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CE

COMMUNICATION PROTOCOL

Engine communication ECU 100/GCU 100

- Description of communication
- Functional description
- Modbus communication

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1. Delimitation

1.1 Scope of engine communication

1.1.1 Scope

This description covers the following products:

ECU 100	SW version 1.00.x or later
GCU 100	SW version 1.00.x or later

2. General information

2.1 Warnings, legal information and safety

2.1.1 Warnings and notes

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

Warnings

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

Notes

Notes provide general information, which will be helpful for the reader to bear in mind.

2.1.2 Legal information and disclaimer

DEIF takes no responsibility for installation or operation of the generator set. If there is any doubt about how to install or operate the engine/generator controlled by the Multi-line 2 unit, the company responsible for the installation or the operation of the set must be contacted.

The Multi-line 2 unit is not to be opened by unauthorised personnel. If opened anyway, the warranty will be lost.

Disclaimer

DEIF A/S reserves the right to change any of the contents of this document without prior notice.

The English version of this document always contains the most recent and up-to-date information about the product. DEIF does not take responsibility for the accuracy of translations, and translations might not be updated at the same time as the English document. If there is a discrepancy, the English version prevails.

2.1.3 Safety issues

Installing and operating the Multi-line 2 unit may imply 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.

2.1.4 Electrostatic discharge awareness

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

2.1.5 Factory settings

The Multi-line 2 unit is delivered from factory with certain factory settings. These are based on average values and are not necessarily the correct settings for matching the engine/generator set in question. Precautions must be taken to check the settings before running the engine/generator set.

3. Description of Engine Communication

3.1 Engine communication

3.1.1 Engine communication

The functionality allows the Unit to communicate with a wide range of engine types via the CANbus.

3.1.2 Terminal description GCU and ECU

Term.	Function	Description
53	CAN-H	Only CAN A for both products.
54	CAN-GND	
55	CAN-L	

3.2 Modbus communication

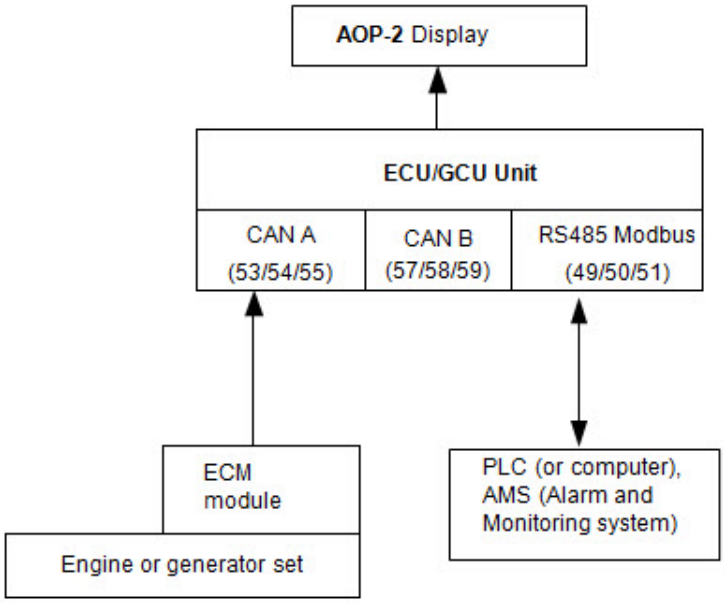
3.2.1 Modbus communication

Engine data can be read via the Modbus.

Details about available DATA and address on Modbus, please refer to the document "Modbus Communication".

For wiring details, please refer to the document "ECU 100 Installation Instructions" or "GCU 100 Installation Instructions".

3.2.2 Principle diagram



4. Functional description

4.1 Electronic Control Module (ECM)

4.1.1 ECM

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

4.2 Engine types

4.2.1 Engine types

ECU/GCU is able to transmit data between the unit and the following engine types:

Engine manufacturer	Engine controller/type	Comment	CAN A
Caterpillar	ADEM III and A4/C4.4, C6.6, C9, C15, C18, C32	Rx/Tx	X
Cummins	CM850/570/2150/2250, QSL, QSB5, QXL15 and 7, QSM11, QSK19, 50 and 60	Rx/Tx	X
Detroit Diesel	DDEC III and IV/Series 50, 60 and 2000	Rx/Tx	X
Deutz	EMR3*, EMR 2 (EMR)/912, 913, 914 and L2011	Rx/Tx	X
-	Generic J1939	Rx/Tx	X
Iveco	EDC7 (Bosch MS6.2)/Series NEF, CURSOR and VECTOR 8	Rx/Tx	X
John Deere	JDEC/PowerTech M, E and Plus	Rx/Tx	X
MTU	MDEC, module M.302 or M.303/Series 2000 and 4000	Rx	X
MTU	MDEC, module M.201 or M.304/Series 2000 and 4000	Rx Select M.303	X
MTU	ADEC/Series 2000 and 4000 (ECU7)	Rx/Tx	X
MTU*	J1939 Smart Connect/Series 1600 (ECU8)	Rx/Tx	x
Perkins	Series 1100, 1300, 2300, 2500 and 2800	Rx/Tx	X
Scania	EMS	Rx	X
Scania	EMS S6 (KWP2000)/Dx9x, Dx12x, Dx16x	Rx/Tx	X
Volvo Penta	EDC4	Rx Select EMR 2	X
Volvo Penta	EMS	Rx	X
Volvo Penta	EMS 2 and EDCIII/D6, D7, D9, D12 and D16 (GE and AUX variants only)	Rx/Tx	X

Rx/Tx: Please go to the section "Specific engine type descriptions" for details of data read and write.

Choice of EIC is made in menu 7560.

For support of controller/engine types not listed, please contact DEIF A/S.

4.3 Communication system

4.3.1 Communication system

All these protocols are based on a CANbus communication system. Except for the MDEC and ADEC communication, all of them are based on the J1939. The MDEC and ADEC protocols are MTU-designed protocols based on CANopen.
The Baud rate is fixed by the engine manufacturer at:

MDEC, ADEC	Caterpillar, Cummins, Detroit Diesel, Deutz, Iveco, John Deere, Perkins, MTU J1939 Smart Connect*, Scania and Volvo Penta
125 kb/s	250 kb/s

4.4 EIC unit

4.4.1 EIC unit

The selection of the EIC unit (menu 10970) determines whether bar/PSI and Celsius/Fahrenheit is used. The selection affects display readings, values used for alarm evaluation (menu 76xx) and data readable by Modbus communication.

4.5 Common for all alarm functions

4.5.1 Common for all alarm functions

A number of alarms can be configured.

The following items can be configured to an alarm:

Menu number	Alarm	Comment
7570	EI comm. error	Communication error
7580	EIC warning	Any alarm listed as warning for the selected engine type in the section "Specific engine type descriptions".
7590	EIC shutdown	Any alarm listed as shutdown for the selected engine type in the section "Specific engine type descriptions".
7600	EIC overspeed	Actual RPM
7610/7620	EIC coolant t. (2 levels)	Actual temperature
7630/7640	EIC oil press. (2 levels)	Actual pressure
7650/7660	EIC oil temp. (2 levels)	Actual temperature
7670/7680	EIC coolant level (2 levels)	Actual cooling water level

4.6 J1939 measurement table

4.6.1 J1939 measurement table

This is the common J1939 measurement overview showing which measurements are available. Note that not all measurements are supported by the individual engines; please refer to the specific engine description.

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

For information about the menu structure, please see the "Operators manual".

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

4.6.2 Error messages

The following error messages can occur:

Message	Description
Engine I. value N.A.	The view is not selectable 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 value is not supported by the engine, or due to communication error.

4.6.3 Object selection, J1939

The view lines can be configured with these available values.

For Modbus scaling, please see the chapter "Modbus communication".

The engine is expected to use source address 0.

