Mercedes-Benz
Daimler AG

Adaption Module as Vehicle Control
ADM3

Control Unit Operating Manual

Revision 9.01

Version History

Date	Revision	Changes
2009-12-18	9.01	• Chapter 9.1. (Fault codes diagnosis version 209) and 9.2. (Fault codes listed by K-line code): New fault codes SPN 1136 FMI 0 and FMI 1 (Engine ECU Temperature too High / too Low) from PLD/MR2 added, FMI values 5 and 6 for path 33 (Output Relay 1) changed to 3 and 4 respectively • Chapter 9.1. (Fault codes diagnosis version 209) and 9.2. (Fault codes listed by K-line code): The following changes only apply to engines which are equipped with a SCR system Proprietary Fault Code SPN 520229 FMI 7 changed to standard compliant SPN 4794 FMI 14, SPN 520261 FMI 12 changed to SPN 4332 FMI 12, FMI values for SPNs 1231, 3220 and 171 from PLD/MR2 changed from 8 to 9, FMI values for SPN 520262 from PLD/MR2 changed from 12 to 14 (Mannheim-Function and Wörth-Function now have the same FMI), • Chapter 11.6.3. (DM1 – Diagnostic Message 1, Active Diagnostic Trouble Codes (send)): Repetition rate of J1939 CAN message DM1 adapted to sending also when there are no active faults
2009-12-18	9.00	• Chapters 4.1.1. and 4.2.1. (Group 01 – CAN Configuration): Parameters 01/17 (J1939 Timeout Detection) and 01/18 (SPN Conversion Method) added • Chapters 4.1.3. (Group 03 – Common Limiters): Maximum value of parameter 03/03 (Maximum Road Speed (legal)) changed • Chapters 4.1.13. and 4.2.13. (Group 13 – Inputs): Description of parameter value 0 of parameter 13/13 changed to disabled or stalk switch, Parameter values of parameter 13/37 (Input DSF2) extended by 2 (Enable TSC1 from SA3), 3 (Quit Signal for CC with Stalk Switch) and 4 (Power Rating with DSF2), default value changed from 1 to 0 • Chapters 4.1.18. and 4.2.18. (Group 18 – Engine Protection): Parameter 18/13 (Oil Level Lamp Configuration) added • Chapters 4.1.20. and 4.2.20. (Group 20 – Remote Accelerator Pedal): New parameter 20/07 (HFG Diagnostics Only With Active Pin “FG-Wahl”) • Chapter 7.1.2.2. (Cruise control when using a stalk switch) added • Chapter 7.5.6. (Engine brake operation with a stalk switch) added • Chapter 7.6.6. (Oil level indicator lamp): The usage of the oil level lamp is extended with the help of the new parameter 18/13 (Oil Level Lamp Configuration) for indicating low oil level and engine overspeed as well • Chapter 7.12.8. (Securing of TSC1 message from third source) added • Chapter 7.12.9. (Power Rating with DSF2) added • Chapter 7.13.2. (J1939 Diagnosis) added • Chapter 8.1. (Analog Values): Analog Value “Ambient Air Temperature” added • Chapter 9. (Fault codes): Description of fault locations brought into accordance with newly integrated errors of J1939-signals • Chapter 9.1. (Fault codes diagnosis version 209): Errors broadcasted from the PLD/MR2 newly included because of possibility to be read out via J1939 • Chapter 9.1. (Fault codes diagnosis version 209) and 9.2. (Fault codes listed by K-line code): Change of diagnosis version from 207 to 209, Errors for J1939-signals (FMI 9: Signal Not Available, FMI 19: Received Network Data In Error) as well as messages (FMI 9: Abnormal Update Rate) added, Failure detection of Decompression Valve MBR_KD (ADM3 path 0) and Intake Air Heater (now residing on ADM3 path 40, SPN 729) separated, SPN of path 0 (Decompression Valve MBR_KD) changed to 1072, SPN of path 46 (Exhaust Brake Valve MBR_BK) changed to 1074, Fault codes 11814 (SPN 599, FMI 14), 11914 (SPN 601, FMI 14), 12002 (SPN 609, FMI 2), 19214 (SPN 1633, FMI 14) added • Chapter 9.2. (Fault codes listed by K-line code) added for reverse search of failure codes • Chapters 11.4.1. (Miscellaneous messages) and 11.5.3. (RESET – Reset): Receive message RESET for deleting of trip data over J1939 added • Chapters 11.4.2 (Diagnostic messages), 11.6.1. (Diagnostic Message 13 – Stop Start Broadcast), 11.6.5. (Diagnostic Message 3 – Diagnostic Data Clear/Reset Of Previously Active DTCs), 11.6.6. (Diagnostic Message 4 – Freeze Frame Parameters) and 11.6.7. (Diagnostic Message 11 – Diagnostic Data Clear/Reset For Active DTCs) added

2009-12-16	7.03j	• Chapter 3.2. (Wiring diagram of ADM3) added • Chapter 3.3.3. (12 pin Connector): Description of pin 12/07 corrected to configurable input DSF2 • Chapters 3.3.2. (18 pin Connector) and 3.3.3. (12 pin Connector) and 3.3.4. (15 pin Connector): Parameter numbers noted for relays 1 to 4, DSF0, DSF1, DSF2, IWA • Chapter 4.1. (List of Parameters): Correction of default values of parameters 02/05, 11/10, 14/01, 14/10, 14/21, 16/01, 19/09, 19/10, 19/13 and 19/14 • Chapter 4.1. (List of Parameters): Completion of units in parameter tables • Chapter 4.1. (List of Parameters): Correction of maximum values of parameters 13/02, 13/07 and 14/74 • Chapter 4.1.5 (Group 05 – Limiters LIM0 and LIM1) and 4.1.6. (Group 06 – Limiters AC/LIM2): Minimum values of parameters 05/04, 05/08 and 06/06 changed to -2000Nm • Chapter 4.1.22 (Group 22 – TSC1 Limiter Governor (N max)): Maximum value of parameter 22/01 changed to 4, Parameters 22/01 to 22/04 are visible now • Chapter 7.12.7. (TSC1 Speed Control and Speed Limitation) added • Chapter 8.2. (Binary Values): Binary value 11/2 changed to DSF2 Status • Chapter 9.1. (Fault codes diagnosis version 207): Fault codes 10202, 10900, 12312, 15002 deleted because they are not supported by software • All chapters: Uniform notation PLD/MR2 for engine controller
2009-04-20	7.03i	• Chapter 4.1.22. (Group 22 – TSC1 Limiter Governor (n max)): Default value of parameter 22/20 corrected to 0 • Chapter 11.5.25. (EBC2 – Wheel Speed Information): Signal names of Bytes 5 to 8 corrected
2009-02-10	7.03h	• Chapter 7.3.1. (PWM accelerator pedal): Correction of abstract “Various PWM accelerator pedal types” • Chapter 7.5. (Engine Brake (Retarder)): Parameter 02/13 corrected to 10/13 (Engine Brake Configuration) • Chapter 7.5.3.4. (Exhaust flap and decompression valve at one valve): X 15/10 changed to X 15/06 in Fig. 12 • Chapter 7.5.3. (Engine brake configuration): Reference to PLD parameters 06/01 and 06/02 extended by reference to MR2 parameters depending on diagnosis version in subchapters 7.5.3.1., 7.5.3.2., 7.5.3.3., 7.5.3.4., 7.5.3.5.1., 7.5.3.5.2. and 7.5.3.5.3., “analog valve” changed to “proportional valve”
2009-01-14	7.03g	• Chapters 3.2.1. (21 pin Connector): Description of pin 21/16 corrected • Chapters 3.2.2. (18 pin Connector), 4.1.14. and 4.2.14. (Relay 3/4, AdBlue, NOx, misc.): Parameter value 11 of parameter 14/10 (Configuration Relay 4 (IWK4)) changed to “Reserved” • Chapters 4.1.25 and 4.2.25 (XTempomat) and 4.1.28 and 4.2.28 (Real TimeClock) added • Chapters 4.1.2. and 4.2.2. (Group 2 – Vehicle Parameters I): Parameter value 2 of parameter 02/09 described more precisely • Chapter 4.1.11. (Group 11 – Accelerator Pedal): Default value of parameter 11/08 (PWM Pedal Kickdown Switch Off Threshold) changed to 11% • Chapters 4.1.19. and 4.2.19. (Group 19 – Fan): Description of parameters 13 (DSF0 Fan) and 14 (DSF1 Fan) added • Chapters 4.1.22 (Group 22 – TSC1 Limiter Governor (n max)): Description of not visible parameters 1-8 and 16-18 eliminated • Chapter 7.3.1. (PWM accelerator pedal): Description of parameter issues caused by new PWM pedal type added • Chapters 7.12.2. (Conventional Retarder) and 7.12.3. (Automatic Fan): Correction of parameter numbering of parameters in group 19 (Fan) and 13 (Inputs) • Chapter 7.12.3. (Automatic Fan): Correction of parameter numbering in Fig. 18 • Release of an updated version 6.06d of this manual containing these and other corrections from the release 7 manuals, for detailed description of the changes compare manual 6.06d
2008-07-16	7.03f	• Chapter 4.1.11. (Group 11 – Accelerator Pedal): Default value of parameter 11/09 corrected to 0 • Release of an updated version 6.06c of this manual containing these and other corrections from the release 7 manuals, for detailed description of the changes compare manual 6.06c
2008-02-07	7.03e	• Chapter 11.5.3. (ACK / NACK – Acknowledgment): Default Sender Address from Retarder corrected to 0x0F • Chapter 11.6.3. (DM2 – Diagnostic Message 2, Previously Active Diagnostic Trouble Codes): Identifier corrected to 0x18FECBxx (xx = Sender Address) • Release of an updated version 6.06b of this manual containing these and other corrections from the release 7 manuals, for detailed description of the changes compare manual 6.06b
2008-01-18	7.03d	• Chapter 3.2.4. (15 pin Connector): Description of PIN 15/01 corrected • Chapter 4.1.3. (Group 03 – Common Limiters): Max value of parameter 03/03 corrected

2007-10-17	7.03c	• Chapter 3.2.2. (18 pin Connector): Description of PIN 18/01 updated • Chapter 3.2.3. (12 pin Connector): Description of PIN 12/05, 12/09, 12/10 updated • Chapter 3.2.4. (15 pin Connector): Description of PIN 15/09, 15/11, 15/12 updated • Chapter 4.1.2. (Group 02 – Vehicle Parameters I): Max value of number 03 (Configuration Relay 2 / Grid heater) incremented to 8 • Chapter 4.1.14. (Group 14 – Relay 3/4, AdBlue, NOx, misc.): Max value of number 01 (Configuration Relay 3 (IWK3) incremented to 13 Max value of number 10 (Configuration Relay 4 (IWK4) incremented to 14 • Chapter 4.1.16. (Group 16 – Relay 1 / Starter Lockout): Max value of number 01 (Output Relay 1/Starter Lockout) incremented to 9 • Chapter 4.2.14. (Group 14 – Relay 3/4, AdBlue, NOx, misc.): Parameter values for number 01 and 10 updated • Chapter 8.1. (Analog Values): Description of value 18 changed from "%" to 0 = Switch defective 1 = Warning 2 = Pre warning 3 = Coolant level normal • All Chapters: changed DaimlerChrysler to Daimler
2007-10-15	7.03b	• Chapter 9. (Fault codes): Fault 639/2 is renamed from "CAN identifier ETC#1 or ACC#1 is missing" to "At least one J1939 message is missing"
2007-09-13	7.03	• Chapter 4. (Parameters): Change of order of parameters 01/13, 01/14, 01/16 in group 01: "Send Free Running Telegram on K line" from 01/13 to 01/16, "SAE J1939 Source Address ACC" from 01/14 to 01/13, "SAE J1939 Source Address Ambient Temperature" from 01/16 to 01/14; • Chapter 4. (Parameters): Extension of parameter values for relays 1..4 for NOx lamp, Relay 1 Par. 16/01 case 9, Relay 2 Par. 02/03 case 8, Relay 3 Par. 14/01 case 13, Relay 4 Par. 14/10 case 14; • Chapter 4. (Parameters): Move of parameter "Fan Type" from 14/21 to 19/01, therefore change of numbering of subsequent parameters in both groups; • Chapter 4. (Parameters): Parameter 14/33 "freebyte 2" changed to 14/32 "NOx torque reduction"; • Chapter 4. (Parameters): Group 14 is renamed from "Relay 3/4" to "Relay 3/4, AdBlue, NOx, misc.", Group 19 is renamed from "Automatic Fan Activation" to "Fan"; • Chapter 4. (Parameters): Change of default values of parameters 18/01 "Engine Protection Shutdown on Coolant Temperature" from 1 to 0 and 18/03 "Engine Protection Shutdown on Oil Pressure" from 1 to 0; • Chapter 4. (Parameters): Change of default value of parameter 19/01 "Fan Type" from 0 to 251; • Chapter 11. (CAN messages according to SAE J1939): CAN message "Auxiliary Input/Output Status 1" extended by the status information of the NOx torque limitation (Byte 4, Bits 4,3); • Chapter 11. (CAN messages according to SAE J1939): Length of CAN message "Engine Configuration 1" changed from 29 to 34 in accordance to newer versions of the J1939 standard; • Chapter 11. (CAN messages according to SAE J1939): Integration of malfunction indicator lamp in message "Diagnostic Message 1" (sending), support of flashing of amber warning lamp, red stop lamp and malfunction indicator lamp; • Chapter 11. (CAN messages according to SAE J1939): Support of CAN message "Diagnostic Message 2".
2007-09-13	6.06	• Complete redesign of the operating manual; • Version number of the operating manual corresponds with the delivered ADM3 software version; • Chapter 11. (CAN messages according to SAE J1939) rewritten because of a lot of new supported J1939 CAN messages since software version 4.23 of the last operating manual release; • Significant changes in chapter 4. (Parameters) and a few changes in chapter 9. (Fault codes) and 10. (Routines for ADM3).

Table of Abbreviations

Abbreviation	Meaning
ABS	Anti-lock braking system
ADM3	Adaption module as vehicle control, new version, also denoted as ADM3-FR in this manual
ADR	PTO speed control
BK	Engine retarder flap, also MBR-BK
C3/B7	Speed signal C3/B7
CAN	Control Area Network
CC+	Cruise Control Resume and Acceleration
CC-	Cruise Control Set and Decelerate
CC_EIN	Cruise Control, Cruise control on-off switch
EEPROM	Electrical erasable and programmable read only memory
EMV	EMC/electromagnetic compatibility
EWG	European economic communities in the European Community, precursor of the EU
FFG	The foot throttle actuator is the accelerator pedal
FMR	Vehicle control for Mercedes-Benz commercial vehicles type Actros or type Atego
FSBE	Input for the switching state of the parking brake
HFG	Remote pedal
Highside Schalter	Switch (switched to battery voltage)
IWA	Actual value output
K-Leitung	Serial communication- and diagnosis line
KD	Constantly open valve, also MBR-KD
Lowside Schalter	Switch (switched to ground)
MBR	Engine brake
MCAN	Engine CAN data bus between ADM3 and PLD/MR2
Minidiag 2	Diagnosis- and configuration unit for the ADM3
MR2	Engine control unit, successor of PLD unit
NE	Input for transmission position Neutral
PLD/MR2	Engine control type PLD (for the injection principle pump-line-nozzle)
PTO	Power Take Off
PWM	Pulse width modulation
SAE J1939	CAN data bus according to standard SAE J1939

Table of Contents

List of Figures

1. Safety

1.1. Symbols

The instructions which follow are shown against various symbols.

Risk of injury!

This symbol appears against all safety instructions which must be complied with in order to avoid a direct risk of danger to life and limb.

This symbol is used against all safety instructions which, if disregarded, could give rise to the danger of material damage or malfunctions.

1.2. General information

Risk of potentially fatal accident!

The ADM3 vehicle control adaption module is essential for defining the functions of the engine and vehicle. Functions such as engine start, engine stop, accelerator pedal evaluation, actuation of engine brake etc. are relevant to safety.
Incorrectly performed modifications to the parameters or tampering with the wiring can cause far-reaching changes to the performance of the engine and/or vehicle. This can lead to personal injury and material damage.

The ADM3 control unit has been developed and tested in accordance with the Daimler Specifications for Operating Safety and EMC Compatibility. The manufacturer of the vehicle or equipment is solely responsible for the examination and implementation of applicable legal stipulations.

1.3. Use for the intended purpose

The Mercedes-Benz Engine and the ADM3 control unit are only to be used for the purpose stated in the contract of purchase. Any other use or an extension of the stated use will be regarded as not conforming to the engine's intended purpose.

Daimler AG cannot accept any liability for damage resulting from such use.

Liability for damage resulting from the engine not having been used for its intended purpose shall rest solely with the manufacturer of the complete machine or vehicle in which the engine is installed.

These ADM3 Operating Instructions and the engine Operating Instructions must be observed.

1.4. Personnel requirements

Work on the electrics and programmed parameters must only be carried out by especially skilled persons or those who have received training from Daimler, or by specialists employed by a workshop authorized by Daimler.

1.5. Conversions and modifications to the ADM3

Unauthorized modifications to the ADM3 could affect the operation and safety of the vehicle/machine in which it is installed. No responsibility will be accepted for any resulting damage.

1.6. Installation

The guidelines and instructions in chapter 5 must be observed.

1.7. Organizational measures

These Operating Instructions should be handed to personnel entrusted with the operation of the ADM3 and should, whenever possible, be stored in an easily accessible place.
With the aid of these Operating Instructions, personnel must be familiarized with the operation of the ADM3, paying special attention to the safety-relevant instructions applicable to the engine.
This applies in particular to personnel who only work on the engine and ADM3 occasionally. In addition to these Operating Instructions, comply with local legal stipulations and any other obligatory accident prevention and environmental protection regulations which may apply in the country of operation.

1.8. Safety precautions for engines with electronic control units

Risk of accident!

When the vehicle electrics are first operated, the drive train must be open (transmission in neutral). The engine could start unexpectedly due to incorrect wiring or unsuitable parameter programming. If the drive train is closed (transmission not in neutral), the vehicle could unexpectedly start moving or set the working machine in operation, constituting a risk to life and limb.

The safety precautions stated below must be applied at all times in order to avoid damage to the engine, its components and wiring, and to avoid possible personal injury.

- Only start the engine with the batteries securely connected.
- Do not disconnect the batteries when the engine is running.
- Only start the engine with the engine speed sensor connected.
- Do not start the engine with the aid of a rapid battery charger. If emergency starting is necessary, only start using separate batteries.
- The battery terminal clamps must be disconnected before a rapid charger is used. Comply with the operating instructions for the rapid charger.
- If electric welding work is to be performed, the batteries must be disconnected and both cables (+ and -) secured together.
- Work is only to be performed on the wiring and connectors are only to be plugged/unplugged with the electrical system switched off.
- The first time starting up the engine, the possibility must be provided to switch off the voltage supply to the PLD/MR2 engine control and to the ADM3 adaption module in an emergency. If it is incorrectly wired up, it may no longer be possible to switch off the engine.
- Interchanging the poles of the control unit's voltage supply (e.g. by interchanging the battery poles) can damage the control unit beyond repair.
- Fasten connectors on the fuel injection system with the specified tightening torque.
- Only use properly fitting test leads for measurements on plug connectors (Daimler connector set).

If temperatures in excess of 80 °C (e.g. in a drying kiln) are to be expected, the control units must be removed as they could be damaged by such temperatures.

Telephones and two-way radios which are not connected to an external aerial can cause malfunctions in the vehicle electronics and thus jeopardize the engine's operating safety.

1.9. Daimler original parts

Daimler original parts are subject to the most stringent quality checks and guarantee maximum functional efficiency, safety and retention of value.
Each part is specially designed, produced, selected and approved for Daimler. For this reason, we are obliged to disclaim all liability for damage resulting from the use of parts and accessories which do not meet the above requirements.

In Germany and various other countries, certain parts (for instance parts relevant to safety) are only officially approved for installation or conversion work if they comply with valid legal stipulations.
These regulations are assured to be satisfied by Daimler original parts.

If other parts, which have not been tested and approved by Daimler, are installed - even if in individual circumstances they have been granted an official operating permit - Daimler is unable to assess them or grant any form of warranty, although the company endeavors to monitor market developments as far as possible. The installation of such parts may therefore restrict the validity of the warranty.

1.10. Safety and emergency running mode

The ADM3, FMR and PLD/MR2 electronic engine control units monitor the engine and carry out self-diagnosis. As soon as a fault is detected it is evaluated by the control unit and one of the following measures is initiated:

- Faults during operation are indicated by the warning lamps being activated.
- Switch-over to a suitable substitute function for continued, albeit restricted engine operation (e.g. constant emergency engine speed).

Have any faults rectified without delay by the responsible Daimler Service Station.

Note:
The Daimler diagnosis tester minidiag2 is connected to the 14 pin diagnosis socket (on the unit). The minidiag2 can be used to read off the fault codes of the ADM3. ADM3 fault codes and their meanings are described in chapter 9.

Note:
Defective units which are still within the period of warranty cover (6 months from Daimler dispatch date) must be returned to the Daimler field service organization.

2. Operation

2.1. Introduction

Daimler 500, 900 and 450 series engines are equipped with an electronic engine control (PLD/MR2). The PLD/MR2 monitors and determines all values which are required for the operation of the engine (e.g. begin of injection, load level, ambient conditions, sensor evaluation, etc.).
The connection to the vehicle is made via a CAN interface, which digitally transmits the nominal values (e.g. torque, engine speed specification etc.) and the actual values (e.g. engine speed, oil pressure etc.).

The vehicle control adaption module (ADM3) contains the CAN interface required by the PLD/MR2 and allows the operator to implement his requirements on the engine. On the one hand the ADM3 allows the use of conventional gauges and at the same time provides a conventional interface for special functions. Predefined engine control settings, e.g. torque/rpm limitations or a specified, predefined set engine speed, can be selected using signal switches. Routines stored in the control unit can be optimally adapted to the respective application with parameter programming. A diagnosis interface is provided to connect up an external diagnosis tester (e.g. minidiag2).

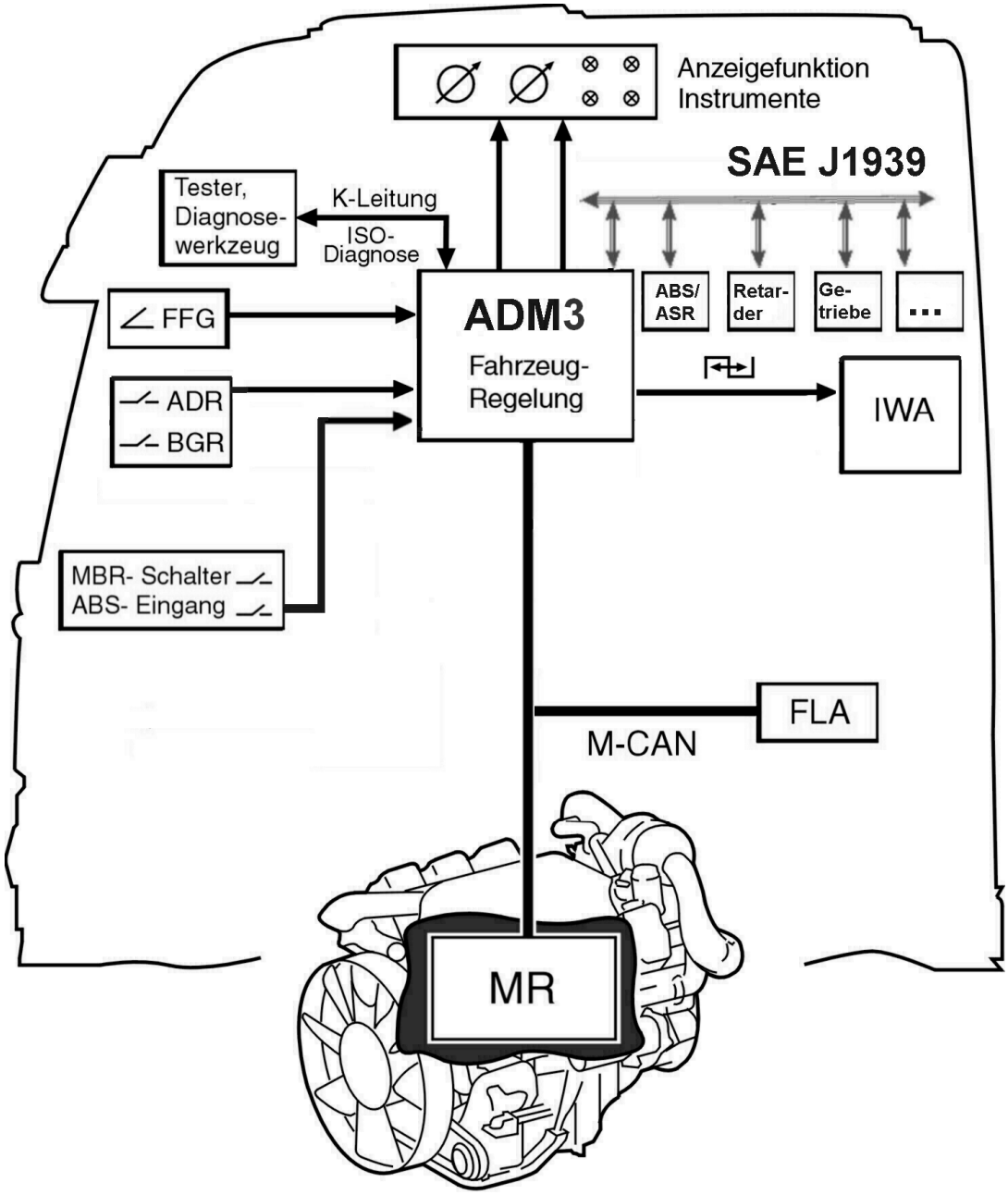


Fig. 1: Adaption module as vehicle control (ADM3):

ABS	= Anti-block brake system
ADR	= PTO speed control
ABS/ASR	= Control unit for anti-block brake system or traction control
BGR	= Limitations
FFG	= Accelerator pedal: torque demand (driving mode) or speed demand (PTO operating mode)
FLA	= Flame-start system
Gearbox	= Control unit for the transmission
ISO	= International Organization for Standardization (e.g. diagnostic line / ISO 9141)
IWA	= Actual value output (for automatic transmission, customer-specific electronics,...)
MBR	= Engine brake
MR	= Engine control for the injection principle pump-line-nozzle (is in this case PLD/MR2)
Retarder	= Control unit for a retarder
SAE J1939	= Data bus according to standard SAE J1939

2.2. Tasks

The tasks of the ADM3 can be split into three areas:
– Functions
– Inputs
– Outputs

2.2.1. Functions

- Driving mode: torque demand to engine control (PLD/MR2)
- PTO speed control: Specified rpm to engine control (PLD/MR2).
- Engine start, engine stop
- Accelerator pedal evaluation, monitoring, fault evaluation
- Engine brakes
- Speed limitation
- Cruise control
- Temposet
- Parameter memory
- Fault memory
- Diagnosis interface for a diagnosis unit e.g. Minidiag2
- Diagnosis intersections: Implementation of K-wire diagnosis to CAN diagnosis only for the engine control PLD/MR2
- Linking with SAE J1939 (High-Speed-CAN-Bus)

2.2.2. Inputs

The ADM3 has **digital inputs** for
- Special functions, e.g. linkup with conventional ABS control unit
- External engine start and engine stop
- Engine Protection Shutdown
- Activating limitations
- Speed adjustment
- Parking brake and driving brake
- Cruise control
- Engine brake (stage 1 and stage 2)
- Transmission „neutral“ position
- Rear axle
  Note: The function is not yet available for the inputs reverse gear, clutch 2 and generator terminal W.

