



-power in control



MULTI-LINE 2 DESCRIPTION OF OPTIONS



Options H5, H7, H12 and H13 MTU MDEC/ADEC and J1939. CANbus engine interface communication

- Description of option
- Functional description
- Modbus communication



DEIF A/S · Frisenborgvej 33 · DK-7800 Skive
Tel.: +45 9614 9614 · Fax: +45 9614 9615
info@deif.com · www.deif.com

Document no.: 41893406740
SW version:

1. Delimitation

1.1. Scope of options H5, H7, H12 and H13.....	5
------------------------------------------------	---

2. General information

2.1. Warnings, legal information and safety.....	6
2.1.1. Warnings and notes	6
2.1.2. Legal information and disclaimer	6
2.1.3. Safety issues	6
2.1.4. Electrostatic discharge awareness	6
2.1.5. Factory settings	7

3. Description of option

3.1. Option H5, H7, H12 and H13.....	8
3.1.1. Engine communication.....	8
3.2. Multi-line 2-based products.....	8
3.2.1. Terminal description.....	8
3.2.2. Option H5.2.....	8
3.2.3. Option H5.8.....	8
3.2.4. Option H7.....	9
3.2.5. Option H12.2 dual CAN.....	9
3.2.6. Option H12.8 dual CAN.....	10
3.2.7. Option H13.....	10
3.3. AGC 100-, CGC 400- and GC-1F-based products.....	10
3.3.1. Terminal description for AGC 100, CGC 400 and GC-1F.....	10
3.4. Modbus communication.....	10
3.4.1. Modbus communication.....	10
3.5. Wiring.....	10
3.5.1. Wiring.....	10
3.5.2. Principle diagram.....	11

4. Functional description

4.1. Electronic Control Module (ECM)	12
4.1.1. ECM.....	12
4.2. Engine types.....	12
4.2.1. Engine types	12
4.3. AVR types.....	14
4.3.1. AVR types.....	14
4.4. Communication system.....	14
4.4.1. Communication system.....	14
4.4.2. EIC Livelink.....	14
4.5. EIC unit.....	14
4.5.1. EIC unit.....	14
4.6. Common for all alarm functions.....	14
4.6.1. Common for all alarm functions.....	14
4.7. J1939 measurement table.....	15
4.7.1. J1939 measurement table.....	15
4.7.2. Error messages.....	15
4.7.3. Object selection, J1939.....	15
4.8. Show engine values in display unit.....	22
4.8.1. Show engine values in display unit.....	22
4.8.2. Configuration of user view.....	22
4.8.3. Activation of auto views.....	22
4.9. Verification of J1939 objects.....	23
4.9.1. Verification	23
4.10. Displaying of J1939 DM1/DM2, Scania KWP2000 and Caterpillar/Perkins alarms.....	24
4.10.1. Displaying alarms, AGC-3, AGC-4, GPC, GPU, PPU and PPM.....	24
4.10.2. Displaying alarms, AGC 100, AGC 200 and CGC 400.....	25
4.10.3. Displaying alarms, GC-1F.....	26

4.11. Control commands sent to the engine.....	28
4.11.1. Control commands.....	28
4.11.2. EIC 50 Hz - 60 Hz switch.....	30
4.11.3. EIC Droop.....	30
4.11.4. EIC Inhibit.....	31
4.11.5. EIC Idle.....	31
4.11.6. EIC Derate request.....	31
4.11.7. TSC1 SA "Torque Speed Control".....	32
4.12. Differential measurement.....	32

5. Specific engine type descriptions

5.1. About type descriptions.....	33
5.2. Caterpillar/Perkins (J1939).....	34
5.2.1. Object selection, J1939.....	34
5.2.2. Readings from the display	35
5.2.3. Warnings and shutdowns.....	36
5.2.4. Write commands to engine controller.....	36
5.3. Cummins CM850-CM570 (J1939).....	37
5.3.1. Warnings and shutdowns.....	37
5.3.2. Write commands to engine controller.....	37
5.3.3. Cummins after treatment.....	38
5.4. Detroit Diesel DDEC (J1939).....	39
5.4.1. Warnings and shutdowns.....	39
5.4.2. Write commands to engine controller.....	39
5.5. Deutz EMR 2 - EMR 3 (J1939).....	40
5.5.1. Warnings and shutdowns.....	40
5.5.2. Write commands to engine controller.....	40
5.6. Generic J1939 (J1939).....	41
5.6.1. Warnings and shutdowns.....	41
5.6.2. Write commands to engine controller.....	41
5.7. Iveco (J1939).....	42
5.7.1. Warnings and shutdowns.....	42
5.7.2. Write commands to engine controller.....	42
5.8. John Deere JDEC (J1939).....	43
5.8.1. Warnings and shutdowns.....	43
5.8.2. Write commands to engine controller.....	43
5.9. Moteurs Baudouin.....	44
5.9.1. Warnings and shutdowns.....	44
5.9.2. Write commands to engine controller.....	44
5.10. MTU J1939 Smart Connect.....	44
5.10.1. Smart Connect.....	44
5.10.2. Warnings and shutdowns.....	45
5.10.3. Write commands to engine controller.....	45
5.10.4. Tier 4 aftertreatment support.....	46
5.11. MTU ADEC (CANopen).....	46
5.11.1. MTU ADEC (CANopen).....	46
5.11.2. Readings from the display	47
5.11.3. Warning.....	47
5.11.4. Shutdown.....	49
5.11.5. Write commands to engine controller.....	49
5.12. MTU ADEC module 501, without SAM module.....	50
5.12.1. MTU ADEC module 501, without SAM module.....	50
5.12.2. Displayed values.....	51
5.12.3. Alarms.....	52
5.12.4. Write commands to engine controller.....	54
5.13. MTU MDEC module 302/303 (MTU).....	55
5.13.1. MTU MDEC module 302/303 (MTU).....	55
5.13.2. Readings from the display	56
5.13.3. Alarms.....	57

5.13.4. Write commands to engine controller.....	59
5.14. PSI/Power Solutions.....	59
5.14.1. Write commands to engine controller.....	59
5.14.2. Warnings and shutdowns.....	60
5.15. Scania EMS (J1939).....	60
5.15.1. Warning/shutdown.....	60
5.15.2. Write commands to engine controller.....	60
5.16. Scania EMS 2 S6 (J1939).....	60
5.16.1. Scania EMS 2 S6 (J1939).....	60
5.16.2. Warnings and shutdowns (DNL2 alarms).....	60
5.16.3. Error log.....	61
5.16.4. Write commands to engine controller.....	63
5.16.5. Control.....	63
5.17. Volvo Penta EMS (J1939).....	64
5.17.1. Warnings and shutdowns.....	64
5.17.2. Write commands to engine controller.....	64
5.18. Volvo Penta EMS 2 (J1939).....	64
5.18.1. Volvo Penta EMS 2 (J1939).....	64
5.18.2. Warnings and shutdowns.....	65
5.18.3. Write commands to engine controller.....	65
5.18.4. Readable states.....	66
5.18.5. Tier 4 aftertreatment support.....	66
6. Parameters	
6.1. Parameters related to engine communication	67
6.1.1. Further information.....	67
7. Modbus communication	
7.1. Additional information for H2/N.....	68
7.2. Readings.....	68
7.2.1. Analogue values.....	68
7.2.2. Analogue values specific for CAT and Perkins Protocol.....	76
7.2.3. Diagnostic codes.....	76
7.3. Alarms.....	80
7.3.1. Caterpillar/Perkins.....	80
7.3.2. Cummins.....	81
7.3.3. DDEC – Detroit engines.....	82
7.3.4. EMR 2 – EMR 3 - Deutz engines.....	83
7.3.5. Generic J1939.....	84
7.3.6. Iveco.....	85
7.3.7. JDEC – John Deere engines.....	86
7.3.8. MTU Smart Connect	87
7.3.9. MTU ADEC.....	88
7.3.10. MTU ADEC module 501, without SAM module.....	90
7.3.11. MTU MDEC series - 2000/4000 - module 302 & 303.....	92
7.3.12. Scania.....	94
7.3.13. Volvo Penta.....	96
8. Appendix	
8.1. MTU Smart connect ECU9.....	97
8.1.1. Alarm texts.....	97

1. Delimitation

1.1 Scope of options H5, H7, H12 and H13

This description of options covers the following products:

AGC-3	SW version 3.62.x or later
AGC-4	SW version 4.4x.x or later
AGC 100	SW version 4.00.0 or later
CGC 400	SW version 1.00.x or later
GC-1F	SW version 1.2x.x or later
GC-1F/2	SW version 2.23.x or later
GPC-3	SW version 3.08.x or later
GPU-3/PPU-3	SW version 3.08.x or later
PPM-3	SW version 3.0x.x

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 terminals 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 option

3.1 Option H5, H7, H12 and H13

3.1.1 Engine communication

These options give the possibility to communicate between ML-2 and several engine types over the CANbus.

Option H7 is a limited version of H5 which does not include MTU MDEC or MTU ADEC module 501 (H13).



Option H7 is not available for AGC 100, CGC 400 and GC-1F.

3.2 Multi-line 2-based products

3.2.1 Terminal description

This description relates to the products AGC-3, AGC-4, GPC, GPU, PPM and PPU.

3.2.2 Option H5.2

The PCB for the engine interface communication module is placed in slot #2.

Term.	Function	Description
29	CAN-H	CAN bus card option H5.2, Engine Interface Communication
30	CAN-GND	
31	CAN-L	
32	CAN-H	
33	CAN-GND	
34	CAN-L	
35	Not used	
36	Not used	



**Terminals 29 and 32 are internally connected.
Terminals 31 and 34 are internally connected.**

3.2.3 Option H5.8

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

Term.	Function	Description
133	CAN-H	CAN bus card option H5.8, Engine Interface Communication
132	CAN-GND	
131	CAN-L	
130	CAN-H	
129	CAN-GND	
128	CAN-L	
127	Not used	
126	Not used	



Terminals 133 and 130 are internally connected.
Terminals 131 and 128 are internally connected.

3.2.4 Option H7

The PCB for the engine interface communication module is placed in slot #7.

Term.	Function	Description
A1	CAN-H	CAN I/F A
A2	CAN-GND	
A3	CAN-L	



AGC-3: If option G5 is active, the option H7 cannot be activated.



AGC-3/AGC-4/PPM: When option H7 is activated, it occupies the communication CAN A. This leaves CAN B only for power management communication, and CAN B will be used, even if CAN A or both is selected in the plant configuration.

3.2.5 Option H12.2 dual CAN

The PCB for the engine interface communication module is placed in slot #2.

Term.	Function	Description
29	CAN-H	H12, dual CAN bus card option H5 or H8, Engine Interface Communication: Terminals 29-31: CAN C Terminals 32-34: CAN D
30	CAN-GND	
31	CAN-L	
32	CAN-H	
33	CAN-GND	
34	CAN-L	
35	Not used	
36	Not used	

3.2.6 Option H12.8 dual CAN

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

Term.	Function	Description
133	CAN-H	H12, dual CAN bus card option H5 or H8, Engine Interface Communication: Terminals 128-130: CAN E Terminals 131-133: CAN F
132	CAN-GND	
131	CAN-L	
130	CAN-H	
129	CAN-GND	
128	CAN-L	
127	Not used	
126	Not used	



Option H12 is a dual CAN card that includes option H5 (engine interface communication) and option H8 (external I/O modules). Option H12 can be ordered to fit in slot #2 OR slot #8. Setup of the terminals is done in the following parameters: Option H12.2 - parameters 7843 and 7844; option H12.8 - parameters 7845 and 7846.

3.2.7 Option H13

The option H13 is a software option which requires that either option H5 or H12 is also present. To communicate with the option H13 engine interface protocols, the ECU is connected to the terminals listed in options H5 and H12.

3.3 AGC 100-, CGC 400- and GC-1F-based products

3.3.1 Terminal description for AGC 100, CGC 400 and GC-1F

Term.	Function	Description
53	CAN-H	CAN J1939 (CGC 400), CAN A (AGC 100) or CAN 1 (GC-1F)
54	CAN-GND	
55	CAN-L	

3.4 Modbus communication

3.4.1 Modbus communication

If option H2/N is present in the ML-2 unit, it is possible to read engine data over the Modbus.

3.5 Wiring

3.5.1 Wiring

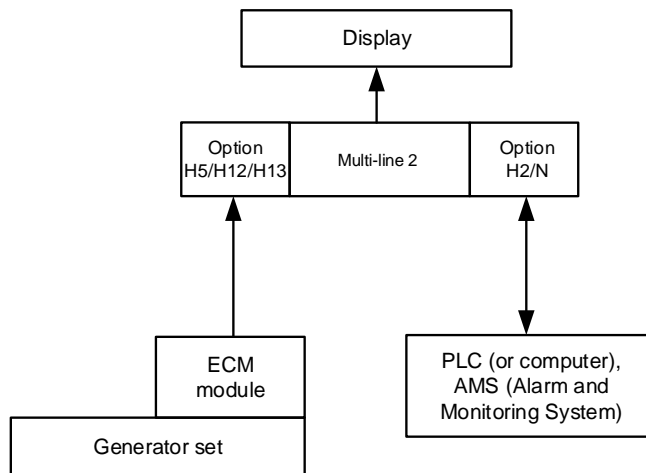


For wiring details, please refer to the document "Installation Instructions".



GC-1F: For wiring details, please refer to the document "Installation Instructions and Reference Handbook".

3.5.2 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

Data can be transmitted between the ML-2 units and the following engine controllers/types:

Engine manufacturer	Engine controller/type	Comment	H5	H7	H12	H13
Caterpillar	ADEM III and A4/C4.4, C6.6, C9, C15, C18, C32	Rx/Tx	X	X	X	X
Cummins	CM 500/558/570/850/2150/2250, QSL, QSB5, QSX15 and 7, QSM11, QSK 19/23/50/60	Rx/Tx	X	X	X	X
Detroit Diesel	DDEC III and IV/Series 50, 60 and 2000	Rx/Tx	X	X	X	X
Deutz	EMR3 ¹ , EMR 2 (EMR)/912, 913, 914 and L2011	Rx/Tx	X	X	X	X
-	Generic J1939	Rx/Tx	X	X	X	X
Iveco	EDC7 (Bosch MS6.2)/Series NEF, CURSOR and VECTOR 8	Rx/Tx	X	X	X	X
John Deere	JDEC/PowerTech M, E and Plus	Rx/Tx	X	X	X	X
Moteurs Baudouin	ECU WISE15	Rx/Tx	X	X	X	X
MTU	MDEC, module M.302 or M.303/Series 2000 and 4000	Rx	X	-	X	X
MTU	MDEC, module M.201 or M.304/Series 2000 and 4000	Rx Select M. 303	X	-	X	X
MTU	ADEC/Series 2000 and 4000 (ECU7), with SAM module MTU PX engines ²	Rx/Tx	X	X	X	X
MTU ¹	J1939 Smart Connect/Series 1600 (ECU8), ECU9	Rx/Tx	X	X	X	X
MTU ¹	ADEC/Series 2000 and 4000 (ECU7), without SAM module (software module 501)	Rx/Tx	-	-	-	X
Perkins	Series 850, 1100, 1200, 1300, 2300, 2500 and 2800.	Rx/Tx	X	X	X	X
PSI/Power Solutions	PSI/Power Solutions	Rx/Tx	X	-	X	X
Scania	EMS	Rx	X	X	X	X
Scania	EMS S6 (KWP2000)/Dx9x, Dx12x, Dx16x	Rx/Tx	X	X	X	X
Volvo Penta	EDC4	Rx Select EMR 2	X	X	X	X
Volvo Penta	EMS	Rx	X	X	X	X
Volvo Penta	EMS 2 and EDCIII/D6, D7, D9, D12 and D16 (GE and AUX variants only)	Rx/Tx	X	X	X	X



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



The engine type is selected in menu 7561.



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

 Protocols marked ¹ do not apply to PPM-3.

 The engine type MTU PX marked ² requires that the MTU SAM module is with updated J1939 protocol supporting DM1/DM2.

4.3 AVR types

4.3.1 AVR types

Data can be transmitted between the ML-2 units and the following AVRs

Engine manufacturer	AVR Types	Comment
Caterpillar	CDVR	Tx

 AVR control requires option D1 in combination with option H5, H7 or H13.

 AVR control only applies to AGC-3, AGC-4, GPC-3, PPU-3 and GPU-3.

4.4 Communication system

4.4.1 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. 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 ¹ , Scania and Volvo Penta
125 kb/s	250 kb/s

 Protocols marked ¹ do not apply to PPM-3.

4.4.2 EIC Livelink

It is possible to activate interface to JCB Livelink via the "EIC Livelink" (channel 7552).

4.5 EIC unit

4.5.1 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 (option H2/N).

4.6 Common for all alarm functions

4.6.1 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) ¹	Actual cooling water level


 Alarms marked ¹ do not apply to PPM-3.

4.7 J1939 measurement table

4.7.1 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 "Designer's Reference Handbook".

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


4.7.2 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.

4.7.3 Object selection, J1939

The view lines can be configured with these available values.

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

 The engine is by default settings expected to use source address 0 which is also the most commonly used setting on ECUs. If a different source address is required, it can be changed in parameter 7562.