Object	PGN	P	S	L	SPN	Unit	J1939-71 scaling
EIC speed	61444	3/6	4	2	190	RPM	0.125 rpm/bit, offset 0
EIC coolant temp. (*1)	65262	3/6	1	1	110	°C	1 deg C/bit, offset -40°C
EIC oil pressure (*2)	65263	6	4	1	100	Bar	4 kPa/bit, offset 0
EIC faults (*4)	65230	6	1	1	1218	NA	1/bit, offset 0
EIC oil temp. (*3)	65262	3/6	3	2	175	°C	0.03125°C/bit, offset -273°C
EIC fuel temp.	65262	3/6	2	1	174	°C	1°C/bit, offset -40°C
EIC intake manifold #1 P.	65270	6	2	1	102	Bar	2 kPa/bit, offset 0
EIC air inlet temp.	65269	6	6	1	172	°C	1°C/bit, offset -40°C
EIC coolant level	65263	6	8	1	111	%	0.4%/bit, offset 0
EIC fuel rate	65266	6	1	2	183	l/h	0.05 l/h per bit, offset 0
EIC intake manifold 1 temp.	65270	6	3	1	105	°C	1°C/bit, offset -40°C
EIC d.d. % torque	61444	3/6	2	1	512	%	1%/bit, offset -125%
EIC actual % torque	61444	3/6	3	1	513	%	1%/bit, offset -125%
EIC acc. pedal pos.	61443	3/6	2	1	91	%	0.4%/bit, offset 0
EIC % load, c. speed	61443	3/6	3	1	92	%	1%/bit, offset 0
EIC air inlet pressure	65270	6	4	1	106	Bar	2 kPa/bit, offset 0
EIC exhaust gas temp.	65270	6	6	2	173	°C	0.03125°C/bit, offset -273°C
EIC engine hours	65253	6	1	4	247	h	0.05 hrs/bit, offset 0, max: 32767 hrs
EIC oil filter diff. press.	65276	3(*1)/6	4	1	99	Bar	0.5 kPa/bit, offset 0
EIC key switch battery potential	65271	6	7	2	158	V DC	0.05V DC/bit, offset 0
EIC fuel del. press.	65263	6	1	1	94	Bar	4 kPa/bit, offset 0
EIC oil level	65263	6	3	1	98	%	0.4%/bit, offset 0
EIC crankcase press.	65263	6	5	2	101	Bar	1/128 kPa/bit, offset -250 kPa
EIC coolant pressure	65263	6	7	1	109	Bar	2 kPa/bit, offset 0
EIC water in. fuel	65279	6	1	2 bit	97	NA	00: No, 01: Yes, 10: Error, 11: Not available
EIC turbo oil temp.	65262	3/6	5	2	176	°C	0.03125°C/bit, offset -273°C
EIC particulate trap inlet	65270	6	1	1	81	Bar	0.5 kPa/bit, offset 0
EIC air filter diff.	65270	6	5	1	107	Bar	0.05 kPa/bit, offset 0
EIC coolant filter diff.	65270	6	8	1	112	Bar	0.5 kPa/bit, offset 0
EIC atmospheric press.	65269	6	1	1	108	Bar	0.5 kPa/bit, offset 0
EIC ambient air temp.	65269	6	4	2	171	°C	0.03125°C/bit, offset -273°C
EIC trip fuel gaseous	65199	6	1	4	1039	kg	0.5 kg/bit, offset 0
EIC total fuel used gaseous	65199	6	5	4	1040	kg	0.5 kg/bit, offset 0

Object	PGN	P	S	L	SPN	Unit	J1939-71 scaling
EIC engine trip fuel	65257	6	1	4	182	L	0.5 L/bit, offset 0
EIC engine total fuel used	65257	6	5	4	250	L	0.5 L/bit, offset 0
EIC Nominal Power	65214	7	1	2	166	kW	0,5 kW/bit
EIC Mean trip fuel consumption	65203	7	5	2	1029	l/h	0,05 [l/h]/bit
EIC Intake manifold #1 absolute pressure	64976	6	5	1	3563	Bar	2 kPa/bit
EIC Air filter diff. pressure	64976	6	1	1	2809	Bar	0.05 kPa offset 0
EIC Fuel supply pump inlet pressure	65130	6	2	1	1381	Bar	2 kPa/bit offset 0
EIC Fuel filter (ss) diff. pressure	65130	6	3	1	1382	Bar	2 kPa/bit offset 0
Diagnostic message 1/2	65226	-	-	-	-	-	-

PGN: Parameter group number
P: J1939 priority
S: Object's start byte in CAN telegram
L: Object's length (byte)
Unit: Unit in display (Bar/°C can be changed to PSI/°F)

Objects marked (*3) also called EIC boost P.

Objects marked (*3) also called EIC charge air temp.

4.6.4 For the Iveco Vector 8 type only:

(*1): EIC coolant temp.: PGN = 65282, priority = 6, start at byte 5, length = 1 byte, SPN = 110, same scale
(*2): EIC oil pressure. PGN = 65282, priority = 6, start at byte 7, length = 1 byte, 8 kPa/bit gain, 0 kPa offset, data range: 0 to +2000 kPa
(*3): EIC oil temp.: PGN=65282, priority = 6, start at byte 6, length = 1byte, SPN = 175, same scale

4.6.5 For the MTU Smart Connect type only:

(*4): EIC Faults: PGN=65284, priority = 6, start at byte 1, length = 2 byte

The objects are not supported by all engines. Please refer to the specific engine type manual for information about the specific engine.

The Modbus addresses are read only (function code 04h).

4.7 Show engine values in display unit

4.7.1 Show engine values in display unit

It is possible to parameterise the ML-2 so all values from the engine CAN bus is shown in the display unit. This is an example where speed, coolant and air inlet temperatur is shown. The number of available views is 20. The number can be increased with the Autoview function.

Speed	1500 rpm
T.Coolant	85 deg
T.Oil	50 deg
Setup V3 V2 V1 P01	

The controller can be set up in two ways:

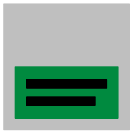
1. Using the function of the PC Utility Software "configuration of the user views". This way the 20 three line views can be configured to show the desired values. Up to a total of 20 views is displayed.
2. By activating the Autoview function in the communication setup (menu number 7564) 20 three line views are kept with their present setup and all engine values are added to the list of the 20 three line views. A total of 20 + 14 three line views are available. The 20 lines are user configurable (as mentioned above) but the additional 14 three line views are dedicated to EIC and cannot be modified by the user.

The first option is useful when a few EIC values needs to be shown and if all off the 20 user configurable views are not already used to display requested values.

The second option is useful if it is requested to read **all available** EIC data from the ECU. It must be noted that all available data is shown when using this method until the additional 14 three line views are used. The number of extra display views depends on the available data from the specific engine controller connected to the ML-2.

4.7.2 Configuration of user view

This configuration is done in PC Utility Software by pressing the user view icon in the horizontal toolbar



4.7.3 Activation of auto views

The extra view lines are displayed if the menu 7564 set to "ON" and the engine CANbus is active. Note that is might be necessary to start the engine before setting 7564 to "ON". The setting automatically returns to "OFF".

To de-activate the auto view function please follow below steps:

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

4.8 Verification of J1939 objects

4.8.1 Verification

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 Multi-line 2 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 (**0xcf00400**) 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 0x**c**f00400 instead of 0x**0c**f00400). 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	Decimal ID	Hexadecimal ID
1	4d	0x4
2	8d	0x8
3	12d	0xc
4	16d	0x10
5	20d	0x14
6	24d	0x18

Normally in SAE J1939, only priority 3 and 6 are used.

Hereafter the data can be read (PGN 61444):

0xcf00400 xD ff 7d 7d e0 15 ff f0 ff

Engine torque	(Data byte 1)	ff	Not available
Driver demand torque	(Data byte 2)	7d	
Actual engine torque	(Data byte 3)	7d	
Engine speed	(Data byte 4)	e0	
Engine speed	(Data byte 5)	15	
Source address	(Data byte 6)	ff	Not available
Engine starter mode	(Data byte 7)	f0	
Engine Demand	(Data byte 8)	ff	Not available

Calculation example:

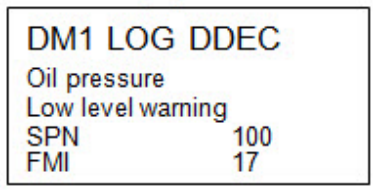
RPM resolution is 0.125 RPM/bit, offset 0.
The result is then 15e0 (Hex) or 5600 (dec)*0.125 = 700 RPM.