The ADM3 has **analog inputs** for
- Accelerator pedal (analog foot throttle actuator)
- Remote accelerator pedal (analog manual throttle actuator)
- Coolant level sensor
- Air filter sensor

2.2.3. Outputs

The ADM3 has outputs for
- Engine brakes (engine retarder flap and constantly open valve)
- Connection of indicator and warning lamps
  – Oil level
  – Lamp red with buzzer (engine stop)
  – Lamp yellow for interference (e.g. oil pressure too low)
  – Heater flange (cold-start device)
  – Air filter
- Connection of measuring instruments
  – Oil pressure*

  - Coolant temperature*
  - Engine speed
- Customer-specific electronics
  - Actual value output IWA (e.g. for automatic transmission)
  - Relay output (e.g. kickdown)

Note*: Either measuring instruments or warning lamps can be connected to the instrument outputs for oil pressure and for coolant temperature.

3. Construction

3.1. Images of the vehicle control adaption module ADM3

Fig. 2: **Diagonal view of ADM3**
Black space for the type label
Connector sizes from the left to the right:
- Connector 15 pin
- Connector 18 pin
- Connector 12 pin
- Connector 21 pin

Fig. 3: Installation position in the vehicle or view of rear side of the ADM3
Connector sizes from the left to the right:
- Connector 21 pin
- Connector 12 pin
- Connector 18 pin
- Connector 15 pin

Fig. 4: **View of connector side of ADM3**
Connector sizes from the left to the right:
- Connector 15 pin
- Connector 18 pin
- Connector 12 pin
- Connector 21 pin

3.2. Wiring diagram of ADM3

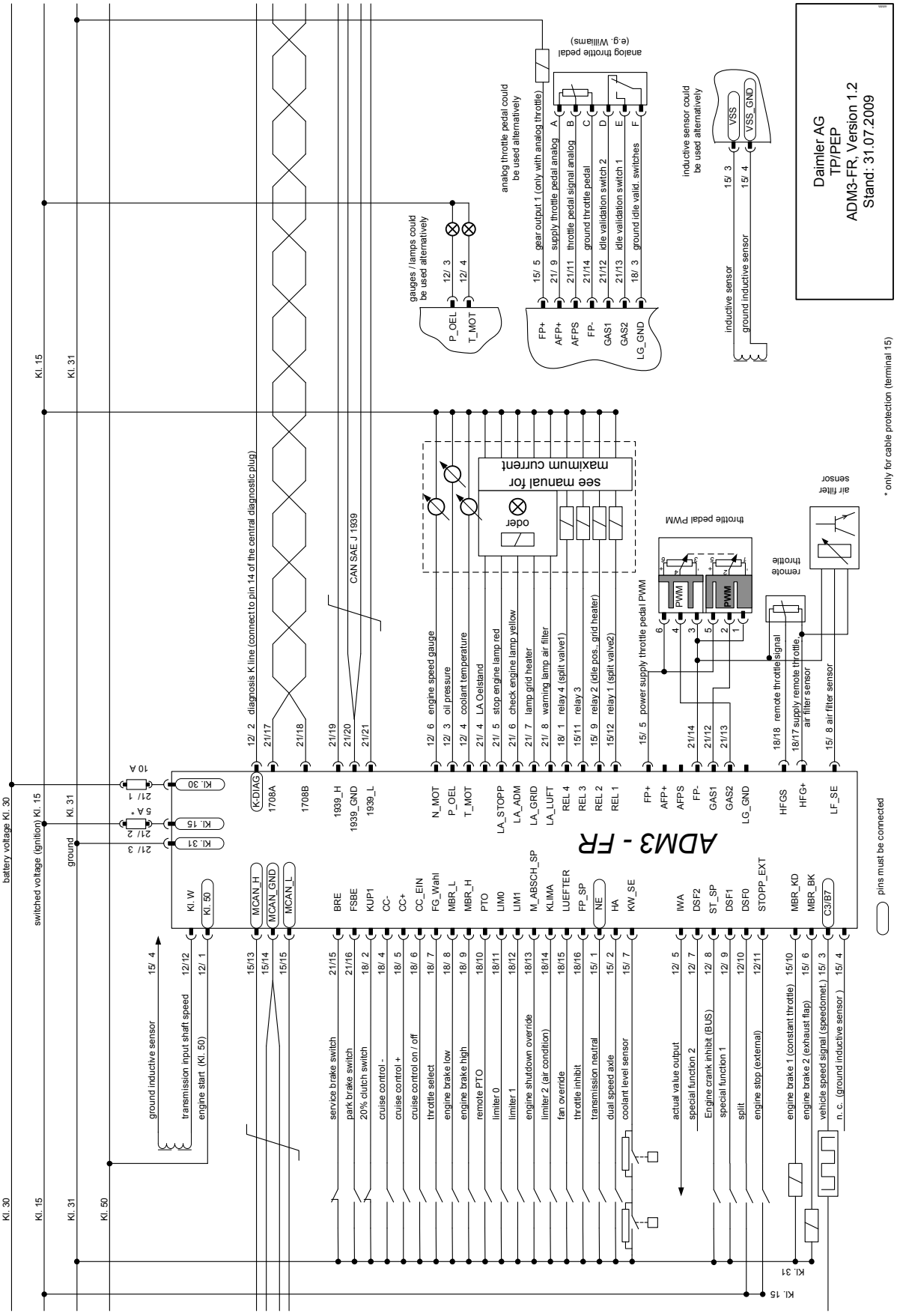


Fig. 5: Wiring diagram of ADM3

3.3. Functional description of the ADM3 pins

3.3.1. 21 pin Connector

21 pin connector				
pin	**type**	**function**	**shortcut**	**description**
21/01		battery voltage	Kl. 30	supply voltage (12V/24V)
21/02	DE	ignition (switched battery voltage)	Kl. 15	ignition switch (terminal 15)
21/03		Ground	Kl. 31	battery ground
21/04	A	warning lamp oil level	LA_OELST	Output active, if oil level too low. Feature only available if oil level sensing enabled. If output is active while engine is running, shut down engine immediately and initiate a maintenance respectively an error diagnosis as soon as possible.
21/05	A	stop engine lamp (buzzer)	LA_STOP	output active, if major faults active, e.g. oil pressure very low If output is active while engine is running, shut down engine immediately and initiate a maintenance respectively an error diagnosis as soon as possible.
21/06	A	check engine lamp (yellow)	LA_ADM	output active, if faults active, e.g. oil pressure too low or ecu detects external input and output faults. If output is active while engine is running, shut down engine immediately and initiate a maintenance respectively an error diagnosis as soon as possible.
21/07	A	lamp Grid heater	LA_GRID	output active, while preheating phase. Lamp off shows engine start is enabled.
21/08	A	warning lamp air filter	LA_LUFT	output active, if air filter loaded.
21/09		power supply throttle pedal analog	AFP+	power supply of analog throttle pedal, e.g. Williams pedal terminal C.
21/10				reserved
21/11	AE	throttle pedal signal analog	AFPS	sensor voltage proportional to pedal position e.g. input for Williams pedal terminal A.
21/12	IE	PWM throttle signal, path 1	GAS1	sensor signal PWM pedal path 1, e.g. VDO pedal terminal 2/9
		idle validation switch 2 (throttle active)		e.g. Williams pedal terminal D
21/13	IE	PWM throttle signal, path 2	GAS2	sensor signal PWM pedal path 2, e.g. VDO pedal terminal 4/9
		idle validation switch 1 (idle active)		e.g. Williams pedal terminal E
21/14		ground throttle pedal	FP-	PWM pedal ground, e.g. VDO pedal terminal 1/9 and 3/9.
				analog pedal ground, e.g. Williams pedal terminal B
21/15	DE	service brake switch	BRE	switch to ground. Switch open, if service brake is depressed
21/16	DE	park brake switch	FSBE	switch to ground. Switch closed, if park brake is engaged
21/17	E/A	SAE 1708, A	1708A	available since diagnosis version 203
21/18	E/A	SAE 1708, B	1708B	available since diagnosis version 203
21/19	E/A	SAE J1939 CAN High (vehicle can)	1939_H	SAE 1939 vehicle CAN high line
21/20		CAN HF Ground	1939_GND	SAE J1939 (HF-ground).
21/21	E/A	SAE J1939 CAN Low (vehicle can)	1939_L	SAE 1939 vehicle CAN low line

A = output
DE = digital input
IE = pulse input
E/A = input/output (bidirectional)
AE = analog input

3.3.2. 18 pin Connector

18 pin connector				
pin	**type**	**function**	**shortcut**	**description**
18/01	A	relay 4	REL4	Output of the actual value comparator 4 (IWK4): Parameter values of parameter 14/10: 0 = Acc. Pedal kickdown position 1 = Actual value torque 2 = Vehicle speed 3 = Engine speed 4 = Coolant temperature (lamp, temp. to low) 5 = Pedal torque 6 = Boost air temperature 7 = Oil pressure (MR threshold) 8 = Coolant temperature (MR threshold) 9 = Off 10 = Reserved 11 = Reserved 12 = MI-Lamp 13 = AdBlue Level Warning Lamp 14 = NOx Lamp
18/02	DE	clutch linked switch 1	KUP1	switch to ground. Switch open, if clutch is depressed.
18/03	A	ground idle validation switches	LG_GND	separate ground of idle validation switches, e.g. Williams pedal terminal F.
18/04	DE	cruise control CC-	CC-	normally open push-button for cruise control „set and decelerate“
18/05	DE	cruise control CC+	CC+	normally open push-button for cruise control „resume and accelerate“.
18/06	DE	cruise control on/off	CC_EIN	switch to ground, normally open, enables cruise control, if closed.
18/07	DE	throttle select	FG_WAHL	switch to ground, normally open, disables acc. pedal and enables remote pedal, if closed.
18/08	DE	engine brake low	MBR_L	engine brake input switches MBR_H und MBR_L: switch to ground, normally open, 0: not active, 1: active H L 0 0 engine brakes disabled 0 1 engine brake step1: decompression valve enabled 1 0 engine brake step2: decompression valve and exhaust flap enabled 1 1 not implemented
18/09	DE	engine brake high	MBR_H	
18/10	DE	remote PTO	PTO	input to activate remote PTO control
18/11	DE	limiter 0	LIM0	Input for the activation of limitations via pin LIM0. During active input these limitations are always effective.
18/12	DE	limiter 1	LIM1	Input for the activation of limitations via pin LIM1. During active input these limitations are always effective.
18/13	DE	engine shutdown override	MABSCH_SP	This input prevents automatic engine shut down, if engine shutdown is enabled
18/14	DE	limiter 2 (air condition)	KLIMA	Input for the activation of limitations via pin LIM1. During active input these limitations are always effective, (e.g. increased idle speed for air conditioner).
18/15	DE	fan override	LUEFTER	switch to ground, normally open, activates fan, if closed
18/16	DE	throttle inhibit	FP_SP	switch to ground, normally open, disables acc. pedal and remote pedal, if closed.
18/17		power supply remote throttle, air filter sensor	HFG+	Supply voltage for remote throttle and air cleaner sensor.
18/18	AE	remote throttle signal	HFGS	The voltage at the sensor is proportional to the remote pedal position.

A = output
DE = digital input
IE = pulse input
E/A = input/output (bidirectional)
AE = analog input

3.3.3. 12 pin Connector

12 pin connector				
pin	**type**	**function**	**shortcut**	**description**
12/01	IE	engine start, terminal 50	Kl. 50	switch to battery voltage, normally open, activates starter, if closed.
12/02	E/A	diagnosis K – line	K_DIAG	K-line diagnosis interface.
12/03	A	oil pressure	P_OEL	low side output, short protected configurable for - analog oil pressure gauge - warning lamp oil pressure (pressure too low)
12/04	A	coolant temperature	T_MOT	low side output, short protected configurable for - analog coolant temperature gauge - warning lamp coolant temperature (temperature too low)
12/05	A	actual value output (PWM)	IWA	Configurable output for actual values, values of parameter 09/01: 0 = output disabled 1 = pedal torque (10% .. 90 %) 2 = differential torque (limit load control) 3 = inverse pedal torque (90% .. 10 %) 4 = actual torque 5 = actual load (automatic transmission) 6 = vehicle speed 7 = demand speed 8 = demand speed CC+/- 9 = AGS2 transmission Temp indication lamp off 10 = AGS2 transmiss. Temp indication lamp on 11 = AdBlue level 10 .. 90%
12/06	A	engine speed gauge	N_MOT	low side output for engine speed gauge (signal definition for speed gauges driven by generator terminal W, ratio configurable)
12/07	DE	configurable input	DSF2	Configurable input, switch to ground, normally open. Values of parameter 13/37: 0 = not active 1 = clutch 2 2 = enable TSC1 from SA3
12/08	DE	engine-hood switch	MOKL	Switch to ground. Normally open. If switch is closed: indicates opened engine-hood. Engine start via terminal 50 or J1939 ESS is locked.
12/09	DE	configurable input	DSF1	Configurable input, switch to ground, normally open Values of parameter 13/18: 0 = disable 1 = enable ABS input 2 = enable retarder input 3 = enable temposet 4 = enable grid heater detection 5 = switchable torque demand 6 = drive on super structure 7 = throttle inhibit super structure 8 = SPLIT select 9 = zerotorque superstructure
12/10	DE	configurable input	DSF0	Configurable input, switch to battery voltage, normally open Values of parameter 13/17: 0 = disable 1 = enable ABS input 2 = enable retarder input 3 = enable temposet 4 = enable grid heater detection 5 = switchable torque demand 6 = drive on super structure 7 = throttle inhibit super structure 8 = SPLIT select 9 = zerotorque superstructure
12/11	DE	engine stop (external)	STOP_EXT	switch to battery voltage, normally open stops engine, if closed
12/12	IE	engine speed alternator (terminal W)	Kl. W	feature not yet available

A = output
DE = digital input
IE = pulse input
E/A = input/output (bidirectional)
AE = analog input

3.3.4. 15 pin Connector

15 pin connector				
pin	**type**	**function**	**shortcut**	**description**
15/01	DE	transmission neutral	NE	switch to ground, normally open, closed if transmission is in neutral position, disables engine start, if open
15/02	DE	dual speed axle	HA	switch to ground, normally open, sets speed ratio, if closed
15/03	IE	vehicle speed signal, tachometer	C3/B7	vehicle speed input for tachometer, signal C3 (B7).
15/04				reserved
15/05	A	power supply throttle pedal PWM	FP+	configurable high side output. - power supply for PWM pedal, e.g. VDO pedal terminal 5/9 und 6/9.
		gear output 1		- output for modulation valve (e.g. Allison automatic transmission).
15/06	A	engine brake 2, exhaust flap	MBR_BK	configurable high side output. - output for exhaust flap. <u>Note to engine break 2</u> If exhaust flap and constant throttle are operating on a single solenoid valve, then this output is not used. The output 15/10 drivers both engine breaks.
15/07	AE	coolant level sensor	KW_SE	analog input for coolant level sensor (two stage resistance coded sensor)
15/08	AE	air filter sensor	LF_SE	analog differential pressure sensor for air filter load
15/09	A	relay 2	REL2	Configurable high side output Values of parameter 02/03: 0 = disabled 1 = grid heater pin 15/9 2 = acc. pedal idle position (pin 21/7) 3 = grid heater pin 15/10 Par 2/5 must be 0 or 2 4 = grid heater MR or FLA 5 = AGS2 backup lamp 6 = MI-Lamp 7 = AdBlue Level Warning Lamp 8 = NOx Lamp
15/10	A	engine brake 1, decompression valve	MBR_KD	Configurable high side output. - output for decompression valve (constant throttle). <u>Note engine break 1</u> If exhaust flap and constant throttle are operating on a single solenoid valve, then this output (15/10) drivers both engine breaks.

15/11	A	relay 3	REL3	Configurable low side output for actual values (actual value comparator 3 (IWK3)) Values of parameter 14/01: 0 = Acc. Pedal kickdown 1 = Actual torque 2 = Road speed 3 = Engine speed 4 = Coolant temperature 5 = Pedal torque 6 = Boost temperature 7 = Oil pressure (MR threshold) 8 = Coolant temperature (MR threshold) 9 = off 10 = reserved 11 = MI-Lamp 12 = AdBlue Level Warning Lamp 13 = NOx Lamp
15/12	A	relay 1	REL1	Configurable low side output for actual values Values of parameter 16/01: 0 = disable 1 = enable starter lockout 2 = enable kick down output 3 = enable modulat. Relay Allison transm. 4 = reserved 5 = split valve 2 6 = starter lockout & AGS2 7 = MIL Lamp 8 = AdBlue Level Warning Lamp 9 = NOx Lamp
15/13	E/A	engine CAN (High)	MCAN_H	engine CAN high line
15/14		CAN Ground (HF)	MCAN_GND	engine CAN- (HF-ground)
15/15	E/A	engine CAN (Low)	MCAN_L	engine CAN low line

A = output
DE = digital input
IE = pulse input
E/A = input/output (bidirectional)
AE = analog input

3.4. Technical data of pin assignment

3.4.1. Power supply

Power supply						
pin	**function**	**abbreviation**	**U_{MAX}**	**U_{MIN}**	**I_{MAX}**	**further data**
21/01	battery voltage	Kl. 30	32 V at UB=24 V, 16 V at UB=12V	16 V at UB=24 V, 10 V at UB=12V	300 mA	no external load
					50 µA	ADM3 switched off
21/02	ignition (switched battery voltage)	Kl. 15	UB			Pull down resistor 30 kOhm
21/03	ground	Kl. 31				battery ground
21/09	power supply throttle pedal analog	AFP+	5 V	5 V	10 mA	stabilized and short protected
21/14	ground throttle pedal	FP-			100 mA	short protected, ground connection for PWM FFG, e.g. VDO FFG, terminal1/9 und 3/9.
					100 mA	short protected, ground connection for analog FFG, e.g. Williams FFG terminal B.
18/17	power supply remote throttle, air filter sensor	HFG+	5 V	5 V	10 mA	stabilized and short protected
15/04						reserved

3.4.2. Dynamic inputs (IE)

Dynamic inputs (IE)						
pin	**function**	**abbreviation**	**f**	**U_{LOW}**	**U_{HIGH}**	**further data**
21/12	PWM throttle signal, path 1	GAS1	220 Hz	< 1,5 V	> 5,5 V	pull up resistor, 39kOhm
	idle validation switch 2 (throttle active)					pull up resistor, 39kOhm
21/13	PWM throttle signal, path 2	GAS2	220 Hz	< 1,5 V	> 5,5 V	pull up resistor 39 kOhm
	idle validation switch 1 (idle active)					pull up resistor, 39kOhm
15/03	vehicle speed signal, tachometer	C3/B7		< 2,5 V	> 6,4 V	pull down resistor47 kOhm
12/01	engine start, terminal 50	Kl. 50		< 4,0 V	> 6,6 V	rising edge detection, pull down resistor 7,7 kOhm
12/12						reserved

3.4.3. Digital inputs (DE)

Digital inputs (DE)							
pin	**function**	**abbreviation**	**U_{MAX}**	**U_{MIN}**	**U_{LOW}**	**U_{HIGH}**	**further data**
21/15	service brake switch	BRE	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
21/16	park brake switch	FSBE	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/02	clutch switch	KUP1	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm

Digital inputs (DE)							
pin	**function**	**abbreviation**	**U_{MAX}**	**U_{MIN}**	**U_{LOW}**	**U_{HIGH}**	**further data**
18/04	cruise control CC-	CC-	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/05	cruise control CC+	CC+	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/06	cruise control on/off	CC_EIN	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/07	throttle select	FG_WAHL	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/08	engine brake low	MBR_L	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/09	engine brake high	MBR_H	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/10	remote PTO	PTO	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/11	limiter 0	LIM0	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/12	limiter1	LIM1	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/13	engine shutdown override	MABSCH_SP	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/14	limiter 2 (air condition)	KLIMA	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/15	fan override	LUEFTER	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/16	throttle inhibit	FP_SP	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
15/01	transmission neutral	NE	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
15/02	dual speed axle	HA	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
12/07	feature not yet available						
12/08	feature not yet available						
12/09	configurable input	DSF1	UB	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
12/10	configurable input	DSF0	UB	0 V	< 3,5 V	> 8,2 V	pull down resistor 7,7kOhm
12/11	engine stop (external)	STOP_EXT	UB	0 V	< 3,5 V	> 8,2 V	pull down resistor 7,7kOhm

3.4.4. Analog inputs (AE)

Analog inputs (AE)					
pin	**function**	**abbreviation**	**U_{MAX}**	**U_{MIN}**	**further data**
21/11	throttle pedal signal analog	AFPS	5 V	0 V	e.g. Williams pedal terminal A, pull down resistor 47 kOhm to ground
18/18	remote throttle signal	HFGS	5 V	0 V	pull up resistor 200 kOhm to 5 V
15/07	coolant level sensor	KW_SE	5 V	0 V	pull up resistor 440 Ohm to 5 V
15/08	air filter sensor	LF_SE	5 V	0 V	pull up resistor 200 kOhm to 5 V

3.4.5. Output for indicating instruments (A)

Output for indicating instruments (A)							
pin	**function**	**abbreviation**	**I_{MAX}**	**U_{MAX}**	**U_{MIN}**	**f**	**further data**
12/03	oil pressure	P_OEL	120 mA	UB	0 V		a) analog low side driver oil pressure gauge, short protected b) low side switch for warning lamp
12/04	coolant temperature	T_MOT	120 mA	UB	0 V		a) analog low side driver coolant temperature gauge, short protected b) low side switch for warning lamp
12/05	actual value output (PWM)	IWA	50 mA	UB	0 V	300 Hz	PWM low side driver, pull up resistor 4,7 kOhm, short protected
12/06	engine speed gauge	N_MOT	50 mA	UB	0 V	0...8 kHz	frequency low side driver pull up resistor 4,7 kOhm, short protected

3.4.6. Driver outputs (A)

Driver outputs (A)						
pin	**function**	**abbreviation**	**I_{MAX}**	**U_{MAX}**	**P_{MAX} lamp**	**further data**
21/04	warning lamp oil level	LA_OELST	250 mA	UB	2 W at 12 V	low side relay driver, short protected
21/05	stop engine lamp (buzzer)	LA_STOP	250 mA	UB	2 W at 12 V	low side relay driver, short protected
21/06	check engine lamp (yellow)	LA_ADM	150 mA	UB	2 W at 12 V	low side relay driver, short protected
21/07	lamp grid heater	LA_GRID	250 mA	UB	2 W at 12 V	low side relay driver, short protected
21/08	warning lamp air filter	LA_LUFT	250 mA	UB	2 W at 12 V	low side relay driver, short protected
18/01	relay 4	REL4	1,3 A	UB		low side relay driver, short protected
18/03	ground idle validation switches	LG_GND	250 mA	0 V		input for Williams pedal terminal F
15/05	power supply throttle pedal PWM	FP+	2 A	UB		high side driver
	gear output 1					high side driver
15/06	engine brake 2, exhaust flap	MBR-BK	2 A	UB		high side relay driver
15/09	relay 2	REL2	2 A	UB		low side relay driver, short protected
15/10	engine brake 1, constant throttle	MBR-KD	1,8 A	UB		high side relay driver
15/11	relay 3	REL3	250 mA	UB		low side relay driver, short protected
15/12	relay 1	REL1	1,3 A	UB		low side relay driver, short protected

3.4.7. Communication interface (E/A)

Communication interface (E/A)						
pin	**function**	**abbreviation**	**I_{MAX}**	**U_{MAX}**	**P_{MAX} lamp**	**further data**
21/17	SAE 1708, A	1708A				only partly implemented
21/18	SAE 1708, B	1708B				only partly implemented
21/19	SAE J1939 CAN (High)	1939_H	5 V			
21/20	CAN-HF-Ground	1939_GND	GND			100 nF to ground
21/21	SAE J1939 CAN (Low)	1939_L	5 V			
15/13	Engine -CAN (High)	MCAN_H		2/3 UB	1/3 UB	ISO/DIS 11992, one wire capability
15/14	CAN-HF-Ground	MCAN_GND	GND			100 nF to ground
15/15	Engine-CAN (Low)	MCAN_L		2/3 UB	1/3 UB	ISO/DIS 11992, one wire capability
12/02	k-line	K_DIAG	UB	UB	0 V	

4. Parameters

The parameters of the ADM3 are divided into 27 groups. Each parameter group corresponds to a functional group.
The parameters correspond with the configuration of minidiag2 in version 4.35.

