspeed	Relay output B	Not used		Not used
7605	EIC overspeed	Enable	OFF	ON	OFF
7606	EIC overspeed	Fail class	Alarm	Trip MB	Warning

7610 EIC coolant t. 1

No.	Setting		Min. setting	Max. setting	Factory setting
7611	EIC coolant t. 1	Set point	-40 deg.	210 deg.	100 deg.
7612	EIC coolant t. 1	Delay	0.0 s	100.0 s	5.0 s
7613	EIC coolant t. 1	Relay output A	Not used	Option dependent	Not used
7614	EIC coolant t. 1	Relay output B	Not used		Not used
7615	EIC coolant t. 1	Enable	OFF	ON	OFF
7616	EIC coolant t. 1	Fail class	Alarm	Trip MB	Warning

7620 EIC coolant t. 2

No.	Setting		Min. setting	Max. setting	Factory setting
7621	EIC coolant t. 2	Set point	-40 deg.	210 deg.	110 deg.
7622	EIC coolant t. 2	Delay	0.0 s	100.0 s	5.0 s
7623	EIC coolant t. 2	Relay output A	Not used	Option dependent	Not used
7624	EIC coolant t. 2	Relay output B	Not used		Not used
7625	EIC coolant t. 2	Enable	OFF	ON	OFF
7626	EIC coolant t. 2	Fail class	Alarm	Trip MB	Warning

7630 EIC oil press. 1

No.	Setting		Min. setting	Max. setting	Factory setting
7631	EIC oil press. 1	Set point	0.0 bar	10.0 bar	2.0 bar
7632	EIC oil press. 1	Delay	0.0 s	100.0 s	5.0 s
7633	EIC oil press. 1	Relay output A	Not used	Option dependent	Not used
7634	EIC oil press. 1	Relay output B	Not used		Not used
7635	EIC oil press. 1	Enable	OFF	ON	OFF
7636	EIC oil press. 1	Fail class	Alarm	Trip MB	Warning

7640 EIC oil press. 2

No.	Setting		Min. setting	Max. setting	Factory setting
7641	EIC oil press. 2	Set point	0.0 bar	10.0 bar	1.0 bar
7642	EIC oil press. 2	Delay	0.0 s	100.0 s	5.0 s
7643	EIC oil press. 2	Relay output A	Not used	Option dependent	Not used
7644	EIC oil press. 2	Relay output B	Not used		Not used
7645	EIC oil press. 2	Enable	OFF	ON	OFF
7646	EIC oil press. 2	Fail class	Alarm	Trip MB	Shutdown

5. Modbus communication

This chapter is to be considered as additional information for option H2. Please refer to the ECM (Engine Communication Module) user manuals for more information about the ECM protocol technical description and the details of each communication value.

A. Cummins QSX15 protocol

Data table (bytes, read only registers, function code 03h)

Object	Protocol address (base 0)	No. of bytes	Refresh time (s)
Engine speed	42000	2	0.5
Coolant temperature	42001	2	0.5
Oil pressure	42002	2	0.5
Battery voltage	42003	2	0.5
Frequency adjust pot.	42004	2	0.5
Droop adjust pot.	42005	2	2.0
Ambient air absolute pressure	42006	2	2.0
Engine running time	42007	4	2.0
ECM on time	42009	4	2.0
Base frequency	42011	2	2.0
Base speed	42012	2	2.0
Final speed reference	42013	2	2.0
Estimated torque	42014	2	2.0
±0.2V speed bias	42015	2	2.0
±2.5V speed bias	42016	2	2.0
Fuel consumption rate	42017	2	2.0
Cumulative fuel consumption	42018	4	2.0
Governor gain adjust pot.	42020	2	2.0
Active warning fault events list_fault code	42032	32	5.0
Active shutdown fault events list_fault code	42048	32	5.0
Intake manifold absolute pressure	42512	2	2.0
Intake manifold temperature	42513	2	2.0
Fuel outlet absolute pressure	42514	2	2.0
Oil temperature	42515	2	2.0

Data table (bits, read only, function code 02h)

Object	Protocol address (base 0)	No. of bits	Refresh time (s)
Idle/rate switch state	22000	1	2.0
Run/stop switch state	22001	1	2.0
Remote emergency stop input	22002	1	2.0
Coolant level switch state	22003	1	2.0
Common shutdown lamp/relay driver command	22004	1	2.0
Common warning lamp/relay driver command	22005	1	2.0
Fuel shut-off valve driver state	22006	1	2.0
Operator interface mode	22007	4	2.0

B. Cummins QSK45 or QSK60 protocol

Data table (read only registers, function code 03h)

Object	Protocol address (base 0)	No. of bytes	Refresh time (s)
Engine speed	42000	2	0.5
Coolant temperature	42001	2	0.5
Oil pressure	42002	2	0.5
Battery voltage	42003	2	0.5
Frequency adjust pot.	42004	2	0.5
Droop adjust pot.	42005	2	2.0
Ambient air absolute pressure	42006	2	2.0
Engine running time	42007	4	2.0
ECM on time	42009	4	2.0
Base frequency	42011	2	2.0
Base speed	42012	2	2.0
Final speed reference	42013	2	2.0
Estimated torque	42014	2	2.0
±0.2V speed bias	42015	2	2.0
±2.5V speed bias	42016	2	2.0
Fuel consumption rate	42017	2	2.0
Cumulative fuel consumption	42018	4	2.0
Governor gain adjust pot.	42020	2	2.0
Active warning fault events list_fault code	42032	32	5.0
Active shutdown fault events list_fault code	42048	32	5.0
Blowby flow	42528	2	2.0
Intake manifold absolute pressure	42529	2	2.0
Intake manifold temperature	42530	2	2.0
Coolant absolute pressure	42531	2	2.0
Fuel pump absolute pressure	42532	2	2.0
Fuel rail absolute pressure	42533	2	2.0
Fuel inlet temperature	42534	2	2.0
Timing rail absolute pressure	42535	2	2.0
Aftercooler water inlet temperature	42536	2	2.0

Data table (bits, read only, function code 02h)

Object	Protocol address (base 0)	No. of bits	Refresh time (s)
Idle/rate switch state	22000	1	2.0
Run/stop switch state	22001	1	2.0
Remote emergency stop input	22002	1	2.0
Coolant level switch state	22003	1	2.0
Common shutdown lamp/relay driver command	22004	1	2.0
Common warning lamp/relay driver command	22005	1	2.0
Fuel shut-off valve driver state	22006	1	2.0
Operator interface mode	22007	4	2.0