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
EngineAuxShutdownSW, MLogic ⁹	61441/F001	4.5	2 bits	6	970	0..3	4 states/2 bit, 0 offset
EIC acc. pedal pos.	61443/F003	2	1	3/6	91	%	0.4 %/bit, offset 0
EIC % load, c. speed	61443/F003	3	1	3/6	92	%	1 %/bit, offset 0
EIC d.d.% torque	61444/F004	2	1	3/6	512	%	1 %/bit, offset -125 %
EIC actual % torque	61444/F004	3	1	3/6	513	%	1 %/bit, offset -125 %
EIC speed	61444/F004	4	2	3/6	190	rpm	0.125 rpm/bit, offset 0
Engine Demand - Torque ⁹	61444/F004	8	1	3	2432	%	1 %/bit, -125 % offset
AT1IntTNOx ⁹	61454/F00E	1	2	6	3216	ppm	0.05 ppm/bit, -200 ppm offset
Aftertreatment 1 Intake Oxygen ⁹	61454/F00E	3	2	6	3217	%	0.000514 %/bit, -12 % offset
AT1OutLNOx ⁹	61455/F00F	1	2	6	3226	ppm	0.05 ppm/bit, -200 ppm offset
Aftertreatment 1 Outlet Oxygen ⁹	61455/F00F	3	2	6	3227	%	0.000514 %/bit, -12 % offset
AT2IntTNOx ⁹	61456/F010	1	2	6	3255	ppm	0.05 ppm/bit, -200 ppm offset
Throttle Actuator Control ⁹	61466/F01A	1	2	4	3464	%	0.0025 %/bit, 0 offset
AT2OutLNOx ⁹	61457/F011	1	2	6	3265	ppm	0.05 ppm/bit, -200 ppm offset
AT1ExhFA.DQ ⁹	61475/F023	1	2	3	4331	g/h	0.3 g/h per bit, 0 offset
AT1ExhFluDAB ⁹	61475/F023	6	1	3	4334	kPa	8 kPa/bit, 0 offset
AT1ExhFluDRQ ⁹	61476/F024	1	2	6	4348	g/h	0.3 g/h per bit, 0 offset
AT2ExhFA.DQ ⁹	61478/F026	1	2	3	4384	g/h	0.3 g/h per bit, 0 offset
AT2ExhFluDAB ⁹	61478/F026	6	1	3	4387	kPa	8 kPa/bit, 0 offset
AT2ExhFluDRQ ⁹	61479/F027	1	2	3	4401	g/h	0.3 g/h per bit, 0 offset
Next Regen ⁹	64697/FCB9	1	4	6	5978	s	1 s/bit
Battery Charger 1 State	64788/FD14	1.1	4 bits	6	4990	bit	16 states/4 bit

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
Battery Charger 1 Power Line State	64788/FD14	1.5	2 bits	6	4991	bit	4 states/2 bit
Battery Charger 1 Output Voltage	64788/FD14	2	2	6	4992	V	0.05 V/bit
Battery Charger 1 Output Current	64788/FD14	4	2	6	4993	A	0.05 A/bit
AT2SCRCInG ⁹	64824/FD38	1	2	6	4413	°C	0.03125 deg C/bit, -273 deg C offset
AT2SCRCOuG ⁹	64824/FD38	4	2	6	4415	°C	0.03125 deg C/bit, -273 deg C offset
AT2ExhFlu DT ⁹	64827/FD3B	3	1	6	4390	°C	1 deg C/bit, -40 deg C offset
AT1SCRCInG ⁹	64830/FD3E	1	2	5	4360	°C	0.03125 deg C/bit, -273 deg C offset
AT1SCRCOuG ⁹	64830/FD3E	4	2	5	4363	°C	0.03125 deg C/bit, -273 deg C offset
AT1ExhFlu DT ⁹	64833/FD41	3	1	6	4337	°C	1 deg C/bit, -40 deg C offset
Long-term Fuel Trim ⁹	64841/FD49	1	2	6	4237	%	0.1 %/bit, -100 % offset
Short-term Fuel Trim ⁹	64841/FD49	3	2	6	4236	%	0.1 %/bit, -100 % offset
Exhaust Gas Oxygen Sensor Status ⁹	64841/FD49	5.1	4 bits	6	4240	bit	16 states/4 bit 0 offset
AT1ExhAvrCons ⁹	64878/FD6E	1	2	6	3826	l/h	0.05 l/h per bit 0 offset
EngOperatingState ⁹	64914/FD92	1.1	4 bits	3	3543	0..15	16 states/4 bit, 0 offset
Engine Derate Request ⁹	64914/FD92	8	1	3	3644	%	0.4 %/bit, 0 offset
EngineAT1RegenerationStatus, MLogic ⁹	64929/FDA1	7.5	2 bits	6	3483	0..3	4 states/2 bit, 0 offset
DPF OUTL T ⁹	64947/FDB3	3	2	6	3246	°C	0.03125 deg C/bit, -273 deg C offset
EIC Air filter diff. pressure	64976/FDD0	1	1	6	2809	bar	0.05 kPa, offset 0
EIC Intake manifold #1 absolute pressure ¹	64976/FDD0	5	1	6	3563	bar	2 kPa/bit
Sp.Humidity ⁹	64992/FDE0	3	2	6	4490	g/kg	0.01 g/kg per bit, 0 offset

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
EIC Exhaust gas temp. R manifold ²	65031/FE07	1	2	6	2433	°C	0.03125 °C/bit, offset -273 °C
EIC Exhaust gas temp. L manifold ²	65031/FE07	3	2	6	2434	°C	0.03125 °C/bit, offset -273 °C
DEF LEVEL ⁹	65110/FE56	1	1	6	1761	%	0.4 %/bit, 0 offset
AT1ExhFluTank deg ⁹	65110/FE56	2	1	6	3031	°C	1 deg C/bit, -40 deg C offset
bScrOprInducementActiveLamp, MLogic ⁹	65110/FE56	5.6	3 bits	6	5245	0 to 7	8 states/3 bit, 0 offset
SCR IND. SEV. ⁹	65110/FE56	6.6	3 bits	6	5246	0 to 7	8 states/3 bit, 0 offset
No view, for Coolant water regulation ⁹	65129/FE69	3	2	6	1637	°C	0.03125 deg C/bit, -273 deg C offset
EIC Fuel supply pump inlet pressure	65130/FE6A	2	1	6	1381	bar	2 kPa/bit, 0 offset
EIC Fuel filter (ss) diff. pressure	65130/FE6A	3	1	6	1382	bar	2 kPa/bit, 0 offset
Engine Desired Ignition Timing ⁹	65159/FE87	1	2	7	1433	deg	1/128 deg/bit -200 deg offset
Engine Actual Ignition Timing ⁹	65159/FE87	7	2	7	1436	deg	1/128 deg/bit -200 deg offset
EngineFuelLeak1, MLogic ⁹	65169/FE91	1	2	7	1239	bit	00 no leakage detect. 01 leakage detect.
AuxCool Pr. ⁹	65172/FE94	1	1	6	1203	kPa	4 kPa/bit gain, 0 kPa offset
T. Cool Aux ⁹	65172/FE94	2	1	6	1212	°C	1 °C/bit gain, -40 °C offset
Tcharger 2 ⁹	65179/FE9B	2	2	7	1169	rpm	4 rpm/bit gain, 0 rpm offset
Tcharger 3 ⁹	65179/FE9B	4	2	7	1170	rpm	4 rpm/bit gain, 0 rpm offset
T-ECU ⁹	65188/FEA4	3	2	6	1136	°C	0.03125 °C/bit gain, -273 °C offset
Intake Man T2 ⁹	65189/FEA5	1	1	7	1131	°C	1 °C/bit gain, -40 °C offset
EIC trip fuel gaseous	65199/FEAF	1	4	7	1039	kg	0.5 kg/bit, offset 0
EIC total fuel used gaseous	65199/FEAF	5	4	7	1040	kg	0.5 kg/bit, offset 0

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
EIC Mean trip fuel consumption ¹	65203/FEB3	5	2	7	1029	l/h	0,05 [l/h]/bit
Est. Fan RPM ⁹	65213/FEBD	1	1	6	975	%	0.4 %/bit gain, 0 % offset
EIC Nominal Power ¹	65214/FEBE	1	2	7	166	kW	0.5 kW/bit
Diagnostic message 1/2	65226/FECA	-	-	3/6/7	-	-	-
EIC faults ⁸	65230/FECE	1	1	6	1218	-	1/bit, offset 0
Number of Software Identification Fields ⁹	65242/FEDA	1	1	6	965	step	1 count/bit, 0 offset
Software Identification ⁹	65242/FEDA	2	Variable	6	234	SCII	ASCII, 0 offset
Tcharger 1 ⁹	65245/FEDD	2	2	6	103	rpm	4 rpm/bit gain, 0 rpm offset
Nom. Friction ⁹	65247/FEDF	1	1	6	514	%	1 %/bit gain, -125 % offset
Desired ⁹	65247/FEDF	2	2	6	515	rpm	0.125 rpm/bit gain, 0 rpm offset
EngineWaitToStart, MLogic ⁹	65252/FEE4	4.1	2 bits	6	1081	bit	00 off 01 on
EngineProtectSysShutdown, MLogic ⁹	65252/FEE4	5.1	2 bits	6	1110	bit	00 yes 01 no
EngineProtectSysApproShutdown, MLogic ⁹	65252/FEE4	5.3	2	6	1109	bit	00 not approaching 01 approaching
EngineAlarmAcknowledge, MLogic ⁹	65252/FEE4	7.1	2 bits	6	2815	0..3	4 states/2 bit, 0 offset
EngineAirShutoffCommandStatus, MLogic ⁹	65252/FEE4	7.5	2 bits	6	2813	0..3	4 states/2 bit, 0 offset
EngineOverspeedTest, MLogic ⁹	65252/FEE4	7.7	2 bits	6	2812	0..3	4 states/2 bit, 0 offset
EngineShutoffStatus, MLogic ⁹	65252/FEE4	8.3	2 bits	6	5404	0..3	4 states/2 bit, 0 offset
EIC engine hours	65253/FEE5	1	4	3/6	247	h	0.05 hrs/bit, offset 0, max: 32767 hrs
EIC engine trip fuel	65257/FEE9	1	4	6	182	L	0.5 L/bit, offset 0
EIC engine total fuel used	65257/FEE9	5	4	6	250	L	0.5 L/bit, offset 0
EIC coolant temp. ⁵	65262/FEEE	1	1	3/6	110	°C	1 deg C/bit, offset -40 °C

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
EIC fuel temp.	65262/FEEE	2	1	3/6	174	°C	1 °C/bit, offset -40 °C
EIC oil temp. ⁷	65262/FEEE	3	2	3/6	175	°C	0.03125 °C/bit, offset -273 °C
EIC turbo oil temp.	65262/FEEE	5	2	3/6	176	°C	0.03125 °C/bit, offset -273 °C
EIC Intercooler temperature ²	65262/FEEE	7	1	3/6	52	°C	1 °C/bit, offset -40 °C
EIC fuel del. press.	65263/FEFF	1	1	6	94	bar	4 kPa/bit, offset 0
EIC oil level	65263/FEFF	3	1	6	98	%	0.4 %/bit, offset 0
EIC oil pressure ⁶	65263/FEFF	4	1	6	100	bar	4 kPa/bit, offset 0
EIC crankcase press.	65263/FEFF	5	2	6	101	bar	1/128 kPa/bit, offset -250 kPa
EIC coolant pressure	65263/FEFF	7	1	6	109	bar	2 kPa/bit, offset 0
EIC coolant level	65263/FEFF	8	1	6	111	%	0.4 %/bit, offset 0
EIC fuel rate	65266/FEF2	1	2	6	183	l/h	0.05 l/h per bit, offset 0
EIC atmospheric press.	65269/FEF5	1	1	6	108	bar	0.5 kPa/bit, offset 0
EIC ambient air temp.	65269/FEF5	4	2	6	171	°C	0.03125 °C/bit, offset -273 °C
EIC air inlet temp.	65269/FEF5	6	1	6	172	°C	1 °C/bit, offset -40 °C
EIC particulate trap inlet	65270/FEF6	1	1	6	81	bar	0.5 kPa/bit, offset 0
EIC intake manifold #1 P. 3	65270/FEF6	2	1	6	102	bar	2 kPa/bit, offset 0
EIC intake manifold 1 temp. ⁴	65270/FEF6	3	1	6	105	°C	1 °C/bit, offset -40 °C
EIC air inlet pressure	65270/FEF6	4	1	6	106	bar	2 kPa/bit, offset 0
EIC air filter diff.	65270/FEF6	5	1	6	107	bar	0.05 kPa/bit, offset 0
EIC exhaust gas temp.	65270/FEF6	6	2	6	173	°C	0.03125 °C/bit, offset -273 °C

Object	PGN (Dec/Hex)	S	L	P	SPN	Unit	J1939-71 scaling
EIC coolant filter diff.	65270/FEF6	8	1	6	112	bar	0.5 kPa/bit, offset 0
EIC key switch battery potential	65271/FEF7	7	2	6	158	V DC	0.05 V DC/bit, offset 0
EIC Fuel filter diff. pressure ²	65276/FEFC	3	1	3/6	95	bar	2 kPa/bit, 0 offset
EIC oil filter diff. press.	65276/FEFC	4	1	3 ¹ /6	99	bar	0.5 kPa/bit, offset 0
EIC water in. fuel	65279/FEFF	1	2	6	97	-	00: No, 01: Yes, 10: Error, 11: Not available
ENG CAC T	64617/FC69	7	2	6	2630	°C	0.03125 °C/bit offset -273 °C
DPF Soot Load	64891/FD7B	1	1	6	3719	%	1 %/bit, offset 0

PGN: Parameter group number

SPN: Suspect parameter number

P: J1939 priority

S: Object's start byte in CAN telegram

L: Object's length is normally written as byte, exceptions of length are written as "bit"

Unit: Unit in display (bar/°C can be changed to PSI/°F)



Objects marked ¹ do not apply to PPM-3.



Objects marked ² only apply to AGC-4.



Objects marked ³ also called EIC boost P.



Objects marked ⁴ also called EIC charge air temp.



Objects marked ⁵ EIC coolant temp.: PGN = 65282, priority = 6, start at byte 5, length = 1 byte, SPN = 110, same scale (only Iveco Vector 8 type).



Objects marked ⁶ 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 (only Iveco Vector 8 type).



Objects marked ⁷ EIC oil temp.: PGN = 65282, priority = 6, start at byte 6, length = 1 byte, SPN = 175, same scale (only Iveco Vector 8 type).



Objects marked ⁸ EIC Faults: PGN = 65284, priority = 6, start at byte 1, length = 2 byte (only MTU SmartConnect).



Objects marked ⁹ are not supported by option H7.

4.8 Show engine values in display unit

4.8.1 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 temperature 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 ML-2 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. A total of 20 views is displayed (unless fewer is set up).
2. Using the Autoview function in the communication setup (menu number 7564). This way the 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.

4.8.2 Configuration of user view

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



4.8.3 Activation of auto views

The extra view lines are displayed if the menu 7564 is switched to "ON" and the engine CANbus is active. Note that it might be necessary to start the engine before switching 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)

4.9 Verification of J1939 objects

4.9.1 Verification

To verify the communication, various CAN PC tools can be used. Common for these are that they must be connected to the CAN bus 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, refer to the manual for the product used.

As an example, see the following telegram:

0xc00400 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 (**0xc00400**) 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 0xc00400 instead of 0x0c00400). In other cases you may read, for example, 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
7	28d	0x1c

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.

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

4.10.1 Displaying alarms, AGC-3, AGC-4, GPC, GPU, PPU and PPM

Besides some engine-specific alarms which are shown in the standard alarm list, the J1939 Diagnostic messages DM1 (active alarms) and DM2 (historic alarm log list) as well as the Scania KWP 2000 alarms can all be shown on the display.

J1939

Press the LOG button for 2 seconds. That will bring the alarm log on the display.

SPN 100 FMI15 oc34
 Oil pressure
 Slightly above range
 CLRALL DM1 DM2

Example:

The alarm log always shows the DM1 (active alarms) as default. By selecting DM2 (move the cursor under DM2 and press ENTER), the historical alarm list can be shown.

Use the  and  buttons to scroll through the list.

Oc: This indicates how many times a specific alarms has occurred.

CLRALL: By pressing ENTER, the entire alarm log list will be cleared. For safety reasons this requires the master password (please see the "Designer's Reference Handbook" for details of passwords).



If the controller has no translation text of an SPN diagnostic number, "Text N/A." will be shown. For information about particular SPN numbers, please consult the engine manufacturer's documentation or SAE J1939-71 for a general description.

Scania KWP 2000

Press the LOG button for 2 seconds. That will bring the alarm log on the display. The top line shows readings of AC values and is not used by the alarm list.

```
BB 0 0 0V
1105 Speed sensor 1
Active alarms: 6
CLRALL First Last
```

Example:

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

Use the  and  buttons to scroll through the list.



CLRALL: By pressing ENTER, the entire alarm log list will be cleared. For safety reasons, this requires the master password (please see the "Designer's Reference Handbook" for details of passwords).

Caterpillar/Perkins

Press the LOG button for 2 seconds. That will bring the alarm log on the display. Caterpillar and Perkins has a primary and a secondary DM1 log as well as one DM2 log.

```
SPN 100 FMI15 oc34
Oil pressure
Slightly above range
CLRALL DM1 DM1se DM2
```

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.

Oc: This indicates how many times a specific alarms has occurred.

CLRALL: By pressing ENTER the entire alarm log list will be cleared. For safety reasons this requires the master password (please see the "Designer's Reference handbook" for details of passwords).



 **The display of Caterpillar/Perkins secondary DM 1 log only applies to AGC-3, AGC-4, GPC-3, PPU-3 and GPU-3.**

4.10.2 Displaying alarms, AGC 100, AGC 200 and CGC 400

To be able to see the different alarms, LOG menu has to be entered.