Following abbreviations are used in the following tables:

Abbreviation	Description	Values
A	Access Level	P = Plant S = Service C = Customer O Others
C	Changeable	Y = Yes N = No
V	Visible	Y = Yes N = No
def.	Default value	

4.1. List of Parameters

4.1.1. Group 01 – CAN Configuration

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Engine CAN One Wire Capability	P	Y	Y	0	1	1		0 = Two Wire Mode Only 1 = Enable One Wire Mode
02	Engine CAN Limp Home Mode	S	Y	Y	0	3	3		Limp home mode if engine CAN fails: 0 = idle speed 1 = engine stop 2 = limp home speed 3 = limp home speed
03	SAE J1939 3. Source Address TSC1	S	Y	Y	0	255	231		e.g. jack knife control
04	SAE J1939 Source Address Motor	P	Y	Y	0	255	0		
05	SAE J1939 Source Address Engine Brake	P	Y	Y	0	255	15		
06	SAE J1939 Source Address Transmission	P	Y	Y	0	255	3		
07	SAE J1939 Source Address ABS	P	Y	Y	0	255	11		
08	SAE J1939 Source Transmission Retarder	P	Y	Y	0	255	10		
09	SAE J1939 Source Address CC1	P	Y	Y	0	255	23		
10	SAE J1939 Source Address CC2	P	Y	Y	0	255	33		
11	SAE J1939 Source Address CC3	P	Y	Y	0	255	49		
12	SAE J1939 Source Address EBC1	P	Y	Y	0	255	33		
14	SAE J1939 Source Address Ambient Temperature	P	Y	Y	0	255	33		Source Address Ambient Temperature
15	EBC1 direction for AGS2	P	Y	Y	0	1	0		0 = receive EBC1 1 = transmit EBC1
16	Send Free Running Telegram on K line	P	Y	Y	0	1	0		0 = no FRT 1 = with FRT
17	J1939 Timeout Detection	P	Y	Y	0	1	0		0 = not active 1 = active
18	SPN Conversion Method	P	Y	Y	0	1	0		0 = 2 1 = 4

4.1.2. Group 02 – Vehicle Parameters I

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Transmission Type	S	Y	Y	0	7	0		0 = manual 1 = automated (ASTRONIC) 2 = automatic 3 = automatic with drive off function 4 = manual; N requested for engine start 5 = automated (EATON 3p) 6 = automated (EATON Autoshift) no Clutch information N requested 7 = automated (EATON Autoshift) no Clutch information no N requested
03	Configuration Relay 2 / Grid heater	S	Y	Y	0	8	0		0 = disabled 1 = grid heater pin 15/9 2 = acc. pedal idle position (pin 21/7) 3 = grid heater pin 15/10 Par 2/5 must be 0 or 2 4 = grid heater MR or FLA 5 = AGS2 backup lamp 6 = MI-Lamp 7 = AdBlue Level Warning Lamp 8 = NOx Lamp
04	Hardware Type	S	Y	Y	0	1	0		0 = 24V, only with 4 connectors 1 = 12V
05	Engine brake outputs	S	Y	Y	0	4	1		0 = MBR_BK and MBR_KD disabled 1 = Exhaust and decompression brake via single valve (MBR_BK) 2 = Exhaust brake only (MBR_BK) 3 = Decom. brake only (MBR_KD) 4 = Exhaust brake on MBR_BK and Decompression brake on MBR_KD
07	Temp. Correction Blockheater	P	Y	Y	-20	50	0		value positive, threshold value for grid heater shift to hot

4.1.3. Group 03 – Common Limiters

Nr.	Parameter	A	C	V	min	max	def.	unit	Description
01	Minimum Engine Speed	C	Y	Y	0	4000	500	1/min	
02	Maximum Engine Speed	C	Y	Y	0	4000	3000	1/min	
03	Maximum Road Speed (legal)	C	Y	Y	48	90	85	km/h	
04	Maximum Engine Torque	S	Y	Y	0	5000	5000	Nm	
05	Enable Limiting Torque Ramp	P	Y	Y	0	1	0		0 = disabled 1 = enabled
06	Limiting Torque Ramp Increment	P	Y	Y	0	5000	10	Nm/10ms	
07	Engine Speed Limit while vehicle stop	C	Y	Y	0	4000	3000	1/min	
08	Desired Idle Speed Single Step Inc./Dec.	P	Y	Y	0	100	10	1/min	
09	Desired Idle Speed Ramp Rate Inc./Dec.	P	Y	Y	0	1000	1	1/min/10ms	
10	Maximum Adjusted Idle Speed	C	Y	Y	0	4000	850	1/min	
11	Max. Road Speed for Idle Inc./Dec.	S	Y	Y	0	48	10	km/h	Maximum Speed
13	Maximum Torque Engine Retarder	C	Y	Y	0	50000	50000	Nm	Scaled to transmission output torque

Nr.	Parameter	A	C	V	min	max	def.	unit	Description
14	Gov# Max. Engine Speed	P	Y	Y	0	15	15		Gov# for Max. Engine Speed Par 3/2 n max limitation 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5..15 = MR Limiter
15	Gov# Veh Standstill	P	Y	Y	0	15	15		Gov# for Veh Standstill Par 3/7 n max limitation 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5..15 = MR Limiter

4.1.4. Group 04 – Surge damping in MR

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Surge damping in MR	C	Y	Y	0	1	0		0 = disabled 1 = enabled
02	SD - droop factor	C	Y	Y	0	5	0,3	%/1/min	
03	SD - frequency limit	C	Y	Y	0	25	1	Hz	
04	SD - Max. throttle position	C	Y	Y	0	100	25	%	
05	SD - Max. engine speed	C	Y	Y	0	4000	900	1/min	
06	SD - Max. torque	C	Y	Y	0	5000	50	Nm	

4.1.5. Group 05 – Limiters LIM0 and LIM1

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Minimum Engine Speed LIM0 enabled	C	Y	Y	0	4000	500	1/min	
02	Maximum Engine Speed LIM0 enabled	C	Y	Y	0	4000	4000	1/min	
03	Maximum Road Speed LIM0 enabled	C	Y	Y	0	152	152	km/h	
04	Maximum Engine Torque LIM0 enabled	C	Y	Y	-2000	5000	5000	Nm	
05	Minimum Engine Speed LIM1 enabled	C	Y	Y	0	4000	500	1/min	
06	Maximum Engine Speed LIM1 enabled	C	Y	Y	0	4000	4000	1/min	
07	Maximum Road Speed LIM1 enabled	C	Y	Y	0	152	152	km/h	
08	Maximum Engine Torque LIM1 enabled	C	Y	Y	-2000	5000	5000	Nm	
09	Gov# Lim0	P	Y	Y	0	15	15		Gov# for Lim0 Par 5/2 nmax limitation 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5..15 = MR Limiter

Nr.	Parameter	A	C	V	min	max	def.	unit	description
10	Gov# Lim1	P	Y	Y	0	15	15		Gov# for Lim1 Par 5/6 nmax limitation 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5..15 = MR Limiter

4.1.6. Group 06 – Limiters AC/LIM2

Nr.	Parameter	A	C	V	min	max	def.	unit	description
03	Minimum Engine Speed LIM2 /KLIMA	C	Y	Y	0	4000	500	1/min	
04	Maximum Engine Speed LIM2 /KLIMA	C	Y	Y	0	4000	4000	1/min	
05	Maximum Road Speed LIM2 / KLIMA	C	Y	Y	0	152	152	km/h	
06	Maximum Engine Torque LIM2 / KLIMA	C	Y	Y	-2000	5000	5000	Nm	
07	Limit Governor# Air Condition	P	Y	Y	0	15	15		Gov# for LIM2/KLIMA Par 6/4 n max limitation 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5..15 = MR Limiter

4.1.7. Group 07 – PTO Control on PTO and CC pin

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Configuration PTO Speed Control	C	Y	Y	0	4	0		0 = disabled 1 = enabled 2 = enabled if neutral 3 = enabled if neutral and park brake 4 = enabled if park brake
02	Maximum PTO Speed with CC+ Switch	C	Y	Y	500	3000	3000	1/min	
03	Minimum PTO Speed with CC- Switch	C	Y	Y	500	3000	500	1/min	
04	PTO Throttle Override Enable	C	Y	Y	0	1	1		0 = Disable 1 = Enable engine speed in PTO mode to be increased with throttle input
05	Max. Engine Speed for Throttle Override	C	Y	Y	0	3000	3000	1/min	
06	PTO dropout on service brake or park brake enabled	C	Y	Y	0	3	0		0 = No PTO drop out with service brake or park brake enabled 1 = Causes PTO to drop out if the Service brake or the park brake is being depressed 2 = Drop out on service brake 3 = Drop out on park brake
07	PTO dropout on clutch enabled	C	Y	Y	0	1	0		0 = No PTO drop out with clutch pedal 1 = Causes PTO to drop out if the clutch is being depressed
08	Maximum Road Speed in PTO Mode	C	Y	Y	0	128	10	km/h	
09	PTO Set Speed with CC- Switch	C	Y	Y	0	3000	500	1/min	
10	PTO Speed Governor Type with CC-Switch	S	Y	Y	1	11	1		Governor type selection, if PTO mode has been activated via CC-

Nr.	Parameter	A	C	V	min	max	def.	unit	description
11	Max. PTO Torque with CC- Switch	C	Y	Y	0	5000	5000	Nm	
12	PTO Set Speed with CC+ Switch	C	Y	Y	0	3000	500	1/min	
13	PTO Speed Governor Type with CC+ Switch	S	Y	Y	1	11	1		Governor type selection, if PTO mode has been activated via CC+
14	Max. PTO Torque with CC+ Switch	C	Y	Y	0	5000	5000	Nm	
15	PTO Ramp Rate	C	Y	Y	25	2500	1000	1/min/s	
16	Number of Speeds via Remote PTO (Pin 18/10)	C	Y	Y	1	3	1		
17	PTO Speed #1	C	Y	Y	500	3000	950	1/min	
18	PTO Speed #1 Governor Type	S	Y	Y	1	11	1		Governor type selection, if fixed speed #1 has been activated
19	PTO Speed #1 Maximum Engine Torque	C	Y	Y	0	5000	5000	Nm	
20	PTO Speed #2	C	Y	Y	500	3000	1250	1/min	
21	PTO Speed #2 Governor Type	S	Y	Y	1	11	1		Governor type selection, if fixed speed #2 has been activated
22	PTO Speed #2 Maximum Engine Torque	C	Y	Y	0	5000	5000	Nm	
23	PTO Speed #3	C	Y	Y	500	3000	1850	1/min	
24	PTO Speed #3 Governor Type	S	Y	Y	1	11	1		Governor type selection, if fixed speed #3 has been activated
25	PTO Speed #3 Maximum Engine Torque	C	Y	Y	0	5000	5000	Nm	

4.1.8. Group 08 – Vehicle Speed Sensor

Nr.	Parameter	A	C	V	min	max	def.	unit	description
02	Vehicle Speed Sensor	P	Y	Y	0	8	1		0 = none 1 = C3 from tachograph 2 = square wave (hall sensor) 3 = J1939 transmission 4 = inductive sensor 5 = J1939 TCO Shaft Speed and Vehicle Speed 6 = J1939 CC1, PGN65265 Vehicle Speed 7 = J1939 CC2, PGN65265 Vehicle Speed 8 = J1939 CC3, PGN65265 Vehicle Speed
03	Axle Ratio	C	Y	Y	1	20	5,29		
04	Number of Output Shaft Teeth	C	Y	Y	0	250	16		
05	Tire Revolutions per Kilometer	C	Y	Y	160	1599	312	1/(km/h)	
06	Top Gear Ratio	C	Y	Y	0,1	2,55	1		
07	Second Highest Gear Ratio	C	Y	Y	0	5,75	2,55		
08	Gear Ratio Tolerance	C	Y	Y	0	60	2	1/min/MPH	
09	Two Speed Axle - Second Axle Ratio	C	Y	Y	1	20	5,29		
15	No monitoring of vehicle speed sensor VSS	P	Y	Y	0	1	0		0 = monitoring active 1 = not active

4.1.9. Group 09 – Analog Outputs

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Configuration Analog Output (IWA)	S	Y	Y	0	11	1		0 = disabled 1 = throttle torque 10..90% 2 = Difference torque (external load control) 3 = throttle torque 90..10% 4 = actual torque 5 = load torque (no idle torque for automatic transmission) 6 = road speed 7 = demand speed 8 = demand speed CC+/- 9 = AGS2 transmission Temp indication lamp off 10 = AGS2 transmiss. Temp indication lamp on 11 = AdBlue level 10..90%
02	Engine Speed Display N_Mot	S	Y	Y	200	15000	2173		Scaling: Pulses per 100 rpm
03	Oil Pressure / Fuel Filter	S	Y	Y	0	4	1		0 = lamp 1 = 5 bar cluster 2 = 10 bar cluster 3 = no sensor 4 = fuel filter sensor
04	Coolant Temperature / AGS2 Lamp	S	Y	Y	0	5	1		0 = lamp 1 = cluster 3 = off (not used) 4 = reserved 5 = AGS2 check transmiss. indication lamp

4.1.10. Group 10 – Engine Brake

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Minimum Engine Speed for Engine Brakes	S	Y	Y	0	4000	1100	1/min	
02	Maximum Throttle Position for Engine Brakes	S	Y	Y	0	100	4	%	
03	Enable Engine Brakes on Service Brake	C	Y	Y	0	2	0		0 = disable 1 = engine brake on service brake, engine brake remains engaged 2 = engine brake on service brake
04	Minimum Road Speed for Engine Brake Operation	C	Y	Y	0	200	0	km/h	
05	Enable Engine Brake on Road Speed Limiter	C	Y	Y	0	48	5	km/h	Engine brakes will come on automatically if vehicle exceeds entered value. 0 = engine brake disabled for overspeed
06	Engine Brakes and Cruise Control	C	Y	Y	0	2	0		0 = no automatic engine brake on cruise control 1 = enable automatic engine brake operation with cruise control 2 = disable cruise control on engine rake
07	CC Eng. Brake 1 on	S	Y	Y	0	48	5	km/h	Maximum Cruise Control Over-Speed for Engine Brake 1
08	CC Eng. Brake 1 off	S	Y	Y	0	48	2	km/h	Minimum Cruise Control Over-Speed for Engine Brake 1
09	CC Eng. Brake 2 on	S	Y	Y	0	48	7	km/h	Maximum Cruise Control Over-Speed for Engine Brake 2
10	CC Eng. Brake 2 off	S	Y	Y	0	48	5	km/h	Minimum Cruise Control Over-Speed for Engine Brake 2
11	CC Eng. Brake 3 on	S	Y	Y	0	48	10	km/h	Maximum Cruise Control Over-Speed for Engine Brake 3

Nr.	Parameter	A	C	V	min	max	def.	unit	description
12	CC Eng. Brake 3 off	S	Y	Y	0	48	6	km/h	Minimum Cruise Control Over-Speed for Engine Brake 3
13	Engine Brake Configuration	S	Y	Y	0	1	0		0 = MBR_KD MBR_BK 1 = MBR_KD TURBOBRAKE
14	Engine Brake Stage 1 Mask	S	Y	Y	0	255	64		0 = no engine brake activation 64 = decompression valve only 80 = decompression valve and exhaust flap 81 = decompression valve and turbobrake
15	Engine Brake Stage 1 Factor	S	Y	Y	0	100	100	%	
16	Engine Brake Stage 2 Mask	S	Y	Y	0	255	80		0 = no engine brake activation 64 = decompression valve only 80 = decompression valve and exhaust flap 81 = decompression valve and turbobrake
17	Engine Brake Stage 2 Factor	S	Y	Y	0	100	100	%	
18	Engine Brake Stage 3 Mask	S	Y	Y	0	255	80		0 = no engine brake activation 64 = decompression valve only 80 = decompression valve and exhaust flap 81 = decompression valve and turbobrake
19	Engine Brake Stage 3 Factor	S	Y	Y	0	100	100	%	
20	Engine Brake Transmission Mask	S	Y	Y	0	255	64		0 = no engine brake activation 64 = decompression valve only 80 = decompression valve and exhaust flap 81 = decompression valve and turbobrake
21	Engine Brake Transmission Factor	S	Y	Y	0	100	100	%	
22	J1939 Engine Retarder Configuration	P	Y	Y	0	255	255		3 = MBR_KD (Decompression brake) 4 = MBR_BK (Exhaust brake) 255 = not defined
23	Steps Engine Brake	P	Y	Y	0	255	255		Info for databus SAE J1939: 0 = continuous 1..n = one-..n-steps 255 = not defined
24	Minimum Engine Speed Hysteresis	C	Y	Y	0	3000	80	1/min	

4.1.11. Group 11 – Accelerator Pedal

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Accelerator Pedal Type	P	Y	Y	0	7	2		0 = none 1 = PWM throttle 2 = analog pedal type 1 3 = analog pedal type 2 4 = analog pedal type 3 5 = AP via J1939, EEC2 SA=1 6 = AP via J1939, EEC2 SA=PAR 1/3 7 = AP via J1939, EEC2 SA=33
02	Analog Pedal Kickdown Threshold	P	Y	Y	0	40	5		
03	Idle Validation Switch Limp Home Engine Speed	S	Y	Y	0	4000	875	1/min	
04	Limp Home Ramp Up on Idle Validation Switch	S	Y	Y	0	1000	250	1/min/s	
05	Accelerator Position Ramp Up Rate if Fault Clears	P	Y	Y	0	1000	100	1/min/s	
06	Accelerator Position Ramp Down Rate if Fault Clears	P	Y	Y	0	100	50	%/s	

Nr.	Parameter	A	C	V	min	max	def.	unit	description
07	PWM Pedal Kickdown Switch On Threshold	C	Y	Y	0	40	4	%	
08	PWM Pedal Kickdown Switch Off Threshold	C	Y	Y	0	40	11	%	
09	Boost Thres. active	C	Y	Y	0	1	0		
10	Boost Thres ramp	C	Y	Y	0	2000	300	Nm/10ms	
11	acc.pedal characteristic x1	C	Y	Y	0	100	0	%	
12	acc.pedal characteristic y1	C	Y	Y	0	100	0	%	
13	acc.pedal characteristic x2	C	Y	Y	0	100	100	%	
14	acc.pedal characteristic y2	C	Y	Y	0	100	100	%	
15	acc.pedal characteristic x3	C	Y	Y	0	100	100	%	
16	acc.pedal characteristic y3	C	Y	Y	0	100	100	%	
17	acc.pedal characteristic x4	C	Y	Y	0	100	100	%	
18	acc.pedal characteristic y4	C	Y	Y	0	100	100	%	
20	pedal filter tau large signal range	C	Y	Y	0,00	10,0	0,00	s	
21	pedal filter tau small signal range	C	Y	Y	0,00	10,0	0,00	s	
22	pedal filter small signal range	C	Y	Y	0	100	0	%	
23	acc. pedal ramp up	C	Y	Y	0	100	100	%/10ms	
24	acc. pedal ramp down	C	Y	Y	0	100	100	%/10ms	

4.1.12. Group 12 – MAS & OI

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Maintenance Alert System	P	Y	Y	0	1	0		0 = MAS disabled 1 = MAS enabled
04	CEL/SEL Delay After Ignition	S	Y	Y	1	255	15	s	Time duration after bulb check for CEL/SEL to flash at ignition on.
05	Level Fault CEL/SEL Flash Mode	S	Y	Y	0	3	1	mode	Mode for CEL/SEL flashing for maintenance monitor level faults. 0 = none 1 = flash at ignition on 2 = CEL on continuously when fault active 3 = both
06	Filter Fault CEL/SEL Flash Mode	S	Y	Y	0	3	2	mode	Mode for CEL/SEL flashing for maintenance monitor filter faults. 0 = none 1 = flash at ignition on 2 = CEL on continuously when fault active 3 = both

4.1.13. Group 13 – Inputs

Nr.	Parameter	A	C	V	min	max	def.	unit	description
02	Coolant Level Sensor Input (KW_SE)	P	Y	Y	0	1	0		0 = Disable 1 = ACTROS sensor
03	Enable Air Filter Sensor Input	S	Y	Y	0	2	0		0 = no air filter 1 = MB-Air Filter 2 = DDC Air Filter Strategy
06	Configuration Service Brake	P	Y	Y	0	4	1		0 = Disable 1 = service brake input 2 = CC1 service brake 3 = CC2 service brake 4 = CC3 service brake

Nr.	Parameter	A	C	V	min	max	def.	unit	description
07	Enable Transmission Neutral Input (NE)	S	Y	Y	0	1	1		0 = J1939 (ETC2) e.g. no switch 1 = switch (PIN 15/01)
10	Configuration Park Brake	P	Y	Y	0	4	1		0 = Disable 1 = park brake input 2 = CC1 park brake 3 = CC2 park brake 4 = CC3 park brake
11	Configuration CC switch ON/OFF	S	Y	Y	0	3	0		0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
12	Configuration CC set/coast and resume/accel	S	Y	Y	0	3	0		0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
13	Configuration CC Pause	S	Y	Y	0	3	0		0 = disabled or stalk switch 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
14	Configuration 2nd axle speed switch	S	Y	Y	0	3	0		0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
15	Configuration clutch	S	Y	Y	0	3	0		0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
16	Configuration engine brake switch	S	Y	Y	0	1	0		0 = hardwired 1 = J1939 EBC1
17	Configuration Variable Input DSF0	P	Y	Y	0	9	0		0 = disable 1 = enable ABS input 2 = enable retarder input 3 = enable temposet 4 = enable grid heater detection 5 = switchable torque demand 6 = drive on super structure 7 = throttle inhibit super structure 8 = SPLIT select 9 = zerotorque superstructure
18	Configuration Variable Input DSF1	P	Y	Y	0	9	1		0 = disable 1 = enable ABS input 2 = enable retarder input 3 = enable temposet 4 = enable grid heater detection 5 = switchable torque demand 6 = drive on super structure 7 = throttle inhibit super structure 8 = SPLIT select 9 = zerotorque superstructure
19	switchable torque demand via DSF0	P	Y	Y	-5000	5000	-5000	Nm	
20	switchable torque demand via DSF1	P	Y	Y	-5000	5000	-5000	Nm	
37	Input DSF2	S	Y	Y	0	4	0		0 = not active 1 = clutch 2 2 = Enable TSC1 from SA3 3 = Quit Signal for CC with Stalk Switch 4 = Power Rating with DSF2
38	Input DSF3	S	Y	Y	0	2	1		0 = not active 1 = Engine Hood Bus 2 = optimized idle safety loop