4.9 Displaying of J1939 DM1/DM2, Scania KWP2000 and Caterpillar/Perkins alarms

4.9.1 Displaying alarms

J1939

Use the or buttons until the DM1 or DM2 is shown in the display and press enter. The alarm log will be shown in the display.
Example:

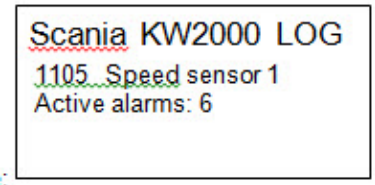


The alarm log in DM1 shows the active alarms, the DM2 shows the historical alarms.

Use the and buttons to scroll through the list.

Scania KWP 2000

Use the or buttons until the engine log is shown in the display and press enter. The alarm log will be shown in the display.
Example:

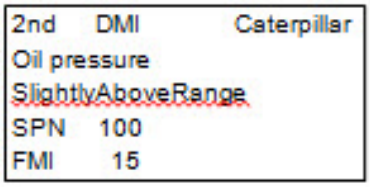


The Scania KWP 2000 log shows active and passive alarms in a mix.

Use the and buttons to scroll through the list.

Caterpillar/Perkins

Caterpillar and Perkins have a primary and a secondary DM1 log as well as one DM2 log. Use the or buttons until the "2nd DM1 log" is shown and press enter. The second alarm log will be shown in the display.
Example:



The primary DM1 log show alarms from the ADEM III/IV engine controllers. The secondary DM1 log show alarms from the EMCP 3.x gen-set controller. Similar to the J1939 protocol the DM2 log shows the historical alarms. Use the  and  buttons to scroll through the list.

4.10 Control commands sent to the engine

4.10.1 Control commands

Engine types with the possibility to send commands to the ECM via the CANbus communication line:

Engine type / Command	Detroit Diesel DDEC	John Deere JDEC	Caterpillar	Perkins	Cummins	Generic J1939	Deutz EMR	Iveco	Iveco Vector 8
Preheat	-	-	-	-	-	-	-	-	-
Start/Stop	-	-	X	X	-	-	-	-	-
Engine speed	X	X	X	X	-	X	X	X	X
Nominal frequency	-	-	-	-	X	-	-	-	-
Governor gain	-	-	-	-	X	-	-	-	-
Idle speed	X	X	X	X	X	X	X	X	-
Droop	-	-	X	X	X	-	-	-	-
Shutdown override	-	-	-	-	X	-	-	-	-
Engine overspeed test	-	-	-	-	-	-	-	-	-
Enable cylinder cut out	-	-	-	-	-	-	-	-	-
Intermittent oil priming	-	-	-	-	-	-	-	-	-
Engine operating mode	-	-	-	-	-	-	-	-	-
Demand switch	-	-	-	-	-	-	-	-	-
Trip counter reset	-	-	-	-	-	-	-	-	-
Engine speed GOV parameter command	-	-	-	-	-	-	-	-	-

Engine type / Command	MTU MDEC	MTU ADEC	MTU J1939 Smart Connect	Scania EMS	Scania EMS S6	Volvo Penta	Volvo Penta EMS 2
Preheat	-	-	-	-	-	-	X
Start/Stop	-	X	X	-	X	-	X
Run/Stop (fuel)	-	-	-	-	-	-	-
Engine speed	-	X	X	-	X	-	X
Nominal frequency	-	X	X	-	X	-	X
Governor gain	-	-	-	-	-	-	-
Idle speed	-	X	X	-	X	-	X
Droop	-	X	X	-	X	-	X
Shutdown override	-	-	X	-	X	-	X
Engine overspeed test	-	-	X	-	-	-	-
Enable cylinder cut out	-	X	X	-	-	-	-
Intermittent oil priming	-	-	X	-	-	-	-
Engine operating mode	-	-	X	-	-	-	-
Demand switch	-	X	X	-	-	-	-
Trip counter reset	-	X	X	-	-	-	-
Engine speed GOV parameter command	-	-	X	-	-	-	-

For engine types not mentioned, CANbus control is not supported. In these cases start/stop etc. must be sent to the controller using hardwired connections.

The menu number 7563 has to be used for enabling or disabling the transmission of all the Multi-line 2 unit EIC control frames listed in the above table.

4.10.2 EIC 50 Hz - 60 Hz switch

If the set point $f_{nominal}$ is changed in the ML-2 between 50 and 60 Hz then the change is made with a frequency ramp of 2 Hz per second. This frequency ramp is used when switching between nominal settings 1 and 2 or if the parameter of the nominal frequency is changed between 50 and 60 Hz.

4.10.3 EIC Droop

There are to way of obtaining a speed droop:

For engines where the droop command or set point can be sent to the engine controller the droop setting in parameter 2771 is the actual droop that is being used and this set point is sent to the ECU. This method is referred to as "EIC droop".

For engines where the droop command or set point cannot be sent to the engine controller the droop setting in parameter 2771 is used for droop emulation in the ML-2. This method is referred to as "EIC droop emulation".

In both cases the droop function is activated in the M-Logic (EIC droop/EIC droop emulation) command output.

Please refer to the specific engine type to determine if droop is supported or whether emulated droop has to be used.

4.10.4 EIC Inhibit

The EIC alarms can be inhibited through M-Logic. This would typically be necessary during stopping of the engine. The following alarm can be inhibited:

- EIC red alarm
- EIC yellow alarm
- EIC malfuction
- EIC protection

4.10.5 EIC Idle

The "Idle" function of the ML-2 is activated in menu 6290. If this is used with engines whit speed control from CAN bus communication the speed is defined to be 700 rpm.

4.11 Differential measurement

The differential measurement functionality relates to the hardware supporting configurable analogue inputs or engine communication.

Setup and functional description are specified in the Designer's Reference Handbook (DRH) for the ECU 100 and GCU 100.

5. Specific engine type descriptions

5.1 About type descriptions

The J1939 warnings/shutdowns with corresponding SPN and FMI numbers in this chapter refer to those that will automatically appear in the alarm list. The alarms can be acknowledged from the display.

The available alarms vary from engine type to engine type. Besides these, the entire log list can be read in the engine controller by holding the "Reset horn" button for 3 seconds.

5.2 Caterpillar/Perkins (J1939)

5.2.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	17	1
Intake manifold #1 P	102	15	-
Coolant temperature	110	15	1
High inlet air temp.	172	15	-
Fuel temperature	174	15	-
Overspeed	190	15	0
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.2.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).
- Engine speed
  CANbus ID for speed control: 0x0c000000. J1939 TSC1.
- M-Logic commands are available to enable/disable start/stop and speed controls
  - EIC start/stop enable
  - EIC speed control inhibit

5.3 Cummins CM850-CM570 (J1939)

5.3.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	18	1
Coolant temperature	110	16	0
Oil temperature	175	16	0
Intake manifold temp	105	16	0
Fuel temperature	174	16	0
Coolant level low	111	18	1
Overspeed	190	-	16
Crankcase pressure high	101	-	0
Coolant pressure low	109	-	1
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.3.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).

  M-Logic commands are available to enable/disable speed controls:
  - EIC speed control inhibit.

- Engine speed
  CANbus ID for speed control: 0x00FF69DC. For Cummins proprietary "Engine governing" EG telegram, the source address of the ML-2 controller is 0xDC/220 dec).

- Frequency selection
  Nominal frequency is written automatically based on the frequency nominal setting. 50 Hz is written if fNOM < 55 Hz, 60 Hz is written if fNOM is > 55 Hz.
- Gain setting
  Gain is set in menu 2773.
- Shut down override
  This command can be used in order to prevent shut down actions from the ECU/GCU. (digital input)

5.3.3 Cummins after treatment

If Cummnins After Treatment equipment is installed in the exhaust line and the system is connected to the ECU/GCU 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 DEIF AOP diplay unit.