This is done by pressing  or  and choose 

J1939

Use the  or  buttons to choose the DM1 or DM2 and press enter. The alarm log will be shown in the display.



DM1 LOG DDEC	
Oil pressure	
Low level warning	
SPN	100
FMI	17

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 to choose the engine log and press enter. The alarm log will be shown in the display.

Scania KW2000 LOG	
1105 Speed sensor 1	
Active alarms: 6	



Example:

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

Use the  and   buttons to scroll through the list.



KWP2000 clear all: By pressing ENTER, the entire alarm log list will be cleared. For safety reasons this requires the master password (please see the "Designer's Reference Handbook" for details of passwords).

Caterpillar/Perkins

Caterpillar and Perkins has 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.



2nd	DMI	Caterpillar
Oil pressure		
SlightlyAboveRange		
SPN	100	
FMI	15	

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.

4.10.3 Displaying alarms, GC-1F

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.

DM1 LOG DDEC



```
Oil pressure
Low level warning
SPN          100
FMI          17
```

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.

Scania KW2000 LOG



```
1105 Speed sensor 1
Active alarms: 6
```

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 has 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.

```
2nd DMI      Caterpillar
Oil pressure
SlightlyAboveRange
SPN  100
FMI  15
```

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.



The display of Caterpillar/Perkins secondary DM 1 log only applies to GC-1F/2.

4.11 Control commands sent to the engine

4.11.1 Control commands









The table below shows the engine types with the possibility to send commands to the ECM via the CAN bus communication line.

Required options for these commands are H5, H7 and H12.

Engine type	Detroit Diesel DDEC	John Deere JDEC	Caterpillar	Perkins	Cummins	Generic J1939	Deutz EMR	Iveco
Preheat	-	-	-	-	-	-	-	-
Start/Stop	-	-	X ^{1, 5}	X ^{1, 5}	-	X ¹	-	-
Run/Stop (fuel)	-	-	-	-	X ⁴	-	-	-
Speed bias	X	X	X	X	X ^{1, 2}	X ¹	X	X
Nominal frequency	-	-	-	-	X	-	-	-
Governor gain	-	-	-	-	X	-	-	-
Idle speed	X ¹	X ¹	X ¹	X ¹	X	X ¹	X ¹	X ¹
MTU alternate droop setting (M-Logic)	-	-	X ¹	X ¹	X	-	-	-
Shutdown override	-	-	-	-	X	X ¹	-	-

Engine type	Iveco Vector 8	Mo- teurs Bau- douin	MTU MDEC	MTU ADEC	MTU ADEC M501	MTU J1939 Smart Connect	Scania EMS	Scania EMS S6
Preheat	-	-	-	-	-	-	-	-
Start/Stop	-	-	-	X	X	X ^{1, 5}	-	X
Run/Stop (fuel)	-	-	-	-	-	-	-	-
Speed bias	-	X	-	X	X	X ^{1, 5}	-	X
Nominal fre- quency	X	-	-	X	X	X ¹	-	X
Governor gain	-	-	-	-	-	-	-	-
Idle speed	-	-	-	X ¹	X ¹	X ¹	-	X
MTU alternate droop setting (M-Logic)	-	-	-	X ¹	X ¹	X ^{1, 5}	-	X
Shutdown over- ride	-	-	-	X ¹	X ¹	X ¹	-	X
Engine over- speed test	-	-	-	-	-	X ¹	-	-
Enable cylinder cut out	-	-	-	X ¹	X ¹	X ¹	-	-
Intermittent oil priming	-	-	-	-	-	X ¹	-	-
Engine operat- ing mode	-	-	-	-	-	X ¹	-	-
Demand switch	-	-	-	X ¹	X ¹	X ¹	-	-
Trip counter re- set	-	-	-	X ¹	X ¹	X ¹	-	-
Engine speed GOV parameter command	-	-	-	-	-	X ¹	-	-
Reset trip fuel value	-	-	X ³	-	-	-	-	-

Engine type	Volvo Penta	Volvo Penta EMS 2	PSI/ Power Solution
Command			
Preheat	-	X	-
Start/Stop	-	X	X ¹
Run/Stop (fuel)	-	-	-
Speed bias		X	X ¹
Nominal frequency	-	X	-
Governor gain	-	-	-
Idle speed	-	X	X ¹
MTU alternate droop setting (M-Logic)	-	X	-
Shutdown override	-	X ¹	X ¹

-  For engine types not mentioned, CAN bus control is not supported. In these cases start/stop and so on must be sent to the controller using hardwired connections.
-  The menu number 7563 must be used to enable or disable the transmission of all the Multi-line 2 unit EIC control frames listed in the above table.
-  Commands marked X¹ do not apply to PPM-3.
-  Commands marked X² do not apply to AGC 100, CGC 400, GC-1F and GC-1F/2.
-  Commands marked X³ only apply to AGC-4, MDEC 303.
-  Commands marked X⁴ only apply to Cummins CM570 ECU.
-  Commands marked X⁵ are not possible with option H7.
-  Option H7 does not support ECU9.

4.11.2 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 1-4 or if the parameter of the nominal frequency is changed between 50 and 60 Hz.

4.11.3 EIC Droop

There are two ways of obtaining a speed droop:

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

For engines where the droop command or setpoint 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". EIC droop emulation is a generic function developed by DEIF which it is possible to use on every engine type.

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

In the table below, it is shown which engine types support EIC droop with a command or setpoint.

Engine type/protocols	Command	Setpoint
Scania	X	X
Cummins	X	X
Iveco	X	-
Perkins	X	-
Caterpillar	X	-
Volvo	X	-
MTU	-	-
DDEC (Detroit Diesel)	-	-
JDEC (John Deere)	-	-
EMR (Deutz)	-	-
Generic J1939	-	-

4.11.4 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 malfunction
- EIC protection

4.11.5 EIC Idle

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

4.11.6 EIC Derate request

It is possible to derate via the ECU.

The function is enabled via "EIC Derate" (channel 7551). Configuration of the input, start point and slope are configured via channels 624x, 625x and 626x, the power derate settings 1, 2 and 3. The power derate settings are described in the Designer's reference handbook.

4.11.7 TSC1 SA "Torque Speed Control"

TSC1, which is "Torque Speed Control 1", is the speed bias control signal that is transmitted from the DEIF controller towards the engine ECU. The DEIF controller will choose the expected source address for known protocols when parameter 7566 is set to -1 (default value). It is possible to change parameter 7566 to a specific source address. Consult your engine manufacturer for verification of TSC1 source address if in doubt. TSC1 is only relevant for J1939 protocols.

4.12 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 respective products listed below.

Product	DRH doc. no.
AGC 100	4189340766
AGC-4	4189340686
CGC 400	4189340786
GPC-3	4189340587
GPU-3	4189340584
PPU-3	4189340583



Differential measurements are available in GPC-3, GPU-3 and PPU-3 from version 3.08.0.

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 "LOG" button for 3 seconds.

5.2 Caterpillar/Perkins (J1939)

5.2.1 Object selection, J1939

The view lines can be configured with these available values.



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



EIC Exhaust Gas P1...P16 are fixed to the source address 241. The remaining entries in the below table are fixed to source address 0.

Object	PGN	P	S	L	SPN	Unit	J1939-71 scaling
EIC Exhaust Gas P1 Temp	65187	7	1	2	1137	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P2 Temp	65187	7	3	2	1138	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P3 Temp	65187	7	5	2	1139	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P4 Temp	65187	7	7	2	1140	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P5 Temp	65186	7	1	2	1141	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P6 Temp	65186	7	3	2	1142	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P7 Temp	65186	7	5	2	1143	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P8 Temp	65186	7	7	2	1144	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P9 Temp	65185	7	1	2	1145	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P10 Temp	65185	7	3	2	1146	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P11 Temp	65185	7	5	2	1147	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P12 Temp	65185	7	7	2	1148	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P13 Temp	65184	7	1	2	1149	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P14 Temp	65184	7	3	2	1150	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P15 Temp	65184	7	5	2	1151	°C	0.03125 °C/bit, -273°C offset
EIC Exhaust Gas P16 Temp	65184	7	7	2	1152	°C	0.03125 °C/bit, -273°C offset
EIC Coolant Temp 2	64870	6	1	1	4076	°C	1 °C/bit, -40 °C offset
EIC Coolant Temp 3	64870	6	8	1	6209	°C	1 °C/bit, -40 °C offset
EIC Coolant Pump Outlet Temp	64870	6	2	1	4193	°C	1 °C/bit, -40 °C offset
EIC Filtered Fuel Delivery Pressure	64735	6	2	1	5579	kPa	4 kPa/bit, 0 offset
EIC Auxiliary Coolant Temp	65172	6	2	1	1212	kPa	4 kPa/bit, 0 offset
EIC Turbo 1 Intake Temp	65176	6	1	2	1180	°C	0.03125 °C/bit, -273°C offset
EIC Turbo 2 Intake Temp	65176	6	3	2	1181	°C	0.03125 °C/bit, -273°C offset

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)



The table above only applies for AGC-4.

5.2.2 Readings from the display

SAE name	Displayed text
Engine Exhaust Gas Port 1 Temperature	Exh.P T01
Engine Exhaust Gas Port 2 Temperature	Exh.P T02
Engine Exhaust Gas Port 3 Temperature	Exh.P T03
Engine Exhaust Gas Port 4 Temperature	Exh.P T04
Engine Exhaust Gas Port 5 Temperature	Exh.P T05
Engine Exhaust Gas Port 6 Temperature	Exh.P T06
Engine Exhaust Gas Port 7 Temperature	Exh.P T07
Engine Exhaust Gas Port 8 Temperature	Exh.P T08
Engine Exhaust Gas Port 9 Temperature	Exh.P T09
Engine Exhaust Gas Port 10 Temperature	Exh.P T10
Engine Exhaust Gas Port 11 Temperature	Exh.P T11
Engine Exhaust Gas Port 12 Temperature	Exh.P T12
Engine Exhaust Gas Port 13 Temperature	Exh.P T13
Engine Exhaust Gas Port 14 Temperature	Exh.P T14
Engine Exhaust Gas Port 15 Temperature	Exh.P T15
Engine Exhaust Gas Port 16 Temperature	Exh.P T16
Engine Coolant Temperature 2	T. Coolant2
Engine Coolant Temperature 3	T. Coolant3
Engine Coolant Pump Outlet Temperature	T. Cool PO
Engine Filtered Fuel Delivery Pressure	P. FilFuel
Engine Auxiliary Coolant Temperature	T. Cool Aux
Engine Turbocharger 1 Turbine Intake Temperature	Turb.int1
Engine Turbocharger 2 Turbine Intake Temperature	Turb.int2

5.2.3 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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

5.2.4 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).
- 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 enable¹
 - EIC speed control inhibit¹



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Commands marked ¹ do not apply to PPM-3.

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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

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 inhibit¹.
- 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.).
- Engine speed (engine with PCC controller)^{1, 2}
 CAN bus ID for speed control: 0x00FF5FDC. For Cummins proprietary "Engine governing" EG telegram the source address of the ML-2 controller is 0xDC/220 (dec.). This speed telegram is used by enabling the M-logic function "EIC select Cummins PCC1301".




The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).

- 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. The function follows the standard AGC function "shutdown override" (digital input on the AGC)

 **Commands marked ¹ do not apply to PPM-3.**

 **Commands marked ² do not apply to AGC 100, CGC 400, GC-1F and GC-1F/2.**

5.3.3 Cummins after treatment

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

The table shows lamps and status indicators from the after treatment. The states can be reached through M-logic and can be shown on a DEIF AOP-1 or AOP-2 display unit.

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

 Cummins after treatment does not apply to PPM-3.

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 ¹	-	X	-
EIC protection ¹	-	X	-

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

 Warnings and shutdowns marked ¹ do not apply to PPM-3.

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: 0x0c000003. J1939 TSC1.
M-Logic commands are available to enable/disable start/stop and speed controls
 - EIC speed control inhibit¹

 The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).

 Commands marked ¹ do not apply to PPM-3.

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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

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.

 M-Logic commands are available to enable/disable speed controls:
 - EIC speed control inhibit¹



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Commands marked ¹ do not apply to PPM-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 ¹	-	X	-
EIC Protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

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: 0x0c000003. J1939 TSC1.
M-Logic commands are available to enable/disable start/stop and speed controls
 - EIC speed control inhibit¹



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Commands marked ¹ do not apply to PPM-3.

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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

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 inhibit¹



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Commands marked ¹ do not apply to PPM-3.

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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

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: 0x0c000003. J1939 TSC1.
 M-Logic commands are available to enable/disable start/stop and speed controls
 - EIC speed control inhibit¹



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Commands marked ¹ do not apply to PPM-3.

5.9 Moteurs Baudouin

5.9.1 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



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

5.9.2 Write commands to engine controller

- Engine controls
 All the write commands to the engine controller (speed only) are enabled via "EIC Controls" (Channel 7563).
- Engine speed
 CANbus ID for speed control: 0x0c00000B. J1939 TSC1.



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).

5.10 MTU J1939 Smart Connect

5.10.1 Smart Connect

This protocol is available with MTU series 1600 with ECU8/ECU9/Smart Connect.




This protocol does not apply to PPM-3.



Alarm texts for ECU9 can be found in the Appendix under "MTU Smart Connect ECU9".

5.10.2 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.

5.10.3 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: 0x0c0000ea.J1939TSC1.
M-Logic commands are available to enable/disable start/stop and speed controls:
 - EIC start/stop enable
 - EIC speed control inhibit

 The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC controls).

- Frequency selection
Normal frequency is written automatically based on the frequency nominal setting. 50 Hz is written if $f_{nominal} < 55\text{Hz}$, 60 Hz is written if $f_{nominal}$ is $> 55\text{ Hz}$
- Shut down override
This command can be used with a digital input in order to override shut down actions from the ECU.
- 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 relay 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.
If the MTU ECU is unable to detect a valid speed demand signal, it will issue the "AI Speed deman def.". This alarm indicates that the MTU ECU may see a CAN speed bias signal, and is setup to 3 - ADEC Analog Relative or that 4 - ADEC Analog relative is used and the signal is out of range (not connected, etc.). When this happens, check the settings on the MTU ECU,

PR500 (MTU SAM/Diasys reference)

0 - Default dataset ADEC

1 - ADEC Increase/Decrease Input

2 - CAN Increase/Decrease Input

3 - ADEC Analog Absolute

4 - ADEC Analog Relative

5 - ADEC Frequency Input

6 - CAN Analog

7 - CAN Speed Demand Switch

- 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.
- Idle Run
This command activates Idle speed.
- Speed Increase
This command increases the speed of the engine by a small amount. The command is activated through M-Logic.
- Speed Decrease
This command decreases the speed of the engine by a small amount. The command is activated through M-Logic.
- Alternate Droop Setting
This command activates alternate droop setting. The command is activated through M-Logic.
- Start
This command starts the genset.
- Stop
This command stops the genset.

5.10.4 Tier 4 aftertreatment support

In specific countries, it is required that Tier 4 aftertreatment support is active during power production.

Tier 4 is supported in the AGC-4 if the requirements listed below are met:

- Application software 4.60.0 or newer is present in the controller
- "MTU J1939 SmartConnect" is selected in "Engine I/F" (channel 7561)
- MTU ECU version 9 or later is required

5.11 MTU ADEC (CANopen)

5.11.1 MTU ADEC (CANopen)



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

5.11.2 Readings from the display

Display readings
Ambient temperature
Battery
EIC faults
Engine power ¹
Fuel rate
Mean T. fuel
Nom. power ¹
Operation
P. Aux 1
P. Aux 2
P. Boost
P. Fuel
P. Oil
Speed
T. Charg A
T. Coolant
T. Exh. L
T. Exh. R
T. Fuel
T. Int. Co.
T. Oil
T. Winding 1
T. Winding 2
T. Winding 3
Trip fuel



The Modbus addresses are read-only (function code 04h), and are only available if option H2/N Modbus RTU is implemented.



Objects marked ¹ only apply to AGC 100, AGC-4 and CGC 400.

5.11.3 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	Display list
Coolant temp. high	HI T-Coolant
Charge air temp. high	HI T-Charge Air
Intercooler coolant temp. high	HI T-Coolant Interc
Lube oil temp. high	HI T-Lube Oil
ECU temp. high	HI T-ECU
Engine speed too low	SS Engine Speed Low
Prelube fail.	AL Prelub. Fail
Start speed not reached	AL Start Spe. N. Re.
Common alarm (yellow)	AL Com. Alarm Yellow
Lube oil pressure low	LO P-Lube Oil
Coolant level low	LO Coolant Level
Intercooler coolant level low	LO Interc. Cool. L.
ECU defect	AL ECU Defect
Speed demand failure	AL Speed Demand Def.
Power supply low voltage	LO Power Supply
Power supply high voltage	HI Power supply
Overspeed	SS Overspeed
Lube oil pressure low low	LOLO P-Lube Oil
Coolant temp. high high	HIHI T-Coolant
Lube oil temp. high high	HIHI T-Lube Oil
Charge air temp. high high	HIHI T-Charge Air
ECU power supply high high	HIHI ECU PS Voltage
ECU power supply low low	LOLO ECU PS Voltage
Generator temp. high	T-Generator Warning
Holding tank high level	HI Level Day-Tank
Holding tank low level	LO Level Day-Tank
Generator winding 1 high temp.	HI T-Winding 1
Generator winding 2 high temp.	HI T-Winding 2
Generator winding 3 high temp.	HI T-Winding 3
Ambient temp. high	HI T-Ambient
Water in fuel 1	AL Water I F. Pref. 1
Water in fuel 2	AL Water I F. Pref. 2
Fuel temp. high	HI T-Fuel
Exhaust bank A high temp.	HI T-Exhaust A
Exhaust bank B high temp.	HI T-Exhaust B
Fuel high pressure 1	HI Pressure 1
Fuel high pressure 2	HI Pressure 2

Warning list	Display list
Day tank high level	HI L. Holding-Tank
Day tank low level	LO L. Holding-Tank
Run-up speed not reached	AL Runup. Speed N. Re
Idle speed not reached	AL Idle Speed N. Re

5.11.4 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

5.11.5 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 enable¹

 **The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls). Commands marked ¹ do not apply to PPM-3.**

- 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 relay 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.