4.1.14. Group 14 – Relay 3/4, AdBlue, NOx, misc.

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Configuration Relay 3 (IWK3)	P	Y	Y	0	13	0		Reference value for comparator function: 0 = Acc. pedal idle position 1 = Actual torque 2 = Road speed 3 = Engine speed 4 = Coolant temperature 5 = Pedal torque 6 = Boost temperature 7 = Oil pressure (MR threshold) 8 = Coolant temperature (MR threshold) 9 = off 10 = reserved 11 = MI-Lamp 12 = AdBlue Level Warning Lamp 13 = NOx Lamp
02	IWK3 Torque	P	Y	Y	0	5000	4999	Nm	
03	IWK3 Hysteresis Torque	P	Y	Y	0	5000	50	Nm	
04	IWK3 Road Speed	P	Y	Y	0	150	150	km/h	
05	IWK3 Hysteresis Road Speed	P	Y	Y	0	150	5	km/h	
06	IWK3 Engine Speed	P	Y	Y	0	4000	3998	1/min	
07	IWK3 Hysteresis Engine Speed	P	Y	Y	0	4000	50	1/min	
08	IWK3 Temperature	P	Y	Y	-50	200	200	℃	
09	IWK3 Hysteresis Temperature	P	Y	Y	0	200	5	℃	
10	Configuration Relay 4 (IWK4)	P	Y	Y	0	14	0		Reference value for comparator function: 0 = Acc. Pedal kickdown 1 = Actual torque 2 = Road speed 3 = Engine speed 4 = Coolant temperature 5 = Pedal torque 6 = Boost temperature 7 = Oil pressure (MR threshold) 8 = Coolant temperature (MR threshold) 9 = off 10 = reserved 11 = reserved 12 = MI-Lamp 13 = AdBlue Level Warning Lamp 14 = NOx Lamp
11	IWK4 Torque	P	Y	Y	0	5000	4999	Nm	
12	IWK4 Hysteresis Torque	P	Y	Y	0	5000	50	Nm	
13	IWK4 Road Speed	P	Y	Y	0	150	150	km/h	
14	IWK4 Hysteresis Road Speed	P	Y	Y	0	150	5	km/h	
15	IWK4 Engine Speed	P	Y	Y	0	4000	3998	1/min	
16	IWK4 Hysteresis Engine Speed	P	Y	Y	0	4000	50	1/min	
17	IWK4 Temperature	P	Y	Y	-50	200	200	℃	
18	IWK4 Hysteresis Temperature	P	Y	Y	0	200	5	℃	
19	Diagnosis Relay 4	P	Y	Y	0	1	0		0 = disabled 1 = enabled
20	AdBlue Number of CAN messages	C	Y	Y	0	50	50		
21	AdBlue Tank-ID	C	Y	Y	0	65535	65535		
22	AdBlue Tankcapacity	C	Y	Y	0	250	90	l	
23	AdBlue reserve fuel	C	Y	Y	0	100	14	%	
24	AdBlue empty fuel	C	Y	Y	0	100	5	%	
25	Diesel reserve fuel	C	Y	Y	0	100	14	%	
26	Diesel empty fuel	C	Y	Y	0	100	5	%	
27	Damping AdBlue consumption	C	Y	Y	0	100	100	10km	

Nr.	Parameter	A	C	V	min	max	def.	unit	description
28	Damping Diesel consumption	C	Y	Y	0	100	100	10km	
29	Damping AdBlue level	C	Y	Y	0	250	60	s	
31	Battery cutoff switch / GGVS	C	Y	Y	0	3	0		0 = without Battery cutoff switch / GGVS 1 = with Battery cutoff switch / GGVS 2 = n.d. 3 = s.n.v.
32	NOx torque reduction	P	Y	Y	0	255	60	%	FDOK protected parameter!
34	Resistance 1	C	Y	Y	0	65535	65535	Ohm	
35	Level 1	C	Y	Y	0	65535	65535	%	
36	Resistance 2	C	Y	Y	0	65535	65535	Ohm	
37	Level 2	C	Y	Y	0	65535	65535	%	
38	Resistance 3	C	Y	Y	0	65535	65535	Ohm	
39	Level 3	C	Y	Y	0	65535	65535	%	
40	Resistance 4	C	Y	Y	0	65535	65535	Ohm	
41	Level 4	C	Y	Y	0	65535	65535	%	
42	Resistance 5	C	Y	Y	0	65535	65535	Ohm	
43	Level 5	C	Y	Y	0	65535	65535	%	
44	Resistance 6	C	Y	Y	0	65535	65535	Ohm	
45	Level 6	C	Y	Y	0	65535	65535	%	
46	Resistance 7	C	Y	Y	0	65535	65535	Ohm	
47	Level 7	C	Y	Y	0	65535	65535	%	
48	Resistance 8	C	Y	Y	0	65535	65535	Ohm	
49	Level 8	C	Y	Y	0	65535	65535	%	
50	Resistance 9	C	Y	Y	0	65535	65535	Ohm	
51	Level 9	C	Y	Y	0	65535	65535	%	
52	Resistance 10	C	Y	Y	0	65535	65535	Ohm	
53	Level 10	C	Y	Y	0	65535	65535	%	
54	Resistance 11	C	Y	Y	0	65535	65535	Ohm	
55	Level 11	C	Y	Y	0	65535	65535	%	
56	Resistance 12	C	Y	Y	0	65535	65535	Ohm	
57	Level 12	C	Y	Y	0	65535	65535	%	
58	Resistance 13	C	Y	Y	0	65535	65535	Ohm	
59	Level 13	C	Y	Y	0	65535	65535	%	
60	Resistance 14	C	Y	Y	0	65535	65535	Ohm	
61	Level 14	C	Y	Y	0	65535	65535	%	
62	Resistance 15	C	Y	Y	0	65535	65535	Ohm	
63	Level 15	C	Y	Y	0	65535	65535	%	
64	Resistance 16	C	Y	Y	0	65535	65535	Ohm	
65	Level 16	C	Y	Y	0	65535	65535	%	
66	Resistance 17	C	Y	Y	0	65535	65535	Ohm	
67	Level 17	C	Y	Y	0	65535	65535	%	
68	Resistance 18	C	Y	Y	0	65535	65535	Ohm	
69	Level 18	C	Y	Y	0	65535	65535	%	
70	Resistance 19	C	Y	Y	0	65535	65535	Ohm	
71	Level 19	C	Y	Y	0	65535	65535	%	
72	Lower faulty Resistance	C	Y	Y	0	65535	65535	Ohm	
73	Upper faulty Resistance	C	Y	Y	0	65535	65535	Ohm	
74	Diesel Tank Capacity	C	Y	Y	0	5000	500	L	

4.1.15. Group 15 – Cruise Control I

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Minimum Road Speed for Cruise Control	C	Y	Y	38	152	48	km/h	
02	Maximum Set Speed for Cruise Control	C	Y	Y	48	152	152	km/h	
03	Cruise Set Speed Increment	P	Y	Y	0	10	2	km/h	
04	Cruise Set Speed Decrement	P	Y	Y	0	10	2	km/h	
05	Cruise Set Speed Ramp Up	P	Y	Y	0	20	2	km/h/s	
06	Cruise Set Speed Ramp Down	P	Y	Y	0	20	2	km/h/s	
07	Enable Cruise Auto Resume	C	Y	Y	0	2	0		0 = disable 1 = enable automatic cruise resume function after clutch has been released once 2 = release clutch twice
08	Min. Eng. Speed Cruise Control	P	Y	Y	400	3000	800	1/min	
16	Cruise Control Logic	P	Y	Y	0	2	0		0 = FTL 1 = Hyundai 2 = Mitsubishi

4.1.16. Group 16 – Relay 1 / Starter Lockout

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Output Relay 1/Starter Lockout	S	Y	Y	0	9	2		0 = disable 1 = enable starter lockout 2 = enable kick down output 3 = enable modulat. Relay Allison transm. 4 = reserved 5 = split valve 2 6 = starter lockout & AGS2 7 = MI-Lamp 8 = AdBlue Level Warning Lamp 9 = NOx Lamp
02	Starter Lockout Diagnosis	P	Y	Y	0	1	0		Starter Lockout Open Load Diagnosis: 0 = enabled 1 = disabled

4.1.17. Group 17 – Idle/PTO Shutdown

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Enable Idle Shutdown	C	Y	Y	0	3	0		0 = disable 1 = enable idle shutdown with Park Brake status 2 = enable idle shutdown without Park Brake status 3 = enable idle shutdown with edge triggered accelerator pedal
02	Idle Shutdown Time	C	Y	Y	1	5000	60	s	
03	Enable PTO Shutdown	C	Y	Y	0	3	0		0 = disable 1 = enable PTO shutdown with Park Brake status 2 = enable PTO shutdown without Park Brake status 3 = enable PTO shutdown with edge triggered accelerator pedal
04	PTO Shutdown Time	C	Y	Y	1	5000	60	s	
05	Maximum Engine Load for PTO Shutdown	S	Y	Y	0	5000	100	Nm	
06	Time for CEL before Idle/PTO Shutdown	P	Y	Y	3	120	20	s	

Nr.	Parameter	A	C	V	min	max	def.	unit	description
07	Time for SEL before Idle/PTO Shutdown	P	Y	Y	3	120	10	s	
08	Minimum Coolant Temp	S	Y	Y	-40	200	-10	℃	for Engine Shutdown
09	Enable Idle/PTO Shutdown Override	C	Y	Y	0	2	1		0 = disable 1 = enable, allows Engine Check switch (MABSCH_SP) to override engine idle/PTO shutdown 2 = enable without clutch and S brake

4.1.18. Group 18 – Engine Protection Shutdown

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Engine Protection Shutdown on Coolant Temperature	C	Y	Y	0	1	0		0 = disable 1 = enable
02	Engine Protection Shutdown on Coolant Level	C	Y	Y	0	1	0		0 = disable 1 = enable
03	Engine Protection Shutdown on Oil Pressure	C	Y	Y	0	1	0		0 = disable 1 = enable
04	Engine Protection Shutdown on Oil Level	C	Y	Y	0	1	0		0 = disable 1 = enable
05	Engine Protection Shutdown Time	S	Y	Y	1	120	60	s	
06	Engine Protection Shutdown Time on Oil Pressure	S	Y	Y	1	120	30	s	
07	Counter of Engine Protection Shutdown Overrides	S	Y	Y	0	255	0		
08	Time for CEL before Engine Protection Shutdown	S	Y	Y	3	120	20	s	
09	Time for SEL before Engine Protection Shutdown	S	Y	Y	3	120	10	s	
10	Overspeed BR 400	S	Y	Y	500	4000	2500	1/min	
11	Overspeed BR 500	S	Y	Y	500	4000	2500	1/min	
12	Overspeed BR 900	S	Y	Y	500	4000	3000	1/min	
13	Oil Level Lamp Configuration	S	Y	Y	0	2	0		0 = Oil Level 1 = Engine Overspeed 2 = Oil Level or Engine Overspeed

4.1.19. Group 19 – Fan

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Fan Type	C	Y	Y	0	255	251		0 = Linnig; on highway 1 = Linnig; off highway 2 = on highway Unimog / Visko 3 = NAW; Econic, Unimog 4 = Horton; Freightliner 5 = Bosch; EvoBus,Unimog, off highway /1hy 6 = Bosch; EvoBus, Unimog /2hy. 7 = Horton; Freightliner, off highway /1 8 = BorgWarner; on highway 9 = Bosch; Unimog, Econic 251 = fan defined in MR2 255 = no fan
03	Fan Power on Engine Brake	P	Y	Y	0	100	0	%	
05	Fan Power on Air Condition	P	Y	Y	0	100	0	%	
07	Fan Power on PTO	P	Y	Y	0	100	0	%	
08	Fan Power on Fan Override	P	Y	Y	0	100	100	%	enabled via fan override pin 18/15
09	Cool. Temp. at 0 percent fan	S	Y	Y	0	200	80	℃	fan control on coolant temp

Nr.	Parameter	A	C	V	min	max	def.	unit	description
10	Cool. Temp. at 100 percent fan	S	Y	Y	0	200	100	°C	
11	Hold time Fan	P	Y	Y	0	600	10	s	
12	Ramp Fan	P	Y	Y	1	100	25	%/s	
13	Fan Power on DSF0	P	Y	Y	0	100	50	%	Selection of the percentage of the fan power consumption on DSF0
14	Fan Power on DSF1	P	Y	Y	0	100	50	%	Selection of the percentage of the fan power consumption on DSF1

4.1.20. Group 20 – Remote Accelerator Pedal

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Enable Remote Accelerator Pedal Input	S	Y	Y	0	1	0		0 = disable 1 = enable
02	Delay Time for Rem.Acc.Pedal Wide Open Calibration	P	Y	Y	0	5	1	s	
03	Maximum Change of Remote Acc. Pedal Wide Open	P	Y	Y	0	15	1	%	
04	Remote Accelerator Pedal Signal Filter Coefficient	P	Y	Y	0	1	0,5		
05	Remote Accelerator Pedal Idle Position	S	Y	Y	0	30	20	%	
06	Remote Accelerator Pedal Wide Open Position	S	Y	Y	70	85	78	%	
07	HFG Diagnostics Only With Active Pin “FG-Wahl”	S	Y	Y	0	1	1		0 = always 1 = only by active pin 18/7 throttle select

4.1.21. Group 21 – Droop Control Mode

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Droop Control Mode	S	Y	Y	0	2	0		0 = disable 1 = without pedal tolerance 2 = with pedal tolerance
02	Droop Control Governor Type	S	Y	Y	1	11	1		
03	Droop Maximum Engine Torque	S	Y	Y	0	5000	5000	Nm	

4.1.22. Group 22 – TSC1 Limiter Governor (N max)

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Gov# TSC1 Transmission	P	Y	Y	0	4	2		Gov# for TSC1 Transmission n max limitation
02	Gov# TSC1 ABS	P	Y	Y	0	15	15		Gov# for TSC1 ABS n max limitation
03	Gov# TSC1 Jack Knife	P	Y	Y	0	15	15		Gov# for TSC1 Jack Knife n max limitation
04	Gov# TSC1 ACC	P	Y	Y	0	5	5		Gov# for TSC1 ACC n max limitation
20	Speed Gov# TSC1 condition #0	P	Y	Y	0	16	0		MR speed governor# which is used for TSC1 requested speed control condition #0. See J1939/71 SPN 696
21	Speed Gov# TSC1 condition #1	P	Y	Y	0	11	1		MR speed governor# which is used for TSC1 requested speed control condition #1. See J1939/71 SPN 696

Nr.	Parameter	A	C	V	min	max	def.	unit	description
22	Speed Gov# TSC1 condition #2	P	Y	Y	0	11	2		MR speed governor# which is used for TSC1 requested speed control condition #2. See J1939/71 SPN 696
23	Speed Gov# TSC1 condition #3	P	Y	Y	0	11	3		MR speed governor# which is used for TSC1 requested speed control condition #3. See J1939/71 SPN 696

4.1.23. Group 23 – Limiters II

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Torque factor gear down protection	S	Y	Y	0,00	1,00	1,00		Torque reduction factor in gears below the ratio that is set in parameter 23/2
02	Gear ratio for gear down protection	S	Y	Y	0,000	2000	0,010	km/h/ (1/min)	Torque reduction occurs to gear ratios below this value. See also parameter 23/01
03	Torque factor high gear power	S	Y	Y	0,00	1,00	1,00		Torque reduction factor in gears below the ratio that is set in parameter 23/4
04	Gear ratio for high gear power	S	Y	Y	0,000	2000	0,020	km/h/ (1/min)	Torque reduction occurs to gear ratios below this value. See also parameter 23/03
06	Max engine speed for progressive shifting	C	Y	Y	500	3000	3000	1/min	Engine RPM is limited to this value when vehicle is in a gear ratio below the value set in 23/19. See also Parameter 23/07
07	Gear Ratio for Progressive Shifting	C	Y	Y	0,000	2,000	0,015	km/h/ (1/min)	Gear ratio at which 23/18 is affected. See also Parameter 23/06
08	AL Engine Speed Threshold	S	Y	Y	10	500	50	1/min	Upper-Speed limit := actual engine speed + engine-speed-threshold (Acceleration limiter)
09	AL Min. Engine Speed Threshold	S	Y	Y	500	4000	1200	1/min	Limitation enabled if actual engine speed is higher than Min. Engine Speed threshold (Acceleration limiter)
10	AL Ramp up Rate	S	Y	Y	0	4000	160	(1/min)/s	Acceleration limiter
11	AL Minimum Eng. Torque	S	Y	Y	0	100	100	%	Minimum value of torque reduction in percent of maximum torque. To enable the function the parameter must be <100 % (Acceleration limiter)
12	AL Droop Parameter	S	Y	Y	0,0	100,0	3,0	Nm/(1/min)	Droop governor parameter (Acceleration limiter)
13	gear protection 1st speed	P	Y	Y	0	150	0	km/h	V < V1: engine torque limit
14	gear protection 2nd speed	P	Y	Y	0	150	0	km/h	V > V2: no limitation
15	gear protection, torque limitation	P	Y	Y	0	5000	5000	Nm	V < V1: torque limitation

4.1.24. Group 24 – Vehicle Parameters II

This group contains only not visible parameters.

4.1.25. Group 25 – XTempomat

This group contains only not visible parameters.

4.1.26. Group 26 – VIN Vehicle Identification Number

Nr.	Parameter	A	C	V	min	max	def.	unit	description
06	VIN	S	Y	Y					

4.1.27. Group 27 – Fleetmanagement

Nr.	Parameter	A	C	V	min	max	def.	unit	description
01	Enable Fleet Management	C	Y	Y	0	1	1		0 = disabled 1 = enabled
02	Enable Hard Brake Incident	C	Y	Y	0	1	1		0 = disabled 1 = enabled
03	Enable Service Interval Data	C	Y	Y	0	1	1		0 = disabled 1 = enabled
04	Enable Monthly Trip Data	C	Y	Y	0	1	1		0 = disabled 1 = enabled
05	Enable Detailed Alert Data	C	Y	Y	0	1	1		0 = disabled 1 = enabled
06	Enable Engine Usage Data	C	Y	Y	0	1	1		0 = disabled 1 = enabled
07	Fuel Density	S	Y	Y	0	1000	835	kg/m3	
17	ECU ID for Fleetmanagement	C	Y	Y	0	1	0		0 = send ADM identification 1 = send DDEC identification

4.1.28. Group 28 – Real Time Clock

This group contains only not visible parameters.

4.2. Description of Parameters

4.2.1. Group 01 – CAN Configuration

CAN Configuration

Nr.	Parameter	Description
01	Engine CAN One Wire Capability (MCAN)	In accordance with the CAN definition, the CAN-High and CAN-Low data wires transmit the same information with complementary physical levels. The CAN connection between the vehicle control ADM3 and the engine control PLD/MR2 provides a limp home routine. This allows communications to be continued on the second, intact wire in the event of a failure (short or broken circuit) in one wire. One wire capability must be deactivated if more than two participants are connected to the engine CAN (parameter value 0). Concerning the one wire capability, the vehicle control ADM3 and the engine control PLD/MR2 must have identical settings. **Parameter values:** 1 = Two Wire Mode Only 0 = Enable One Wire Mode
02	Engine CAN Limp Home Mode	Response PLD/MR2 if engine CAN failure **Parameter values:** 0 = idle speed (engine switches over to idle running) 1 = engine stop (engine will shut down) 2 = limp home speed (engine maintains actual speed or reduces the speed to a limp home speed, if it is currently exceeded) 3 = limp home speed (engine maintains actual speed or reduces the speed to a limp home speed, if it is currently exceeded) Upon switching the engine off and on again, the engine adopts the limp home speed via a ramp, starting with the idle speed.
03	SAE J1939 3. Source Address TSC1 (e.g. jack knife protection)	Programmable source address of jack knife protection on SAE J1939 data bus.
04	SAE J1939 Source Address Motor	Programmable source address of the respective participant on the data bus SAE J1939.
05	SAE J1939 Source Address Engine Brake	
06	SAE J1939 Source Address Transmission	
07	SAE J1939 Source Address ABS	
08	SAE J1939 Source Transmission Retarder	
09	SAE J1939 Source Address CC1	
10	SAE J1939 Source Address CC2	
11	SAE J1939 Source Address CC3	
12	SAE J1939 Source Address EBC1	
13		
	SAE J1939 Source Address Ambient Temperature	
15	EBC1 direction for AGS2 **Parameter values:** 0 = receive EBC1 1 = transmit EBC1	
16	Send Free Running Telegram on K line: **Parameter values:** 0 = no FRT 1 = with FRT	
17	J1939 Timeout Detection **Parameter values:** 0 = not active 1 = active	Activation of diagnosis for J1939 CAN signals. Signals are checked for “Not defined” (FMI 19) and “Signal Not Available” (FMI 09), missing messages lead to FMI 09 for signals that are used for the current parameter configuration
18	SPN Conversion Method **Parameter values:** 0 = 2 1 = 4	Conversion Method for SPNs as used in diagnostic messages DM1, DM2 and DM4

4.2.2. Group 02 – Vehicle Parameters I

Vehicle Parameters I

The vehicle control adaption module (ADM3) differentiates between the driving mode and PTO speed control (ADR-mode). This group contains parameters which define the functionality of the driving mode.

Output/setting value for driving mode is the engine torque.

The ADM3 determines an engine torque nominal value based on the accelerator pedal position, and transmits this value to the engine electronics PLD/MR2 via the CAN connection.

Function of cruise control tip switch CC+ and CC-:

Idle speed adjustment
Cruise-control switch (Pin 18/06) off-position:
The idle speed can be adjusted via the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04), it can be increased with CC+ and decreased with CC-.
Refer to chapter 7.1.1.1 for further information about the conditions of idle running.

Cruise-control operating mode
Cruise-control switch (Pin 18/06) "on" and driving speed exceeds threshold:
The nominal value for the speed control can be adjusted via the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04), it can be increased with CC+ and decreased with CC-.
Parameter group 15 refers to this operating mode
Refer to chapter 7.1.2 „Cruise-control" for further information about the conditions of the cruise control operating mode and the description of the cruise control.

PTO speed selection when vehicle is stationary
Cruise-control switch (Pin 18/06) „on" and vehicle is stationary:
The nominal value for the PTO speed can be adjusted via the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04), it can be increased with CC+ and decreased witch CC-.
The parameter groups 7 and 21 for special applications refer to this operating mode.
Refer to chapter 7.2. „PTO speed control" for further information about configuration possibilities and about the three operating modes of the PTO speed control.

Nr.	Parameter	Description
01	Transmission type	**Parameter values:** 0 = manual 1 = automated (ASTRONIC) 2 = automatic 3 = automatic with drive off function 4 = manual; N requested for engine start 5 = automated (EATON 3p) 6 = automated (EATON Autoshift) no clutch information; N requested 7 = automated (EATON Autoshift) no clutch information; no N requested **A)Starter interlock function:** Parameter value 0 or 8: An engine start via terminal 50 or J1939 ESS is always possible, independent of the neutral information Parameter value 1 to 7: An engine start via terminal 50 or J1939 ESS is only possible, if neutral position is encountered (via Pin15/01 or J1939 ETC2) see also Parameter 13/04 **B)Clutch information** Parameter value 0, 1, 4, 5, 7 or 8, Pin 18/02 Clutch switch is encountered. Parameter value 2, 3, 6: No clutch information available. **C)Standing start help function** Parameter value 0, 1, 3, 4, 5, 6, 7 or 8: Function enabled. Parameter value 2: Function disabled.
03	Configuration Relay 2 / Grid heater	**Parameter values:** 0 = disabled (the power stage output for the relay 2 is not active) 1 = grid heater pin 15/09 (the power stage output controls a grid heater via a relay) 2 = acc. pedal idle position (pin 21/07) (the power stage output is active when acceleration pedal is in idle position) 3 = grid heater pin 15/10 Par 02/05, must be 0 or 2 (the power stage output controls a grid heater via a relay) 4 = grid heater MR or FLA (grid heater controlled by PLD/MR2 or FLA. ADM3/VCU output is not used for grid heater) 5 = AGS2 backup lamp (the power stage output controls AGS2 backup lamp) 6 = MI-Lamp (the power stage output controls the MI-Lamp) 7 = AdBlue Level Warning Lamp (the power stage output controls the AdBlue Level Warning Lamp) 8 = NOx Lamp as signal for the status of NOx torque limitation

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>04</td><td>Hardware Type</td><td>Vehicle electric system selection:
Parameter values:
0 = 24 V, only with 4 connectors (preset value)
1 = 12V</td></tr>
<tr><td>05</td><td>Engine brake outputs</td><td>The following engine brake configurations are possible, depending on this parameter.
Parameter values:
0 = MBR_BK and MBR_KD disabled
1 = Exhaust and decompression brake via single valve (MBR_BK)
2 = Exhaust brake only (MBR_BK)
3 = Decom. brake only (MBR_KD)
4 = Exhaust brake on MBR-BK and decompression brake on MBR_KD
<table>
<tr><th>Value</th><th>Output MBR-BK</th><th>Output MBR-KD</th><th>Remarks</th></tr>
<tr><td>0</td><td>Output open</td><td>Output open</td><td>No engine brake installed</td></tr>
<tr><td>1</td><td>Output open</td><td>1 Valve</td><td>Decompression valve and engine retarder flap at one output via single valve at the ADM3</td></tr>
<tr><td>2</td><td>1 Valve (BK)</td><td>Output open</td><td>Engine retarder flap at ADM3 and decompression valve at PLD/MR2</td></tr>
<tr><td>3</td><td>Output open</td><td>Valve (KD)</td><td>Decompression valve at ADM3</td></tr>
<tr><td>4</td><td>1 Valve (BK)</td><td>1 Valve (KD)</td><td>Decompression valve and engine retarder flap are each at one output via two valves at the ADM3.</td></tr>
</table></td></tr>
<tr><td>07</td><td>Temp. Correction Blockheater</td><td>- This parameter is for the compensation of a coolant temperature which may possibly be increased by a block heater.
- If no block heater is installed, the temperature correction value has to be set to 0° C (basic value or preset value).</td></tr>
</table>

4.2.3. Group 03 – Common Limiters

Common Limiters

This group contains general limits which become effective in all operating modes.

It is only possible to modify the limits set in the engine electronics PLD/MR2 to the extent that maximum values are reduced and minimum values increased.

