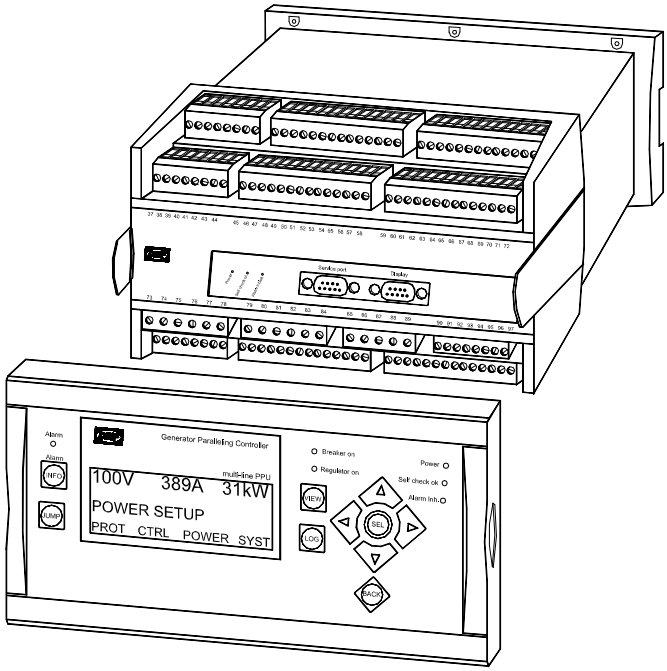
DEIF A/S

Description of options

Option H6
Serial communication – Cummins GSC Multi-line 2 – version 2

4189340360D
SW version 2.4X.X



- *Description of option*
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This manual is valid for standard multi-line 2 GPU/GPC/PPU units with firmware version 2.40.0 or later.

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.

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 option H6, 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 29 and 33 are internally connected.
Terminals 31 and 35 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).

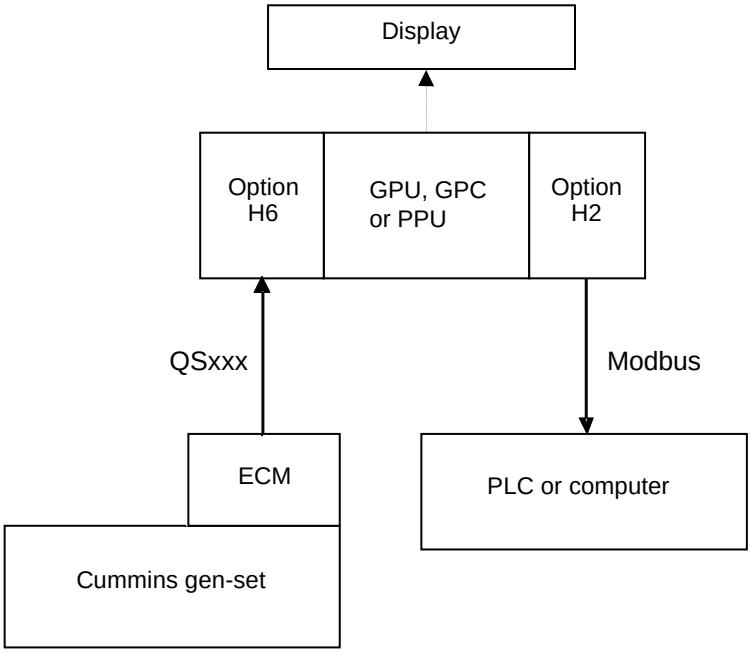
Term.	Function	Description
29	DATA + (A)	Modbus RTU, RS485
30	GND	
31	DATA - (B)	
32	Not used	
33	DATA + (A)	
34	Not used	
35	DATA - (B)	
36	Not used	

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



For wiring diagrams, please refer to the installation instructions.