- **Shutdown override**
This command can be used in order to prevent shutdown actions from the ECU. The function follows the standard AGC function "shutdown override" (digital input on the AGC)

5.12 MTU ADEC module 501, without SAM module

5.12.1 MTU ADEC module 501, without SAM module



The MTU ADEC module 501 is not a part of the J1939, therefore the reading of values, alarms and shutdowns are different.

5.12.2 Displayed values

Display readings
Act-Droop
Battery
Camshaft
ECU Stop activated 1
F speed an
INJECT-QUAN
MDEC Faults
Mean T. fuel
Nom power ¹
Operation ¹
P L Oil Lo
P L Oil Lolo
P. Ch. Air
P. Fuel
P. Oil
Speed
Speed D SW ¹
T. Ch. Air ¹
T. Coolant ¹
T. Fuel ¹
T. Oil ¹
TCOOL-HIHI ¹
T-ECU ¹
T-INTERC ¹
T-LUBE-HI ¹
T-LUBE-HIHI ¹
Total fuel ¹
Trip fuel ¹



The Modbus addresses are read-only (function code 04h), and are only available if the option H2/N Modbus RTU is implemented.



Objects marked ¹ only apply to AGC-4.

5.12.3 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	Display text	Warning	Shutdown
ADEC yellow alarm	EIC yellow lamp WA	X	-
ADEC red alarm	EIC red lamp SD.	-	X
High high engine speed	Overspeed shutdown	X	-
Low low lube oil pressure	L Oil Pres. Shutdown	X	-
High high coolant temperature	H Coolant T Shutdown	X	-
High intercooler temperature	H Interc. T Warning	X	-
Sensor Defect Coolant Level	SD Coolant Level	X	-
Low low coolant level	L Cool. Lev. Shutdown	X	-
ADEC ECU failure	MDEC ECU Failure	X	-
Low Lube oil pressure ¹	L Oil Pres. Warning	X	-
Low Common rail fuel pressure ¹	LO P-Fuel Com-Rail	X	-
High Common rail fuel pressure ¹	HI P-Fuel Com-Rail	X	-
Low preheat temperature ¹	AL Preheat Temp. Low	X	-
Low low Charge air coolant level ¹	SS Cool Level Ch-Air	X	-
Power amplifier 1 failure ¹	AL Power Amplifier 1	X	-
Power amplifier 2 failure ¹	AL Power Amplifier 2	X	-
Transistor output status ¹	AL Status Trans-Outp	X	-
Low ECU power supply voltage ¹	LO ECU Power Supply	X	-
High ECU power supply voltage ¹	HI ECU Power	X	-
High charge air temperature ¹	HI T-Charge Air	X	-
High Lube oil temperature ¹	HI T-Lube Oil	X	-
High ECU temperature ¹	HI T-ECU	X	-
Low engine speed ¹	SS Eng. Speed Low	X	-
Check error code ¹	AL Check Error Code	X	-
Common rail leakage ¹	AL Com. Rail Leakage	X	-
Automatic engine stop ¹	AL Aut. Engine Stop	X	-
MG Start speed not reached ¹	MG Start Speed Fail	X	-
MG runup speed not reached ¹	MG Runup Speed Fail	X	-
MG idle speed reached ¹	MG Idle Speed Fail	X	-
Low low ECU power supply voltage ¹	LOLO ECU Pow. Supply	X	-
High high ECU power supply voltage ¹	HIHI ECU Pow. Supply	X	-
Sensor Defect coolant level charge air ¹	SD Cool Level Ch-Air	X	-
High fuel temperature ¹	HI T-Fuel	X	-
Override feedback from ECU ¹	SS Override	X	-

Alarm list	Display text	Warning	Shutdown
High high lube oil temperature ¹	H Oil Temp. Shutdown	X	-
Speed demand defected ¹	AL Speed demand Def.	X	-
High coolant temperature ¹	H Coolant T Warning	X	-
High high temperature charge air ¹	H Ch. Air T Shutdown	X	-
Low fuel oil pressure ¹	LO P-Fuel Oil	X	-
Low low fuel oil pressure ¹	SS P-Fuel Oil	X	-

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

 **Alarms marked ¹ only apply to AGC-4.**

5.12.4 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).
- Engine speed
 M-Logic commands are available to enable/disable start/stop and speed controls:
 - EIC start/stop enable¹
 - EIC speed control inhibit¹
- Manual speed control (up/down)

 **The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).**

- 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.
- Shut down override
 This command can be used with a digital input in order to override shut down actions from the ECU.
- Trip counter reset*
 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.
- Engine overspeed test
 The command is activated through M-Logic. Testing of the overspeed function at any given rpm.
- EIC alarms acknowledgement
- Intermittent oil priming
 Engage the pre-lubrication oil pump if installed. The command is activated through M-Logic.
- Priming on engine start

 **Commands marked ¹ do not apply to PPM-3.**

5.13 MTU MDEC module 302/303 (MTU)

5.13.1 MTU MDEC module 302/303 (MTU)



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

5.13.2 Readings from the display

Display readings
Act-Droop
Battery
Camshaft
ECU Stop activated 1
F speed an
Fuel Rate
INJECT-QUAN
MDEC Faults
Mean T. fuel
Nom power
Operation
P L Oil Lo
P LOil Lolo
P. Ch. Air
P. Fuel
P. Oil
Speed
Speed D SW ¹
T. Ch. Air ¹
T. Coolant ¹
T. Fuel ¹
T. Oil ¹
T-COOL-HI ¹
TCOOL-HIHI ¹
T-ECU ¹
T-INTERC ¹
T-LUBE-HI ¹
T-LUBE-HIHI ¹
Total fuel ¹
Trip fuel ¹



The Modbus addresses are read-only (function code 04h), and are only available if the option H2/N Modbus RTU is implemented.



Objects marked ¹ only apply to AGC-4 and CGC 400.

5.13.3 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	Display text	Warning	Shutdown
MDEC yellow alarm	EIC yellow lamp	X	-
MDEC red alarm	EIC red lamp SD.	-	X
High high engine speed	Overspeed shutdown	-	X
Low low lube oil pressure	L Oil Pres. Shutdown	X	X
High high coolant temperature	H Coolant T Shutdown	X	X
High high lube oil temperature	H Oil Temp. Shutdown	-	X
High intercooler temperature	H Interc. T Warning	X	-
Sensor Defect Coolant Level	SD Coolant Level	X	-
Low low coolant level	L Cool. Lev. Shutdown	-	X
MDEC ECU failure	MDEC ECU Failure	-	X
Low fuel oil pressure ¹	LO P-Fuel Oil	X	-
Low Lube oil pressure ¹	L Oil Pres. Warning	X	-
Low Common rail fuel pressure ¹	LO P-Fuel Com-Rail	X	-
High Common rail fuel pressure ¹	HI P-Fuel Com-Rail	X	-
Override feedback from ECU ¹	SS Override	X	-
Low preheat temperature ¹	AL Preheat Temp. Low	X	-
Low low Charge air coolant level ¹	SS Cool Level Ch-Air	X	-
Power amplifier 1 failure ¹	AL Power Amplifier 1	X	-
Power amplifier 2 failure ¹	AL Power Amplifier 2	X	-
Transistor output status ¹	AL Status Trans-Outp	X	-
Low ECU power supply voltage ¹	LO ECU Power Supply	X	-
High ECU power supply voltage ¹	HI ECU Power	X	-
High charge air temperature ¹	HI T-Charge Air	X	-
High Lube oil temperature ¹	HI T-Lube Oil	X	-
High ECU temperature ¹	HI T-ECU	X	-
Low engine speed ¹	SS Eng. Speed Low	X	-
Check error code ¹	AL Check Error Code	X	-
Common rail leakage ¹	AL Com. Rail Leakage	X	-
Automatic engine stop ¹	AL Aut. Engine Stop	X	-
MG Start speed not reached ¹	MG Start Speed Fail	X	-
MG runup speed not reached ¹	MG Runup Speed Fail	X	-
MG idle speed reached ¹	MG Idle Speed Fail	X	-
Low low ECU power supply voltage ¹	LOLO ECU Pow. Supply	X	-
High high ECU power supply voltage ¹	HIHI ECU Pow. Supply	X	-

Alarm list	Display text	Warning	Shutdown
Sensor Defect coolant level charge air ¹	SD Cool Level Ch-Air	X	-
High fuel temperature ¹	Hi T-Fuel	X	-



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



Alarms marked ¹ only apply to AGC-4.

5.13.4 Write commands to engine controller

None.

5.14 PSI/Power Solutions

5.14.1 Write commands to engine controller

- Engine controls
All the write commands to the engine controller (for example, speed, start/stop, and so on) are enabled in setting 7563 (EIC Controls)
- Engine speed
CAN bus ID for speed control 0x0c0000ea. J1939 TSC1
M-Logic commands are available to enable/disable start/stop and speed controls
 - EIC speed control inhibit
- Breaker status
These SPNs indicate the measured state of the generator circuit breakers
SPN 3645: Generator circuit breaker status
SPN 3546: Utility circuit breaker status

Bit state 000 = Open
Bit state 001 = Closed
Bit state 010 = Locked out
Bit state 011-101 = Available for SAE assignment
Bit state 110 = Error
Bit state 111 = Not available



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).

5.14.2 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.

5.15 Scania EMS (J1939)

5.15.1 Warning/shutdown

None.

5.15.2 Write commands to engine controller

None.

5.16 Scania EMS 2 S6 (J1939)

5.16.1 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.

5.16.2 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 ¹	X	-
EIC protection ¹	X	-



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



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

5.16.3 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).



For option H5 or H13, the EMS S6 software version and engine number is automatically retrieved when CANbus communication is established.

Flash code	ML-2 displayed text	Description
11	Overrevving	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

5.16.4 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 enable¹
- EIC speed control inhibit¹
- 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



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



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



Commands marked ¹ do not apply to PPM-3.

5.16.5 Control

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

5.17 Volvo Penta EMS (J1939)

5.17.1 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 ¹	-	X	-
EIC protection ¹	-	X	-



Warnings and shutdowns marked ¹ do not apply to PPM-3.

5.17.2 Write commands to engine controller

None.

5.18 Volvo Penta EMS 2 (J1939)

5.18.1 Volvo Penta EMS 2 (J1939)

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

5.18.2 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 ¹	-	X	-
EIC protection ¹	-	X	-



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



Warnings and shutdowns marked ¹ do not apply to PPM-3.

5.18.3 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 enable¹
 - EIC speed control inhibit¹
- Preheat
- Start/stop



Commands marked ¹ do not apply to PPM-3.

5.18.4 Readable states

- Preheat and running



The speed regulation is enabled in setting 2781 (Reg. output) and 7563 (EIC Controls).



Selection of primary or secondary speed is selected in setting 2774.

5.18.5 Tier 4 aftertreatment support

In specific countries, it is required that Tier 4 aftertreatment support is active during power production.

Tier 4 is supported in the AGC-4 if the requirements listed below are met:

- Application software 4.60.0 or newer is present in the controller
- "Volvo Penta EMS 2" is selected in "Engine I/F" (channel 7561)
- ECM is at least version 2.3

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:

AGC-3	Document no. 4189340705
AGC-4	Document no. 4189340688
AGC 100	Document no. 4189340764
CGC 400	Document no. 4189340789
GPC-3	Document no. 4189340580
GPU-3/PPU-3	Document no. 4189340581
PPM-3	Document no. 4189340672

For GC-1F, please see the "Installation Instructions and Reference Handbook".

7. Modbus communication

7.1 Additional information for H2/N

This chapter is to be considered as additional information for option H2/N (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 option H2/N is installed, the data can be transmitted to a PLC, a computer, the alarm-and-monitoring system or a Scada system.



Please refer to the option H2/N 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 option H2/N.

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 (SPN 190)
594	EIC coolant temp.	[deg] [F]	1/10	1/10	1/10	Coolant temperature (SPN 110)
595	EIC oil pressure	[bar] [psi]	1/100	1/100	1/100	Engine oil pressure (SPN 100)
596	EIC no of faults	[Faults]	1/1	1/1	1/1	Number of faults (SPN 1218)
597	EIC oil temp.	[deg] [F]	1/10	1/10	1/10	Engine oil temperature (SPN 175)
598	EIC fuel temp.	[deg] [F]	1/1	1/10	1/10	Fuel temperature (SPN 174)
599	EIC intake manifold #1 P	[bar] [psi]	1/100	1/100	-	Intake manifold #1 P (SPN 102)
600	EIC air inlet temp.	[deg] [F]	1/1	-	-	Air inlet temperature (SPN 172)
601	EIC coolant level	[%]	1/10	-	-	Coolant level (SPN 111)
602	EIC fuel rate	[L/h]	1/10	1/1	-	Fuel rate (SPN 183)
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 (SPN 105)
605	EIC d.d. % torque	[%]	1/1	-	-	Driver's demand engine - percent torque (SPN 512)
606	EIC actual % torque	[%]	1/1	-	-	Actual engine - percent torque (SPN 513)
607	EIC acc. pedal pos.	[%]	1/1	-	-	Accelerator pedal position (SPN 91)
608	EIC % load, c. speed	[%]	1/1	-	-	Percent load at current speed (SPN 92)
609	EIC air inlet pressure	[bar] [psi]	1/100	-	-	Air inlet pressure (SPN 106)
610	EIC exhaust gas temp.	[deg] [F]	1/10	-	-	Exhaust gas temperature (SPN 173)
611	EIC engine hours	[H]	1/1	1/1	1/1	ENGINE HOURS (SPN 247)
612	EIC oil filter diff. press.	[bar] [psi]	1/100	-	-	Oil filter diff press (SPN 99)
613	EIC battery voltage	[V]	1/10	1/10	-	Keyswitch battery potential (SPN 158)
614	EIC fuel del. press.	[bar] [psi]	1/100	1/100	-	Fuel delivery pressure (SPN 94)
615	EIC oil level	[%]	1/10	-	-	Engine oil level (SPN 98)
616	EIC crankcase press.	[bar] [psi]	1/100	-	-	Crankcase pressure (SPN 101)

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
617	EIC coolant pressure	[bar] [psi]	1/100	-	-	Coolant pressure (SPN 109)
618	EIC water in fuel	[2 bits]	1/1	-	-	Water in fuel (1 = Yes, 0 =NO, SPN 97)
619	Reserved	-	-	-	-	-
620	Reserved	-	-	-	-	-
621	Reserved	-	-	-	-	-
622	Reserved	-	-	-	-	-
623	EIC turbo oil temp.	[deg] [F]	1/10	-	-	Turbo oil temp. (SPN 176)
624	EIC trap inlet	[bar] [psi]	1/100	-	-	Trap inlet (SPN 81)
625	EIC Air filter diff press	[bar] [psi]	1/1000	-	-	Air filter diff press (SPN 107)
626	EIC Cool filter diff press	[bar] [psi]	1/100	-	-	Cool filter diff press (SPN 112)
627	EIC Atm press	[bar] [psi]	1/100	-	-	Atmospheric pressure (SPN 108)
628	EIC Ambient air temp	[deg] [F]	1/10	-	-	Ambient air temp [F/10] (SPN 171)
629	EIC exch. temp A	[deg] [F]	1/10	1/10	-	Exch. temp bank A (SPN 2433)
630	EIC exch. temp B	[deg] [F]	1/10	1/10	-	Exch. temp bank B (SPN 2434)
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 T. Charge A	[deg] [F]	-	1/10	-	Turbo Charger Air temp
637	EIC Intercooler temp	[deg][F]	-	1/10	-	Intercooler temp (SPN 52)
638	EIC engine trip fuel	[L]	1/1	1/1	-	Engine trip fuel (SPN 182)
639	EIC engine total fuel used	[kL]	1/10	-	-	Engine total fuel used (SPN 250)
640	EIC trip fuel_gaseous	[kg]	1/1	-	-	Trip fuel, gaseous (SPN 1039)
641	EIC total fuel used_gas-eous	[ton]	1/10	-	-	Total fuel used, gaseous (SPN 1040)
850 ³	AT2ExhFluDRQ	[g/h]	1/10	-	-	Aftertreatment 2 Diesel Exhaust Fluid Dosing Requested Quantity (SPN 4401)