Nr.	Parameter	Description
01	Minimum Engine Speed	Definition of the minimum engine speed, provided that the set value is higher than the idling speed of the engine electronics PLD/MR2. The set value is always valid and can only be superseded by higher engine speeds using the programmable limitations. It may be necessary to raise the idling speed if the engine is permanently operated with increased basic load (aggregates, converter transmission).
02	Maximum Engine Speed	Definition of the maximum engine speed, provided that the set value is lower than the cutoff speed of the engine electronics PLD/MR2. The set value is always valid and can only be superseded by lower engine speeds using the programmable limitations. It may be necessary to reduce the maximum engine speed, e.g. when a hydrostatic drive is fitted to prevent the maximum speed of the hydraulic pump from being exceeded.
03	Maximum Road Speed (legal)	The vehicle control adoption module (ADM3) is certified as per directive 92/24/ EWG as a speed limiter for keeping to legally specified maximum speeds. This parameter can only be changed with the relevant authorization. This authorization can be issued to vehicle manufacturers upon application to Daimler. The set value is always valid and can only be superseded by lower vehicle speeds using the programmable limitations.

Nr.	Parameter	Description
04	Maximum Engine Torque	Limitation of the maximum torque value, provided that the set value is below the maximum torque value of the engine electronics PLD/MR2. The set value is always valid and can only be superseded by lower torques using the programmable limitations.
05	Enable Limiting Torque Ramp	Accelerator Pedal delaying on vehicle stand still. **Parameter values:** 0 = disable (limiting Torque Ramp is not active) 1 = enable (limiting Torque Ramp is activated)
06	Limiting Torque Ramp Increment	Accelerator Pedal delay rate on vehicle stand still.
07	Engine Speed Limit while Vehicle stop	While vehicle stop the engine speed is limited to the value which has been defined here
08	Desired Idle Speed Single Step Increase/Decrease	Idle-speed can be adjusted with the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04) and with the cruise-control switch (Pin18/06) is in the off position. This parameter determines the step size, which applies to both cruisecontrol tip switches and is of the same size when increasing with CC+ and decreasing with CC-
09	Desired Idle Speed Ramp Rate Increase/Decrease	This parameter indicates the ramp, with which the idle-speed is adjusted when the tip switches are activated continuously.
10	Maximum Adjusted Idle Speed	Upper final value of idle speed adjustment.
11	Max. Road Speed for Idle Increase/Decrease	Limit speed of the vehicle, up to which the idle-speed adjustment is enabled.
13	Maximum Torque Engine Retarder	Maximum engine brake torque.
14	Governor Maximum Engine Speed	Parameter values 0..4 used PI-Governor. **Parameter values:** 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5 .. 15 = MR Limiter
15	Governor Vehicle Standstill	Parameter values 0..4 used PI-Governor. **Parameter values:** 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5 .. 15 = MR Limiter

4.2.4. Group 04 – Surge damping in MR

Surge damping PLD/MR2

Nr.	Parameter	Description
01	Surge damping in MR	The damper of engine jerking is switched on with this parameter. **Parameter values:** 0 = disabled 1 = enabled  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering.
02	SD - droop factor	This parameter indicates the gain of the governor for the damper of engine jerking.  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering
03	SD - frequency limit	This parameter indicates the frequency limit of the governor for the damper of engine jerking.  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering

Nr.	Parameter	Description
04	SD - Max. throttle position	This parameter indicates the maximum position of the accelerator pedal for the damper of engine jerking.  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering.
05	SD - Max. engine speed	This parameter indicates the maximum speed for the damper of engine jerking.  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering.
06	SD - Max. torque	This parameter indicates the maximum torque for the damper of engine jerking.  Adjustment of parameters 04/01 until 04/06 only in driving test and only through skilled workers with know-how in control engineering.

4.2.5. Group 05 – Limiters LIM0 and LIM1

Limiters LIM0 and LIM1

These limitations become effective depending on the switching state of the digital inputs LIM0 (limit 0) or LIM1 (limit 1).

The limitations are effective in the **driving mode** as well as in the **PTO speed control (ADR-mode)**.
The effective limit values result from a minimum value generation based on the upper limit values and a maximum value generation based on the lower limit values of PLD/MR2 internal limit values.

Limit values of the parameter group 03 (common limiters) and
limit values of the parameter group 05 and 06 (variable limiters)

Nr.	Parameter	Description
01	Minimum Engine Speed LIM0	Definition of idle speed increase. The set value is selected via input LIM0 (limit 0).
02	Maximum Engine Speed LIM0	Definition of engine speed limitation. The set value is selected via input LIM0 (limit 0).
03	Maximum Road Speed LIM0	Definition of a reduced maximum speed. The set value is selected via input LIM0 (limit 0).
04	Maximum Engine Torque LIM0	Definition of torque limitation. The set value is selected via input LIM0 (limit 0).
05	Minimum Engine Speed LIM1	Definition of idle speed increase. The set value is selected via input LIM1 (limit1).
06	Maximum Engine Speed LIM1	Definition of engine speed limitation. The set value is selected via input LIM1 (limit 1).
07	Maximum Road Speed LIM1	Definition of a reduced maximum speed. The set value is selected via input LIM1 (limit 1).
08	Maximum Engine Torque LIM1	Definition of torque limitation. The set value is selected via input LIM1 (limit 1).
09	Governor LIM0 (Gov# for Lim0 Par5/2 nmax limitation)	Parameter values 0..4 used PI-Governor. **Parameter values:** 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5 .. 15 = MR Limiter
10	Governor LIM1 (Gov# for Lim1 Par5/6 nmax limitation)	Parameter values 0..4 used PI-Governor. **Parameter values:** 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5 .. 15 = MR Limiter

4.2.6. Group 06 – Limiters AC/LIM2

Limiters AC/LIM2

These limitations become effective depending on the switching state of the digital input „KLIMA" (limit 2).

The limitations are effective in the **driving mode** as well as in the **PTO speed control (ADR-operation).**

The effective limit values result from a minimum value generation based on the upper limit values and a maximum value generation based on the lower limit values of PLD/MR2 internal limit values.

Limit values of the parameter group 03 (general limits) and
limit values of the parameter group 05 and 06 (variable limits)

Nr.	Parameter	Description
03	Minimum Engine Speed LIM2 / KLIMA	Definition of an idling speed increase. The set value is selected via input KLIMA (limit 2), air conditioner.
04	Maximum Engine Speed LIM2 / KLIMA	Definition of engine speed limitation. The set value is selected via input KLIMA (limit 2), air conditioner.
05	Maximum Road Speed LIM2 / KLIMA	Definition of a reduced maximum speed. The set value is selected via input KLIMA (limit 2), air conditioner.
06	Maximum Engine Torque LIM2 / KLIMA	Definition of torque limitation. The set value is selected via input KLIMA (limit 2), air conditioner.
07	Limit Governor# Air Condition	Parameter values 0..4 used PI-Governor. **Parameter values:** 0 = Transient Optimized for driveline disengaged 1 = Stability Optimized for driveline disengaged 2 = Stability Optimized for driveline engaged 3 = Stability Optimized for PTO 4 = Auxiliary 5 .. 15 = MR Limiter

4.2.7. Group 07 – PTO Control on PTO and CC pin

PTO Control on PTO and CC pin

This group contains parameters which define the functionality of the PTO speed control.

The PTO speed control is used for power take-offs, working equipment (e.g. cranes, piste maintenance equipment, harvesters etc.) and for stationary applications (e.g. compressors, power generators, pumps, etc.).

Output- or setting value for PTO-mode is a nominal engine speed.

The nominal engine speed is determined by the ADM3 and transmitted to the engine electronics PLD/MR2 via the CAN connection.

There are three different operating modes in the PTO-mode:
- Driver's cab – PTO
- PTO with fixed speeds via PTO switch
- Driving with PTO with special applications

Driver's cab - PTO (parameter 01 to 05)

Cruise-control switch (Pin 18/06) ON and vehicle is stationary:
The nominal value for the PTO speed can be adjusted via the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04). It can be increased with CC+ and decreased with CC-.

Refer to chapter 7.2.1.1 for information on configuration

PTO with fixed speeds via the PTO switch (parameter 16 to 25)

Up to three preset fixed speeds can be activated via the PTO Switch (Pin 18/10).

An initial switch-on activates a PTO speed control with the fixed speed 1.
If it is switched off and shortly after switched on again (less than 1 second), the nominal speed value is set to the next nominal speed, fixed speed 2. Fixed speed 3 can be selected in the same way and thereupon it can be switched over to fixed speed 1.
The PTO speed control is switched off, as soon as the PTO switch is for more than one second in the OFF position.

The operating mode PTO via PTO switch has priority over the driver's cab PTO via the CC tip switches

Refer to chapter 7.2.1.2 for information on configuration.

Driving with PTO with special applications (see parameter group 21)

This operating mode enables driving in the speed-controlled operation (RQV-mode).

Refer to chapter 7.2.1.3 for information on configuration.

Nr.	Parameter	Description
01	Configuration PTO Speed Control	**Parameter values:** 0 = disabled (PTO speed control is disabled) 1 = enabled (PTO speed control is enabled) 2 = enabled if neutral (PTO speed control is only enabled as long as the transmission is in neutral position) 3 = enabled if neutral and park brake (PTO speed control is only enabled as long as the transmission is in neutral position and the parking brake is closed) 4 = enabled if park brake (PTO speed control is only enabled as long as the parking brake is closed)
02	Maximum PTO Speed with CC+ Switch	Maximum speed, which can be achieved for the PTO speed control when the nominal speed is increased via the cruise control tip switch CC+
03	Minimum PTO Speed with CC- Switch	Minimum speed, which can be achieved for the PTO mode when the nominal speed is decreased via the cruise control tip switch CC
04	PTO Throttle Override Enable	This parameter indicates, if the engine speed in the PTO mode can be enabled to be increased with the throttle input **Parameter values:** 0 = Disable 1 = Enable engine speed in PTO mode to be increased with throttle input
05	Max. Engine Speed for Throttle Override	This parameter indicates the maximum speed when the accelerator pedal is actuated in PTO-mode.
06	PTO dropout on service brake or park brake enabled	This parameter indicates if the PTO is caused to drop out when the service brake or the park brake is actuated. **Parameter values:** 0 = No PTO drop out with service brake or park brake enabled 1 = Causes PTO to drop out if the service brake or the park brake is being depressed 2 = Drop out on service brake 3 = Drop out on park brake

Nr.	Parameter	Description
07	PTO dropout on clutch enabled	This parameter defines, if the PTO is caused to drop out when the clutch is being depressed. **Parameter values:** 0 = No PTO drop out with clutch pedal 1 = Causes PTO to drop out if the clutch is being depressed
08	Maximum Road Speed in PTO Mode	Maximum road speed, up to which a PTO mode is possible
09	PTO Set Speed with CC- Switch	Starting speed, if PTO mode has been activated via CC-
10	PTO Speed Governor Type with CC-Switch	Governor type selection, if PTO mode has been activated via CC-
11	Maximum PTO Torque with CC- Switch	Maximum torque, if PTO mode has been activated via CC-
12	PTO Set Speed with CC+ Switch	Starting speed, if PTO mode has been activated via CC+
13	PTO Speed Governor Type with CC+ Switch	Governor type selection, if PTO mode has been activated via CC+
14	Maximum PTO Torque with CC+ Switch	Maximum torque, if PTO mode has been activated via CC-+
15	PTO Ramp Rate	In PTO mode, a new engine speed will be achieved over a ramp
16	Number of Speeds via Remote PTO (Pin 18/10)	Number of fixed speeds when activating the PTO speed control via the PTO switch: **Parameter values:** 1 = one fixed speed can be selected Parameters 07/17 to 07/19 are effective 2 = two fixed speeds can be selected Parameters 07/17 to 07/22 are effective 3 = three fixed speed can be selected Parameters 07/17 to 07/25 are effective (the generally valid and variable limits and the limits of the PLD/MR2 remain effective)
17	PTO Speed #1	Programmable speed value for fixed speed #1
18	PTO Speed #1 Governor Type	Governor type selection, if fixed speed #1 has been activated
19	PTO Speed #1 Maximum Engine Torque	Maximum engine torque, if fixed speed #1 has been activated
20	PTO Speed #2	Programmable speed value for fixed speed #2
21	PTO Speed #2 Governor Type	Governor type selection, if fixed speed #2 has been activated
22	PTO Speed #2 Maximum Engine Torque	Maximum engine torque, if fixed speed #2 has been activated
23	PTO Speed #3	Programmable speed value for fixed speed #3
24	PTO Speed #3 Governor Type	Governor selection, if fixed speed #3 has been activated
25	PTO Speed #3 Maximum Engine Torque	Maximum engine torque, if fixed speed #3 has been activated

4.2.8. Group 08 – Vehicle Speed Sensor

Vehicle Speed Sensor

This group contains the speed determination parameters.

To implement a speed limitation, the ADM3 requires a speed signal.
Refer to chapter 7.8 „tachograph“ for further information about the function „speed signal“.

The parameter group 22 „speed sensor” only becomes active with the corresponding configuration of the parameter group 08 for either square-wave sensor (if parameter 08/01 with the value=2) or for SAE J1939 data bus (if parameter 08/ 01 with the value=3).

Nr.	Parameter	Description
02	Vehicle Speed Sensor	This parameter defines whether a speed signal is present, and if so what type. This value can only be changed with the relevant authorization. Such authorization can be issued to vehicle manufacturers upon application to Daimler. **Parameter values:** 0 = none (disabled, no speed signal, e.g. for stationary operation) 1 = C3 from tachograph 2 = square wave (hall sensor) 3 = J1939 transmission (Transmission output shaft speed via SAE J1939 ETC1 (output shaft speed), PGN 61442) 4 = inductive sensor 5 = J1939 TCO Shaft Speed and Vehicle Speed 6 = J1939 CC1, PGN65265 Vehicle Speed 7 = J1939 CC2, PGN65265 Vehicle Speed 8 = J1939 CC3, PGN65265 Vehicle Speed
03	Axle Ratio	Axle ration of rear axle.
04	Number of Output Shaft Teeth	Number of output shaft teeth.

Nr.	Parameter	Description
05	Tire Revolutions per Kilometer	Tire revolutions per kilometer.
06	Top Gear Ratio	Top gear ratio of the transmission. It is used for the speed limitation in the case of a defective sensor.
07	Second Highest Gear Ratio	Ratio of road speed to engine speed for second highest gear of the transmission.
08	Gear Ratio Tolerance	Tolerance on second highest gear.
09	Two Speed Axle - Second Axle Ratio	2nd gear ratio.
15	No monitoring of vehicle speed sensor VSS	0 = monitoring active (Vehicle speed sensor open wire detection enabled) 1 = not active (Vehicle speed sensor open wire detection disabled)

4.2.9. Group 09 – Analog Outputs

Analog Outputs

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>01</td><td>Configuration Analog Output (IWA)
Refer to chapter 7.7 for further information about the function IWA
Parameter values:
0 = disabled
1 = throttle torque 10..90%
2 = Difference torque (external load control)
3 = throttle torque 90..10%
4 = actual torque
5 = load torque (no idle torque for automatic transmission)
6 = road speed
7 = demand speed
8 = demand speed CC+/-
9 = AGS2 transmission Temp indication lamp off
10 = AGS2 transmiss. Temp indication lamp on
11 = AdBlue level 10 – 90%</td><td>The physical value output at IWA can be selected. Pulse duty factors < 5% and >95% are evaluated as faults or as signal failures by the subsequent electronic circuit connected.
<table>
<tr><th>Value</th><th>Meaning</th><th>Remarks</th></tr>
<tr><td>0</td><td></td><td></td></tr>
<tr><td>1</td><td>Throttle torque (10% .. 90%)</td><td>Indication of accelerator pedal position idle - full throttle to 10 % .. 90 % pulse duty factor.</td></tr>
<tr><td>2</td><td>Differential torque (limit load signal)</td><td>Signal for engine load evaluation e.g. for limit load control
90%: Maximum engine torque reached (drive)
50%: Engine not under load
10%: Maximum friction torque reached</td></tr>
<tr><td>3</td><td>Throttle torque inverted (10% .. 90%)</td><td>Indication of accelerator pedal position idle - full throttle to 90 % .. 10 % pulse duty factor.</td></tr>
<tr><td>4</td><td>Actual torque</td><td>Indication of the actual engine torque 0 .. Md_{max} to 10 % .. 90% pulse duty factor</td></tr>
<tr><td>5</td><td>Load signal</td><td>Load signal for coupling an automatic transmission with PWM interface. Output value is the minimum of the active torque and set torque, which is calculated on the basis of a maximum value generation of the accelerator pedal demand and the cruise control demand</td></tr>
<tr><td>6</td><td>Road speed</td><td>Formation of an C3 signal for other electronics.
$v_{FZG}[\mathrm{km/h}] = \frac{0{,}45 * 1000}{t[\mathrm{ms}]}$
t = periodic time of signal
(with T = 2ms = constant = pulse period)</td></tr>
<tr><td>7</td><td>Nominal speed</td><td>Indication of the currently active nominal speed during PTO mode to 10% .. 90% pulse duty factor</td></tr>
<tr><td>8</td><td>Demand speed CC +/-</td><td>Special function for crawler-vehicles.
Cruise control function with CC+ / CC-
Demand speedoutput on pin 12/05</td></tr>
<tr><td>9</td><td>AGS2 transmission temp indication lamp off</td><td></td></tr>
<tr><td>10</td><td>AGS2 transmission temp indication lamp on</td><td></td></tr>
<tr><td>11</td><td>AdBlue Level</td><td>Indication of the AdBlue tank level.
10% PWM = AdBlue tank is empty
90% PWM = AdBlue tank is full</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>02</td><td>Engine Speed Display N_MOT</td><td>A square-wave signal which is directly proportional to the engine speed is available at the N-MOT output. Pulse duty factor approx. 50%. The scaling, i.e. correlation of frequency to engine speed can be adjusted.
$$f_{\mathrm{MOT}}[\mathrm{Hz}] = k\,\frac{n_{\mathrm{MOT}}[\mathrm{min}^{-1}]}{6000}$$
f_{MOT} : Frequency at output N_MOT
k : Impulse number tachometer, number of impulses per 100 revolutions
n_{MOT}: Current engine speed, actual value</td></tr>
<tr><td>03</td><td>Oil Pressure / Fuel Filter</td><td>Configuration of the output P_OEL (oil pressure), according to the analog oil pressure display.
Parameter values:
0 = lamp (Warning lamp is connected to the output)
1 = 5 bar cluster (Analog 5 bar display connected):
<table>
<tr><th>Oil pressure [bar]</th><th>Reference resistance [Ohm]</th></tr>
<tr><td>0</td><td>10</td></tr>
<tr><td>1</td><td>48</td></tr>
<tr><td>2</td><td>82</td></tr>
<tr><td>3</td><td>116</td></tr>
<tr><td>4</td><td>151</td></tr>
<tr><td>5</td><td>184</td></tr>
</table>
2 = 10 bar cluster (Analog 10 bar display connected):
<table>
<tr><th>Oil pressure [bar]</th><th>Reference resistance [Ohm]</th></tr>
<tr><td>0</td><td>10</td></tr>
<tr><td>2</td><td>52</td></tr>
<tr><td>4</td><td>88</td></tr>
<tr><td>6</td><td>124</td></tr>
<tr><td>8</td><td>155</td></tr>
<tr><td>10</td><td>184</td></tr>
</table>
3 = no sensor
4 = fuel filter sensor</td></tr>
<tr><td>04</td><td>Coolant Temperature / AGS2 Lamp</td><td>Configuration of the output T_MOT (coolant temperature) according to the connected analog coolant-temperature display.
Parameter values:
0 = lamp (Warning lamp connected to the output)
1 = cluster (Analog display connected):
<table>
<tr><th>Temperature [C°]</th><th>Reference resistance [Ohm]</th></tr>
<tr><td>40</td><td>287,4</td></tr>
<tr><td>60</td><td>134</td></tr>
<tr><td>80</td><td>69,1</td></tr>
<tr><td>100</td><td>38,5</td></tr>
<tr><td>120</td><td>22,7</td></tr>
</table>
3 = off (not used)
4 = reserved
5 = AGS2 check transmiss. Indication lamp</td></tr>
</table>

4.2.10. Group 10 – Engine Brake

Engine brake

This group contains parameters which define the characteristics and the function of an engine brake intervention.
Refer to chapter 7.5 "Engine brake / ABS / Retarder" for further information about the function "Engine Brake".

Risk of injury!

The engine brake is a safety-relevant function for commercial vehicles.

Incorrect or unsuitable parameter programming can make it impossible to actuate the engine brake. The lack of, or reduction in, engine braking power could lead to the vehicle brake being overloaded.

Changes to the parameters in this group must only be performed by specially trained personnel or after consultation with the engine manufacturer.

It is not normally necessary to change these parameters.

Nr.	Parameter	Description
01	Minimum Engine Speed for Engine Brakes	An intervention of the engine brake is only possible, if the engine speed is above the speed which has been set here. This prevents the engine from being stopped by the engine brake intervention at excessively low speed.
02	Maximum Throttle Position for Engine Brakes (MBR)	This parameter indicates the maximum position of the accelerator pedal (as a percentage of the complete deflection of the accelerator pedal), where the engine brake is still controlled.
03	Enable Engine Brakes on Service Brake	This parameter specifies, if the engine brake is activated by the service brake. **Parameter values:** 0 = disable 1 = engine brake on service brake, engine brake remains engaged 2 = engine brake on service brake
04	Minimum Road Speed for Engine Brake Operation	The intervention of the engine brake is only enabled, if the vehicle speed is above the vehicle speed which has been set here.
05	Enable Engine Brake on Road Speed Limiter	Engine brakes will be automatically activated, if vehicle speed exceeds set speed threshold. This parameter indicates the speed threshold. 0 km/h = engine brake disabled for overspeed (function deactivated)
06	Engine Brakes and Cruise Control	Engine brake will be automatically activated, if vehicle speed exceeds Cruise Control set speed. **Parameter values:** 0 = no automatic engine brake on cruise control (function deactivated) 1 = enable automatic engine brake operation with cruise control 2 = disable cruise control on engine rake
07	Cruise Control Engine Brake 1 on (MBR_L On)	Cut in and cut off speeds (threshold values) for the engine brake step 1 (MBR_L) and 2 (MBR_H). In this case the parameter values are differential speeds referred to the set speed of the cruise control.
08	Cruise Control Engine Brake 1 off (MBR_L Off)	
09	Cruise Control Engine Brake 2 on (MBR_H On)	
10	Cruise control Engine Brake 2 off (MBR_H Off)	
11	Cruise Control Engine Brake 3 on (both MBR_H and MBR_L on)	Cut in and cut off speeds (threshold values) for the engine brake step 3 (MBR_L and MBR_H).
12	Cruise Control Engine Brake 3 off (both MBR_H and MBR_L off)	Cut in and cut off speeds (threshold values) for the engine brake step 3 (MBR_L and MBR_H).
13	Engine Brake Configuration	Type of engine brake system **Parameter values:** 0 = compression brake and exhaust flap 1 = compression brake and turbo brake

Nr.	Parameter	Description
14	Engine Brake Stage 1 Mask	Engine brake activation if MBR_L=1 and MBR_H=0 **Parameter values:** 0 = no activation 64 = decompression valve (stage1) 80 = decompression valve and exhaust flap (stage 2) 81 = decompression valve, exhaust flap and turbo brake (stage 3)

15	Engine Brake stage 1 Factor	Turbo brake torque demand relative value
		If parameter 10/14 = 81 then
		parameter 10/15 can be set from 0 to 100% for turbo brake demand
		else
		parameter 10/15 has to be set on value 100%

16	Engine Brake Stage 2 Mask	Engine brake activation if MBR_L=0 and MBR_H=1 **Parameter values:** 0 = no activation 64 = decompression valve (stage 1) 80 = decompression valve and exhaust flap (stage 2) 81 = decompression valve ,exhaust flap and turbo brake (stage 3)

17	Engine Brake Stage 2 Factor	Turbo brake torque demand relative value
		If parameter 10/16 = 81 then
		parameter 10/17 can be set from 0 to 100% for turbo brake demand
		else
		parameter 10/17 has to be set on value 100%

18	Engine Brake Stage 3 Mask	Engine brake activation if MBR_L=1 and MBR_H=1 **Parameter values:** 0 = no activation 64 = decompression valve (stage 1) 80 = decompression valve and exhaust flap (stage 2) 81 = decompression valve ,exhaust flap and turbo brake (stage 3)

19	Engine Brake Stage 3 Factor	Turbo brake torque demand relative to value
		If parameter 10/18 = 81 then
		parameter 10/19 can be set from 0 to 100% for turbo brake demand
		else
		parameter 10/19 has to be set on value 100%

20	Engine Brake Transmission Mask	Engine brake activation via J1939 TSC1 from transmission **Parameter values:** 0 = no activation 64 = decompression valve (stage 1) 80 = decompression valve and exhaust flap (stage 2) 81 = decompression valve ,exhaust flap and turbo brake (stage 3)

21	Engine Brake Transmission Factor	Turbo brake torque demand relative value
		If parameter 10/20 = 81 then
		parameter 10/21 can be set from 0 to 100% for turbo brake demand
		else
		parameter 10/21 has to be set on value 100%

22	J1939 Engine Retarder Configuration	refer to standard SAE 1939 chapter 5.2.2.2 and chapter 5.2.2.3 **Parameter values:** 3 = MBR_KD (constantly open valve) 4 = MBR_BK (engine retarder flap) 255 = not defined
23	Steps Engine Brake	For databus SAE J1939: **Parameter values:** 0 = continuous 1..n = one-..n-steps 255 = not defined
24	Minimum Engine Speed Hysteresis	Minimum Engine speed hysteresis

4.2.11. Group 11 – Accelerator Pedal

Accelerator pedal

This group contains parameters which define the evaluation of the accelerator pedal.
Refer to chapter 7.3 „Accelerator Pedal/Remote accelerator pedal“ for further information about the function „accelerator pedal“.