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

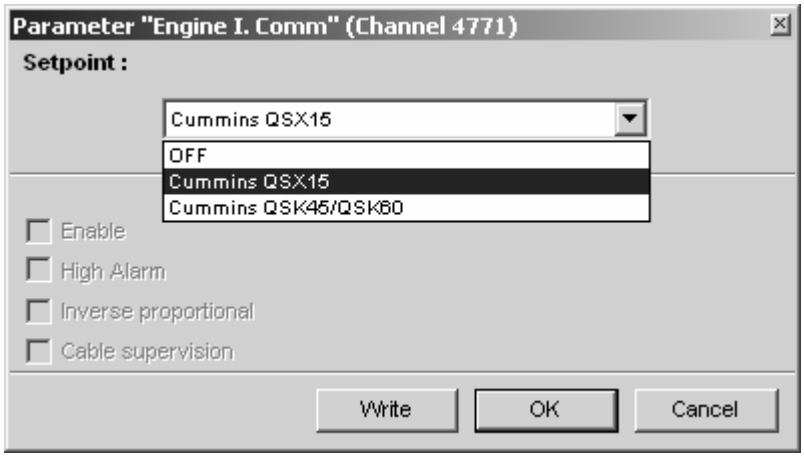
The Cummins Engine Interface Communication (EIC) supports two protocols depending on the Generator drive Control System (GCS).

It is possible to read data from the engine types QSX15, QSX45 and QSX60. The specific engine type can be set up via the display or via the PC utility software.

Engine type selection

The proper communication is selected via the utility software in the dialog box shown below. It can also be selected in the display in menu 4770.

If OFF is selected it means that no communication is selected.



Communication system

The Cummins protocol is based on a Modbus system where 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 Cummins protocol's technical description and details.

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
4790	Communication error	
4800	EIC warning	Corresponds to the Cummins bit data 'Common warning lamp/driver command'
4810	EIC shutdown	Corresponds to the Cummins bit data 'Common shutdown lamp/driver command'
4820	Overspeed	Actual RPM
4830/4840	Coolant temperature (2 levels)	Actual temperature
4850/4860	Oil pressure (2 levels)	Actual pressure

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

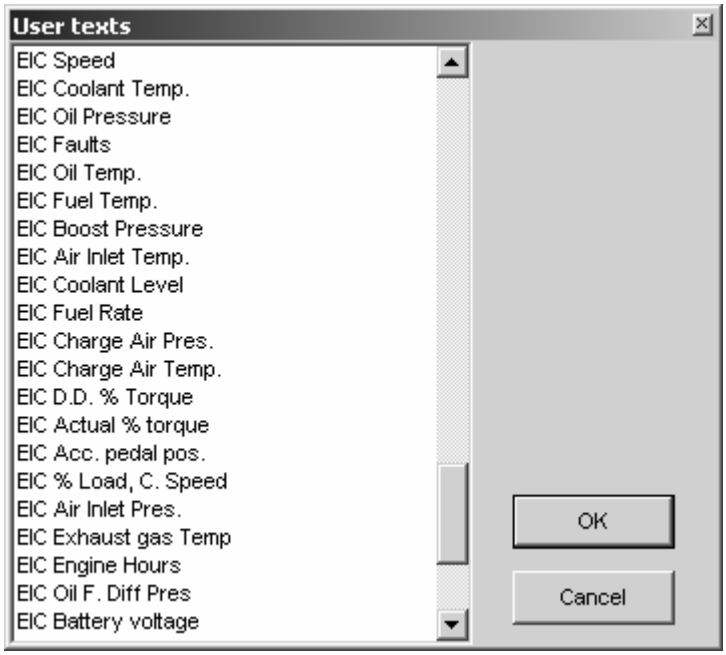
Displayed values

The table shows which values can be displayed in the view menu. That is in V1, V2 and V3.

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

In the GPU without option G2 on V1 is available.

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

Menu 4780 (EIC unit) affects the display value. This menu does not affect the data readable by the Modbus communication (option H2).

Modbus communication

If the Modbus option (H2) is installed, then 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 controller unit ML-2 to an external PLC (or computer).