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
851 ³	AT2SCRCInG	[deg] [F]	1/10	-	-	Aftertreatment 2 SCR Catalyst Intake Gas Temperature (SPN 4413)
852 ³	AT2SCRCOuG	[deg] [F]	1/10	-	-	Aftertreatment 2 SCR Catalyst Outlet Gas Temperature (SPN 4415)
853	EIC Engine Oil-Filter Outlet Pressure	[bar] [psi]	1/100	-	-	Engine Oil-Filter Outlet Pressure (SPN 3549)
854 ³	EngOperatingState	-	1/1	-	-	Engine Operating State (SPN 3543)
855	EIC SA of Controlling Device	-	1/1	-	-	Source Address of Controlling Device (SPN 1483)
856	EIC Engine Rated Speed	[RPM]	1/1	-	-	Engine Rated Speed (SPN 199)
857	EIC Engine Speed At Idle, Point 1	[RPM]	1/1	-	-	BAM message: Engine Speed At Idle, Point 1 (Engine Configuration, SPN188)
858	EIC Engine Controller 5	-	1/1	-	-	MTU only: Engine Controller 5
859	EIC Fuel Consumption	[g/kWh]	1/1	-	-	MTU only: Fuel Consumption
860	EIC UREA Level	[%]	1/10	-	-	Scania only: UREA Level
861 ³	SCR IND. SEV	-	1/1	-	-	Severity status of the operator inducement system (SPN 5246)
862 ³	DPF OUTL T	[deg] [F]	1/10	-	-	Temperature of engine combustion byproducts leaving the diesel particulate filter exhaust in exhaust bank 1. (SPN 3246)
863	Next Regen	[h]	1/10	-	-	Time to activate next regeneration for diesel particulate filter (SPN 5978)
864	ENG CAC T	[deg] [F]	1/10	-	-	Temperature of combustion air after it exits from the Charge Air Cooler 1 but before any mixing of recirculated exhaust gas. (SPN 2630)

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
865	DPF Soot Load	[%]	1/1	-	-	Aftertreatment 1 Diesel Particulate Filter Soot Load Percent (SPN 3719)
900	EIC trip average fuel rate	[L/h]	-	1/10	-	Average fuel rate (trip, SPN 1029)
901 ¹	EIC nominal power	[Kwm]	1/1	1/1	-	Nominal power of the engine (SPN 166)
902	EIC trip fuel liquid	[L]	1/2	1/10	-	High word (SPN 182)
903	EIC trip fuel liquid	[L]	1/2	1/10	-	Low word (SPN 182)
904	EIC total fuel liquid	[L]	1/2	1/10	-	High word (SPN 250)
905	EIC total fuel liquid	[L]	1/2	1/10	-	Low word (SPN 250)
906	EIC mean trip fuel consumption	[L/h]	-	1/1000	-	High word (SPN 1029)
907	EIC mean trip fuel consumption	[L/h]	-	1/1000	-	Low word (SPN 1029)
908 ¹	EIC engine power	[Kwm]	-	1/1	-	Nominal power of the engine (ADEC)
911 ¹	Int Man abs	Bar or psi	1/100	-	-	Engine intake manifold #1 Absolute pressure (SPN 3563)
912	EIC Air filter diff. pressure	Bar or psi	1/100	-	-	Change in engine air system pressure (SPN 2809)
913	EIC Fuel supply pump inlet pressure	Bar or psi	1/100	-	-	Absolute pressure of fuel at the fuel supply pump intake (SPN 1381)
914	EIC Fuel filter (suction side) diff. pressure	Bar or psi	1/100	-	-	Differential pressure measured across the fuel filter between the fuel tank and the supply pump (SPN 95)
915 ²	EIC Fuel filter diff. pressure	Bar or psi	1/100	-	-	Diff pressure (SPN 1382)
932 ²	EIC Speed Demand source	Digit	-	-	1/1	Identifies speed dem. source 0, Default Dataset ADEC 1, ADEC Incr./Decr. Input 2, CAN Incr./Decr. Input 3, ADEC Analog Absolute 4, ADEC Analog Relative 5, ADEC Frequency Input 6, CAN analog
933 ²	EIC lube oil pressure LO limit	mbar	-	-	1/100	Lubrication oil pressure limit 1

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
934 ²	EIC lube oil pressure LO-LO limit	mbar	-	-	1/100	Lubrication oil pressure limit 2
935 ²	EIC fuel pressure	bar	-	-	1/100	Fuel pressure
936 ²	EIC coolant limit HI	[deg] [F]	-	-	1/10	Coolant high limit temp. 1
937 ²	EIC coolant limit HIHI	[deg] [F]	-	-	1/10	Coolant high limit temp. 2
938 ²	EIC intercooler coolant	[deg] [F]	-	-	1/10	Intercooler coolant temperature
939 ^{2,3}	T-ECU	[deg] [F]	1/10	-	1/10	ECU temperature (SPN 1136)
940 ²	EIC actual droop	%	-	-	1/10	Actual droop percentage
941 ²	EIC act. inject. Quantity	%	-	-	1/10	Injection quantity Act. DBR %
942 ²	EIC camshaft	[RPM]	-	1/1	-	Camshaft speed
943 ²	EIC Temp lube HI	[deg] [F]	-	1/10	-	Lube oil temperature HI
944 ²	EIC Temp lube HIHI	[deg] [F]	-	1/10	-	Lube oil temperature HIHI
945 ²	EIC speed demand analog	Digit	-	1/1	-	Speed demand analog
946 ²	ECU Stop activated #	[bit]	-	-	Boolean	1: Stop activated, 0: Stop not activated
971 ³	T. Cool Aux	[deg] [F]	1/1	-	-	Coolant temperature of intercooler which is located after the turbocharger (SPN 1212)
974	EIC Engine Auxiliary Coolant Pressure	[bar] [psi]	1/100	-	-	Engine Auxiliary Coolant Pressure (SPN 1203)
975 ³	Sp.Humidity	[g/kg]	1/10	-	-	Ambient Conditions 2 Specific Humidity (SPN 4490)
976 ³	Tcharger 2	[RPM]	1/1	-	-	Engine Turbocharger 2 Speed (SPN 1169)
977 ³	Tcharger 3	[RPM]	1/1	-	-	Engine Turbocharger 3 Speed (SPN 1170)
978	EIC Trip Engine Running Time	[h]	1/1	-	-	Trip Engine Running Time (SPN 1036)
979	EIC Trip Idle Time	[h]	1/1	-	-	Trip Idle Time (SPN 1037)
980	EIC Estimated Percent Fan Speed	[%]	1/10	-	-	Estimated Percent Fan Speed (SPN 975)
981 ³	Tcharger 1	[RPM]	1/1	-	-	Engine Turbocharger 1 Speed (SPN 103)

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
982	EIC Nominal Friction - Percent Torque	[%]	1/1	-	-	Nominal Friction - Percent Torque (SPN 514)
983	EIC Engine's Desired Operating Speed	[RPM]	1/1	-	-	Engine's Desired Operating Speed (SPN 515)
984	EIC Engine Intake Manifold 2 Temperature	[deg] [F]	1/1	-	-	Engine Intake Manifold 2 Temperature (SPN 1131)
985 ³	EIC DEF LEVEL	[%]	1/10	-	-	Aftertreatment 1 Diesel Exhaust Fluid Tank Level (SPN 1761)
986 ³	EIC DEF temperature	[deg] [F]	1/1	-	-	Aftertreatment 1 Diesel Exhaust Fluid Tank Temperature (SPN 3031)
987 ³	AT1IntTNOx	[ppm]	1/10	-	-	Aftertreatment 1 Intake NOx (SPN 3216)
988 ³	AT1OutLNOx	[ppm]	1/10	-	-	Aftertreatment 1 Outlet NOx (SPN 3226)
989 ³	AT1ExhFA.DQ	[g/h]	1/10	-	-	Aftertreatment 1 Diesel Exhaust Fluid Actual Dosing Quantity (SPN 4331)
990 ³	AT1ExhFluDAB	[bar] [psi]	1/100	-	-	Aftertreatment 1 Diesel Exhaust Fluid Dosing Absolute Pressure (SPN 4334)
991 ³	AT1ExhFlu DT	[deg] [F]	1/1	-	-	Aftertreatment 1 SCR Dosing Air Assist Valve (SPN 4337)
992 ³	AT1ExhFlu DT	[g/h]	1/1	-	-	Aftertreatment 1 Diesel Exhaust Fluid Dosing Requested Quantity (SPN 4348)
993 ³	AT1SCRInG	[deg] [F]	1/10	-	-	Aftertreatment 1 SCR Catalyst Intake Gas Temperature (SPN 4360)
994 ³	AT1SCR COuG	[deg] [F]	1/10	-	-	Aftertreatment 1 SCR Catalyst Outlet Gas Temperature (SPN 4363)
995 ³	AT2IntTNOx	[ppm]	1/10	-	-	Aftertreatment 2 Intake NOx (SPN 3255)
996 ³	AT2OutLNOx	[ppm]	1/10	-	-	Aftertreatment 2 Outlet NOx (SPN 3265)
997 ³	AT2ExhFA.DQ	[g/h]	1/10	-	-	Aftertreatment 2 Diesel Exhaust Fluid Actual Dosing Quantity (SPN 4384)

Measurement table (read only) function code 04h.						
Addr	Content	Unit	Scaling			Description
			J1939	ADEC	MDEC	
998 ³	AT2ExhFluDAB	[bar] [psi]	1/100	-	-	Aftertreatment 2 Diesel Exhaust Fluid Dosing Absolute Pressure (SPN 4387)
999 ³	AT2ExhFlu DT	[deg] [F]	1/1	-	-	Aftertreatment 2 SCR Dosing Air Assist Valve (SPN 4390)
1819 ³	Intake Man T2	[deg] [F]	1/1	-	-	Temperature of pre-combustion air found in intake manifold of engine air supply system (SPN 1131)



Addresses marked ¹ only apply to AGC 100, AGC-3, AGC-4 and CGC 400.



Addresses marked ² only apply to AGC-4 and CGC 400.



Addresses marked ³ are not supported for option H7.

7.2.2 Analogue values specific 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	-	-	
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 DeliveryPress	[bar] [psi]	1/100	-	-	
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 ¹
		Bit 11 7680 EIC coolant level2 ¹
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 ¹
		Bit 13 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

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 ¹
		Bit 11 7680 EIC coolant level 2 ¹
1023	EIC alarms, engine controller (DM1)	Bit 0 EIC yellow ¹
		Bit 1 Red*
		Bit 2 EIC protection ¹
		Bit 3 EIC malfunction ¹
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		



Bits marked ¹ do not apply to PPM-3.

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 ¹
Bit 11 7680 EIC coolant level 2 ¹		
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC communication error, warning
		Bit 1 EIC warning
		Bit 2 EIC shutdown
		Bit 3 EIC protection ¹
		Bit 4 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

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 ¹
		Bit 11 7680 EIC coolant level 2 ¹
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 ¹
		Bit 7 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

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 ¹
Bit 11 7680 EIC coolant level 2 ¹		
1024	EIC alarms, engine controller (DM1)	Bit 0 EIC communication error ¹
		Bit 1 EIC yellow ¹
		Bit 2 EIC red ¹
		Bit 3 EIC protection ¹
		Bit 4 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

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 ¹
		Bit 11 7680 EIC coolant level 2 ¹
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 ¹
		Bit 13 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

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 ¹
		Bit 11 7680 EIC coolant level 2 ¹
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 ¹
		Bit 12 EIC protection ¹
		Bit 13 EIC malfunction ¹



Bits marked ¹ do not apply to PPM-3.

7.3.8 MTU Smart Connect

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



This protocol does not apply to PPM-3.

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 temp. 1
		Bit 5 7620 EIC coolant water temp. 2
		Bit 6 7630 EIC oil pressure level 1
		Bit 7 7640 EIC oil pressure level 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

7.3.9 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 ¹
		Bit 11 EIC 7680 coolant level 2 ¹
		1022
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



Bits marked ¹ do not apply to PPM-3.

7.3.10 MTU ADEC module 501, without SAM module

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
1022	EIC alarms, engine controller	Bit 0 EIC Automatic engine stop ¹
		Bit 1 EIC MG start speedfail ¹
		Bit 2 EIC Runup speedfail ¹
		Bit 3 EIC Idle speedfail ¹
		Bit 4 EIC ECU power supply voltage low limit ² ¹
		Bit 5 EIC ECU power supply voltage high limit ² ¹
		Bit 6 EIC Aftercooler coolant level sensor defect ¹
		Bit 7 EIC Fuel temperature high limit ² ¹
1023	EIC alarms, engine controller	Bit 0 EIC Common rail fuel pressure limit 1 ¹
		Bit 1 EIC Common rail fuel pressure limit 2 ¹
		Bit 2 EIC Override ¹
		Bit 3 EIC Preheat temperature low ¹
		Bit 4 EIC Charge air coolant level 2 ¹
		Bit 5 EIC Power amplifier 1 ¹
		Bit 6 EIC Power amplifier 2 ¹
		Bit 7 EIC Transistor output status, TAA1 to TAA6 ¹
		Bit 8 EIC ECU Power supply voltage low limit ¹
		Bit 9 EIC ECU Power supply voltage high limit ¹
		Bit 10 EIC Charge air temperature limit ¹
		Bit 11 EIC Lube oil temperature limit ¹
		Bit 12 EIC ECU temperature limit ¹
		Bit 13 EIC Engine speed low limit ¹
		Bit 14 EIC Check error code ¹
		Bit 15 EIC Common rail leakage ¹
1024	EIC alarms, engine controller	Bit 0 EIC overspeed, shutdown
		Bit 1 EIC low oil pressure, warning

Addr.	Content	Type
		Bit 2 EIC low oil pressure, shutdown
		Bit 3 EIC low coolant level, shutdown
		Bit 4 EIC ADEC 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 ADEC yellow alarm, warning
		Bit 12 EIC ADEC red alarm, shutdown
		Bit 13 EIC communication error ¹
		Bit 14 EIC fuel delivery pressure limit ¹
		Bit 15 EIC fuel delivery pressure limit ²



Bits marked ¹ only apply to AGC-4.

7.3.11 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
1022	EIC alarms, engine controller	Bit 0 EIC Automatic engine stop ¹
		Bit 1 EIC MG start speed fail ¹
		Bit 2 EIC Runup speed fail ¹
		Bit 3 EIC Idle speed fail ¹
		Bit 4 EIC ECU power supply voltage low limit 2 ¹
		Bit 5 EIC ECU power supply voltage high limit 2 ¹
		Bit 6 EIC Aftercooler coolant level sensor defect ¹
		Bit 7 EIC Fuel temperature high limit 2 ¹
1023	EIC alarms, engine controller	Bit 0 EIC Common rail fuel pressure limit 1 ¹
		Bit 1 EIC Common rail fuel pressure limit 2 ¹
		Bit 2 EIC Override ¹
		Bit 3 EIC Preheat temperature low ¹
		Bit 4 EIC Charge air coolant level 2 ¹
		Bit 5 EIC Power amplifier 1 ¹
		Bit 6 EIC Power amplifier 2 ¹
		Bit 7 EIC Transistor output status, TAA1 to TAA6 ¹
		Bit 8 EIC ECU Power supply voltage low limit 1 ¹
		Bit 9 EIC ECU Power supply voltage high limit 1 ¹
		Bit 10 EIC Charge air temperature limit 1 ¹
		Bit 11 EIC Lube oil temperature limit 1 ¹
		Bit 12 EIC ECU temperature limit 1 ¹
		Bit 13 EIC Engine speed low limit 1 ¹
		Bit 14 EIC Check error code ¹
Bit 15 EIC Common rail leakage ¹		

Addr.	Content	Type
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
		Bit 13 EI communication error ¹
		Bit 14 EIC fuel delivery pressure limit 1 ¹
Bit 15 EIC fuel delivery pressure limit 2 ¹		



Bits marked ¹ only apply to AGC-4 and CGC 400.

7.3.12 Scania

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

Addr.	Content	Type
1026	EIC alarms (KWP 2000)	Bit 0 EIC overrevving
		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

7.3.13 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*



Bits marked * do not apply to PPM-3.