Risk of injury!

The accelerator pedal is a safety-relevant function for commercial vehicles.
Incorrect or unsuitable parameter programming can seriously affect the reactions of the accelerator pedal. This can cause the driver's requirements (e.g. throttle back) not to be implemented properly or only after a delay.

Changes to the parameters in this group must only be performed by specially trained personnel or after consultation with the engine manufacturer.
It is not normally necessary to change these parameters.

Nr.	Parameter	Description
01	Accelerator Pedal Type	In general the accelerator pedal serves for the transfer of the driver's requirements to the engine. **Parameter values:** 0 = not available (system without accelerator pedal Evaluation and monitoring of the FFG-signals are deactivated) 1 = PWM FFG (PWM accelerator pedal activated, e.g. VDO-Sensor) 2 = analog FFG type 1 (analog accelerator pedal activated, e.g. Williams-Pedal) 3 = analog FFG type 2 (analog accelerator pedal activated) 4 = analog FFG type 3 (analog accelerator pedal activated) 5 = SAE J1939 EEC2, SA =1 6 = SAE J1939 EEC2, SA =Par. 1/2 7 = SAE J1939 EEC2, SA =33
02	Analog pedal Kickdown Threshold	Definition of the accelerator pedal position of the analog FFG below which (as a percentage of the complete deflection) the status „kickdown“ is set. The reference point (0%) is the maximum limit stop of the accelerator pedal.
03	Idle validation Switch Limp Home Engine Speed	The limp home speed, which the engine adopts in the case of an accelerator pedal failure. The limp home operating mode becomes effective, if the analogue value adopts implausible values, but the idle validation switches do still adopt plausible conditions.
04	Limp Home Ramp Up on Idle Validation Switch	Speed ramp for the transition from normal operation to limp home operating mode
05	Accelerator Position Ramp Up Rate if Fault Clears	Speed ramp for the transition from limp home operating mode to normal operation
06	Accelerator Position Ramp Down Rate if Fault Clears	Release via a ramp, if the FFG fault clears
07	PWM Pedal Kickdown Switch On Threshold	Definition of the accelerator pedal position of the PWM FFG below which (as a percentage of the complete deflection) the status „kickdown“ is set. The reference point (0%) is the maximum limit stop of the accelerator pedal.
08	PWM Pedal Kickdown Switch Off Threshold	Definition of the accelerator pedal position of the PWM FFG above which (as a percentage of the complete deflection) the status „kickdown“ is switched off. The reference point (0%) is the maximum limit stop of the accelerator pedal.
09	Boost Threshold active	
10	Boost Threshold Ramp	
11	acc.pedal characteristic x1	
12	acc.pedal characteristic y1	
13	acc.pedal characteristic x2	
14	acc.pedal characteristic y2	
15	acc.pedal characteristic x3	
16	acc.pedal characteristic y3	
17	acc.pedal characteristic x4	
18	acc.pedal characteristic x4	
20	pedal filter tau large signal range	The parameters 11/20 to 11/22 are the filters for the signal changes of the accelerator

Nr.	Parameter	Description
21	pedal filter tau small signal range	pedal (analog or PWM accelerator pedal or remote pedal): If the modification is within the small signal range, it is filtered with a low time constant (small signal time constant, parameter 11/21). If the modification of the signal is outside the small signal range, it is filtered with a high time constant (large signal time constant, parameter 11/20). The limit value is the threshold value of the small signal range.
22	pedal filter small signal range	
23	Accelerator Pedal Ramp Up	There are applications, where it is necessary to ramp up und down the accelerator pedal signal with different gradients.
24	Accelerator Pedal Ramp Down	

4.2.12. Group 12 – MAS & OI

Maintenance Alert System and Optimized Idle

This function is for the minimization of a possible „load-trashing“ caused by a transmission play while engine is running around zero torque (reversing torque)

Nr.	Parameter	Description
01	Maintenance Alert System	**Parameter values:** 0 = MAS disabled (Maintenance Alert System disabled) 1 = MAS enabled (Maintenance Alert System enabled)
		Parameter values:
04	CEL/SEL Delay After Ignition	Time duration after bulb check for CEL/SEL to flash at ignition on.
05	Level Fault CEL/SEL Flash Mode	Mode for CEL/SEL flashing for maintenance monitor level faults. **Parameter values:** 0 = none 1 = flash at ignition on 2 = CEL on continuously when fault active 3 = both
06	Filter Fault CEL/SEL Flash Mode	Mode for CEL/SEL flashing for maintenance monitor filter faults. **Parameter values:** 0 = none 1 = flash at ignition on 2 = CEL on continuously when fault active 3 = both

4.2.13. Group 13 – Inputs

Inputs

The parameters in this group define the functions of analog and digital inputs of the ADM3.

Nr.	Parameter	Description
02	Coolant Level Sensor Input (KW_SE)	**Parameter values:** 0 = disabled 1 = ACTROS sensor
03	Enable Air Filter Sensor Input: 0 = disable 1 = enable air filter sensor	In this case the parameter value = 1 indicates, that an input for the air filter sensor is available.
06	Configuration Service Brake (Input BRE: Parameter used in ADM3)	**Parameter values:** 0 = Disable (no service brake switch available) 1 = service brake input (service brake switch is wired on pin 21/5) 2 = CC1 service brake (M2 MUX Service Brake Switch Status received via TSC1 PGN 65265 CC1) 3 = CC2 service brake (M2 MUX Service Brake Switch Status received via TSC1 PGN 65265 CC2) 4 = CC3 service brake (M2 MUX Service Brake Switch Status received via TSC1 PGN 65265 CC3)

Nr.	Parameter	Description
07	Enable Transmission Neutral Input (Input NE J1939 ETC2)	In this case the parameter value1= indicates, that an input for the sensing of the neutral position of the transmission is available. **Parameter values:** 0 = J1939 (ETC2) e.g. no switch (neutral information is read from J1939, ETC1, Byte 4) 1 = switch (PIN 15/01) (neutral information is read from Pin 15/01)
10	Configuration Park Brake:	**Parameter values:** 0 = disable 1 = park brake input 2 = CC1 park brake 3 = CC2 park brake 4 = CC3 park brake
11	Configuration CC Switch ON/OFF	**Parameter values:** 0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
12	Configuration CC set/coast and resume/accelerate	**Parameter values:** 0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
13	Configuration CC Pause	**Parameter values:** 0 = disabled or stalk switch 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
14	Configuration 2nd Axle Speed Switch	**Parameter values:** 0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
15	Configuration Clutch	**Parameter values:** 0 = hardwired 1 = J1939 CC1 2 = J1939 CC2 3 = J1939 CC3
16	Configuration Engine Brake Switch	**Parameter values:** 0 = hardwired 1 = J1939 EBC1

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>17</td><td>Configuration Variable Input DSF0
Refer to chapter 7 for further information about the function of ABS, Retarder, Temposet and grid heater.
Parameter values:
0 = Disable
1 = Enable ABS Input
2 = Enable Retarder Input
3 = Enable Temposet
4 = Enable grid heater monitoring
5 = switchable torque demand
6 = Drive on super structure
7 = Throttle inhibit super structure
8 = SPLIT select
9 = zerotorque super structure</td><td>Depending on the setting of this parameter, certain functions are activated with the high side digital input DSF0 (special function 0)
<table>
<tr><th>Value</th><th>Meaning</th><th>Remarks</th></tr>
<tr><td>0</td><td>Input DSF0</td><td>not active</td></tr>
<tr><td>1</td><td>ABS intervention</td><td>DSF0 is available for coupling of conventional ABS control unit. When input DSF0 is active, the engine brake outputs are deactivated.</td></tr>
<tr><td>2</td><td>Retarder intervention</td><td>The input DSF0 is available for coupling a conventional retarder. When input DSF0 is active, the information „Retarder intervention“ is transmitted to the engine control PLD/MR2. This setting only has a useful purpose on units on which the fan is controlled via the engine control PLD/MR2.</td></tr>
<tr><td>3</td><td>Temposet</td><td>The input DSF0 is available for setting and deleting a temporary maximum speed. The temposet speed is also deleted when actuating the kickdown.</td></tr>
<tr><td>4</td><td>Monitoring Grid Heater</td><td>The input DSF0 monitors the function of the grid heater.</td></tr>
<tr><td>5</td><td>Switchable torque demand</td><td>If the switch DSF0 is actuated, as much torque is demanded from the engine as set in parameter 13/08. (Application e.g. with harvesters, in order to demand a maximum torque when harvesting, without having to install an accelerator pedal (FFG)).</td></tr>
<tr><td>6</td><td>Super Structure</td><td>Drive on super structure. Setting of the addresses in the CAN SAE J1939: super structure engine on address 1 and driving engine on address 0 (preset value). Switch-over from accelerator pedal (FFG) in the bottom carriage to the FFG in the super structure by actuating the switch DSF0. Now it is possible to accelerate the driving engine with the FFG in the super structure by actuating the switch DSF0.</td></tr>
<tr><td>7</td><td>Throttle inhibit super structure</td><td>If the switch is actuated, then accelerator pedal signal is only directed to IWA and relay 3 and 4. For IWA see: actual value output, pin 12/05 and parameter 09/01 values 1, 3, 7 and 8. For relay 3 see parameter 14/01 (value = 5). For relay 4 see parameter 14/10 (value = 5). If switch is actuated, all other functions are not supported with accelerator pedal signal, e.g. driving mode is disabled.</td></tr>
<tr><td>8</td><td>SPLIT select</td><td>SPLIT switch.</td></tr>
<tr><td>9</td><td>Zerotorque superstructure</td><td></td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>18</td><td>Configuration Variable Input DSF1
Parameter values:
0 = Disable
1 = Enable ABS Input
2 = Enable Retarder Input
3 = Enable Temposet
4 = Enable grid heater monitoring
5 = switcheable torque
6 = Drive on super structure
7 = Throttle inhibit super structure
8 = SPLIT select
9 = zerotorque super structure</td><td>select Depending on this parameter certain functions are activated with the low side digital input DSF1(special function 1).
<table>
<tr><th>Value</th><th>Meaning</th><th>Remarks</th></tr>
<tr><td>0</td><td>Input DSF1</td><td>not active</td></tr>
<tr><td>1</td><td>ABS intervention</td><td>The input DSF1 is available for coupling a conventional ABS control unit. The engine brake outputs are deactivated if the output DSF0 is active</td></tr>
<tr><td>2</td><td>Retarder intervention</td><td>The input DSF1 is available for coupling a conventional retarder. When input DSF1 is active, the. information „Retarder intervention“ is transmitted to the engine control PLD/MR2. This setting only has a useful purpose on units on which the fan is controlled via the engine control PLD/MR2.</td></tr>
<tr><td>3</td><td>Temposet</td><td>The input DSF1 is available for setting and deleting a temporary maximum speed. The temposet speed is also deleted when actuating the kickdown. actuating the kickdown.</td></tr>
<tr><td>4</td><td>Monitoring Grid Heater</td><td>The input DSF1 monitors the function of r the grid heater.</td></tr>
<tr><td>5</td><td>Switcheable Torque Demand</td><td>5 If the switch DSF1 is actuated, as much torque is demanded from the engine as set in the parameter 13/09. (Application e.g. with harvesters, in order to demand a maximum torque when harvesting, without having to install an accelerator pedal (FFG)</td></tr>
<tr><td>6</td><td>Super Structure</td><td>Drive on super structure. Setting of the addresses in the CAN SAE J1939: super structure engine on address 1 and driving engine on address 0 (preset value). Switch-over from accelerator pedal (FFG) in the bottom carriage to the FFG in the super structure by actuating the switch DSF1. Now it is possible to accelerate the driving engine with the FFG in the super structure by actuating the switch DSF1.</td></tr>
<tr><td>7</td><td>Throttle inhibit super structure</td><td>If the switch is actuated, then accelerator pedal signal is only directed to IWA and relay 3 and 4. For IWA see: actual value output, pin 12/05 and parameter 09/01 values 1, 3, 7 and 8. For relay 3 see parameter 14/01 (value = 5). For relay 4 see parameter 14/10 (value = 5). If switch is actuated, all other functions are not supported with accelerator pedal signal, e.g. driving mode is disabled.</td></tr>
<tr><td>8</td><td>SPLIT select</td><td>SPLIT switch.</td></tr>
<tr><td>9</td><td>Zerotorque superstructure</td><td></td></tr>
</table></td></tr>
<tr><td>19</td><td>Switchable torque demand via DSF0</td><td>Parameter to set torque demand value, which is used if Parameter 13/06 is set to value 5 and digital input DSF0 is active.</td></tr>
<tr><td>20</td><td>Switchable torque demand via DSF1</td><td>Parameter to set torque demand value, which is used if Parameter 13/07 is set to value 5 and digital input DSF1 is active.</td></tr>
<tr><td>37</td><td>Input DSF2</td><td>Parameter values:
0 = not active
1 = clutch2
2 = Enable TSC1 from SA3
3 = Quit Signal for CC with Stalk Switch (please keep in mind, that the stalk switch functionality is activated only by setting this parameter value)
4 = Power Rating with DSF2</td></tr>
<tr><td>38</td><td>Input DSF3</td><td>Parameter values:
0 = not active
1 = Engine Hood Bus
2 = optimized idle safety loop</td></tr>
</table>

4.2.14. Group 14 – Relay 3/4, AdBlue, NOx, misc.

Relay 3/4, AdBlue, NOx, misc.

The parameters of this group define two actual value comparators (IWK). These comparators can be used to check whether the actual torque, road speed, engine speed, coolant temperature, accelerator pedal torque or the boost temperature is higher than the programmed threshold values. If the actual value exceeds the threshold, the corresponding output will be activated.

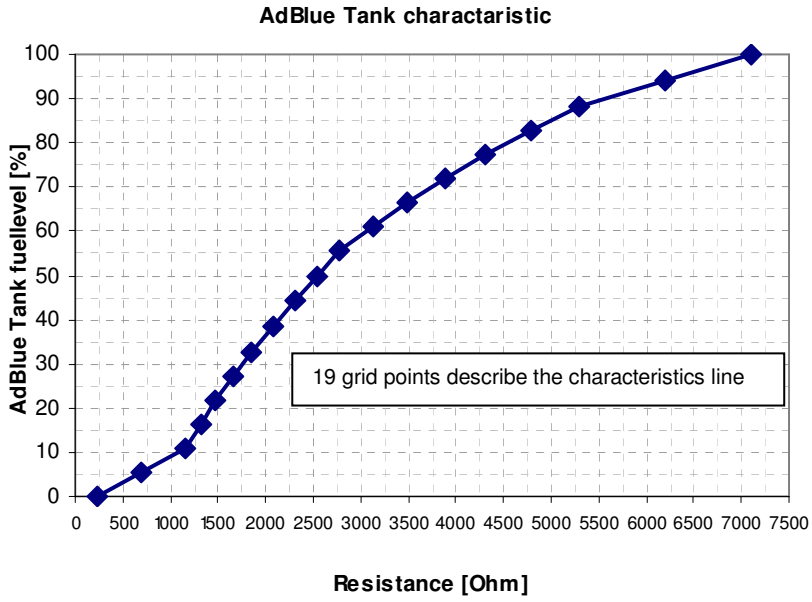
This group includes also the parameters for the Euro 4 AdBlue functionality, e.g. the AdBlue Tank characteristics line.

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>01</td><td>Configuration Relay (IWK3)
Parameter values:
0 = Acc. Pedal Idle Position
1 = Actual Torque
2 = Road Speed
3 = Engine Speed
4 = Coolant Temperature
5 = Pedal Torque
6 = Boost Temperature
7 = Oil Pressure (MR threshold)
8 = Coolant Temperature (MR threshold)
9 = off
10 = reserved
11 = MI-Lamp
12 = AdBlue Level Warning Lamp
13 = NOx Lamp</td><td>Parameters for „REL 3“ digital output configuration (output relay 3).
<table>
<tr><th>Value</th><th>Meaning</th><th>Remarks</th></tr>
<tr><td>0</td><td>Acc. pedal idle position</td><td>REL3“ output is active, provided, that the accelerator pedal is in the idle position</td></tr>
<tr><td>1</td><td>Mactual > M_KOMP3</td><td>Comparison of the actual engine torque with the values „02 IWK3, torque M“ and „03 IWK3, hysteresis M“. The output „REL3“ is active, provided that the actual engine torque is greater than the „02 IWK3, torque M“. The „REL3“ output is not active, provided that the actual engine torque is less than the difference between „02IWK3torqueM“ and „03 IWK3 hysteresis M“.</td></tr>
<tr><td>2</td><td>Vactual > V_KOMP3</td><td>Comparison of the actual road speed with the values „04 IWK3 speed v“ and „05 IWK3 hysteresis v“. The output „REL3“ is active, provided that the actual road speed is greater than „04IWK3speed v“. The output „REL3“ is not active, provided that the actual road speed is less than the difference between „04 IWK3 road speed v“ and „05 IWK3 hysteresis v“</td></tr>
<tr><td>3</td><td>Nactual > N_KOMP3</td><td>Comparison of the actual engine speed with the values „06 IWK3 engine speed n“ and „07 IWK3 hysteresis n“. The output „REL3“ is active, provided that the actual engine speed is greater than „06 IWK3 engine speed n“. The output „REL3“ is not active, provided that the actual engine speed is less than the difference between „06 IWK3 engine speed n“ and „07 IWK3 hysteresis n“.</td></tr>
<tr><td>4</td><td>Tactual > T_KOMP3</td><td>Comparison of the actual coolant temperature with the values „08 IWK3 coolant temperature“ and „09 IWK3 hysteresis T“. The output „REL3“ is active, provided that the actual coolant temperature is greater than „08IWK3coolant temperature“. The output „REL3“ is not active, provided that the actual coolant temperature is less than the difference between „08 IWK3 coolant temperature“ and „09 IWK3 hysteresis T“.</td></tr>
<tr><td>5</td><td>Mactual > M_KOMP3</td><td>Comparison of the accelerator pedal torque with the values „02 IWK3 torque M“ and „03 IWK3 hysteresis M“. The output „REL3“ is active, provided that the accelerator pedal torque is greater than „02 IWK3 torque M“. The output „REL3“ is not active, provided that the accelerator pedal torque is less than the difference between „02IWK3torqueM“ and „03 IWK3 hysteresis M“.</td></tr>
<tr><td>6</td><td>Tactual > T_KOMP3</td><td>Comparison of the actual boost temperature with the values „08 IWK3 temperature“ and „09 IWK3 hysteresis T“. The output „REL3“ is active, provided that the actual boost temperature is greater than „08IWK3temperature“. . The output „REL3“ is not active, provided that the actual boost temperature is less than the difference between „08 IWK3 temperature“ and „09 IWK3 hysteresis T“.</td></tr>
<tr><td>7</td><td>Warning Lamp Oil Pressure</td><td>Enables the control of a warning lamp for oil pressure via the output REL3.</td></tr>
<tr><td>8</td><td>Warning Lamp Coolant Temp.</td><td>Enables the control of a warning lamp for coolant temperature via the output REL3</td></tr>
<tr><td>9</td><td>Off</td><td>Off</td></tr>
<tr><td>10</td><td></td><td>Reserved</td></tr>
<tr><td>11</td><td>MI-Lamp</td><td>Enables the control of a warning lamp for MI (EU4) via the output REL3.</td></tr>
<tr><td>12</td><td>AdBlue Level Warning Lamp</td><td>Enables the control of a warning lamp for the AdBlue tank level via the output REL3.</td></tr>
<tr><td>13</td><td>NOx Lamp</td><td>NOx Lamp as signal for the status of NOx torque limitation</td></tr>
</table></td></tr>
</table>

Nr.	Parameter	Description
02	IWK3 Torque	Definition of the reference value for the actual engine torque.
03	IWK3 Hysteresis Torque	Definition of the hysteresis for the comparison of the actual engine torque with „02IWK3torqueM“
04	IWK3 Road Speed	Definition of the reference value for the actual road speed.
05	IWK3 Hysteresis Road Speed	Definition of the hysteresis for the comparison of the actual road speed with „04 IWK3 road speed“
06	IWK3 Engine Speed	Definition of the reference value for the actual engine speed.
07	IWK3 Hysteresis Engine Speed	Definition of the hysteresis for the comparison of the actual engine speed with „06IWK3engine speed n“.
08	IWK3 Temperature	Definition of the reference value for the actual coolant temperature or the actual boost temperature.
09	IWK3 Hysteresis Temperature	Definition of the hysteresis for the comparison of the actual coolant temperature or the actual boost temperature with „08 IWK3 temperature“

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>10</td><td>Configuration Relay 4 (IWK4)
Parameter values:
0 = Acc. Pedal Kickdown Position
1 = Actual Torque
2 = Road Speed
3 = Engine Speed
4 = Coolant Temperature
5 = FFG Torque
6 = Boost Temperature
7 = Oil Pressure (MR threshold)
8 = Coolant Temperature (MR threshold)
9 = off
10 = reserved
11 = reserved
12 = MI Lamp
13 = AdBlue Level Warning Lamp
14 = NOx Lamp</td><td>Parameters for „REL4“ digital output configuration (output relay 4)
<table>
<tr><th>Value</th><th>Meaning</th><th>Remark</th></tr>
<tr><td>0</td><td>Acc. Pedal Kickdown Position</td><td>The output „REL4“ is active, provided that the acceleration pedal is in the kickdown position.</td></tr>
<tr><td>1</td><td>Mactual > M_KOMP4</td><td>Comparison of the actual engine torque with the values „11 IWK4, torque M“ and „12 IWK4 hysteresis M“. The output „REL4“ is active, provided that the actual engine torque is greater than „11 IWK4 torque M“. The output „REL4“ is not active, provided that the actual engine torque is less than the difference between „11IWK4torqueM“ and „12 IWK4 hysteresis M“.</td></tr>
<tr><td>2</td><td>Vactual > V_KOMP4</td><td>Comparison of the actual road speed with the values „13IWK4road speed v“ and „14 IWK4 hysteresis v“. The output „REL4“ is active, provided that the actual road speed is greater than „13 IWK4, road speed v“. The output „REL4“ is not active, provided that the actual road speed is less than the difference between „13 IWK4 road speed v and „14IWK4hysteresisv“.</td></tr>
<tr><td>3</td><td>Nactual > N_KOMP4</td><td>Comparison of the actual engine speed with the values „15 IWK4 engine speed n“ and „16 IWK4 hysteresis n“. The output „REL4“ is active, provided that the actual engine speed is greater than „15 IWK4 engine speed n“. The output „REL4“ is not active, provided that the actual engine speed is less than the difference between „15 IWK4 engine speed n“ and „16 IWK4 hysteresis n“.</td></tr>
<tr><td>4</td><td>Tactual > T_KOMP4</td><td>Comparison of actual coolant temperature with the values „17 IWK4 coolant temperature“ and „18 IWK4 hysteresis T“. The output „REL4“ is active, provided that the actual coolant temperature is greater than „17 IWK4 coolant temperature“. The output „REL4“ is not active, provided that the actual coolant temperature is less than the difference between „17 IWK4 coolant temperature“ and „18 IWK4 hysteresis T“.</td></tr>
<tr><td>5</td><td>Mactual > M_KOMP4</td><td>Comparison of the accelerator pedal torque with the values „11 IWK4 torque M“ and „12 IWK4 hysteresis M“. The output „REL4“ is active, provided that the accelerator pedal torque is greater than „11 IWK4 torque M“. The output „REL4“ is not active, provided that the accelerator pedal torque is less than the difference between „11IWK4torqueM“ and „12 IWK4 hysteresis M“.</td></tr>
<tr><td>6</td><td>Tactual > T_KOMP4</td><td>Comparison of the actual boost temperature with the values „17 IWK4 temperature“ and „18 IWK4 hysteresis T“. The output „REL4“ is active, provided that the actual boost temperature is greater than „17IWK4temperature“. The output „REL4“ is not active, provided that the actual boost temperature is less than the difference between „17 IWK4 temperature“ and „18IWK4hysteresis T“.</td></tr>
<tr><td>7</td><td>Warning Lamp Oil Pressure</td><td>The function 7 enables the control of a warning lamp for oil pressure via the output REL4</td></tr>
<tr><td>8</td><td>Warning Lamp Coolant Temp</td><td>The function 8 enables the control of a warning lamp for coolant temperature via the output REL4.</td></tr>
<tr><td>9</td><td>off</td><td>Relay4 is deactivated.</td></tr>
<tr><td>10</td><td></td><td>Reserved.</td></tr>
<tr><td>11</td><td></td><td>Reserved</td></tr>
<tr><td>12</td><td>MI Lamp</td><td>Enables the control of a warning lamp for MI (EU4) via the output REL3.</td></tr>
<tr><td>13</td><td>AdBlue level warning lamp</td><td>Enables the control of a warning lamp for the AdBlue tank level via the output REL3.</td></tr>
<tr><td>14</td><td>NOx Lamp</td><td>NOx Lamp as signal for the status of NOx torque limitation</td></tr>
</table></td></tr>
<tr><td>11</td><td>IWK4 Torque</td><td>Definition of the reference value for the actual engine torque or FFG torque.</td></tr>
<tr><td>12</td><td>IWK4 Hysteresis Torque</td><td>Definition of the hysteresis for the comparison of the actual engine torque or FFG torque with „11IWK4torqueM“.</td></tr>
<tr><td>13</td><td>IWK4 Road Speed</td><td>Definition of the reference value for the actual road speed.</td></tr>
</table>