4. Parameter list

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

Engine communication settings

4770 Engine interface communication

No.	Setting		Min. setting	Max. setting	Factory setting
4771	Engine I. comm.	Type	OFF		OFF
				QSX15	
				QSK45/QSK60	

4780 EIC unit

No.	Setting		Min. setting	Max. setting	Factory setting
4781	EIC unit	Unit	Bar/Celsius	Psi/Fahrenheit	Bar/Celsius

4790 Engine interface communication error

No.	Setting		Min. setting	Max. setting	Factory setting
4791	EI comm. error	Delay	0.0 s	100.0 s	0.0 s
4792	EI comm. error	Relay output A	R0 (none)	Option dependent	R0 (none)
4793	EI comm. error	Relay output B	R0 (none)		R0 (none)
4794	EI comm. error	Enable	OFF	ON	OFF

4800 EIC warning

No.	Setting		Min. setting	Max. setting	Factory setting
4801	EIC warning	Delay	0.0 s	100.0 s	0.0 s
4802	EIC warning	Relay output A	R0 (none)	Option dependent	R0 (none)
4803	EIC warning	Relay output B	R0 (none)		R0 (none)
4804	EIC warning	Enable	OFF	ON	OFF

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

4810 EIC shutdown

No.	Setting		Min. setting	Max. setting	Factory setting
4811	EIC shutdown	Delay	0.0 s	100.0 s	0.0 s
4812	EIC shutdown	Relay output A	R0 (none)	Option dependent	R0 (none)
4813	EIC shutdown	Relay output B	R0 (none)		R0 (none)
4814	EIC shutdown	Enable	OFF	ON	OFF

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

4820 EIC overspeed

No.	Setting		Min. setting	Max. setting	Factory setting
4821	EIC overspeed	Set point	0 RPM	2000 RPM	1600 RPM
4822	EIC overspeed	Delay	0.0 s	100.0 s	2.0 s
4823	EIC overspeed	Relay output A	R0 (none)	Option dependent	R0 (none)
4824	EIC overspeed	Relay output B	R0 (none)		R0 (none)
4825	EIC overspeed	Enable	OFF	ON	OFF

4830 EIC coolant temp.1

No.	Setting		Min. setting	Max. setting	Factory setting
4831	EIC coolant t. 1	Set point	-40 deg.	210 deg.	100 deg.
4832	EIC coolant t. 1	Delay	0.0 s	100.0 s	5.0 s
4833	EIC coolant t. 1	Relay output A	R0 (none)	Option dependent	R0 (none)
4834	EIC coolant t. 1	Relay output B	R0 (none)		R0 (none)
4835	EIC coolant t. 1	Enable	OFF	ON	OFF

4840 EIC coolant temp. 2

No.	Setting		Min. setting	Max. setting	Factory setting
4841	EIC coolant t. 2	Set point	-40 deg.	210 deg.	110 deg.
4842	EIC coolant t. 2	Delay	0.0 s	100.0 s	5.0 s
4843	EIC coolant t. 2	Relay output A	R0 (none)	Option dependent	R0 (none)
4844	EIC coolant t. 2	Relay output B	R0 (none)		R0 (none)
4845	EIC coolant t. 2	Enable	OFF	ON	OFF

4850 EIC oil pressure 1

No.	Setting		Min. setting	Max. setting	Factory setting
4851	EIC oil press. 1	Set point	0.0 bar	10.0 bar	2.0 bar
4852	EIC oil press. 1	Delay	0.0 s	100.0 s	5.0 s
4853	EIC oil press. 1	Relay output A	R0 (none)	R16 (relay 16)	R0 (none)
4854	EIC oil press. 1	Relay output B	R0 (none)	R16 (relay 16)	R0 (none)
4855	EIC oil press. 1	Enable	OFF	ON	OFF