Status indicator **State**	**Diesel particulate filter regeneration status**	**Diesel particulate filter status**	**Particulate filter lamp**	**High exhaust system temp.**	**Regeneration 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.

5.4 Detroit Diesel DDEC (J1939)

5.4.1 Warnings and shutdowns

Warning/shutdown list	**J1939 codes**		
	SPN	**FMI warning**	**FMI shutdown**
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.4.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).
- Engine speed
  CANbus ID for speed control: 0x0c000000. J1939 TSC1.
  M-Logic commands are available to enable/disable start/stop and speed controls
  - EIC speed control inhibit*

5.5 Deutz EMR 2 - EMR 3 (J1939)

5.5.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	-	1
Coolant temperature	110	-	0
Overspeed	190	-	0
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.5.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).
- Engine speed
  CANbus ID for speed control: 0xc000003. For J1939 TSC1, the source address of the ML-2 controller is 3.

5.6 Generic J1939 (J1939)

5.6.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC Malfunction	-	X	-
EIC Protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.6.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).
- Engine speed
  CANbus ID for speed control: 0x0c000000. J1939 TSC1.

5.7 Iveco (J1939)

5.7.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	17	1
Intake manifold #1 P	102	15	-
Coolant temperature	110	15	0
High inlet air temp.	172	15	-
Fuel temperature	174	15	-
Overspeed	190	15	0
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction*	-	X	-
EIC protection*	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.7.2 Write commands to engine controller

- Engine controls

All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).

- Engine speed
  CANbus ID for speed control: 0xc000003.
  For J1939 TSC1, the source address of the ML-2 controller is 3.
  For the Iveco Vector 8 type only: CANbus ID for speed control: 0xcFF0027.
  M-Logic commands are available to enable/disable start/stop and speed controls:
  - EIC speed control inhibit

5.8 John Deere JDEC (J1939)

5.8.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	18	1
Intake manifold	105	16	-
Coolant temperature	110	16	0
Fuel injection pump	1076	10	6
Fuel temperature	174	-	16
ECU failure	2000	-	6
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction*	-	X	-
EIC protection*	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.8.2 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).
- Engine speed
  CANbus ID for speed control: 0x0c000000. J1939 TSC1.
  M-Logic commands are available to enable/disable start/stop and speed controls

5.9 MTU J1939 Smart Connect

5.9.1 Smart Connect

This protocol is available with MTU series 1600 With ECU8/Smart Connect.

5.9.2 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.9.3 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (e.g. speed, start/stop etc.) are enabled in setting 7563 (EIC controls).
- Engine speed
  CAN bus ID for speed control: 0x0c000000.J1939TSC1.
  M-Logic commands are available to enable/disable start/stop and speed controls:
  - EIC start/stop enable
- Frequency selection
  Normal frequency is written automatically based on the frequency nominal setting. 50 Hz is written if $f_{nominal}$ <55Hz, 60 Hz is written if $f_{nominal}$ is >55 Hz
- Shut down override
  This command can be used with a digital input in order to override shut down actions from the ECU/GCU.
- Engine overspeed test
  The command is activated through M-Logic. Testing of the overspeed function at any given rpm.
- Enable Cylinder Cutout
  The command can be used to engage all cylinders if the engine is running with one bank only. The command is activated through M-Logic.
- Intermittent oil priming
  Engage the pre-lubrication oil pump if installed. The command is activated through M-Logic.
- Engine operating mode
  Switches the operating mode of the engine. The command is activated through M-Logic (EIC Engine opr mode command)
- Demand switch
  Set method of speed control between digital ("Up/down ECU" with ralay controls), analogue ("Analog ECU Relative" for analogue VDC control) or from J1939 commands ("Analog CAN"). This is selected in menu 2790. Please refer to the MTU documentation for the ECU8 for further information about switching between normal and amergency operation in local or remote.
- Speed gov. param command
  Parameter switch for selection between: Default and Variant 1 M-Logic is used to select variant 1 parameters.
- Trip counter reset
  This command resets the trip fuel consumption counter. The command is activated through M-Logic.

5.10 MTU ADEC (CANopen)

5.10.1 MTU ADEC (CANopen)

The MTU ADEC is not a part of the J1939, therefore the reading of values, alarms and shut-downs are different.

5.10.2 Display readings

Object
EIC speed
EIC coolant temp.
EIC oil pressure
EIC faults
EIC oil temp.
EIC fuel temp.
EIC Coolant level
EIC charge air pressure
EIC charge air temp. (or EIC intake manifold 1 temp.)
EIC air inlet press.
EIC running hours
EIC ECU power supp.
EIC oil level
EIC after cooler water inlet temp.
EIC atmospheric press.
EIC ambient air temp.
EIC exch. temp. A
EIC exch. temp. B
EIC temp. winding 1
EIC temp. winding 2
EIC temp. winding 3
EIC turbo 1 outlet temp.
EIC engine intercooler temp.
EIC fuel rate
EIC engine trip fuel
EIC trip average fuel rate
EIC Mean trip fuel consumption*
EIC Nominal power*
EIC Engine power*

The Modbus addresses are read-only (function code 04h).

5.10.3 Warning

Below is a list of warnings that can be shown on the display. The warnings 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 list	Warning list
Coolant temp. high	ECU power supply high
Charge air temp. high	ECU power supply low
Intercooler coolant temp. high	Generator temp. high
Lube oil temp. high	Holding tank high level
ECU temp. high	Holding tank low level
Engine speed too low	Generator winding 1 high temp.
Prelube fail.	Generator winding 2 high temp.
Start speed not reached	Generator winding 3 high temp.
Common alarm (yellow)	Ambient temp. high
Lube oil pressure low	Water in fuel 1
Coolant level low	Water in fuel 2
Intercooler coolant level low	Fuel temp. high
ECU defect	Exhaust bank A high temp.
Speed demand failure	Exhaust bank B high temp.
Power supply low voltage	Fuel high pressure 1
Power supply high voltage	Fuel high pressure 2
Overspeed	Day tank high level
Lube oil press. low	Day tank low level
Coolant temp. high	Run-up speed not reached
Lube oil temp. high	Idle speed not reached
Charge air temp. high	

5.10.4 Shutdown

Below is a shutdown value that can be shown on the display. It is possible to configure "EIC shutdown" in the system setup to put the unit in a shutdown state and/or to activate relay outputs if necessary. The shutdown state is present, until it disappears in the ECM module.

Shutdown list	Display text
AL Com. Alarm Red	AL Com. Alarm Red

5.10.5 Write commands to engine controller

- Engine controls

All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls).

- Engine speed
  CANbus ID for speed control: 0x300+ADEC ID – speed demand telegram (ADEC ID is selected in menu 7562, default ID is 6: 0x306).

  M-Logic commands are available to enable/disable start/stop and speed controls:
  - EIC start/stop enable*
- Start/Stop command
- Frequency selection
  Nominal frequency is written automatically based on the frequency nominal setting. 50 Hz is written if fNOM < 55 Hz, 60 Hz is written if fNOM is > 55 Hz.

The CANopen node ID no is selected in setting 7562. The default value (6) usually matches the ADEC setting.

- Demand switch
  Set method of speed control between digital ("Up/down ECU" with ralay controls), analogue ("Analog ECU Relative" for analogue VDC control) or from J1939 commands ("Analog CAN"). This is selected in menu 2790. Please refer to the MTU documentation for the ECU8 for further information about switching between normal and emergency operation in local or remote.
- Trip counter*
  This command resets the trip fuel consumption counter. The command is activated through M-logic.
- Enable Cylinder Cutout*
  The command can be used to engage all cylinders if the engine is running with one bank only. The command is activated through M-logic.

5.11 MTU MDEC module 302/303 (MTU)

5.11.1 MTU MDEC module 302/303 (MTU)

The MTU MDEC is not a part of the J1939, therefore the reading of values, alarms and shutdowns are different.

5.11.2 Displayed values

Object
EIC speed
EIC coolant temp.
EIC oil pressure
EIC faults
EIC oil temp.
EIC fuel temp.
EIC charge air pressure
EIC charge air temp. (or EIC intake manifold 1 temp.)