8. Appendix

8.1 MTU Smart connect ECU9

8.1.1 Alarm texts

DEIF Display	MTU	SPN	FMI
SD Feedback Thrott A	SD Feedback Throttle A	51	11
AI Req Angle Throt A	AI Req Angle Throttle A	51	15
AL mixture throt A f	AL mixture throttle A fault	51	31
SS T-Coolant Interco	SS T-Coolant Intercooler	52	0
SD T-Coolant InterC	SD T-Coolant Intercooler	52	11
HI T-Coolant Interco	HI T-Coolant Intercooler	52	15
SS P-Fuel	SS P-Fuel	94	1
SD P-Fuel before Fil	SD P-Fuel before Filter	94	11
LO P-Fuel	LO P-Fuel	94	17
SS P-Diff-Fuel	SS P-Diff-Fuel	95	0
SD P-Diff Fuel	SD P-Diff Fuel	95	11
HI P-Diff-Fuel	HI P-Diff-Fuel	95	15
SD Level W.Fuel PreF	SD Level Water Fuel Prefilter	97	11
HI Level W.Fuel PreF	HI Level Water Fuel Prefilter	97	15
AL L2 Level Lube oil	AL L2 Level Lube Oil J1939	98	1
SD Level Lube oil	SD Level Lube Oil J1939	98	11
SD Level Lube oil	SD Level Lube Oil	98	11
AL L1 Level Lube Oil	AL L1 Level Lube Oil J1939	98	17
SS P-Diff-Lube Oil	SS P-Diff-Lube Oil	99	0
SD P-Diff Lube Oil	SD P-Diff Lube Oil	99	11
HI P-Diff-Lube Oil	HI P-Diff-Lube Oil	99	15
SS P-Lube Oil	SS P-Lube Oil	100	1
SD P-Lube Oil	SD P-Lube Oil	100	11
LO P-Lube Oil	LO P-Lube oil	100	17
SS P-Crank Case	SS P-Crank Case	101	0
LOLO P-Crank Case	LOLO P-Crank Case	101	1
SD P-CrankCase	SD P-CrankCase	101	11
HI P-Crank Case	HI P-Crank Case	101	15
LO P-Crank Case	LO P-Crank Case	101	17
HIHI P-Charge Mix A	HIHI P-Charge Mix A	102	0
SD P-Charge Mix A	SD P-Charge Mix A	102	11
SS ETC1 Overspeed	SS ETC1 Overspeed	103	0
SD Charger 1 Speed	SD Charger 1 Speed	103	11

DEIF Display	MTU	SPN	FMI
HI ETC1 Overspeed	HI ETC1 Overspeed	103	15
AL L2 P-Lubeoil ETCA	AL L2 P-Lubeoil ETC A	104	1
SD-P-Lubeoil ETC A	SD-P-Lubeoil ETC A	104	11
AL L1 P-Lubeoil ETCA	AL L1 P-Lubeoil ETC A	104	17
HIHI T-Charge Mix	HIHI T-Charge Mix	105	0
HIHI T-Intake Air	HIHI T-Intake Air	105	0
SS T-Charge Air	SS T-Charge Air	105	0
SD T-Charge Air	SD T-Charge Air	105	11
SD T-Charge Mix	SD T-Charge Mix	105	11
HI T-Charge Mix	HI T-Charge Mix	105	15
HI T-Charge Air	HI T-Charge-air	105	15
HI T-Intake Air	HI T-Intake Air	105	15
LO T-Charge Mix	LO T-Charge Mix	105	17
SD P-Intake Air Filt	SD P-Intake Air Filter Diff.	107	11
SD P-AmbientAirT2800	SD P-Ambient Air (HDT2800)	108	11
SS P-Coolant	SS P-Coolant	109	1
SD P-Coolant	SD P-Coolant	109	11
HI P-Coolant	HI P-Coolant	109	15
LO P-Coolant	LO P-Coolant	109	17
SS T-Coolant L4	SS T-Coolant L4	110	0
SD T-Coolant	SD T-Coolant	110	11
HI T-Coolant	HI T-Coolant	110	15
SS T-Coolant	SS T-Coolant	110	16
ALL2 Lev Cool. Water	AL L2 Level Coolant Water	111	1
SD Level Coolant W.	SD Level Coolant Water	111	11
ALL1 Lev Coola Water	AL L1 Level Coolant Water	111	17
LO Coolant Level	LO Coolant Level	111	17
SD P-Coolant Diff	SD P-Coolant Diff	112	11
LO P-Coolant Diff	LO P-Coolant Diff	112	17
SD P-HD	SD P-HD	157	11
HI P-Fuel (ComRail)	HI P-Fuel (Common Rail)	157	15
LO P-Fuel (ComRail)	LO P-Fuel (Common Rail)	157	17
HIHI ECU PS Voltage	HIHI ECU Power Supply Voltage	158	0
LOLO ECU PS Voltage	LOLO ECU Power Supply Voltage	158	1
SD ECU PS Voltage	SD ECU Power Supply Voltage	158	11
HI ECU PS Voltage	HI ECU Power Supply Voltage	158	15
LO ECU PS Voltage	LO ECU Power Supply Voltage	158	17

DEIF Display	MTU	SPN	FMI
SD T0-AmbientAir	SD T0-Ambient Air (HDT2800)	171	11
LOLO T-Intake Air	LOLO T-Intake Air	172	1
SD T-Intake Air	SD T-Intake Air	172	11
LO T-Intake Air	LO T-Intake Air	172	17
SD-T-Exh. after Eng.	SD-T-Exh. after Engine	173	11
AL L1 T-Exh. aft.Eng	AL L1 T	173	17
AL L2 T-Fuel b.Eng.	AL L2 T-Fu	174	0
SS T-Fuel	SS T-Fuel	174	0
AL T-Gas L2	AL T-Gas L2	174	1
SD T-Fuel	SD T-Fuel	174	11
SD T-Fuel b.Engine	SD T-Fu	174	11
SD T-Gas	SD T-Gas	174	11
AL L1 T-Fuel b.Eng.	AL L1 T-Fu	174	15
HI T-Fuel	HI T-Fuel	174	15
AL T-Gas L1	AL T-Gas L1	174	17
SS T-Lube Oil	SS T-Lube Oil	175	0
SD T-Lube Oil	SD T-Lube Oil	175	11
HI T-Lube Oil	HI T-Lube Oil	175	15
AL L2 T-Lubeoil ETC	AL L2 T-Lubeoil ETC	176	0
SD-T-Lubeoil ETC	SD-T-Lubeoil ETC	176	11
AL L1 T-Lubeoil ETC	AL L1 T-Lubeoil ETC	176	15
SS Idle Sp.N Reac	SS Idle Speed Not Reached	188	1
SS Engine Overspeed	SS Engine Overspeed	190	0
SS Engine Speed tool	SS Engine Speed too Low	190	1
AL Eng Hours Cnt def	AL Eng Hours Counter Defect	247	31
AL Fuel Cons.Cnt def	AL Fuel Cons. Counter Defect	250	31
AL L1 T-Aux 1	AL L1 T-Aux 1	441	15
AL L2 T-Aux2	AL L2 T-Aux2	442	0
AL L1 T-Aux 2	AL L1 T-Aux 2	442	15
AL Comb. Alarm Red	AL Comb. Alarm Red (Plant)	623	31
AL Comb. Alarm Yel	AL Comb. Alarm Yel (Plant)	624	31
SD Speed Demand	SD Speed Demand	898	11
AL Develop PR Set	AL Develop PR Set	966	31
AL L2 Aux1	AL L2 Aux1	1083	0
SD AUX 1	SD AUX 1	1083	11
AL L1 Aux 1	AL L1 Aux 1	1083	15
AL L2 Aux2	AL L2 Aux2	1084	0

DEIF Display	MTU	SPN	FMI
SD AUX 2	SD AUX 2	1084	11
AL L1 Aux 2	AL L1 Aux 2	1084	15
AL HIHI T-ChargeAirB	AL HIHI T-Charge Air B	1131	0
SD T-Charge Air B	SD T-Charge Air B	1131	11
AL HI T-Charge Air B	AL HI T-Charge Air B	1131	15
SD T-ECU	SD T-ECU	1136	11
HI T-ECU	HI T-ECU	1136	15
AL L2 P-Lubeoil ETCB	AL L2 P-Lubeoil ETC B	1168	1
AL L1 P-Lubeoil ETCB	AL L1 P-Lubeoil ETC B	1168	17
SD P-Lube Oil (R2)	SD P-Lube Oil (R2)	1168	31
SD-P-Lubeoil ETC B	SD-P-Lubeoil ETC B	1168	31
SS ETC2 Overspeed	SS ETC2 Overspeed	1169	0
SD Charger 2 Speed	SD Charger 2 Speed	1169	11
HI ETC2 Overspeed	HI ETC2 Overspeed	1169	15
SS ETC3 Overspeed	SS ETC3 Overspeed	1170	0
SD Charger 3 Speed	SD Charger 3 Speed	1170	11
HI ETC3 Overspeed	HI ETC3 Overspeed	1170	15
SS ETC4 Overspeed	SS ETC4 Overspeed	1171	0
SD Charger 4 Speed	SD Charger 4 Speed	1171	11
HI ETC4 Overspeed	HI ETC4 Overspeed	1171	15
ALL2TExh.bef.TurbA1	AL L2 T-Exh. bef. HP Turbine A1	1172	1
ALL1TExh.bef.TurbA1	AL L1 T-Exh. bef. HP Turbine A1	1172	17
AL L2 P-IntakeA a.FA	AL L2 P-Intake Air after Filter A	1176	1
AL L1 P-IntakeA a.FA	AL L1 P-Intake Air after Filter A	1176	17
AL L2 P-IntakeA a.FB	AL L2 P-Intake Air after Filter B	1177	1
AL L1 P-IntakeA a.FB	AL L1 P-Intake Air after Filter B	1177	17
SS P-Coolant InterC	SS P-Coolant InterCooler	1203	1
SD P-Coolant InterC	SD P-Coolant Intercooler	1203	11
LO P-Coolant InterC	LO P-Coolant InterCooler	1203	17
SD P-Lube Oil bef. F	SD P-Lube Oil before Filter	1208	11
AL Override applied	AL Override applied	1237	31
SD Level Leak. Fuel	SD Level Leakage Fuel	1239	11
HI Level LeakageFuel	HI Level Leakage Fuel	1239	15
SD P-HD2	SD P-HD2	1349	11
SD-P-Fuel before Eng	SD-P-Fuel before Engine	1349	11
HI P-Fuel 2(ComRail)	HI P-Fuel 2 (Common Rail)	1349	15
AL L1 P-Fuel bef.Eng	AL L1 P-Fuel before Engine	1349	17

DEIF Display	MTU	SPN	FMI
LO P-Fuel 2(ComRail)	LO P-Fuel 2 (Common Rail)	1349	17
SD-Level Oil Refill	SD-Level Oil Refill Tank	1380	11
LO Oil Level Refill	LO Oil Level Refill	1380	17
AL L2 T-Aux1	AL L2 T-Aux1	1385	0
SD T-AUX 1	SD T-AUX 1	1385	11
SD T-AUX 2	SD T-AUX 2	1386	11
AL L2 P-Aux1	AL L2 P-Aux1	1387	1
SD P-AUX 1	SD P-AUX 1	1387	11
AL L1 P-Aux 1	AL L1 P-Aux 1	1387	17
AL L2 P-Aux2	AL L2 P-Aux2	1388	1
SD P-AUX 2	SD P-AUX 2	1388	11
AL L1 P-Aux 2	AL L1 P-Aux 2	1388	17
Niveau RM Tank	Niveau RM Tank	1761	11
SS T-Exhaust B	SS T-Exhaust B	2433	0
SD T-Exhaust B	SD T-Exhaust B	2433	11
HI T-Exhaust B	HI T-Exhaust B	2433	15
SS T-Exhaust A	SS T-Exhaust A	2434	0
SD T-Exhaust A	SD T-Exhaust A	2434	11
HI T-Exhaust A	HI T-Exhaust A	2434	15
SD P-Ch MixbefThrott	SD P-Charge Mix before Throttle	2631	11
SD T-RM Tank	SD T-RM Tank	3031	11
HIHI Nox Value	HIHI Nox Value	3226	0
LOLO Nox Value	LOLO Nox Value	3226	1
SD Smart NOx Oxi.Fac	SD Smart NOx Oxidation Factor O2	3226	11
HI Nox Value	HI Nox Value	3226	15
LO Nox Value	LO Nox Value	3226	17
AL NOx ATO1Comm.lost	AL NOx ATO1 Communication Lost	3226	31
AL L2 T-Exhaust Bef.	AL L2 T-Exhaust Before DPF	3242	0
SD T-Exhaust bef.DPF	SD T-Exhaust before DPF A	3242	11
AL L1 T-Exhaust Bef.	AL L1 T-Exhaust Before DPF	3242	15
AL L2 T-ExhaustAfter	AL L2 T-Exhaust After DPF	3246	0
SD T-Exhaust a. DPF	SD T-Exhaust after DPF A	3246	11
AL L1 T-ExhaustAfter	AL L1 T-Exhaust After DPF	3246	15
AL L2 P-DPF Diff.	AL L2 P-DPF Difference	3251	0
SD P-DeltaExhaustDPF	SD P-DeltaExhaust DPF A	3251	11
AL L1 P-DPF Diff.	AL L1 P-DPF Difference	3251	15
SS T-Fuel B	SS T-Fuel B	3468	0

DEIF Display	MTU	SPN	FMI
SD-T-Fuel B	SD-T-Fuel B	3468	11
HI T-Fuel B	HI T-Fuel B	3468	15
AL Urea Qua Release	AL Urea Quality Release	3516	31
AL turning activated	AL turning activated	3543	31
HIHI P-Charge Mix B	HIHI P-Charge Mix B	3562	0
SD P-Charge Mix B	SD P-Charge Mix B	3562	11
SS P-Charge Air	SS P-Charge Air	3563	0
SD P-Charge Air	SD P-Charge Air	3563	11
HI P-Charge Air	HI P-Charge Air	3563	15
SD Level Cool.InterC	SD Level Coolant Intercooler	3668	11
LO Coolant LevelIntC	LO Coolant Level Intercooler	3668	17
SD Feedback Thrott B	SD Feedback Throttle B	3673	11
AI Req Angle Throt B	AI Req Angle Throttle B	3673	15
AL mix throt B fault	AL mixture throttle B fault	3673	31
AL DPF Rigorous TM S	AL DPF Rigorous TM Suppression	3703	11
SD T-Coolant (R2)	SD T-Coolant (R2)	4076	31
SS T-Coolant bef Eng	SS T-Coolant before Engine	4193	0
SD T-Coolant b.Engin	SD T-Coolant b.Engine	4193	11
HI T-Coolant bef Eng	HI T-Coolant before Engine	4193	15
SD EngRPM 3rd Sensor	SD Engine Speed 3rd Sensor	4202	31
AL SCR F1 SU AdBlueQ	AL SCR F1 SU AdBlue Quantity	4348	15
AL L2 T-Exh.Bef.SCR1	AL L2 T-Exhaust Before SCR F1	4360	0
SD T-Exh bef. SCR F1	SD T-Exh before SCR F1	4360	11
SD T-Exh bef. SCR F3	SD T-Exh before SCR F3	4360	11
AL L1 T-Exh.Bef.SCR1	AL L1 T-Exhaust Before SCR F1	4360	15
AL F1 T-Exh bef.SCRL	AL F1 T-Exh before SCR too LOW	4360	17
AL L2 T-Exh.Aft.SCR1	AL L2 T-Exhaust After SCR F1	4363	0
SD T-Exh a. SCR F1	SD T-Exh after SCR F1	4363	11
SD T-Exh aft. SCR F3	SD T-Exh after SCR F3	4363	11
AL L1 T-Exh.Aft.SCR1	AL L1 T-Exhaust After SCR F1	4363	15
AL F1 T-Exh aft.SCRL	AL F1 T-Exh after SCR too LOW	4363	17
AL SCR F1 SU Rev. Ra	AL SCR F1 SU Revolution Range	4375	31
AL SCR F2 SU AdBlueQ	AL SCR F2 SU AdBlue Quantity	4401	15
AL L2 T-Exh.Bef.SCR2	AL L2 T-Exhaust Before SCR F2	4413	0
SD T-Exh bef. SCR F1	SD T-Exh before SCR F2	4413	11
AL L1 T-Exh.Bef.SCR2	AL L1 T-Exhaust Before SCR F2	4413	15
AL F2 T-Exh bef.SCRL	AL F2 T-Exh before SCR too LOW	4413	17

DEIF Display	MTU	SPN	FMI
AL L2 T-Exh.Aft.SCR2	AL L2 T-Exhaust After SCR F2	4415	0
SD T-Exh a. SCR F2	SD T-Exh after SCR F2	4415	11
AL L1 T-Exh.Aft.SCR2	AL L1 T-Exhaust After SCR F2	4415	15
AL F2 T-Exh aft.SCR1	AL F2 T-Exh after SCR too LOW	4415	17
AL SCR F2 SU Rev. Ra	AL SCR F2 SU Revolution Range	4441	31
SD Air Humidity	SD Air Humidity	4490	11
SD Air Humidity	SD Air Humidity (HDT2800)	4490	11
AL Rel. Humidity L1	AL Rel. Humidity L1	4490	15
AL L2 T-Exhaust Bef.	AL L2 T-Exhaust Before DOC	4765	0
SD T-Exhaust bef.DOC	SD T-Exhaust before DOC A	4765	11
AL L1 T-Exhaust Bef.	AL L1 T-Exhaust Before DOC	4765	17
AL Battery Not Charg	AL Battery Not Charging	4990	31
AL L2 P-Charge Air B	AL L2 P-Charge Air B	5422	1
AL L1 P-Charge Air B	AL L1 P-Charge Air B	5422	17
SD-P-Fuel Returnpath	SD-P-Fuel Return path	5571	11
AL L1 P-FuelRet.Path	AL L1 P-Fuel Return Path	5571	17
SD P-L Oil aft L. Pu	SD-P-Lube Oil aft Level Pump	520406	11
AL L1 P-OilNivPump	AL L1 P-OilNivPump	520406	17
AL Wiring TO 1	AL Wiring TO 1	520872	31
AL Selected Mode NV	AL Selected Mode not Valid	520873	31
AL No Valid ModeSw.S	AL No Valid Mode Switch Signal	520874	11
AL Speed Demand Fail	AL Speed Demand Failure	520875	31
AL SD Stop Button	AL SD Stop Button	520876	11
AL SD Start Button	AL SD Start Button	520877	11
AL SD Up Button	AL SD Up Button	520878	11
AL SD Down Button	AL SD Down Button	520879	11
AL SD Ext. Speed D_S	AL SD Ext. Speed Demand Switch	520880	11
AL SD Speed D Inc	AL SD Speed Demand Increase	520881	11
AL SD Bin Speed Lim	AL SD Binary Speed Limitation	520882	11
AL SD Droop 2 Switch	AL SD Droop 2 Switch	520883	11
AL SD Frequency SW	AL SD Frequency Switch	520884	11
AL SD Test Overspeed	AL SD Test Overspeed	520885	11
AL SD Override Butto	AL SD Override Button	520886	11
AL SD Alarm Reset	AL SD Alarm Reset	520887	11
AL SD Cylin CutOut	AL SD Cylinder Cut Out	520888	11
AL SD Request BinOut	AL SD Request BinOut Test	520889	11
AL SD Ext.Engine Pro	AL SD Ext. Engine Protection	520890	11