4860 EIC oil pressure 2

No.	Setting		Min. setting	Max. setting	Factory setting
4861	EIC oil press. 2	Set point	0.0 bar	10.0 bar	1.0 bar
4862	EIC oil press. 2	Delay	0.0 s	100.0 s	5.0 s
4863	EIC oil press. 2	Relay output A	R0 (none)	R16 (relay 16)	R0 (none)
4864	EIC oil press. 2	Relay output B	R0 (none)	R16 (relay 16)	R0 (none)
4865	EIC oil press. 2	Enable	OFF	ON	OFF

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	21000	2	0.5
Coolant temperature	21001	2	0.5
Oil pressure	21002	2	0.5
Battery voltage	21003	2	0.5
Frequency adjust pot.	21004	2	0.5
Droop adjust pot.	21005	2	2.0
Ambient air absolute pressure	21006	2	2.0
Engine running time	21007	4	2.0
ECM on time	21009	4	2.0
Base frequency	21011	2	2.0
Base speed	21012	2	2.0
Final speed reference	21013	2	2.0
Estimated torque	21014	2	2.0
±0.2V speed bias	21015	2	2.0
±2.5V speed bias	21016	2	2.0
Fuel consumption rate	21017	2	2.0
Cumulative fuel consumption	21018	4	2.0
Governor gain adjust pot.	21020	2	2.0
Active warning fault events list_fault code	21032	32	5.0
Active shutdown fault events list_fault code	21048	32	5.0
Intake manifold absolute pressure	21512	2	2.0
Intake manifold temperature	21513	2	2.0
Fuel outlet absolute pressure	21514	2	2.0
Oil temperature	21515	2	2.0

Data table (bits, read only, function code 01h)

Object	Protocol address (base 0)	No. of bits	Refresh time (s)
Idle/rate switch state	11000	1	2.0
Run/stop switch state	11001	1	2.0
Remote emergency-stop input	11002	1	2.0
Coolant level switch state	11003	1	2.0
Common shutdown lamp/relay driver command	11004	1	2.0
Common warning lamp/relay driver command	11005	1	2.0
Fuel shut-off valve driver state	11006	1	2.0
Operator interface mode	11007	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	21000	2	0.5
Coolant temperature	21001	2	0.5
Oil pressure	21002	2	0.5
Battery voltage	21003	2	0.5
Frequency adjust pot.	21004	2	0.5
Droop adjust pot.	21005	2	2.0
Ambient air absolute pressure	21006	2	2.0
Engine running time	21007	4	2.0
ECM on time	21009	4	2.0
Base frequency	21011	2	2.0
Base speed	21012	2	2.0
Final speed reference	21013	2	2.0
Estimated torque	21014	2	2.0
±0.2V speed bias	21015	2	2.0
±2.5V speed bias	21016	2	2.0
Fuel consumption rate	21017	2	2.0
Cumulative fuel consumption	21018	4	2.0
Governor gain adjust pot.	21020	2	2.0
Active warning fault events list_fault code	21032	32	5.0
Active shutdown fault events list_fault code	21048	32	5.0
Blowby flow	21528	2	2.0
Intake manifold absolute pressure	21529	2	2.0
Intake manifold temperature	21530	2	2.0
Coolant absolute pressure	21531	2	2.0
Fuel pump absolute pressure	21532	2	2.0
Fuel rail absolute pressure	21533	2	2.0
Fuel inlet temperature	21534	2	2.0
Timing rail absolute pressure	21535	2	2.0
Aftercooler water inlet temperature	21536	2	2.0

Data table (bits, read only, function code 01h)

Object	**Protocol address (base 0)**	**No. of bits**	**Refresh time (s)**
Idle/rate switch state	11000	1	2.0
Run/stop switch state	11001	1	2.0
Remote emergency-stop input	11002	1	2.0
Coolant level switch state	11003	1	2.0
Common shutdown lamp/relay driver command	11004	1	2.0
Common warning lamp/relay driver command	11005	1	2.0
Fuel shut-off valve driver state	11006	1	2.0
Operator interface mode	11007	4	2.0