The Modbus addresses are read-only (function code 04h).

5.11.3 Alarms

Below is a list of alarms that can be shown on the display. The alarms will be shown 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.

Alarm list	Warning	Shutdown
MDEC yellow alarm	X	-
MDEC red alarm	-	X
Overspeed	-	X
Low oil pressure	X	X
High coolant temp.	X	X
High oil temp	-	X
High intercooler temp.	X	-
Defective cool. level switch	X	-
Low coolant level	-	X
MDEC ECU failure	-	X

MDEC indication " – " means that the alarm in question is not supported.

5.11.4 Write commands to engine controller

None.

5.12 Scania EMS (J1939)

5.12.1 Warning/shutdown

None.

5.12.2 Write commands to engine controller

None.

5.13 Scania EMS 2 S6 (J1939)

5.13.1 Scania EMS 2 S6 (J1939)

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.

5.13.2 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	-

DNL2 indication " – " means that the alarm in question is not supported.

Handling of alarms is only active when the engine is running.

5.13.3 Error log

It is possible to retrieve and acknowledge alarms in the error log of the Scania EMS S6 (KWP 2000).

The alarms available are the same alarms which can be read by the flash combination of the diagnostics lamp on the EMS S6 (please refer to the engine documentation).

Flash code	ML-2 displayed text	Description
11	Overreving	One or both engine speed sensors have indicated above 3000 rpm
12	Speed sensor 1	Engine sensor 1
13	Speed sensor 2	Engine sensor 2
14	Water T sen.	Engine coolant temperature sensor
15	Char. air T sen	Charge air temperature sensor
16	Char. air P sen	Charge air pressure sensor
17	Oil temp. sen.	Oil temperature sensor
18	Oil pres. sen.	Oil pressure sensor
23	Fault in cor.	Fault in coordinator
25	Throttle pedal	CAN message for fine tune nominal speed out of range
27	Emerg. stop o.r	Engine stop overridden
31	Oil pres. prot	Oil pressure protection activated
32	Wrong parameter	Wrong parameter setting for defect CAN communication
33	Battery voltage	Battery voltage out of range
37	Emerg. stop cor	Emergency stop switch activated
43	CAN cir. defect	CAN circuit defect
48	CAN mess. DLN1	CAN message from the coordinator missing or not correct
49	Wrong CAN ver.	Non-matching CAN version in EMS and coordinator
51	Un. inj. cyl. 1	Unit injector cylinder 1
52	Un. inj. cyl. 2	Unit injector cylinder 2
53	Un. inj. cyl. 3	Unit injector cylinder 3
54	Un. inj. cyl. 4	Unit injector cylinder 4
55	Un. inj. cyl. 5	Unit injector cylinder 5
56	Un. inj. cyl. 6	Unit injector cylinder 6
57	Un. inj. cyl. 7	Unit injector cylinder 7
58	Un. inj. cyl. 8	Unit injector cylinder 8
59	Extra ana. inp.	Voltage out of range on extra analogue input pin
61	System shutdown	System shut down incorrectly
66	Coola. l. prot.	Low engine coolant level
86	HW watchdog	Hardware watchdog
87	Fault in RAM	The EMS has detected that the fault code memory is not functioning correctly
89	Seal	The programme in the EMS has been altered in a prohibited manner
94	Coola. shut off	Engine coolant temperature/oil pressure shutdown
96	Overheat prot.	Overheat protection activated
99	Fault in TPU	Error in TPU Timer Processor Unit

5.13.4 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls)
- Droop
- Engine speed

CANbus ID:	Offset: 0xcfff727
Speed	0x0cff8027

M-Logic commands are available to enable/disable start/stop and speed controls:
- EIC start/stop enable
- EIC speed control inhibit

- Frequency selection
  Nominal speed/frequency is selected in 2772. If "User" is selected, nominal speed/frequency is written automatically, based on the frequency nominal setting.
- Start/stop command

It is only possible to write commands to the engine when the Scania Coordinator is NOT mounted.

5.13.5 Control

In the parameter 2770, it is possible to configure the droop setting and the initial speed setting.

5.14 Volvo Penta EMS (J1939)

5.14.1 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	5	-
Intake manifold #1 P	102	-	-
Coolant temperature	110	5	-
High inlet air temp.	172	5	-
Fuel temperature	174	-	-
Fuel pressure	94	5	-
Oil level	98	5	-
Overspeed	190	-	0
Coolant level low	111	-	1
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

5.14.2 Write commands to engine controller

None.

5.15 Volvo Penta EMS 2 (J1939)

5.15.1 Volvo Penta EMS 2 (J1939)

EMS 2 and EDCIII/D6, D7, D9, D12 and D16 (GE and AUX variants only).

5.15.2 Warnings and shutdowns

Warning/shutdown list	J1939 codes		
	SPN	FMI warning	FMI shutdown
Low oil pressure	100	5	-
Intake manifold #1 P	102	-	-
Coolant temperature	110	5	-
High inlet air temp.	172	5	-
Fuel temperature	174	-	-
Fuel pressure	94	5	-
Oil level	98	5	-
Overspeed	190	-	0
Coolant level low	111	-	1
EIC yellow lamp	-	X	-
EIC red lamp	-	-	X
EIC malfunction	-	X	-
EIC protection	-	X	-

FMI indication " – " means that the alarm in question is not supported.

5.15.3 Write commands to engine controller

- Engine controls
  All the write commands to the engine controller (ex: speed, start/stop, etc.) are enabled in setting 7563 (EIC Controls)
- Engine speed
  CANbus ID for speed control: 0x0cff4611 – Volvo Penta proprietary telegram
  M-Logic commands are available to enable/disable start/stop and speed controls:
  - EIC start/stop enable
  - EIC speed control inhibt
- Preheat
- Start/stop

5.15.4 Readable states

- Preheat and running

6. Parameters

6.1 Parameters related to engine communication

6.1.1 Further information

Parameters related to engine communication can be found in settings 2770-2790 and 7500-7680.

For further information, please see the separate parameter list for the Multi-line unit in question:

ECU 100/GCU 100 parameter list	Document no. 4189340796

7. Modbus communication

7.1 Additional information

This chapter is to be considered as additional information for Modbus RS 485 RTU. 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. If Modbus RS 485 RTU is used, then the data can be transmitted to a PLC, a computer, the alarm-and-monitoring system or a Scada system.

Please refer to the Modbus table technical documentation for more information about our standard external Modbus communication.

A certain amount of engine data can be transmitted from the engine communication module to the controller unit. They can be transmitted through Modbus.

The available values depend on the selected type of engine communication.

The data readable by the Modbus communication are converted into the chosen unit in menu 10970.

7.2 Readings

7.2.1 Analogue values

The reading of values is independent of engine type, so all readings below are available in the Modbus protocol.

The availability of data from the individual engine types is dependent on the specific engine. Please refer to the engine manual in question.

These data refer to the common J1939 display reading list as well as the overview of readings in the MTU ADEC (CANopen) and MTU MDEC (MTU protocol).