Nr.	Parameter	Description
14	IWK4 Hysteresis Road Speed	Definition of the hysteresis for the comparison of the actual road speed with „13 IWK4 road speed v“.
15	IWK4 Engine Speed	Definition of the reference value for the actual engine speed.
16	IWK4 Hysteresis Engine Speed	Definition of the hysteresis for the comparison of the actual engine speed with „15 IWK4 engine speed n“.
17	IWK4 Temperature	Definition of the reference value for the actual coolant temperature or the actual boost temperature.
18	IWK4 Hysteresis Temperature	Definition of the hysteresis for the comparison of the actual coolant temperature or the actual boost temperature with „17 IWK4 temperature“.
19	Diagnosis Relay 4 0 = disabled 1 = enabled	Diagnosis function
20	AdBlue Number of CAN messages	Number of Can messages needed to describe the AdBlue characteristic
21	AdBlue Tank-ID	AdBlue Tank ID, valid Identification must be < 50001
22	AdBlue Tankcapacity	Fuel capacity of the AdBlue tank
23	AdBlue reserve fuel	AdBlue level for Reserve Warning
24	AdBlue empty fuel	AdBlue level for Empty Warning
25	Diesel reserve fuel	Diesel level for Reserve Warning
26	Diesel empty fuel	Diesel level foe Empty Warning
27	Damping AdBlue consumption	Damping for AdBlue consumption
28	Damping Diesel consumption	Damping for Diesel consumption
29	Damping AdBlue level	Damping for the AdBlue level
31	Battery cutoff switch / GGVS	Described the **Parameter values:** 0 = Without Battery cutoff switch / GGVS 1 = Battery cutoff switch / GGVS 2 = Not defined 3 = s.n.v.
32	NOx torque reduction	Reduction of the maximum available torque in percent of the maximum torque (reference torque of the engine), FDOK protected parameter!
34	Resistance 1	Describes the characteristics of the AdBlue Tank and the level sensor
35	Level 1	19 grid points describe the AdBlue Tank characteristics lines
36	Resistance 2	The grid points should be strictly monotonic (decreasing or increasing)
37	Level 2	If not all grid points are used, it is necessary to fill up the unused points with the last valid values
38	Resistance 3	
39	Level 3	
40	Resistance 4	
41	Level 4	
42	Resistance 5	
43	Level 5	
44	Resistance 6	
45	Level 6	
46	Resistance 7	
47	Level 7	
48	Resistance 8	
49	Level 8	
50	Resistance 9	
51	Level 9	
52	Resistance 10	
53	Level 10	
54	Resistance 11	
55	Level 11	
56	Resistance 12	
57	Level 12	Example of an AdBlue characteristics line with all 19 grid points



Nr.	Parameter	Description
58	Resistance 13	
59	Level 13	
60	Resistance 14	
61	Level 14	
62	Resistance 15	
63	Level 15	
64	Resistance 16	
65	Level 16	
66	Resistance 17	
67	Level 17	
68	Resistance 18	
69	Level 18	
70	Resistance 19	
71	Level 19	
72	Lower faulty Resistance	A valid resistance value must be higher than this parameter
73	Upper faulty Resistance	A valid resistance value must be lower than this parameter
74	Diesel Tank Capacity	Fuel capacity for the diesel tank

4.2.15. Group 15 – Cruise Control I

Cruise Control I

The cruise control is switched on with the cruise-control switch CC_ON (Pin 18/06) and it remains switched on. There upon either the cruise-control tip switch CC+ (Pin 18/04) can be used to increase the nominal speed by toggling the switch, or the cruise-control tip switch CC- (Pin 18/05) can be used to reduce the nominal speed.

The initial speed for setting the cruise control can be programmed with CC+ and CC-.

Thereupon this operating mode is switched off again with the cruise-control switch CC_ON (Pin 18/06).

Refer to chapter 7.1.2 „Cruise control“ for further information about the requirements of the cruise-control operation and the description of the cruise control.

Nr.	Parameter	Description
01	Minimum Road Speed for Cruise Control	This parameter indicates the minimum road speed which is required to activate the cruise control. It is the limit speed for the idle speed adjustment (parameter 02/04).
02	Maximum Set Speed for Cruise Control	This parameter indicates the maximum set speed up to which the cruise control can be set. The maximum speed which can be set is the legal maximum speed (parameter 03/03).
03	Cruise Set Speed Increment (Single-step CC+)	The step size of the cruise-control tip switch CC+ can be selected by this parameter. (It is usually of the same size like the step size of CC-)
04	Cruise Set Speed Decrement (Single-step CC-)	The step size of the cruise-control tip switch CC- can be selected by this parameter. (It is usually of the same size like the step size of CC+)
05	Cruise Set Speed Ramp Up	Selection of the ramp for the cruise-control tip switch CC+.
06	Cruise Set Speed Ramp Down	Selection of the ramp for the cruise-control tip switch CC-.
07	Enable Cruise Auto Resume (Automatic Resume Function after Gear Shift)	Activation of an automatic cruise-control resume after a gear shift. **Parameter values:** 0 = disable 1 = enable automatic cruise resume function after clutch has been released once 2 = release clutch twice
08	Minimum Engine Speed Cruise Control	This parameter indicates the minimum engine speed which is required to activate the cruise control.
16	Cruise Control Logic	Activation of an automatic cruise-control resume after a gear shift. **Parameter values:** 0 = FTL 1 = Hyundai 2 = Mitsubishi

4.2.16. Group 16 – Relay 1 / Starter Lockout

Relay 1 / Starter Lockout

Adjustment of parameters 16/01 only in driving test and only through skilled workers with know-how in control engineering

Nr.	Parameter	Description
01	Output Relay 1/Starter Lockout	**Parameter values:** 0 = disable (the driver stage output for the relay 1 is unassigned) 1 = enable starter lockout (the output takes on the starter lockout function) 2 = enable kick down output (the accelerator pedal is in the kickdown position) 3 = enable modulat. relay Allison transm. (the driver stage output controls a modulation valve e.g. for an Allison automatic transmission) 4 = reserved 5 = split valve 2 (valve 2 for SPLIT function) 6 = starter lockout and AGS2 (Starter Lockout and AGS2 available only for automatic clutch) 7 = MIL Lamp (the power stage output controls the MI-Lamp) 8 = AdBlue Level Warning Lamp (the power stage output controls the AdBlue Level Warning Lamp) 9 = NOx Lamp as signal for the status of NOx torque limitation
02	Starter Lockout Diagnosis: 0 = enabled 1 = disabled	Starter Lockout Open Load Diagnosis.

4.2.17. Group 17 – Idle/PTO Shutdown

Idle/PTO Shutdown

Adjustment of the parameters 17/01 to 17/09 only in driving test and through skilled workers with know-how in control engineering.

Nr.	Parameter	Description
01	Enable Idle Shutdown	The idle shutdown is enabled by this parameter. **Parameter values:** 0 = disable 1 = enable idle shutdown with Park Brake status 2 = enable idle shutdown without Park Brake status 3 = enable idle shutdown with edge triggered accelerator pedal
02	Idle Shutdown Time	This parameter determines the maximum idle time until the idle shutdown.
03	Enable PTO Shutdown	This parameter activates the idle shutdown, provided that the application has been in the PTO mode and the engine has been idling last. **Parameter values:** 0 = disable 1 = enable PTO shutdown with Park Brake status 2 = enable PTO shutdown without Park Brake status 3 = enable PTO shutdown with edge triggered accelerator pedal
04	PTO Shutdown Time	This parameter determines the maximum time of the PTO operation until the PTO shutdown.
05	Maximum Engine Load for PTO Shutdown	This parameter determines the torque threshold, up to which a PTO shutdown is activated.
06	Time for CEL before Idle/PTO Shutdown	Warning period of the Check Engine Light prior to engine shutdown.
07	Time for SEL before Idle/PTO Shutdown	Warning period of Stop Engine Light prior to engine shutdown.
08	Minimum Coolant Temperature	Minimum coolant temperature up to which an engine shutdown is activated.
09	Enable Idle/PTO Shutdown Override (Input MABSCH_SP)	**Parameter values:** 0 = disable 1 = enable, allows Engine Check switch (MABSCH_SP) to override engine idle/PTO shutdown This parameter activates the shutdown override with the input MABSCH_SP.

4.2.18. Group 18 – Engine Protection Shutdown

Engine Protection Shutdown

Adjustment of the parameters 18/01 to18/09 only in driving test and through skilled workers with know-how in control engineering.

This function is intended for **non-monitored engines**, e.g. for emergency power generating units or other stationary applications, e.g. with pumps, compressors or with power generating units in containers.

Refer to chapter 7.10.1 „Engine protection shutdown" for further information on the engine protection shutdown function.

Nr.	Parameter	Description
01	Engine Protection Shutdown on Coolant Temperature	Engine protection shutdown on engine temperature fault indication. **Parameter values:** 0 = disable 1 = enable
02	Engine Protection Shutdown on Coolant Level	Engine protection shutdown on coolant level fault indication. **Parameter values:** 0 = disable 1 = enable
03	Engine Protection Shutdown on Oil Pressure	Engine protection shutdown on oil pressure fault indication. **Parameter values:** 0 = disable 1 = enable
04	Engine Protection Shutdown on Oil Level	Engine protection shutdown on oil level fault indication. **Parameter values:** 0 = disable 1 = enable
05	Engine Protection Shutdown Time	Selection of the shutdown time for engine protection shutdown for all conditions according to parameter 18/01 to 18/04 except for the shutdown on oil pressure fault indication (18/03).
06	Engine Protection Time on Oil Pressure	Selection of the shutdown time for engine protection shutdown on oil pressure fault indication.
07	Counter of Engine Protection Shutdown Overrides	Counter of engine protection shutdown overrides. The counter indicates how many times the engine shutdown was prevented by the switch „shutdown override" (Pin 18/13).
08	Time for CEL before Engine Protection Shutdown	Warning period for check engine light. Time for the check engine light to flash prior to shutdown.
09	Time for SEL before Engine Protection Shutdown	Selection of the warning period of the engine stop light. Time for Engine Stop Light to flash prior to shutdown.
10	Overspeed BR 400	Overspeed warning (engine stop lamp red) for the engine speed 400, 500 and 900 rpm
11	Overspeed BR 500	
12	Overspeed BR 900	
13	Oil Level Lamp Configuration	Configuration of input signals for Oil Level Lamp. Compare chapter 7.6.6. for detailed description of the oil level indicator lamp signal **Parameter values:** 0 = Oil Level 1 = Engine Overspeed 2 = Oil Level or Engine Overspeed

4.2.19. Group 19 – Fan

Fan

Refer to chapter 7.12.3 „Fan demand“ for further information on the fan activation function.

Nr.	Parameter	Description
01	Fan Type	Defines the used fan. **Parameter values:** 0 = Linnig; on highway 1 = Linnig; off highway 2 = on highway Unimog /Visko 3 = NAW; Econic, Unimog 4 = Horton; Freightliner 5 = Bosch; Evobus, Unimog, off highway /1hy 6 = Bosch; Evobus, Unimog /2hy 7 = Horton; Freightliner, off highway /1 8 = BorgWarner; on highway 9 = Bosch; Unimog, Econic 251 = fan defined in MR2 255 = no fan
03	Fan Power on Engine Brake	Selection of the percentage of the fan power consumption on engine brake.
05	Fan Power on air Condition	Selection of the percentage of the fan power consumption on air conditioner.
07	Fan Power on PTO	Selection of the percentage of the fan power consumption on PTO speed control.
08	Fan Activation on Fan Override	This parameter indicates the percentage of the fan power consumption if the input „Fan“ is active, provided that the fan is demanded via digital input „LUEFTER“ (Pin 18/15).
09	Coolant Temperature at 0% Fan	Selection of the coolant temperature if the fan is OFF (0% fan power consumption)
10	Coolant Temperature at 100% Fan	Selection of the coolant temperature if the fan is ON (100% fan power consumption).
11	Hold time Fan	Maximum value generation based on the parameters 19/01 to19/03, 19/06 and 19/07, which is considered to be the resulting fan demand. A time-delayed reduction of the fan power consumption takes place, if the resulting value falls. This prevents fast power jumps of the fan in the case of a frequent fan demand.
12	Ramp Fan	A new value (percentage of fan power consumption) will be achieved over a ramp. The ramp has the same gradient, regarding to increasing and decreasing values.
13	Fan Power on DSF0	Selection of the percentage of fan power consumption for a conventional retarder, input DSF0 at pin 12/10 is used for information about retarder intervention, compare chapter 7.12.2. (Conventional Retarder)
14	Fan Power on DSF1	Selection of the percentage of fan power consumption for a conventional retarder at input DSF1 (pin 12/09), compare chapter 7.12.2. (Conventional Retarder)

4.2.20. Group 20 – Remote Accelerator Pedal

Remote accelerator pedal

This group contains parameters which define the remote accelerator pedal evaluation.

Refer to chapter 7.3 „Accelerator pedal/Remote accelerator pedal“ for further information on the remote accelerator pedal function.

Risk of accident!

Changes to the parameters in this group must only be performed by specially trained personnel or after consultation with the engine manufacturer. Changes to the parameters of this group must only be performed by specially trained personnel or after consultation with the engine manufacturer.
It is not normally necessary to change these parameters.

Nr.	Parameter	Description
01	Enable Remote Accelerator Pedal Input	This parameter indicates, if a remote accelerator pedal is available or not. The evaluation and the monitoring of the HFG signals must be deactivated in the case of a system without remote accelerator pedal. In this case the parameter value 0 has to be set. **Parameter values:** 0 = disable 1 = enable
02	Delay Time for Remote Accelerator Pedal Calibration	 Adjustment of the parameters 20/02 to 20/06 only in driving test and only through skilled workers with know-how in control engineering.
03	Maximum Change of Remote Accelerator Pedal Wide Open	
04	Remote Accelerator Pedal Signal Filter	
05	Remote Accelerator Pedal Idle Position	Definition of the upper limit of the remote accelerator pedal position for the status „idle“. In this case the reference point (0%) is the minimum stop limit of the remote accelerator pedal.
06	Remote Accelerator Pedal Wide Open Position	Definition of the lower limit of the remote accelerator pedal position for the status „Wide open“. In this case the reference point (0%) is the minimum stop limit of the remote accelerator pedal. **The upper stop limit of the remote accelerator pedal is automatically adjusted**!
07	HFG Diagnostics Only With Active Pin “FG-Wahl”	Diagnostics of the Remote Accelerator Pedal (SPN 974, FMI 2, 3 or 4) can be chosen to be performed always or only in combination with an active pin 18/7 **Parameter values:** 0 = always 1 = only by active pin 18/7 throttle select

4.2.21. Group 21 – Droop Control Mode

Driving with PTO speed (ADR)

In this operating mode it is constantly switched over to PTO speed control operation (ADR).

The effective limit values from PLD/MR2 internal limit values, limit values of the parameter group 03 (general limits) and limit values of the parameter group 05 and 06 (variable limits) remain active.

Refer to chapter 7.2.1.3 „Configuration of the operating mode driving with PTO speed control in special applications“ for further information on the function „driving with PTO speed“.

Nr.	Parameter	Description
01	Droop Control Mode	Activation of the operating mode „driving with PTO speed control“ **Parameter values:** 0 = function disabled. 1 = without pedal tolerance 2= with pedal tolerance
02	Droop Control Governor Type	Selection of the governor type for the operating mode „driving with PTO speed control
03	Droop Maximum Engine Torque	Maximum engine torque for the operating mode „driving with PTO speed control“

4.2.22. Group 22 – TSC1 Limiter Governor (N max)

TSC1 Limiter Governor (n max)

Nr.	Parameter	Description
01	Governor TSC1 Transmission	Governor for torque speed control transmission limitation.
02	Governor TSC1 ABS	Governor torque speed control ABS limitation.
03	Governor TSC1 Jack Knife	Governor torque speed control Jack Knife limitation.
04	Governor TSC1 ACC	Governor torque speed control ACC limitation.
20	Speed Gov# TSC1 condition #0	MR speed governor# which is used for TSC1 requested speed control condition #0. See J1939/71 SPN 696

Nr.	Parameter	Description
21	Speed Gov# TSC1 condition #1	MR speed governor# which is used for TSC1 requested speed control condition #1. See J1939/71 SPN 696
22	Speed Gov# TSC1 condition #2	MR speed governor# which is used for TSC1 requested speed control condition #2. See J1939/71 SPN 696
23	Speed Gov# TSC1 condition #3	MR speed governor# which is used for TSC1 requested speed control condition #3. See J1939/71 SPN 696

4.2.23. Group 23 – Limiters II

Limiters II

Nr.	Parameter	Description
01	Torque Factor Gear Down Protection	Torque reduction factor in gears below the ratio that is set in parameter 23/02.
02	Gear Ratio for Gear Down Protection	Torque reduction occurs to gear ratios below this value. Review also parameter 23/01.
03	Torque Factor High Gear Power	Torque reduction factor in gears below the ratio that is set in parameter 23/04.
04	Gear Ratio for High Gear Power	Torque reduction occurs to gear ratios below this value. Review also parameter 23/03.
06	Maximum Engine Speed for Progressive Shifting	Engine RPM is limited to this value when vehicle is in a gear ratio below the value set in 23/19. Review also parameter 23/07.
07	Gear Ratio for Progressive Shifting	Gear Ratio at which 23/18 is effected. Review also Parameter 23/06.
08	Acceleration Limiter Engine Speed Threshold	Upper-Speed limit:= actual engine speed + engine-speed-threshold.
09	Acceleration Limiter Minimum Engine Speed Threshold	Limitation enabled if an actual engine speed is higher than Minimum Engine Speed threshold.
10	Acceleration Limiter Ramp up Rate	Acceleration limiter engine speed ramp.
11	Acceleration Minimum Engine Torque	Minimum value of torque reduction in percent of maximum torque. To enable the function the parameter must be less than 100%.
12	Acceleration Droop Parameter	Droop governor parameter.
13	Gear protection 1st speed	When V < V1 then the engine torque limit exist.
14	Gear protection 2nd speed	When V > V2 then there is no limitation.
15	Gear protection, Torque Limitation	When V < V1 then torque limitation exist.

4.2.24. Group 24 – Vehicle Parameters II

Vehicle Parameters II
This group contains only not visible parameters.

4.2.25. Group 25 – XTempomat

XTempomat
This group contains only not visible parameters.

4.2.26. Group 26 – VIN Vehicle Identification Number

VIN Vehicle Identification Number

Nr.	Parameter	Description
06	VIN	

4.2.27. Group 27 – Fleetmanagement

Fleet Management

Nr.	Parameter	Description
01	Enable Fleet Management	Enable function of the fleet management
02	Enable Hard Brake Incident	Enable function of hard brake incident
03	Enable Service Interval Data	Enable function of service interval data
04	Enable Monthly Trip Data	Enable function of monthly trip data
05	Enable Detailed Alert System	Enable function of detailed alert system
06	Enable Engine Usage Data	Enable function of usage data
07	Fuel Density	The relationship between fuel mass and volume.
17	ECU ID for Fleetmanagement	**Parameter values:** 0 = send ADM identification. 1 = send DDEC identification.

4.2.28. Group 28 – Real Time Clock

Real Time Clock
This group contains only not visible parameters.

5. Fitting and connecting

5.1. Operating data

Protection rating of ADM3 with plugged-on connector sockets: IP 30:

Ambient temperature for use and storage of ADM3:
- operating temperature range: from -40 °C to +70 °C
- storage temperature range: from -50 °C to +80 °C

5.2. Installation

Install the ADM3 on a flat surface in a dry place with the connectors facing downwards:
Fit the central diagnosis socket in an easily accessible place.

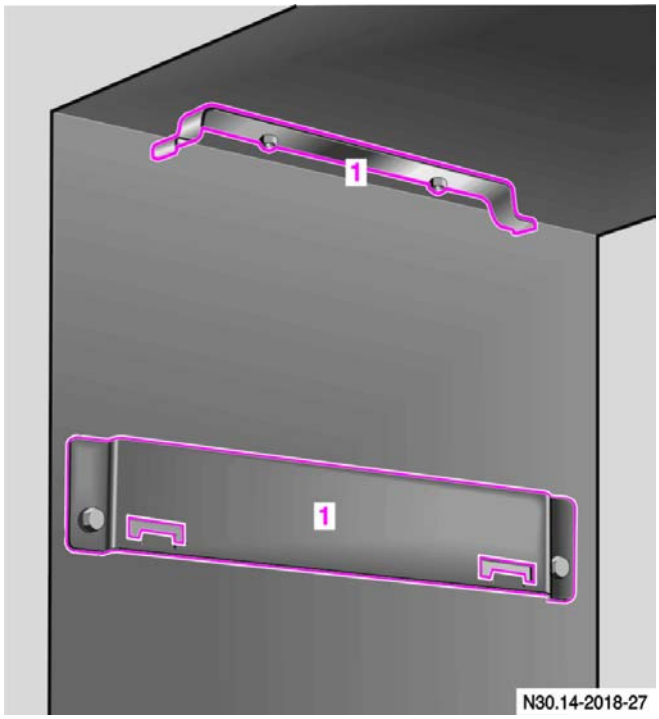


Fig. 6: Brackets

Only use Daimler brackets for the installation of the ADM3. This will guarantee that the ADM3 is securely mounted.

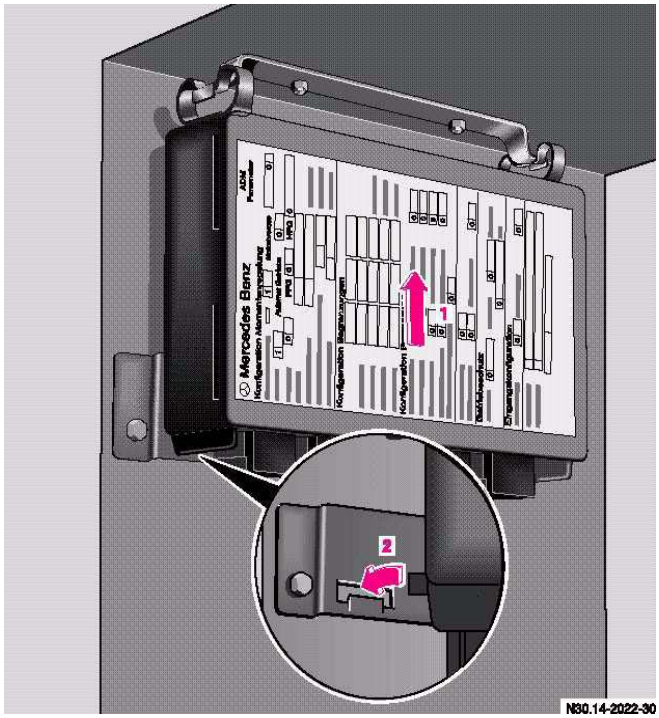


Fig. 7: Mounting the ADM3

To install:

1 Press the ADM3 against the upper bracket with the mounting springs
2 Guide the support lugs into the recesses in the lower bracket.

To remove:

Press the ADM3 against the upper bracket with the mounting springs until the support lugs can be taken from the recesses in the lower bracket.

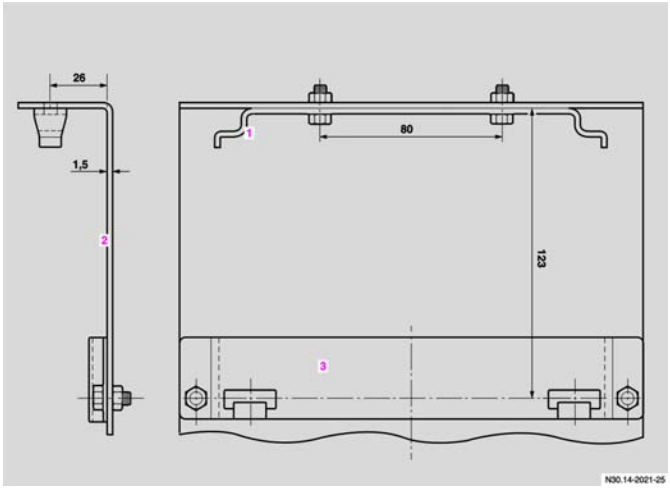


Fig. 8: Dimensioned block diagram of the bracket
All bores Ø = 5,5mm
No. 1 bracket MB - part number A 670 542 06 40
No. 2 mounting face
No. 3 bracket MB - part number A 670 542 05 40

Install the brackets on a flat surface with the specified dimensions.

Fig. 9: **Fitting position in the vehicle or the rear of the ADM3**
connector size from the left to the right
- connector 21 pin
- connector 12 pin
- connector 18 pin
- connector 15 pin

5.2.1. Use in the vehicle

Here, installation is recommended in the cab in the lower section of the dashboard.
Installation in the engine compartment is not permissible.

