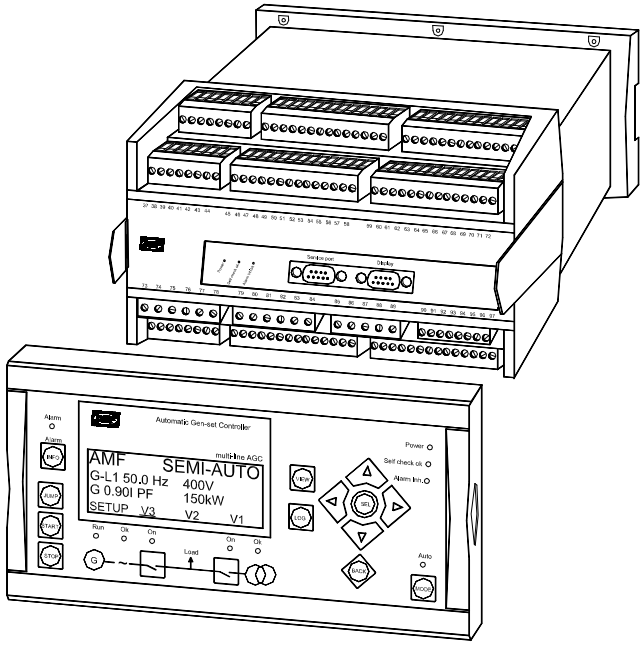
DEIF A/S

Description of options

Option H6,
Cummins GCS communication
Automatic Gen-set Controller

4189340376C
SW version 2.1X.X



- *Description of option*
- *Functional description*
- *Parameter list*
- *Modbus communication*

DEIF A/S, *Frisenborgvej 33*
DK-7800 Skive, Denmark

Tel.: +45 9614 9614, Fax: +45 9614 9615
E-mail: deif@deif.com, URL: www.deif.com

Table of contents

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).

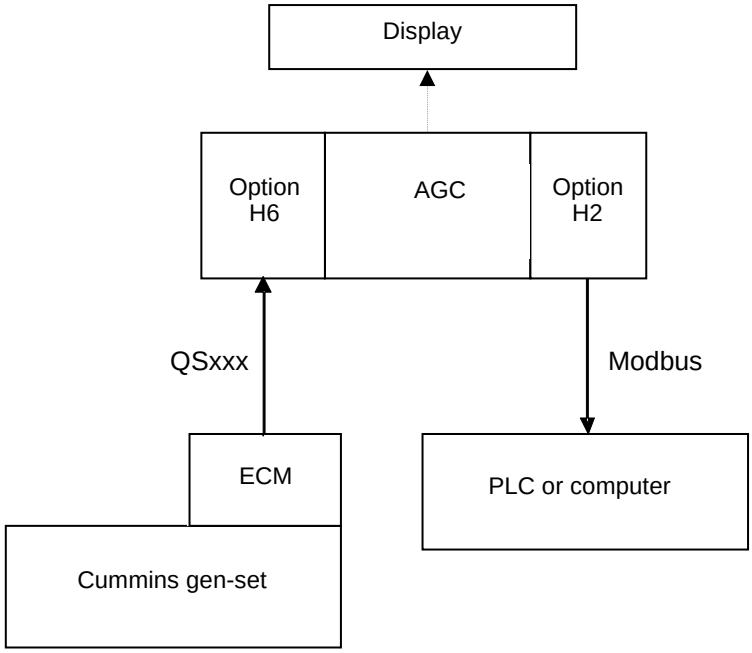
Term.	Function	Description
29	DATA + (A)	Modbus RTU, RS485
30	GND	
31	DATA - (B)	
32	Not used	
33	DATA + (A)	
34	Not used	
35	DATA - (B)	
36	Not used	

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 actual 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

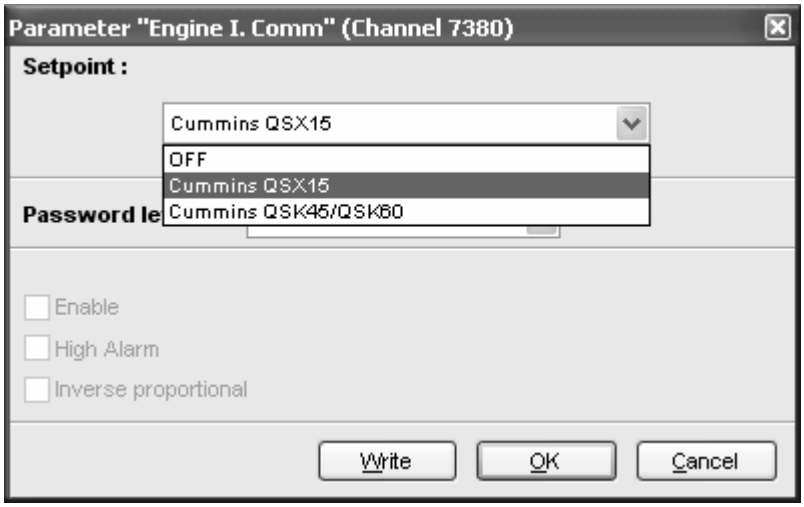
The Cummins Engine Interface Communication (EIC) supports two protocols depending on the Generator drive Control System (GCS).