DEIF Display	MTU	SPN	FMI
AL SD Prelubri. Sig.	AL SD Prelubrication Signal	520891	11
AL SD Ext.IncldeBin	AL SD Ext. Increased Idle Bin	520892	11
AL SD Request P. DBR	AL SD Request Plant DBR	520893	11
AL Wiring Cylind.A1	AL Wiring Cylinder A1	520900	31
AL Wiring Cylind.A2	AL Wiring Cylinder A2	520901	31
AL Wiring Cylind.A3	AL Wiring Cylinder A3	520902	31
AL Wiring Cylind.A4	AL Wiring Cylinder A4	520903	31
AL Wiring Cylind.A5	AL Wiring Cylinder A5	520904	31
AL Wiring Cylind.A6	AL Wiring Cylinder A6	520905	31
AL Wiring Cylind.A7	AL Wiring Cylinder A7	520906	31
AL Wiring Cylind.A8	AL Wiring Cylinder A8	520907	31
AL Wiring Cylind.A9	AL Wiring Cylinder A9	520908	31
AL Wiring Cylind.A10	AL Wiring Cylinder A10	520909	31
AL Wiring Cylind.B1	AL Wiring Cylinder B1	520910	31
AL Wiring Cylind.B2	AL Wiring Cylinder B2	520911	31
AL Wiring Cylind.B3	AL Wiring Cylinder B3	520912	31
AL Wiring Cylind.B4	AL Wiring Cylinder B4	520913	31
AL Wiring Cylind.B5	AL Wiring Cylinder B5	520914	31
AL Wiring Cylind.B6	AL Wiring Cylinder B6	520915	31
AL Wiring Cylind.B7	AL Wiring Cylinder B7	520916	31
AL Wiring Cylind.B8	AL Wiring Cylinder B8	520917	31
AL Wiring Cylind.B9	AL Wiring Cylinder B9	520918	31
AL Wiring Cylind.B10	AL Wiring Cylinder B10	520919	31
SS T-Coolant L3	SS T-Coolant L3	520923	0
AL Power too high	AL Power too high	520924	15
AL Open L.Cylind.A1	AL Open Load Cylinder A1	520930	31
AL Open L.Cylind.A2	AL Open Load Cylinder A2	520931	31
AL Open L.Cylind.A3	AL Open Load Cylinder A3	520932	31
AL Open L.Cylind.A4	AL Open Load Cylinder A4	520933	31
AL Open L.Cylind.A5	AL Open Load Cylinder A5	520934	31
AL Open L.Cylind.A6	AL Open Load Cylinder A6	520935	31
AL Open L.Cylind.A7	AL Open Load Cylinder A7	520936	31
AL Open L.Cylind.A8	AL Open Load Cylinder A8	520937	31
AL Open L.Cylind.A9	AL Open Load Cylinder A9	520938	31
AL Open L.Cylind.A10	AL Open Load Cylinder A10	520939	31
AL Open L.Cylind.B1	AL Open Load Cylinder B1	520940	31
AL Open L.Cylind.B2	AL Open Load Cylinder B2	520941	31

DEIF Display	MTU	SPN	FMI
AL Open L.Cylind.B3	AL Open Load Cylinder B3	520942	31
AL Open L.Cylind.B4	AL Open Load Cylinder B4	520943	31
AL Open L.Cylind.B5	AL Open Load Cylinder B5	520944	31
AL Open L.Cylind.B6	AL Open Load Cylinder B6	520945	31
AL Open L.Cylind.B7	AL Open Load Cylinder B7	520946	31
AL Open L.Cylind.B8	AL Open Load Cylinder B8	520947	31
AL Open L.Cylind.B9	AL Open Load Cylinder B9	520948	31
AL Open L.Cylind.B10	AL Open Load Cylinder B10	520949	31
AL Wiring TOP 1	AL Wiring TOP 1	520952	31
AL Wiring TOP 2	AL Wiring TOP 2	520953	31
AL Wiring TOP 3	AL Wiring TOP 3	520954	31
AL Wiring TOP 4	AL Wiring TOP 4	520955	31
AL Open Load DI 1	AL Open Load Digital Input 1	520958	31
AL Open Load DI 2	AL Open Load Digital Input 2	520959	31
AL Open Load DI 3	AL Open Load Digital Input 3	520960	31
AL Open Load DI 4	AL Open Load Digital Input 4	520961	31
AL Open Load DI 5	AL Open Load Digital Input 5	520962	31
AL Open Load DI 6	AL Open Load Digital Input 6	520963	31
AL Open Load DI 7	AL Open Load Digital Input 7	520964	31
AL Open Load DI 8	AL Open Load Digital Input 8	520965	31
AL Wiring PWM_CM1	AL Wiring PWM_CM1	520970	31
AL Wiring PWM_CM2	AL Wiring PWM_CM2	520971	31
AL Wiring PWM_CM3	AL Wiring PWM_CM3	520972	31
AL Wiring PWM_CM4	AL Wiring PWM_CM4	520973	31
AL Wiring PWM_CM5	AL Wiring PWM_CM5	520974	31
AL Wiring PWM_CM6	AL Wiring PWM_CM6	520975	31
AL Wiring PWM_CM7	AL Wiring PWM_CM7	520976	31
AL Wiring PWM_CM8	AL Wiring PWM_CM8	520977	31
AL Wiring PWM_CM9	AL Wiring PWM_CM9	520978	31
AL Wiring PWM_CM10	AL Wiring PWM_CM10	520979	31
HIHI U-PDU	HIHI U-PDU	520982	0
LOLO U-PDU	LOLO U-PDU	520982	1
SD U-PDU	SD U-PDU	520982	11
HI U-PDU	HI U-PDU	520982	15
LO U-PDU	LO U-PDU	520982	17
AL Wiring Suct. Res1	AL Wiring Suction Restrictor 1	520983	31
AL Wiring Suct. Res2	AL Wiring Suction Restrictor 2	520984	31

DEIF Display	MTU	SPN	FMI
AL Wiring Pres.CV 1	AL Wiring Pressure Control Valve 1	520985	31
AL Wiring Pres.CV 2	AL Wiring Pressure Control Valve 2	520986	31
AL Crash Rec. Init.	AL Crash Rec. Init. Error	520990	31
AL ECU Power OFF/ON R	AL ECU Power OFF/ON Required	520991	31
AL OL ASO FlapFeedbB	AL OL ASO Flap Feedback B	520994	11
AL ASOFlapB cl. Aerr	AL ASO Flap B closed, A failed	520995	11
AL OL ASO FlapFeedbA	AL OL ASO Flap Feedback A	520996	31
AL ASOFlapA cl. Aerr	AL ASO Flap A closed, B failed	520997	31
AL ASO Flaps Closed	AL ASO Flaps Closed	520998	31
AL ASO Flaps open/err	AL ASO Flaps open / failed to close	520999	31
AL ASO Flap A Not Cl	AL ASO Flap A Not Closed by ECU	521000	31
AL Rail Leakage	AL Rail Leakage	521001	31
SS Release Sp.N Reac	SS Release Speed Not Reached	521002	1
SS Starter Sp.N Reac	SS Starter Speed Not Reached	521003	1
SS T-Preheat	SS T-Preheat	521004	1
LO T-Preheat	LO T-Preheat	521004	17
AL ASO Flap B Not Cl	AL ASO Flap B Not Closed by ECU	521005	31
AL CAN1 Node Lost	AL CAN1 Node Lost	521006	31
AL CAN2 Node Lost	AL CAN2 Node Lost	521007	31
AL CAN Wrong Param.	AL CAN Wrong Parameters	521008	31
AL CAN No PU-Data	AL CAN No PU-Data	521009	31
AL CAN PU-Data Flash	AL CAN PU-Data Flash Error	521010	31
AL CAN1 Bus Off	AL CAN1 Bus Off	521011	31
AL CAN1 Error Pass.	AL CAN1 Error Passive	521012	31
AL CAN2 Bus Off	AL CAN2 Bus Off	521013	31
AL CAN2 Error Pass.	AL CAN2 Error Passive	521014	31
AL Stop Camsh. S def	AL Stop Camshaft Sensor Defect	521016	31
SD Crankshaft Speed	SD Crankshaft Speed	521017	11
SD Camshaft Speed	SD Camshaft Speed	521018	11
SD Frequency Input	SD Frequency Input	521019	11
AL Power Stage Low	AL Power Stage Low	521020	31
AL Power Stage High	AL Power Stage High	521021	31
AL Stop Power Stage	AL Stop Power Stage	521022	31
AL L2 Aux1 Plant	AL L2 Aux1 Plant	521023	0
AL L1 Aux1 Plant	AL L1 Aux1 Plant	521023	15
AL Stop MVWiring GND	AL Stop MV-Wiring Ground	521023	31
AL Open Load Emerg.	AL Open Load Emerg. Stop Input ESI	521024	31

DEIF Display	MTU	SPN	FMI
SD Idle/End-TorqueIN	SD Idle/End-Torque Input [%]	521025	11
SS Power Reduct. Act	SS Power Reduction Active	521026	31
AL Stop SD	AL Stop SD	521027	31
AL Wiring FO	AL Wiring FO	521028	31
AL Wiring PWM_CM2	AL Wiring PWM_CM2	521028	31
AL Ext. Engine Prot.	AL Ext. Engine Protection	521029	31
AL Starter Not Engag	AL Starter Not Engaged	521030	31
AL Power Cut-Off det	AL Power Cut-Off detected	521031	31
AL ESCM Override	AL ESCM Override	521032	31
AL MD CANReq Idle S.	AL MD CAN Request Idle Speed	521033	31
AL MD CAN Speed Limi	AL MD CAN Speed Limitation	521034	31
AL L2 PRV Defect	AL L2 PRV Defect	521035	0
AL L1 PRV Defect	AL L1 PRV Defect	521035	15
AL L1 PRV Defect	AL L1 PRV Defect	521036	31
AL L2 PRV Defect	AL L2 PRV Defect	521037	31
SD ETC1+ETC2	SD ETC1+ETC2	521038	11
AL Doub.Nod. Lost1+2	AL Double Nodes Lost CAN 1 + 2	521039	31
AL EIL Protection	AL EIL Protection	521040	31
AL EIL Error	AL EIL Error	521041	31
AL EGR Throttle ADef	AL EGR Throttle A Defect	521042	31
AL Bypass Throt. Def	AL Bypass Throttle Defect	521043	31
AL Dispen. Throt.Def	AL Dispenser Throttle Defect	521044	31
SD P-Exhaust Lambda	SD P-Exhaust Lambda	521045	11
SD P-Charge Air B	SD P-Charge Air B	521046	11
SD Smart NOx HeaterE	SD Smart NOx Heater Element	521047	11
SD Smart NOx Concent	SD Smart NOx Concentration	521048	11
AL Emission Fault	AL Emission Fault	521050	31
SD P-Fuel	SD P-Fuel	521052	11
AL L2L Voltage ASO	AL L2L Voltage ASO	521053	1
AL SD Voltage ASO	AL SD Voltage ASO	521053	11
AL L1L Voltage ASO	AL L1L Voltage ASO	521053	17
SD P-Ambient Air	SD P-Ambient Air	521060	11
AL Emerg. Stop fail	AL Emergency Stop Failed	521061	31
AL CAN Engine St.Loc	AL CAN Engine Start Lock	521062	31
SD P-Fuel bef. Add.s	SD P-Fuel bef. Add.sec.fuelfilter	521063	11
AL L1 P-Fuel Add.sec	AL L1 P-Fuel Add.sec.fuelfilt. Diff	521063	15
AL L2 P-Fuel b.o.F.	AL L2 P-Fuel b.o.F.	521064	0

DEIF Display	MTU	SPN	FMI
SD P-Fuel b.o.F.	SD P-Fuel b.o.F.	521064	11
AL L1 P-Fuel b.o.F.	AL L1 P-Fuel b.o.F.	521064	15
AL Emission Warning	AL Emission Warning	521067	31
AL Gas Path Warning	AL Gas Path Warning	521068	31
AL Gas Path Fault	AL Gas Path Fault	521069	31
AL GPE Lambda v.inva	AL GPE Lambda value invalid	521070	31
AL NOx value invalid	AL NOx value invalid	521071	31
AL Thermal Manag.Act	AL Thermal Management active	521072	31
AL p5 ctrlvar LO Act	AL p5 ctrlvar lower limit active	521073	31
AL p5 ctrlvar max BO	AL p5 ctrlvar max BOI min active	521074	31
AL Lambda ctrlvar li	AL Lambda ctrlvar limit min active	521075	31
AL Lambda ctrlvar ma	AL Lambda ctrlvar max BOI min act	521076	31
AL Nox p5 min BOI ma	AL Nox p5 min BOI max active	521077	31
AL NOx p5 max BOI mi	AL NOx p5 max BOI min active	521078	31
AL GPS p5 ctrlvar ma	AL GPS p5 ctrlvar max active	521080	31
AL GPS p5 ctrlvar mi	AL GPS p5 ctrlvar min active	521081	31
AL GPS p5 ctrlvar mi	AL GPS p5 ctrlvar min active	521082	31
AL Bypass Throttle 2	AL Bypass Throttle 2 Defect	521083	31
AL Bypass Valve Def.	AL Bypass Valve Defect	521084	31
AL Intake AirThrottl	AL Intake AirThrottle Defect	521085	31
SD Bosch LSU LambdaS	SD Bosch LSU Lambda Sensor	521086	11
AL EGR Throttle BDef	AL EGR Throttle B Defect	521087	31
AL L2 Delta T-NT Int	AL L2 Delta T-NT Intercooler	521088	0
AL L1 Delta T-NT Int	AL L1 Delta T-NT Intercooler	521088	17
AL Lim T-Coolant LT	AL Lim T-Coolant LT Fan	521089	31
AL ETC2 CutIn Failur	AL ETC2 CutIn Failure	521091	31
AL Prelubrication	AL Prelubrication Fault	521092	31
AL MCR exceeded 1h	AL MCR exceeded 1 hour	521093	31
AL EMU Parameter Not	AL EMU Parameter Not Supported	521094	31
SD Spinning Value	SD Spinning Value	521095	11
AL MCR exceeded	AL MCR exceeded	521096	31
AL Rail 2 Leakage	AL Rail 2 Leakage FMI-	521097	31
HI T-Exhaust EMU	HI T-Exhaust EMU	521098	15
LO T-Exhaust EMU	LO T-Exhaust EMU	521098	17
HI T-Coolant EMU	HI T-Coolant EMU	521099	15
SD Coil Current	SD Coil Current	521100	11
AL ETC4 CutIn Failur	AL ETC4 CutIn Failure	521103	31

DEIF Display	MTU	SPN	FMI
AL ETC3 CutIn Failur	AL ETC3 CutIn Failure	521104	31
AL Wiring POM Starte	AL Wiring POM Starter 1	521105	11
AL Wiring POM Starte	AL Wiring POM Starter 2	521106	11
AL Open Load POM Alt	AL Open Load POM Alternator	521107	11
AL L1 T-Raw W a. Pum	AL L1 T-Raw water after Pump	521108	17
AL CAN POM Node Lost	AL CAN POM Node Lost	521109	11
AL Low Starter Volta	AL Low Starter Voltage	521110	1
AL POM Error	AL POM Error	521111	31
AL Wrong POM-ID	AL Wrong POM-ID	521112	31
Write Error Flash	Write Error Flash	521113	31
Oillevel Calibration	Oillevel Calibration Error	521114	31
SD P-Intake Air a.FA	SD P-Intake Air after Filter A	521115	11
SD P-Intake Air a.FB	SD P-Intake Air after Filter B	521116	11
SS Engine Oversp. CS	SS Engine Overspeed Camshaft	521117	0
SD T-Lube Oil Pan	SD T-Lube Oil Pan	521118	11
AL T-Lube Oil Pan LO	AL T-Lube Oil Pan Low	521118	17
SD P-Oil Refill Pump	SD P-Oil Refill Pump	521119	11
LO P-Oil Refill Pump	LO P-Oil Refill Pump	521119	17
SD T-Exhaust A+B	SD T-Exhaust A+B	521120	11
SD T-Lube Oil Pan	SD T-Lube Oil Pan J1939	521121	11
AL MB Valve error	AL MB Valve error	521122	31
AL L2 P-DPF Norm Dif	AL L2 P-DPF Norm Difference	521123	0
AL L4 P-DPF Norm Dif	AL L4 P-DPF Norm Difference	521123	1
AL L1 P-DPF Norm Dif	AL L1 P-DPF Norm Difference	521123	15
AL L3 P-DPF Norm Dif	AL L3 P-DPF Norm Difference	521123	17
AL DPF Rigorous TM A	AL DPF Rigorous TM Aborted	521124	11
AL DPF Periodic Rigo	AL DPF Periodic Rigorous TM	521125	11
AL DPF Flash ReadErr	AL DPF Flash Read Error	521126	11
AL DEF Nozzle Damage	AL DEF Nozzle Damage	521127	11
AL SmartConnect Lost	AL Smart Connect Lost	521128	11
SD-T-Sea water a.Pum	SD-T-Sea water after Pump	521129	11
SD-P-LOil, HP Pump A	SD-P-Lube Oil at HP Pump A	521131	11
SD-P-LOil, HP Pump B	SD-P-Lube Oil at HP Pump B	521132	11
SD Charger 5 Speed	SD Charger 5 Speed	521133	11
AL F1 NOx bef. SCR	AL F1 NOx before SCR SensorDefect	521134	11
AL F1 NOx bef. SCR	AL F1 NOx before SCR Comm Lost	521134	31
AL F1 NOx a. SCR	AL F1 NOx after SCR SensorDefect	521135	11