Measurement table (read only) function code 04h.						
Addr	**Content**	**Unit**	**Scaling**			**Description**
			J1939	**ADEC**	**MDEC**	
593	EIC speed	[RPM]	1/1	1/1	1/1	Speed
594	EIC coolant temp.	[deg] [F]	1/10	1/10	1/10	Coolant temperature
595	EIC oil pressure	[bar] [psi]	1/100	1/100	1/100	Engine oil pressure
596	EIC no of faults	[Faults]	1/1	1/1	1/1	Number of faults
597	EIC oil temp.	[deg] [F]	1/10	1/10	1/10	Engine oil temperature
598	EIC fuel temp.	[deg] [F]	1/1	1/10	1/10	Fuel temperature
599	EIC intake manifold #1 P	[bar] [psi]	1/100	1/100	-	Intake manifold #1 P
600	EIC air inlet temp.	[deg] [F]	1/1	-	-	Air inlet temperature
601	EIC coolant level	[%]	1/10	-	-	Coolant level
602	EIC fuel rate	[L/h]	1/10	1/1	-	Fuel rate
603	EIC charge air press	[bar] [psi]	-	-	1/100	Charge air press
604	EIC intake manifold 1 T (or EIC charge air T)	[deg] [F]	1/1	-	1/10	Intake manifold 1 temperature
605	EIC d.d. % torque	[%]	1/1	-	-	Driver's demand engine - percent torque
606	EIC actual % torque	[%]	1/1	-	-	Actual engine - percent torque
607	EIC acc. pedal pos.	[%]	1/1	-	-	Accelerator pedal position
608	EIC % load, c. speed	[%]	1/1	-	-	Percent load at current speed
609	EIC air inlet pressure	[bar] [psi]	1/100	-	-	Air inlet pressure
610	EIC exhaust gas temp.	[deg] [F]	1/10	-	-	Exhaust gas temperature
611	EIC engine hours	[H]	1/1	1/1	-	ENGINE HOURS
612	EIC oil filter diff. press.	[bar] [psi]	1/100	-	-	Oil filter diff press
613	EIC battery voltage	[V]	1/10	1/10	-	Keyswitch battery potential
614	EIC fuel del. press.	[bar] [psi]	1/100	1/100	-	Fuel delivery pressure
615	EIC oil level	[%]	1/10	-	-	Engine oil level
616	EIC crankcase press.	[bar] [psi]	1/100	-	-	Crankcase pressure
617	EIC coolant pressure	[bar] [psi]	1/100	-	-	Coolant pressure
618	EIC water in fuel	[2 bits]	1/1	-	-	Water in fuel (1 = Yes, 0 =NO)
619	Reserved	-	-	-	-	-
620	Reserved	-	-	-	-	-
621	Reserved	-	-	-	-	-
622	Reserved	-	-	-	-	-
623	EIC turbo oil temp.	[deg] [F]	1/10	-	-	Turbo oil temp.

Measurement table (read only) function code 04h.						
Addr	**Content**	**Unit**	**Scaling**			**Description**
			J1939	**ADEC**	**MDEC**	
624	EIC trap inlet	[bar] [psi]	1/100	-	-	Trap inlet
625	EIC Air filter diff press	[bar] [psi]	1/1000	-	-	Air filter diff press
626	EIC Cool filter diff press	[bar] [psi]	1/100	-	-	Cool filter diff press
627	EIC Atm press	[bar] [psi]	1/100	-	-	Atmospheric pressure
628	EIC Ambient air temp	[deg] [F]	1/10	-	-	Ambient air temp [F/10]
629	EIC exch. temp A	[deg] [F]	1/10	1/10	-	Exh. temp bank A
630	EIC exch. temp B	[deg] [F]	1/10	1/10	-	Exch. temp bank B
631	EIC Winding 1 temp	[deg] [F]	-	1/1	-	Gen winding 1 temp
632	EIC Winding 2 temp	[deg] [F]	-	1/1	-	Gen winding 2 temp
633	EIC Winding 3 temp	[deg] [F]	-	1/1	-	Gen winding 3 temp
634	Reserved	-	-	-	-	-
635	Reserved	-	-	-	-	-
636	EIC Turbo 1 compr outlet press	[bar] [psi]	-	1/10	-	Turbo 1 compr outlet press
637	EIC Intercooler temp	[deg][F]	-	1/10	-	Intercooler temp
638	EIC engine trip fuel	[L]	1/1	1/1	-	Engine trip fuel
639	EIC engine total fuel used	[kL]	1/10	-	-	Engine total fuel used
640	EIC trip fuel_gaseous	[kg]	1/1	-	-	Trip fuel, gaseous
641	EIC total fuel used_gaseous	[ton]	1/10	-	-	Total fuel used, gaseous
900	EIC trip average fuel rate	[L/h]	-	1/10	-	Average fuel rate (trip)
901	EIC nominal power	[Kwm]	1/1	1/1	-	Nominal power of the engine
902	EIC trip fuel liquid	[L]	1/2	1/10	-	High word
903	EIC trip fuel liquid	[L]	1/2	1/10	-	Low word
904	EIC total fuel liquid	[L]	1/2	1/10	-	High word
905	EIC total fuel liquid	[L]	1/2	1/10	-	Low word
906	EIC mean trip fuel consumption	[L/h]	-	1/1000	-	High word
907	EIC mean trip fuel consumption	[L/h]	-	1/1000	-	Low word
908	EIC engine power	[Kwm]	-	1/1	-	Nominal power of the engine (ADEC)
911	EIC intake manifold #1 absolute pressure	Bar or psi	1/100	-	-	*Only MTU J1939 Smart Connect
912	EIC Air filter diff. pressure	Bar or psi	1/100	-	-	-
913	EIC Fuel supply pump inlet pressure	Bar or psi	1/100	-	-	-

Measurement table (read only) function code 04h.						
Addr	**Content**	**Unit**	**Scaling**			**Description**
			J1939	**ADEC**	**MDEC**	
914	EIC Fuel filter (suction side) diff. pressure	Bar or psi	1/100	-	-	-
915	EIC Fuel filter diff. pressure	Bar or psi	1/100	-	-	Diff Pressure
932	EIC Speed Demand source	Digit	-	-	-	Identifies speed demand sourc
933	EIC lube oil pressure LO limit	mbar	-	-	1/100	Lubrication oil pressure limit 1
934	EIC lube oil pressure LOLO limit	mbar	-	-	1/100	Lubrication oil pressure limit 2
935	EIC fuel pressure	bar	-	-	1/100	Fuel pressure
936	EIC coolant limit HI	[deg] [F]	-	-	1/10	Coolant high limit temp. 1
937	EIC coolant limit HIHI	[deg] [F]	-	-	1/10	Coolant high limit temp. 2
938	EIC intercooler coolant	[deg] [F]	-	-	1/10	Intercooler coolant temperature
939	EIC ECU temperature	[deg] [F]	-	-	1/10	ECU temperature
940	EIC actual droop	%	-	-	1/10	Actual droop percentage
941	EIC act. inject. Quantity	%	-	-	1/10	Injection quantity Act. DBR %
942	EIC camshaft	[RPM]	-	1/1	-	Camshaft speed
943	EIC Temp lube HI	[deg] [F]	-	1/10	-	Lube oil temperature HI
944	EIC Temp lube HIHI	[deg] [F]	-	1/10	-	Lube oil temperature HIHI
945	EIC speed demand analog	Digit	-	1/1	-	Speed demand analog
946	EIC act. inject Quantity	[bit]	-	-	-	1: Stop activated, 0: Stop not activated
947						
948	EIC Ambient Conditions 2 Specific Humidity					
949						
950						
951						
952	ds	asd	asd	asd	das	as
953						
954						
955						
956						
957						
958						

Measurement table (read only) function code 04h.						
Addr	**Content**	**Unit**	**Scaling**			**Description**
			J1939	**ADEC**	**MDEC**	
959						
960						
961						
962						
963						
964						
965						
966						
967						
968						
969						
970						
971						
972						
973						

7.2.2 Analogue values for CAT and Perkins protocol

Measurement table (read only) function code 04h.						
Addr	**Content**	**Unit**	**Scaling**			**Description**
			J1939	**ADEC**	**MDEC**	
947	EIC Exhaust Gas P1 Temp	[deg] [F]	1/10	-	-	
948	EIC Exhaust Gas P2 Temp	[deg] [F]	1/10	-	-	
949	EIC Exhaust Gas P3 Temp	[deg] [F]	1/10	-	-	
950	EIC Exhaust Gas P4 Temp	[deg] [F]	1/10	-	-	
951	EIC Exhaust Gas P5 Temp	[deg] [F]	1/10	-	-	
952	EIC Exhaust Gas P6 Temp	[deg] [F]	1/10	-	-	
953	EIC Exhaust Gas P7 Temp	[deg] [F]	1/10	-	-	
954	EIC Exhaust Gas P8 Temp	[deg] [F]	1/10	-	-	
955	EIC Exhaust Gas P9 Temp	[deg] [F]	1/10	-	-	
956	EIC Exhaust Gas P10 Temp	[deg] [F]	1/10	-	-	
957	EIC Exhaust Gas P11 Temp	[deg] [F]	1/10	-	-	
958	EIC Exhaust Gas P12 Temp	[deg] [F]	1/10	-	-	
959	EIC Exhaust Gas P13 Temp	[deg] [F]	1/10	-	-	