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 7380.

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
7400	Communication error	
7410	EIC warning	Corresponds to the Cummins bit data 'Common warning lamp/driver command'
7420	EIC shutdown	Corresponds to the Cummins bit data 'Common shutdown lamp/driver command'
7430	Overspeed	Actual RPM
7440/7450	Coolant temperature (2 levels)	Actual temperature
7460/7470	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 AGC, 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

Menu 7390 (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 AGC 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

7380 Engine communications

No.	Setting		Min. setting	Max. setting	Factory setting
7381	Engine i. comm.	Type	OFF		OFF
				Cummins QSX15	
				Cummins QSK45/QSK60	

7390 EIC unit

No.	Setting		Min. setting	Max. setting	Factory setting
7391	EIC unit	Unit	Bar/Celsius	Psi/Fahrenheit	Bar/Celsius

7400 EI communication error

No.	Setting		Min. setting	Max. setting	Factory setting
7401	EI comm. error	Delay	0.0 s	100.0 s	0.0 s
7402	EI comm. error	Relay output A	R0 (none)	Option dependent	R0 (none)
7403	EI comm. error	Relay output B	R0 (none)		R0 (none)
7404	EI comm. error	Enable	OFF	ON	OFF
7405	EI comm. error	Fail class	Warning (2)	Trip MB (6)	Warning (2)

7410 EIC warning

No.	Setting		Min. setting	Max. setting	Factory setting
7411	EIC warning	Delay	0.0 s	100.0 s	0.0 s
7412	EIC warning	Relay output A	R0 (none)	Option dependent	R0 (none)
7413	EIC warning	Relay output B	R0 (none)		R0 (none)
7414	EIC warning	Enable	OFF	ON	OFF
7415	EIC warning	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

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

7420 EIC shutdown

No.	Setting		Min. setting	Max. setting	Factory setting
7421	EIC shutdown	Delay	0.0 s	100.0 s	0.0 s
7422	EIC shutdown	Relay output A	R0 (none)	Option dependent	R0 (none)
7423	EIC shutdown	Relay output B	R0 (none)		R0 (none)
7424	EIC shutdown	Enable	OFF	ON	OFF
7425	EIC shutdown	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

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

7430 EIC overspeed

No.	Setting		Min. setting	Max. setting	Factory setting
7431	EIC overspeed	Set point	0 RPM	2000 RPM	1600 RPM
7432	EIC overspeed	Delay	0.0 s	100.0 s	2.0 s
7433	EIC overspeed	Relay output A	R0 (none)	Option dependent	R0 (none)
7434	EIC overspeed	Relay output B	R0 (none)		R0 (none)
7435	EIC overspeed	Enable	OFF	ON	OFF
7436	EIC overspeed	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

7440 EIC cooling water temperature 1

No.	Setting		Min. setting	Max. setting	Factory setting
7441	EIC cool w. t. 1	Set point	-40 deg.	210 deg.	100 deg.
7442	EIC cool w. t. 1	Delay	0.0 s	100.0 s	5.0 s
7443	EIC cool w. t. 1	Relay output A	R0 (none)	Option dependent	R0 (none)
7444	EIC cool w. t. 1	Relay output B	R0 (none)		R0 (none)
7445	EIC cool w. t. 1	Enable	OFF	ON	OFF
7446	EIC cool w. t. 1	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

7450 EIC cooling water temperature 2

No.	Setting		Min. setting	Max. setting	Factory setting
7451	EIC cool w. t. 2	Set point	-40 deg.	210 deg.	110 deg.
7452	EIC cool w. t. 2	Delay	0.0 s	100.0 s	5.0 s
7453	EIC cool w. t. 2	Relay output A	R0 (none)	Option dependent	R0 (none)
7454	EIC cool w. t. 2	Relay output B	R0 (none)		R0 (none)
7455	EIC cool w. t. 2	Enable	OFF	ON	OFF
7456	EIC cool w. t. 2	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

7460 EIC oil pressure 1

No.	Setting		Min. setting	Max. setting	Factory setting
7461	EIC oil press. 1	Set point	0.0 bar	10.0 bar	2.0 bar
7462	EIC oil press. 1	Delay	0.0 s	100.0 s	5.0 s
7463	EIC oil press. 1	Relay output A	R0 (none)	Option dependent	R0 (none)
7464	EIC oil press. 1	Relay output B	R0 (none)		R0 (none)
7465	EIC oil press. 1	Enable	OFF	ON	OFF
7466	EIC oil press. 1	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

7470 EIC oil pressure 2

No.	Setting		Min. setting	Max. setting	Factory setting
7471	EIC oil press. 2	Set point	0.0 bar	10.0 bar	1.0 bar
7472	EIC oil press. 2	Delay	0.0 s	100.0 s	5.0 s
7473	EIC oil press. 2	Relay output A	R0 (none)	Option dependent	R0 (none)
7474	EIC oil press. 2	Relay output B	R0 (none)		R0 (none)
7475	EIC oil press. 2	Enable	OFF	ON	OFF
7476	EIC oil press. 2	Fail class	Alarm (1)	Trip MB (6)	Warning (2)

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 01h)

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 01h)

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