DEIF Display	MTU	SPN	FMI
AL F1 NOx a. SCR C	AL F1 NOx afterSCR Comm Lost	521135	31
AL F2 NOx bef. SCR	AL F2 NOx before SCR SensorDefect	521136	11
AL F2 NOx bef. SCR	AL F2 NOx before SCR Comm Lost	521136	31
AL F2 NOx a. SCR	AL F2 NOx after SCR SensorDefect	521137	11
AL F2 NOx a. SCR	AL F2 NOx after SCR Comm Lost	521137	31
AL F3 NOx bef. SCR	AL F3 NOx before SCR SensorDefect	521138	11
AL F3 NOx bef. SCR	AL F3 NOx before SCR Comm Lost	521138	31
AL F3 NOx a. SCR	AL F3 NOx after SCR SensorDefect	521139	11
AL F3 NOx a. SCR	AL F3 NOx after SCR Comm Lost	521139	31
HI ETC1 Idle Speed H	HI ETC1 Idle Speed too High	521140	31
HI ETC2 Idle Speed H	HI ETC2 Idle Speed too High	521141	31
HI ETC3 Idle Speed H	HI ETC3 Idle Speed too High	521142	31
HI ETC4 Idle Speed H	HI ETC4 Idle Speed too High	521143	31
HI ETC5 Idle Speed H	HI ETC5 Idle Speed too High	521144	31
AL ETC1 Speed Dev.	AL ETC1 Speed Deviation	521145	31
AL ETC2 Speed Dev.	AL ETC2 Speed Deviation	521146	31
AL ETC3 Speed Dev.	AL ETC3 Speed Deviation	521147	31
AL ETC4 Speed Dev.	AL ETC4 Speed Deviation	521148	31
AL ETC5 Speed Dev.	AL ETC5 Speed Deviation	521149	31
AL ETC Job Rotation	AL ETC Job Rotation	521150	31
AL EIL Different Eng	AL EIL Different Engine Number	521151	31
AL ash volume	AL ash volume	521152	31
AL HIHI T-ChargeAEGR	AL HIHI T-Charge Air before EGR	521153	0
AL HI T-ChargeAirEGR	AL HI T-Charge Air before EGR	521153	15
SD T-Charge Air bef.	SD T-Charge Air before EGR	521153	31
AL HIHI T-Char.ADAB	AL HIHI T-Charge Air Diff AB	521154	0
AL HI T-ChargeAirDAB	AL HI T-Charge Air Diff AB	521154	15
AL Ext.Start, HD HI	AL External Start and HD too high	521155	31
AL Max. BlankShot TE	AL Max. Blank Shot time expired	521156	31
AL HSB1 Comm. lost	AL HSB1 Communication Lost	521157	31
AL HSB1 Actuat. def.	AL HSB1 Actuator defect	521158	31
AL NOx ATO1 Sen. Def	AL NOx ATO1 Sensor Defect	521159	31
AL HSB2 Comm. lost	AL HSB2 Communication Lost	521160	31
AL HSB2 Actuator def	AL HSB2 Actuator defect	521161	31
Defect DEFpsns/act S	Defect in DEF pipe sns/act system	521162	31
DEF Tank ht. sns/act	DEF Tank ht. sns/act defect	521163	31
AL HSB3 Comm. lost	AL HSB3 Communication Lost	521164	31

DEIF Display	MTU	SPN	FMI
AL HSB3 Actuator def	AL HSB3 Actuator defect	521165	31
AL HSB4 Comm. lost	AL HSB4 Communication Lost	521166	31
AL HSB4 Actuator def	AL HSB4 Actuator defect	521167	31
AL MB Valve defect 2	AL MB Valve defect 2	521168	31
AL EGR A Ref.learn	AL EGR A Reference learn failed	521169	31
AL Urea Tank L.Empty	AL Urea Tank Level Empty	521170	31
AL EGR B Ref. learn	AL EGR B Reference learn failed	521171	31
AL Bypass A Ref.	AL Bypass A Reference learn failed	521172	31
AL Bypass B Fast lea	AL Bypass B Fast learn failed	521173	31
AL Dispenser Ref.lea	AL Dispenser Reference learn failed	521174	31
AL Intake Thr. Ref L	AL Intake Throttle Ref learn failed	521175	31
AL SCR AdBlue press.	AL SCR AdBlue pressure	521176	31
AL Flow1 SU 1 Comm L	AL Flow 1 Supply Unit 1 Comm Lost	521177	31
AL Flow1 SU 2 Comm L	AL Flow 1 Supply Unit 2 Comm Lost	521178	31
AL Flow2 SU 1 Comm L	AL Flow 2 Supply Unit 1 Comm Lost	521179	31
AL Flow2 SU 2 Comm L	AL Flow 2 Supply Unit 2 Comm Lost	521180	31
AL Flow3 SU 1 Comm L	AL Flow 3 Supply Unit 1 Comm Lost	521181	31
AL Flow3 SU 2 Comm L	AL Flow 3 Supply Unit 2 Comm Lost	521182	31
AL Trican Comm. Lost	AL Trican Communication Lost	521183	31
AL OLT Comm. Lost	AL OLT Communication Lost	521184	31
AL SD T Coolant Cy.H	AL SD T Coolant at cylinder head	521187	11
HI T-Coolant Cy.Head	HI T-Coolant Cylinder Head	521187	15
SS T-Coolant Cyl. H	SS T-Coolant Cylinder Head	521187	16
AL F1 DEF consump.	AL F1 DEF consumption error	521188	31
AL F1 DEF balance	AL F1 DEF balance error	521189	31
AL F1 Raw gas emissi	AL F1 Raw gas emission error	521190	31
AL F1 NOx Annaeherun	AL F1 NOx Annaeherung error	521191	31
AL Texh bef SCR F1F2	AL T-Exh bef SCR between F1 and F2	521192	31
AL F1 Erw Tabg v SCR	AL F1 Erw T-Abg vor SCR Error	521193	31
AL F1Exp TExh af SCR	AL F1 Exp T-Exh aft SCR error	521194	31
AL F1 gr TExh bf SCR	AL F1 grad T-Exh bef SCR error	521195	31
AL F2 gr TExh bf SCR	AL F2 grad T-Exh bef SCR error	521196	31
AL F1 gr TExh af SCR	AL F1 grad T-Exh aft SCR error	521198	31
AL F2 gr TExh af SCR	AL F2 grad T-Exh aft SCR error	521199	31
AL SCR F3 T-Exh aft.	AL SCR F3 T-Exh after gradient	521200	31
AL L2 T-Exh.Bef.SCR3	AL L2 T-Exhaust Before SCR F3	521201	0
AL L1 T-Exh.Bef.SCR3	AL L1 T-Exhaust Before SCR F3	521201	15

DEIF Display	MTU	SPN	FMI
AL L2 T-Exh.Aft.SCR3	AL L2 T-Exhaust After SCR F3	521202	0
AL L1 T-Exh.Aft.SCR3	AL L1 T-Exhaust After SCR F3	521202	15
AL SCR oper. T TooLO	AL SCR operating temperature too-LOW	521203	17
AL Cataly conv. F1	AL Cataly conversion too lowF1	521204	17
AL Cataly conv. F2	AL Cataly conversion too lowF2	521205	17
AL Cataly conv. F3	AL Cataly conversion too lowF3	521206	17
AL Invalid LSI Ch.Co	AL Invalid LSI Channel Config	521207	31
AL SCR SU fault(s)	AL SCR SU fault(s) exist	521208	31
AL ETC0 CutIn Fail	AL ETC0 CutIn Failure	521209	31
AL ETC1 CutIn Fail	AL ETC1 CutIn Failure	521210	31
AL SCR SU fault(s)F2	AL SCR SU fault(s) exist F2	521211	31
AL SCR SU Prim. RF1	AL SCR SU Priming Request F1	521213	31
AL SCR SU Prim. RF2	AL SCR SU Priming Request F2	521214	31
AL L1 P-Oil bef. PuA	AL L1 P-Oil before HD Pump A	521216	17
AL L1 P-Oil bef. PuB	AL L1 P-Oil before HD Pump B	521217	17
SD Loadp.Analog filt	SD Loadp.Analog filt	521218	11
SD T-Intake Air B	SD T-Intake Air B	521219	11
SS P-Coolant befEng	SS P-Coolant before Engine	521220	1
SD P-Coolant b.Engin	SD P-Coolant b.Engine	521220	11
LO P-Coolant befEngi	LO P-Coolant before Engine	521220	17
SD P-Charge Mix Diff	SD P-Charge Mix Diff	521221	11
HI P-Charge Mix Diff	HI P-Charge Mix Diff	521221	31
HIHI P-ChargeMixDiff	HIHI P-Charge Mix Diff	521221	31
SD ele. Eng powerAI2	SD electr. engine power AI2	521222	31
AL CR Trig. Eng.Stop	AL CR Trigger Engine Stop	521223	31
HIHI Power Diff	HIHI Power Difference	521224	0
LOLO Power Diff	LOLO Power Difference	521224	1
AL GasControlCheck	AL GasControlCheck Fault	521225	31
AL Ignition Fault	AL Ignition Fault	521226	31
AL GasValve Fault	AL GasValve Fault	521227	31
AL EngineSpeedCollap	AL EngineSpeedCollapse Fault	521228	31
AL SAM Missing Data	AL SAM Missing Data Fault	521229	31
L3 AI CANMaxRetar. T	L3 AI CAN Max. Retarded Timing	521235	0
L1 AI CANMaxRetar. T	L1 AI CAN Max. Retarded Timing	521235	15
L2 AI CANMaxRetar. T	L2 AI CAN Max. Retarded Timing	521235	16
AL Cir. Break closed	AL Circuit Breaker Closed	521236	31
AL Hut Changespeed M	AL Hut Changespeed	521237	31

DEIF Display	MTU	SPN	FMI
HIHI Actual Value Hu	HIHI Actual Value Hu	521238	0
LOLO Actual Value Hu	LOLO Actual Value Hu	521238	1
HI Actual Value Hu	HI Actual Value Hu	521238	15
LO Actual Value Hu	LO Actual Value Hu	521238	17
AI Knock Intensity	AI Knock Intensity	521239	31
AL Preheating Error	AL Preheating Error	521240	31
AL GET Comm Lost	AL GET Comm Lost	521241	31
AL IC92x Comm Lost	AL IC92x Comm Lost	521242	31
AL FSeries Comm Lost	AL FSeries Comm Lost	521243	31
AL TecJet Comm Lost	AL TecJet Comm Lost	521244	31
AL ProActA Comm Lost	AL ProActA Comm Lost	521245	31
AL ProActB Comm Lost	AL ProActB Comm Lost	521246	31
AL NOxA Comm Lost	AL NOxA Comm Lost	521247	31
AL NOxB Comm Lost	AL NOxB Comm Lost	521248	31
AL Oil Refill Error	AL Oil Refill Error	521249	31
AL GET Yellow	AL GET Yellow	521250	31
AL IC92x Yellow	AL IC92x Yellow	521251	31
AL FSeries Yellow	AL FSeries Yellow	521252	31
AL TecJet Yellow	AL TecJet Yellow	521253	31
AL ProActA Yellow	AL ProActA Yellow	521254	31
AL ProActB Yellow	AL ProActB Yellow	521255	31
AL NOxA Yellow	AL NOxA Yellow	521256	31
AL NOxB Yellow	AL NOxB Yellow	521257	31
AL GET Red	AL GET Red	521258	31
AL IC92x Red	AL IC92x Red	521259	31
AL FSeries Red	AL FSeries Red	521260	31
AL TecJet Red	AL TecJet Red	521261	31
AL ProActA Red	AL ProActA Red	521262	31
AL ProActB Red	AL ProActB Red	521263	31
AL NOxA Red	AL NOxA Red	521264	31
AL NOxB Red	AL NOxB Red	521265	31
AL Lube Oil Min	AL Lube Oil Min	521266	31
AL Lube Oil Max	AL Lube Oil Max	521267	31
LO Oil Refill	LO Oil Refill	521268	31
HI Oil Refill	HI Oil Refill	521269	31
HI Lube Oil L. Ref	HI Lube Oil Level refill	521270	31
AL ActFuelValvePosL1	AL ActFuelValvePos L1	521271	31

DEIF Display	MTU	SPN	FMI
AL MIC5 Yellow	AL MIC5 Yellow	521272	31
AL MIC5 Red	AL MIC5 Red	521273	31
AL MIC5 Comm Lost	AL MIC5 Comm Lost	521274	31
AL ESI activated	AL ESI activated	521275	31
AL MIC5 Sign. diff	AL MIC5 Signature difference	521276	31
AL CAN3 Bus Off	AL CAN3 Bus Off	521277	31
AL CAN3 Error Pas	AL CAN3 Error Passive	521278	31
AL CAN4 Bus Off	AL CAN4 Bus Off	521279	31
AL CAN4 Error Pas	AL CAN4 Error Passive	521280	31
HIHI Delta NOx (A-B)	HIHI Delta NOx (A-B)	521297	0
HI Delta NOx (A-B)	HI Delta NOx (A-B)	521297	15
HI Delta p5 for NOx	HI Delta p5 for NOx	521298	15
AL MIC5 para. DL act	AL MIC5 parameter download active	521299	31
AL F2 DEF consumptio	AL F2 DEF consumption error	521332	31
AL F2 DEF balance	AL F2 DEF balance error	521333	31
AL F2 Raw gas emissi	AL F2 Raw gas emission error	521334	31
AL F2 Nox Annaeherun	AL F2 NOx Annaeherung error	521335	31
AL TExh af. SCR F1F2	AL T-Exh aft SCR between F1 and F2	521336	31
AL F2Exp TExh bf SCR	AL F2 Exp T-Exh bef SCR error	521337	31
AL F2Exp TExh af SCR	AL F2 Exp T-Exh aft SCR error	521338	31
AL SCRSU AdBlue Pres	AL SCR SU AdBlue Pressure	521350	31
AL Check Sum IIG	AL Check Sum IIG	521351	31
SS ETC5 Overspeed	SS ETC5 Overspeed	521352	0
HI ETC5 Overspeed	HI ETC5 Overspeed	521352	15
AL NOxATO2 Sens Def.	AL NOx ATO2 Sensor Defect	521353	11
AL Nox ATO2 Comm.err	AL NOx ATO2 Communication Lost	521353	19
AL DEF Tank Lev. low	AL DEF Tank Level low	521354	17
AL T.Breakd.NOx sen.	AL Total breakdown NOx sensors	521355	31
AL Redun.lossNOx sen	AL Redundancy loss NOx sensors	521356	31
AL Engine Cold Activ	AL Engine Cold Active	521357	31
AL Engine Cool. T.SD	AL Engine Coolant Temperature SD	521358	11
AL Intake Air T. SD	AL Intake Air Temperature SD	521359	11
AL DEF Tank T. SD	AL DEF Tank Temperature SD	521360	11
AL Engine Cool.V.DEF	AL Engine Coolant Valve Defect(DEF)	521361	31
AL Fl.EgrA Comm.lost	AL Flap Egr A Communication Lost	521362	31
AL Fl.EgrA T.t. high	AL Flap Egr A Temperature too high	521363	0
AL Fl.EgrA Targ.pos	AL Flap Egr A Targetposition	521364	31

DEIF Display	MTU	SPN	FMI
AL Fl.EgrB Comm.lost	AL Flap Egr B Communication Lost	521365	31
AL Fl.EgrB T.t. high	AL Flap Egr B Temperature too high	521366	0
AL Fl.EgrB Targ.pos	AL Flap Egr B Targetposition	521367	31
AL Fl.By.A Comm.lost	AL Flap BypassA Communication Lost	521368	31
AL Fl.By.A T.to.high	AL Flap BypassA Temperature too high	521369	0
AL Fl. By. A Tar.pos	AL Flap Bypass A Targetposition	521370	31
AL Fl.By B comm.lost	AL Flap BypassB Communication Lost	521371	31
AL Fl.By.B. T. high	AL Flap BypasB Temperature too high	521372	0
AL Fl.By B Tar.pos.	AL Flap Bypass B Targetposition	521373	31
AL Fl.Disp.Comm.lost	AL Flap Dispens Communication Lost	521374	31
AL Fl.Disp.T.toohigh	AL Flap DispensTemperature too high	521375	0
AL Fl. Disp. Tar.pos	AL Flap Dispenser Targetposition	521376	31
AL Fl. Int.Comm.lost	AL Flap Intake Communication Lost	521377	31
AL Fl.Int.T.too high	AL Flap Intake Temperature too high	521378	0
AL Fl.int.A Tar.pos.	AL Flap Intake Air Targetposition	521379	31
AL Fl.EgrA Calibr.Dr	AL Flap Egr A Calibration Drive Err	521380	31
AL Fl.EgrB Calibr.Dr	AL Flap Egr B Calibration Drive Err	521381	31
AL Fl.ByA Calibr. Dr	AL Flap BypassA Calibr. Drive Err	521382	31
AL Fl.By B Calibr. Dr	AL Flap BypassB Calibr. Drive Err	521383	31
AL Fl.Disp.Calibr Dr	AL Flap Dispenser Calibr Drive Err	521384	31
AL Fl.Int.A.Cali. Dr	AL Flap Intake Air Calibr Drive Err	521385	31
AL L2 PCV Defect	AL L2 PCV Defect	521386	0
AL L1 PCV Defect	AL L1 PCV Defect	521386	15
AL L2 PCV2 Defect	AL L2 PCV2 Defect	521387	0
AL L1 PCV2 Defect	AL L1 PCV2 Defect	521387	15
AL Short Cir.Ana.O 1	AL Short Circuit Analog Out 1	521388	6
AL Short Cir.Ana.O 2	AL Short Circuit Analog Out 2	521389	6