Measurement table (read only) function code 04h.						
960	EIC Exhaust Gas P14 Temp	[deg] [F]	1/10	-	-	
961	EIC Exhaust Gas P15 Temp	[deg] [F]	1/10	-	-	
962	EIC Exhaust Gas P16 Temp	[deg] [F]	1/10	-	-	
967	EIC Filtered Fuel Deliv-eryPress	[deg] [F]	1/100	-	-	12
968	EIC Coolant Temp 2	[deg] [F]	1/1	-	-	
969	EIC Coolant Temp 3	[deg] [F]	1/1	-	-	
970	EIC Coolant Pump Outlet Temp	[deg] [F]	1/1	-	-	
971	EIC Auxiliary Coolant Temp	[deg] [F]	1/1	-	-	
972	EIC Turbo 1 Intake Temp	[deg] [F]	1/10	-	-	
973	EIC Turbo 2 Intake Temp	[deg] [F]	1/10	-	-	

7.2.3 Diagnostic codes

To interpret an SPN and/or FMI number, refer to the documentation of the engine manufacturer.

SPN means "Suspect Parameter Number". E.g. if the coolant water temperature becomes too high, the SPN code "110" will be shown.

FMI means "Failure Mode Indicator". E.g. if the temperature in the above example is at shutdown level, the FMI code "0" will be shown.

Oc means "occurrence counter" and it indicates how many times a specific alarm has occurred. E.g. if the specific alarm in the above example (SPN 100, FMI 0) has occurred 2 times, the oc code "2" will be shown.

In the table below a specific SPN number is linked to the same FMI and oc number.

Active Diagnostic Code (DM1/SPN)		
Addr.	**Content**	**Description**
1370	SPN diagnostic no. 1	Lo word
1371	SPN diagnostic no. 2	Lo word
1372	SPN diagnostic no. 3	Lo word
1373	SPN diagnostic no. 4	Lo word
1374	SPN diagnostic no. 5	Lo word
1375	SPN diagnostic no. 6	Lo word
1376	SPN diagnostic no. 7	Lo word
1377	SPN diagnostic no. 8	Lo word
1378	SPN diagnostic no. 9	Lo word
1379	SPN diagnostic no. 10	Lo word
1380	SPN diagnostic no. 1	Hi word
1381	SPN diagnostic no. 2	Hi word
1382	SPN diagnostic no. 3	Hi word
1383	SPN diagnostic no. 4	Hi word
1384	SPN diagnostic no. 5	Hi word
1385	SPN diagnostic no. 6	Hi word
1386	SPN diagnostic no. 7	Hi word
1387	SPN diagnostic no. 8	Hi word
1388	SPN diagnostic no. 9	Hi word
1389	SPN diagnostic no. 10	Hi word
1390-1401	Not used	Reserved

Active Fail Mode Identifier (DM1/FMI)		
Addr.	**Content**	**Description**
1402	FMI diagnostic no. 1	-
1403	FMI diagnostic no. 2	-
1404	FMI diagnostic no. 3	-
1405	FMI diagnostic no. 4	-
1406	FMI diagnostic no. 5	-
1407	FMI diagnostic no. 6	-
1408	FMI diagnostic no. 7	-
1409	FMI diagnostic no. 8	-
1410	FMI diagnostic no. 9	-
1411	FMI diagnostic no. 10	-
1412-1417	Not used	Reserved

Active Occurrence Counter (DM1/OC)		
Addr.	**Content**	**Description**
1418	Occurrence counter diagnostic no. 1	-
1419	Occurrence counter diagnostic no. 2	-
1420	Occurrence counter diagnostic no. 3	-
1421	Occurrence counter diagnostic no. 4	-
1422	Occurrence counter diagnostic no. 5	-
1423	Occurrence counter diagnostic no. 6	-
1424	Occurrence counter diagnostic no. 7	-
1425	Occurrence counter diagnostic no. 8	-
1426	Occurrence counter diagnostic no. 9	-
1427	Occurrence counter diagnostic no. 10	-
1428-1433	Not used	Reserved

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

Active Fail Mode Identifier (DM2/FMI)		
Addr.	**Content**	**Description**
1466	FMI diagnostic no. 1	-
1467	FMI diagnostic no. 2	-
1468	FMI diagnostic no. 3	-
1469	FMI diagnostic no. 4	-
1470	FMI diagnostic no. 5	-
1471	FMI diagnostic no. 6	-
1472	FMI diagnostic no. 7	-
1473	FMI diagnostic no. 8	-
1474	FMI diagnostic no. 9	-
1475	FMI diagnostic no. 10	-
1476-1481	Not used	Reserved

Active Occurrence Counter (DM2/OC)		
Addr.	**Content**	**Description**
1482	Occurrence counter diagnostic no. 1	-
1483	Occurrence counter diagnostic no. 2	-
1484	Occurrence counter diagnostic no. 3	-
1485	Occurrence counter diagnostic no. 4	-
1486	Occurrence counter diagnostic no. 5	-
1487	Occurrence counter diagnostic no. 6	-
1488	Occurrence counter diagnostic no. 7	-
1489	Occurrence counter diagnostic no. 8	-
1490	Occurrence counter diagnostic no. 9	-
1491	Occurrence counter diagnostic no. 10	-
1492-1499	Not used	Reserved

7.3 Alarms

7.3.1 Caterpillar/Perkins

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
		Bit 12 7680 EIC Cyl ExhaustDiff 1
		Bit 13 7680 EIC Cyl ExhaustDiff 2
1024	EIC alarms, engine controller (DM1)	Bit 1 EIC low oil pressure, warning
		Bit 2 EIC low oil pressure, shutdown
		Bit 3 EIC boost pressure, warning
		Bit 4 EIC high coolant temperature, warning
		Bit 5 EIC low coolant level, shutdown
		Bit 6 EIC high inlet air temperature, warning
		Bit 7 EIC fuel temperature, warning
		Bit 8 EIC ECM yellow lamp, warning
		Bit 9 EIC ECM red lamp, shutdown
		Bit 10 EIC overspeed, warning
		Bit 11 EIC overspeed, shutdown
		Bit 12 EIC protection
		Bit 13 EIC malfunction

7.3.2 Cummins

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1023	EIC alarms, engine controller (DM1)	Bit 0 EIC yellow
		Bit 1 Red
		Bit 2 EIC protection
		Bit 3 EIC malfunction
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC DEC communication error
		Bit 1 EIC low oil pressure, warning
		Bit 2 EIC low oil pressure, shutdown
		Bit 3 EIC high coolant temp, warning
		Bit 4 EIC high coolant temperature, shutdown
		Bit 5 EIC low coolant level, warning
		Bit 6 EIC low coolant level, shutdown
		Bit 7 EIC intake manifold temp, warning
		Bit 8 EIC intake manifold, shutdown
		Bit 9 EIC fuel temp., warning
		Bit 10 EIC fuel temp, shutdown
		Bit 11 EIC coolant pressure, shutdown
		Bit 12 EIC oil temp., warning
		Bit 13 EIC oil temp., warning
		Bit 14 EIC overspeed shutdown
		Bit 15 EIC crankcase press., shutdown

7.3.3 DDEC – Detroit engines

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		BIt 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC communication error, warning
		Bit 1 EIC warning
		Bit 2 EIC shutdown
		Bit 3 EIC protection
		Bit 4 EIC malfunction

7.3.4 EMR 2 – EMR 3 - Deutz engines

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC high coolant temperature, shutdown
		Bit 1 EIC low oil pressure, shutdown
		Bit 2 EIC overspeed, shutdown
		Bit 3 EIC EMR shutdown (LS: lamp status)
		Bit 4 EIC EMR warning (LS: lamp status)
		Bit 5 EIC communication error
		Bit 6 EIC protection
		Bit 7 EIC malfunction

7.3.5 Generic J1939

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC communication error
		Bit 1 EIC yellow
		Bit 2 EIC red
		Bit 3 EIC protection
		Bit 4 EIC malfunction

7.3.6 Iveco

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC communication error
		Bit 1 EIC low oil pressure, warning
		Bit 2 EIC low oil pressure, shutdown
		Bit 3 EIC boost pressure, warning
		Bit 4 EIC high coolant temperature, warning
		Bit 5 EIC low coolant level, shutdown
		Bit 6 EIC high inlet air temperature, warning
		Bit 7 EIC fuel temperature, warning
		Bit 8 EIC ECM yellow lamp, warning
		Bit 9 EIC ECM red lamp, shutdown
		Bit 10 EIC overspeed, warning
		Bit 11 EIC overspeed, shutdown
		Bit 12 EIC protection
		Bit 13 EIC malfunction

7.3.7 JDEC – John Deere engines

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC high coolant temperature, shutdown
		Bit 1 EIC low oil pressure, shutdown
		Bit 2 EIC fuel temperature, shutdown
		Bit 3 EIC fuel control valve, shutdown
		Bit 4 EIC ECU failure, shutdown
		Bit 5 EIC oil pressure, warning
		Bit 6 EIC intake manifold, warning
		Bit 7 EIC coolant temperature, warning
		Bit 8 EIC fuel injection pump, warning
		Bit 9 EIC JDEC shutdown (LS: lamp status)
		Bit 10 EIC JDEC warning (LS: lamp status)
		Bit 11 EIC communication error
		Bit 12 EIC protection
		Bit 13 EIC malfunction

7.3.8 MTU ADEC

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	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
1023	EIC alarms, engine controller	Bit 0 EIC Common alarm red
		Bit 1 EIC Overspeed
		Bit 2 EIC Lube oil press LowLow
		Bit 3 EIC Coolant temperature HiHi
		Bit 4 EIC Lube oil temp HiHi
		Bit 5 EIC Charge air temp HiHi
		Bit 6 EIC ECU power supp voltage HiHi
		Bit 7 EIC Generator temp high warning
		Bit 8 EIC Holding tank high level
		Bit 9 EIC Holding tank low level
		Bit 10 EIC Winding 1 temp high
		Bit 11 EIC Winding 2 temp high
		Bit 12 EIC Winding 3 temp high

Addr.	Content	Type
		Bit 13 EIC Ambient temp high
		Bit 14 EIC Water in fuel 1
		Bit 15 EIC Water in fuel 2
1024	EIC alarms, engine controller	Bit 0 EIC Coolant high temp
		Bit 1 EIC Charge air high temp
		Bit 2 EIC Intercooler coolant high temp
		Bit 3 EIC Lube oil high temp
		Bit 4 EIC ECU high temp
		Bit 5 EIC Engine speed low
		Bit 6 EIC Prelube fail
		Bit 7 EIC Start speed not reached Common alarm
		Bit 8 EIC yellow
		Bit 9 EIC Lube oil pressure low
		Bit 10 EIC Coolant level low
		Bit 11 EIC Intercooler coolant level low
		Bit 12 EIC ECU defect
		Bit 13 EIC Speed demand defect
		Bit 14 EIC Power supply low voltage
		Bit 15 EIC Power supply high voltage

7.3.9 MTU MDEC series - 2000/4000 - module 302 & 303

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 EIC communication error
		Bit 2 EIC shutdown
		Bit 3 EIC overspeed
		Bit 4 EIC coolant water temperature 1
		Bit 5 EIC coolant water temperature 2
		Bit 6 EIC oil pressure 1
		Bit 7 EIC oil pressure 2
1024	EIC alarms, engine controller	Bit 0 EIC overspeed, shutdown
		Bit 1 EIC low oil pressure, warning
		Bit 2 EIC low oil pressure, shutdown
		Bit 3 EIC low coolant level, shutdown
		Bit 4 EIC MDEC ECU failure, shutdown
		Bit 5 EIC high coolant temperature, warning
		Bit 6 EIC high coolant temperature, shutdown
		Bit 7 EIC high intercooler coolant temp, warning
		Bit 8 EIC high oil temperature, shutdown
		Bit 9 EIC high charge air temperature, shutdown
		Bit 10 EIC defect coolant level switch, warning
		Bit 11 EIC MDEC yellow alarm, warning
		Bit 12 EIC MDEC red alarm, shutdown

7.3.10 Scania

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

Addr.	Content	Type
1026	EIC alarms (KWP 2000)	Bit 0 EIC overreving
		Bit 1 EIC speed sensor 1
		Bit 2 EIC speed sensor 2
		Bit 3 EIC water temp. sensor
		Bit 4 EIC charge air temp. sensor
		Bit 5 EIC charge air pressure sensor
		Bit 6 EIC oil temp. sensor
		Bit 7 EIC oil pressure sensor
		Bit 8 EIC fault in cor.
		Bit 9 EIC throttle pedal
		Bit 10 EIC emergency stop override
		Bit 11 EIC oil pressure prot.
		Bit 12 EIC wrong parameter
		Bit 13 EIC battery voltage
		Bit 14 EIC oil pressure prot.
		Bit 15 EIC emergency stop cor.
1027	EIC alarms (KWP 2000)	Bit 0 EIC CAN cir. defect
		Bit 1 EIC CAN mess. DLN1
		Bit 2 EIC Wrong CAN version
		Bit 3 EIC un. inj. cyl. 1
		Bit 4 EIC un. inj. cyl. 2
		Bit 5 EIC un. inj. cyl. 3
		Bit 6 EIC un. inj. cyl. 4
		Bit 7 EIC un. inj. cyl. 5
		Bit 8 EIC un. inj. cyl. 6
		Bit 9 EIC un. inj. cyl. 7
		Bit 10 EIC un. inj. cyl. 8
		Bit 11 EIC extra ana. inp.
		Bit 12 EIC system shutdown
		Bit 13 EIC coola. L. prot.
		Bit 14 EIC HW watchdog
		Bit 15 EIC fault in RAM
1028	EIC alarms (KWP 2000)	Bit 0 EIC seal
		Bit 1 EIC coola. shut OFF

Addr.	Content	Type
		Bit 2 EIC overheat prot.
		Bit 3 Fault in TPU
		Bit 4 Not used
		Bit 5 Not used
		Bit 6 Not used
		Bit 7 Not used
		Bit 8 Not used
		Bit 9 Not used
		Bit 10 Not used
		Bit 11 Not used
		Bit 12 Not used
		Bit 13 Not used
		Bit 14 Not used
		Bit 15 Not used

7.3.11 Volvo Penta

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

Addr.	Content	Type
1020	EIC alarms, DEIF controller	Bit 0 7570 EIC communication error
		Bit 1 7580 EIC warning
		Bit 2 7590 EIC shutdown
		Bit 3 7600 EIC overspeed
		Bit 4 7610 EIC coolant water temperature 1
		Bit 5 7620 EIC coolant water temperature 2
		Bit 6 7630 EIC oil pressure 1
		Bit 7 7640 EIC oil pressure 2
		Bit 8 7650 EIC oil temp. 1
		Bit 9 7660 EIC oil temp. 2
		Bit 10 7670 EIC coolant level 1
		Bit 11 7680 EIC coolant level 2
1024	EIC alarms (DM 1)	Bit 0 EIC overspeed, warning
		Bit 1 EIC oil pressure, warning
		Bit 2 EIC oil temperature, warning
		Bit 3 EIC high coolant temperature, warning
		Bit 4 EIC low coolant level, warning
		Bit 5 EIC fuel pressure, warning
		Bit 6 EIC ECM yellow lamp, warning
		Bit 7 EIC ECM red lamp, shutdown
		Bit 8 EIC high inlet air temperature, warning
		Bit 10 EIC battery voltage, warning
		Bit 11 EIC low oil level, warning
		Bit 12 EIC protection
		Bit 13 EIC malfunction