5.2.2. Use in stationary engines

Ensure that appropriate ambient conditions for the ADM3 are provided for, e.g.
– with a separate housing
– or installation in a control box.

5.3. Connecting up

Risk of accident!

„Terminal 15“ and „Terminal 50“ of the control units are high-resistance signal inputs which draw current in the order of mA. Impermissible residual voltage at these inputs could affect LOW level detection.
Consequence:
- **– engine starts unexpectedly (terminal 50)**
- **– the engine can no longer be switched off (terminal 15)**

If the engine starts unexpectedly and the drive train is closed (transmission not in neutral), the vehicle could unexpectedly start moving or set the working machine in operation, constituting a risk to life and limb.

A battery isolator switch is only to be fitted to one battery terminal (positive)Wiring a ground connection is not permissible and could result in damage to the control units PLD/MR2 and ADM3-FR.

Observe the following guidelines when connecting up the ADM3:

- Only use Daimler star quad cables to wire up CAN connections. These cables are specially designed for vehicle CAN application (EMC).
- The CAN connection between the PLD/MR2 and ADM3 must not exceed a length of 15 meters.
- Switching off the power supply (terminal 30) is only permissible at the end of the control unit’s run-on phase. The run-on phase begins when terminal 15 is switched off and lasts for about 5 seconds. If necessary, new fault codes are wrote into the memory during the run-on phase and stored in the control unit ADM3, in order to preserve these new values when the ADM3 is switched off.
- To avoid fault entries, the input „terminal 15“ should be switched simultaneously for all control units.
- To avoid fault entries, the input „terminal 50“ (engine start) should be switched simultaneously for the ADM3 and PLD/MR2 control units.
- If a battery charge warning lamp is wired, it is important that a blocking diode is installed, as it would not otherwise be possible to switch the engine off via terminal 15.
- The ground connection of all electrical consumers should be distributed in a star formation from the central ground point. If the ground connection is not arranged in a star formation, or if the current flows through frame members with poor conductivity, malfunctions may develop due to ground offset or EMC effects.

6. Parameter programming with the diagnosis unit minidiag2

The following functions can be performed with the diagnosis unit minidiag2:

- Read out the control unit version
- Read out/clear the fault memory
- Read out actual value data (e.g. parameter status, analog values, binary values of inputs and outputs)
- Teach in accelerator pedal (as routine of ADM3)
- Reset all parameter values to their default values (as routine of ADM3)
- Parameter programming of ADM3

The implementation of the functions mentioned above is described in the operating manual of the minidiag2.

7. Application

The following pages describe the areas of application of the ADM3 and the associated inputs/input data, outputs/output data and parameters.

7.1. Driving mode and PTO speed control

The vehicle control adaption module (ADM3) differentiates between the **driving mode** and the **PTO speed control (ADR operation)**.

In the operating state „**driving mode**“ the ADM3 preselects the status „torque demand“ from the PLD/MR2 engine management. ADM3 determines a nominal engine torque and transmits simultaneously a minimum engine speed and a maximum engine speed to the PLD/MR2 engine management.

In the operating state „**PTO speed control**“, the ADM3 preselects the status „speed control“ from the PLD/MR2 engine management. The ADM3 determines a nominal speed and transmits simultaneously a governor type and a maximum torque to the PLD/MR2 engine management.

The limits preset in the PLD/MR2 engine management can not be exceeded. This guarantees that limit values of the engine, which are relevant for the function and the certification, can not be exceeded.

The operating range of the engine can, in addition, be restricted by adjustments of the ADM3. The engine torque, the engine speed and the road speed can be limited through configuration. The possibilities provided for this, are summarized in the chapter 7.9.

After starting the engine, refer to chapter 7.4, the engine switches to the preset operating mode.

7.1.1. Driving mode

In the default setting the ADM3 is in the driving mode. The input variables for the driving mode are:

- the accelerator pedal
- the remote accelerator pedal or
- a torque demand via SAE J 1939

In the ADM3 default setting a nominal value demand is provided on the basis of the evaluation of an accelerator pedal. ADM3 enables the application of an analog accelerator pedal as well as the application of a PWM accelerator pedals. Both have to be adjusted on the initial start-up. Refer to chapter 10, Routine No. 1.

An additional remote accelerator pedal can be enabled by configuration, refer to chapter 4.2.

The demand of an engine torque is, in addition, possible via SAE J 1939 TSC1 Byte 4

The output/setting value in the driving mode is the engine torque. Simultaneously a minimum and a maximum speed are transmitted to the PLD/MR2.

The ADM3 calculates a nominal torque value for the PLD/MR2 engine management on the basis of the accelerator pedal position, the remote accelerator pedal or a SAE J1939 demand, and transmits it to the PLD/MR2 via the CAN data bus. The adjustment range of the nominal torque value ranges between the currently active minimum- and maximum torque.

The limit values are defined by the parameters of **group 03 „Common Limiters“ or group 05 „Limiters LIM0 and LIM1“ No.0 and No.1 or group 06 „Limiters AC / LIM2“ No.2**. The PLD/MR2-internal limit values are also effective.

7.1.1.1. Idle speed adjustment

The PLD/MR2 engine management is delivered with a preset idle speed. If an increased idle speed is required in the driving mode, this can be realized by an adjustment of the engine speed via the cruise-control tip switches CC+ and CC-. However the adjusted idle speed will not be present after a restart.

Cruise-control switch (Pin 18/06) in the off-position:

The idle speed can be adjusted via the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04). It can be increased with CC+ and decreased with CC-.

Further modifications of the function „idle speed adjustment“ can be realized with the parameter group 03:

Parameter group 3:

Nr.	Parameter	Description
8	Desired Idle Speed Single Step Increase/Decrease	Idle-speed can be adjusted with the cruise-control tip switch CC+ (Pin 18/05) or CC- (Pin 18/04) and with the cruise-control switch (Pin18/06) is in the off position. This parameter determines the step size, which applies to both cruisecontrol tip switches and is of the same size when increasing with CC+ and decreasing with CC-
9	Desired Idle Speed Ramp Rate Increase/Decrease	This parameter indicates the ramp, with which the idle-speed is adjusted when the tip switches are activated continuously.
10	Maximum Adjusted Idle Speed	Upper final value of idle speed adjustment.
11	Max. Road Speed for Idle Increase/Decrease	Limit speed of the vehicle, up to which the idle-speed adjustment is enabled.

7.1.1.2. Vehicle speed limiting

The vehicle control adaption module (ADM3) is certified as per directive 92/24/EWG as a speed limiter for keeping to legally specified maximum speeds. The legally specified maximum speed is set in parameter 03/03.
This parameter value is set to 85km/h and can only be changed with the relevant authorization.
The set value is always valid and can only be superseded by lower vehicle speeds using the programmable limitations.
If the vehicle exceeds the maximum speed (i.e. driving downhill), the vehicle can be slowed down by using the service brake or engine brake. The engine brake can only be activated by switching Input MBR_L or MBR_H to ground. For further information about „Engine Brake“ refer to chapter 7.5

The engine brake will not be activated automatically because the Speed limitation with Engine Brake is deactivated (value parameter 10/05 is set to 0 km/h). Refer to chapter 7.1.1.3

Parameters:
- 03/03 Maximum road speed (legal)
  parameter value = 85 km/h
- 10/05 Enable Engine Brake on Road Speed Limiter
  parameter value = 0 km/h

7.1.1.3. Vehicle speed limiting with engine brake

The vehicle control adaption module (ADM3) is certified as per directive 92/24/EWG as a speed limiter for keeping to legally specified maximum speeds. The legally specified maximum speeds is set in parameter 03/03.
This parameter value is set to 85km/h and can only be changed with the relevant authorization.
The set value is always valid and can only be superseded by lower vehicle speeds using the programmable limitations.

If the vehicle exceeds the maximum speed (i.e. driving downhill) and the Speed limitation with engine brake is activated (value parameter 10/05 is bigger than 0 km/h), the Engine brake will be activated automatically, if vehicle speed exceeds the summation of legally specified maximum speeds and set speed threshold. The speed threshold is set in parameter 10/05. Speed limitation with engine brake activates always all configured engine brakes.

For further information about „Engine Brake“ refer to chapter 7.5

Parameters:
- 03/03 Maximum road speed (legal)
  parameter value = 85 km/h
- 10/05 Enable Engine Brake on Road Speed Limiter
  parameter value > 0 km/h

7.1.2. Cruise control operation

In the driving mode a cruise control operation can be activated via switches and tip switches in the instrument panel. Thereby the engine is torque controlled, in order to maintain the preset vehicle speed.
This ensures that a maximum vehicle speed is not exceeded, refer to chapter 7.1.1.2 for „Vehicle speed limiting“. The cruise control function is enabled via the switch „CC On“.
The speed control is activated via the switch CC+ or CC-, provided that the current vehicle speed exceeds a minimum value. See parameter below.
The speed control is activated and the nominal value is set to the actual speed value via the switch CC- (set/decelerate).

When the cruise control is active, the nominal speed can be reduced gradually by momentarily toggling the switch CC-. Holding the switch CC- will reduce the step size via a ramp. The step size and the time constant of the ramp can be configured by a parameter (see below).

The cruise control is deactivated if the brake or clutch pedal is actuated. For reasons of safety the cruise control is also deactivated, if the ADM3 detects an excessive deceleration of the vehicle.

If the cruise control has been deactivated, toggling the switch CC+ (Resume/Acceleration) will reactivate the cruise control set point which was active before the deactivation. If the cruise control is active, momentarily toggling the switch CC+ will gradually increase the nominal speed. Holding the switch CC+ will increase the nominal speed value via a ramp. The step size and the time constant of the ramp can be configured by parameters (see below).

The function „auto resume“ can be configured with the parameter 15/07.
If the auto resume is enabled, the cruise control will not be deactivated, when the clutch pedal is actuated, but it switches over to a stand by mode. The current nominal speed is saved for a period of ....sec and is automatically resumed upon releasing the clutch.

It is communicated to the PLD/MR2, if during the cruise control operation the accelerator pedal or the remote pedal (if activated) or the SAE J1939 demand a torque which is higher than the torque currently demanded by the cruise control. As a result, the road speed is accelerated with the current nominal speed, until the torque demanded by the cruise control becomes the determining torque again.

Upon switching off the cruise control function via CC On, the nominal speed of the cruise control is set to the minimum speed (parameter 15/01).

Parameter group 15:

Nr.	Parameter	Description
01	Minimum Road Speed for Cruise Control	This parameter indicates the minimum road speed which is required to activate the cruise control. It is the limit speed for the idle speed adjustment (parameter 02/04).
02	Maximum Set Speed for Cruise Control	This parameter indicates the maximum set speed up to which the cruise control can be set. The maximum speed which can be set is the legal maximum speed (parameter 03/03).
03	Cruise Set Speed Increment (Single-step CC+)	The step size of the cruise-control tip switch CC+ can be selected by this parameter. (It is usually of the same size like the step size of CC-)
04	Cruise Set Speed Decrement (Single-step CC-)	The step size of the cruise-control tip switch CC- can be selected by this parameter. (It is usually of the same size like the step size of CC+)
05	Cruise Set Speed Ramp Up	Selection of the ramp for the cruise-control tip switch CC+.
06	Cruise Set Speed Ramp Down	Selection of the ramp for the cruise-control tip switch CC-.
07	Enable Cruise Auto Resume (Automatic Resume Function after Gear Shift)	Activation of an automatic cruise-control resume after a gear shift.
08	Minimum Engine Speed Cruise Control	This parameter indicates the minimum engine speed which is required to activate the cruise control.
16	Cruise Control Logic	Activation of an automatic cruise-control resume after a gear shift.

7.1.2.1. Cruise control with engine brake

In the cruise control operating mode the ADM3 authorizes an additional activation of the engine brake, if the set speed is exceeded during downhill driving.

Parameter group 10 (Engine Brake) determines how the engine brake supports the cruise control. The parameter 10/06 (value=1) determines that the engine brake is automatically activated if the vehicle exceeds a preset value.

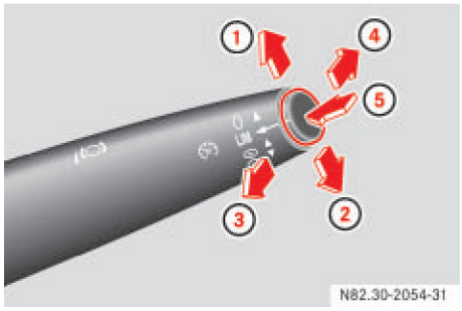
The parameters 10/07 to 10/12 are the cut-in and cut-off speeds (threshold values) for the engine brake step 1 (MBR_L), engine brake step 2 (MBR_H) and step 3 (turbo brake). In this case the parameter values are the differential speeds referred to the set speed of the cruise control.

The differential speed in parameter 10/07 has to be exceeded, so that the constantly open throttle is activated during the cruise control mode. The constantly open throttle is switched off again, if the speed falls below the differential speed in parameter 10/08.
The differential speed in parameter 10/09 has to be exceeded, so that the engine retarder flap is activated during the cruise control mode. The engine brake is switched off again, if the speed falls below the differential speed in parameter 10/10.
The differential speed in parameter 10/11 has to be exceeded, so that the turbo brake is activated during the cruise control mode. The turbo brake is switched off again, if the speed falls below the differential speed in parameter 10/12.

Value changes of the parameters 10/07, 10/08, 10/09 , 10/10, 10/11, 10/12 of the engine brake must only be performed by specially trained personnel or after consultation with the engine manufacturer. It is normally not necessary to change these parameters.

7.1.2.2. Cruise control when using a stalk switch

It is possible to combine the ADM3 with a stalk switch (Part.Nr. A 008 545 10 24 5B21) for cruise control and engine brake operation.
For connecting the stalk switch, Pins 18/04 and 18/05 are used conventionally for Cruise Control Set+Coast and Cruise Control Resume+Accelerate respectively. Pin 18/06, marked as CC_EIN is used as a Cruise Control Pause Switch, compare the following figures too. For safety reasons each cruise control operation leads to an inverted signal on the Quit output of the stalk switch which is connected to Pin 12/07 (DSF2). Parameter 13/37 (Input DSF2) has to be set to 3 (Quit Signal for CC with Stalk Switch) for activating of the stalk switch functionality.
In addition the described stalk switch offers a button for activating the Temposet functionality. The appropriate pin 12/09 (DSF0) or 12/10 (DSF1) has to be connected to the Temposet pin of the stalk switch, the corresponding setting of parameter 13/17 or 13/18 respectively enables Temposet.



Nr.	Function
1	CC+, increase speed, resume
2	CC-, decrease speed, set
3	Engine Brake, one step
4	CC Pause
5	Temposet

Fig. 10: Stalk switch functions

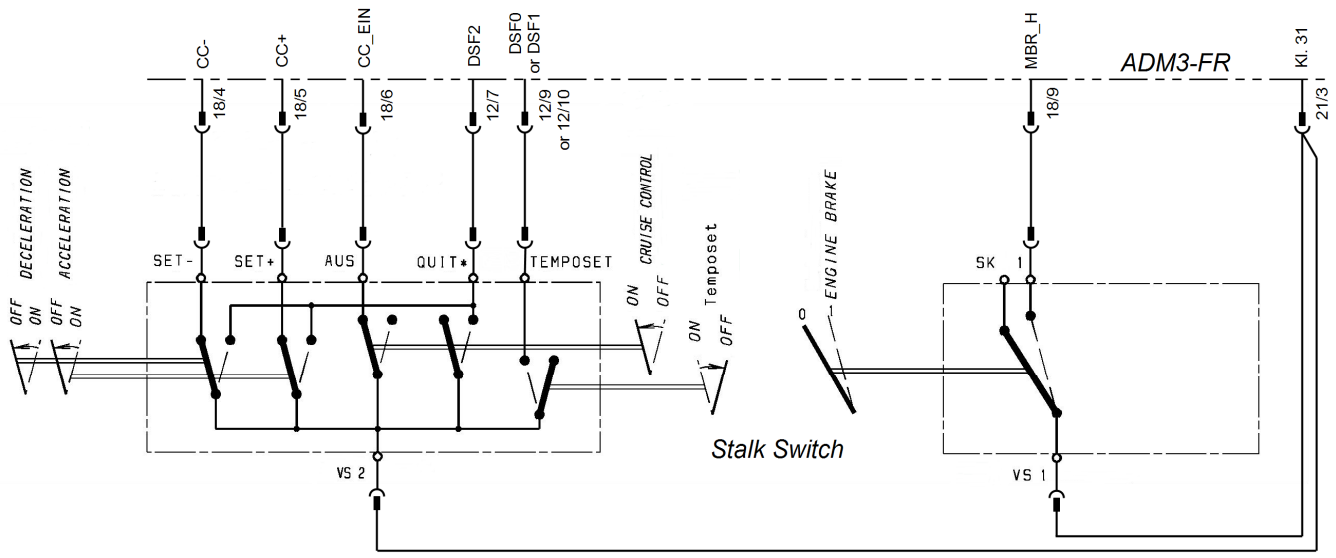


Fig. 11: Stalk switch wiring

It shall be pointed out that the stalk switch functions are activated only by changing the value of parameter 13/37 to 3. Because Pin 12/07 (DSF2) is used as Quit signal for the stalk switch, increased idle speed by simply activating CC+ and CC- is not possible any more. The driver may use the PTO speed control (ADR) to achieve similar functionality.

In the case the input pattern deriving from the inputs CC+, CC-, CC Pause und Quit do not satisfy one of the possible 4 patterns, plausibility check errors for the CC+ and CC- and CC Pause switches are set depending on the inputs, compare chapter 9. Then no cruise control operation is possible.

The stalk switch offers also the possibility for engine brake operation with two stages MBR Low and MBR High, but no Limiter function. Please refer to chapter 7.5.6. for details.

Inputs:

- Pin 12/07 DSF2
- Pin 12/09 DSF0 or 12/10 DSF1
- Pin 18/04 CC-
- Pin 18/05 CC+
- Pin 18/06 CC_EIN (used as CC Pause)
- Pin 18/09 MBR_H
- Pin 21/03 Kl.31

Parameters:

- 13/12 Configuration CC set/coast and resume/accel
  parameter value = 0 (hardwired)
- 13/13 Configuration CC Pause
  parameter value = 0 (disabled or stalk switch)
- 13/17 Configuration Variable Input DSF0
  parameter value = 3 (enable temposet)
- 13/18 Configuration Variable Input DSF1
  parameter value = 3 (enable temposet)
- 13/37 Input DSF2
  parameter value = 3 (Quit Signal for CC with Stalk Switch)

7.1.2.3. Temposet function

ADM3 provides the possibility to limit the vehicle speed to the current speed (temposet function), via a switch in the instrument panel.

A temposet function can be assigned to the digital inputs DSF0 or DSF1 by configuration.

Caution: DSF0 and DSF1 are multiply assigned functions, only one function each can be selected!

Speed limiting to the current value of the driving speed is activated by toggling the selected DSF-switch (temposet function).

The temposet function is deactivated by toggling the selected DSF-switch once again.

Depressing the accelerator pedal into the kick-down position deactivates an active temposet function, and the vehicle can be accelerated, exceeding the set temposet-limit-speed.

Inputs (alternatives)

– Pin 12/10 digital special function 0 (DSF0), input switched to battery voltage
– Pin 12/09 digital special function 1 (DSF1), input switched to ground

Parameter (alternatives)

–13/17 Configuration Variable Input DSF0:
Parameter value 3 = Enable Temposet
–13/18 Configuration Variable Input DSF1:
Parameter value 3 = Enable Temposet

The inputs DSF0 or DSF1 have to be connected according to the configuration of the temposet concerning DSF0 and DSF1: Please note, that the digital input DSF0 has to be switched to battery voltage and the digital input DSF1 has to be switched to ground.

7.2. PTO speed control (ADR)

The vehicle control adaption module (ADM3) differentiates between driving mode and PTO speed control (ADR operation).

The PTO speed control is applied:
e.g. with cranes, piste maintenance equipment, harvesters, sweeping machines, garbage trucks, compressors, power generating aggregates, pumps etc.

The output/setting value of ADM3 in the PTO mode is the engine speed. Simultaneously a governor type and a maximum engine torque is transmitted to the PLD/MR2.

The nominal speed value is determined by the ADM3 on the basis of the input values listed below, and transmitted to the PDL/MR2 engine control via the CAN data bus. The adjustment range of the nominal speed value and the engine torque limit value ranges between the currently active minimum- and maximum values. These limits are (like in the driving mode) defined by the parameters of **group 03 „Common Limters“** or **group 05 „Limiters LIM0 and LIM1“ No.0 and No.1** or **group 06 „Limiters AC/LIM2“ No.2**.

7.2.1. The three operating modes of the PTO speed control

- Driver's cab PTO (control from the driver's cab via CC+ and CC-)
- PTO with fixed speeds via the PTO switch
- Driving with PTO with special applications

7.2.1.1. Driver's cab PTO

The function „Configuration PTO speed control“ is enabled with the parameter 07/01 :

Nr.	Parameter	Description
01	Configuration PTO Speed Control	**Parameter values:** 0 = disabled (PTO speed control is disabled) 1 = enabled (PTO speed control is enabled) 2 = enabled if neutral (PTO speed control is only enabled as long as the transmission is in neutral position) 3 = enabled if neutral and park brake (PTO speed control is only enabled as long as the transmission is in neutral position and the parking brake is closed) 4 = enabled if park brake (PTO speed control is only enabled as long as the parking brake is closed)

When the vehicle is stationary, a PTO mode is enabled by switching on the cruise control switch (Pin 18/06).

ADM3 is switched over to PTO mode via the cruise-control tip switches CC+ (Pin 18/05) or CC- (Pin 18/04). The nominal value for the PTO speed can be adjusted, starting with the idle speed. It can be increased with CC+ and decreased with CC-.

The starting speed, when initially toggling the switches CC+ or CC-, can be preset with the parameters 07/09 and parameter 07/12.

The current PTO speed can be overridden via the accelerator pedal and the remote accelerator pedal, provided that they are enabled for the PTO mode with the parameters 07/04.

Further modifications of the function „PTO Control on PTO and CC pin“ can be realized with the parameters 07/02 to 07/15.

Parameter group 07:

Nr.	Parameter	Description
01	Configuration PTO Speed Control	**Parameter values:** 0 = disabled (PTO speed control is disabled) 1 = enabled (PTO speed control is enabled) 2 = enabled if neutral (PTO speed control is only enabled as long as the transmission is in neutral position) 3 = enabled if neutral and park brake (PTO speed control is only enabled as long as the transmission is in neutral position and the parking brake is closed) 4 = enabled if park brake (PTO speed control is only enabled as long as the parking brake is closed)
02	Maximum PTO Speed with CC+ Switch	Maximum speed, which can be achieved for the PTO speed control when the nominal speed is increased via the cruise control tip switch CC+
03	Minimum PTO Speed with CC- Switch	Minimum speed, which can be achieved for the PTO mode when the nominal speed is decreased via the cruise control tip switch CC
04	PTO Throttle Override Enable	This parameter indicates, if the engine speed in the PTO mode can be enabled to be increased with the throttle input **Parameter values:** 0 = Disable 1 = Enable engine speed in PTO mode to be increased with throttle input
05	Max. Engine Speed for Throttle Override	This parameter indicates the maximum speed when the accelerator pedal is actuated in PTO-mode.
06	PTO dropout on Service break or park brake enabled	This parameter indicates if the PTO is caused to drop out when the service brake or the park brake is actuated. **Parameter values:** 0 = No PTO drop out with Service brake or park brake enabled 1 = Causes PTO to drop out if the Service brake or the park brake is being depressed 2 = Drop out on S brake 3 = Drop out on park brake
07	PTO dropout on clutch enabled	This parameter defines, if the PTO is caused to drop out when the clutch is being depressed. **Parameter values:** 0 = No PTO drop out with clutch pedal 1 = Causes PTO to drop out if the clutch is being depressed
08	Maximum Road Speed in PTO Mode	Maximum road speed, up to which a PTO mode is possible
09	PTO Set Speed with CC- Switch	Starting speed, if PTO mode has been activated via CC-
10	PTO Speed Governor Type with CC-Switch	Governor type selection, if PTO mode has been activated via CC-
11	Maximum PTO Torque with CC- Switch	Maximum torque, if PTO mode has been activated via CC-
12	PTO Set Speed with CC+ Switch	Starting speed, if PTO mode has been activated via CC+
13	PTO Speed Governor Type with CC+ Switch	Governor type selection, if PTO mode has been activated via CC+
14	Maximum PTO Torque with CC+ Switch	Maximum torque, if PTO mode has been activated via CC-+
15	PTO Ramp Rate	In PTO mode, a new engine speed will be achieved over a ramp

7.2.1.2. PTO with fixed speed via the PTO switch

The conditions for enabling and disabling the function „PTO with fixed speeds via PTO switch“ correspond to the conditions for enabling and disabling the function „driver’s cab PTO“.

The function „PTO with fixed speeds“ is enabled with the parameter 07/01:

Nr.	Parameter	Description
01	Configuration PTO Speed Control	**Parameter values:** 0 = disabled (PTO speed control is disabled) 1 = enabled (PTO speed control is enabled) 2 = enabled if neutral (PTO speed control is only enabled as long as the transmission is in neutral position) 3 = enabled if neutral and park brake (PTO speed control is only enabled as long as the transmission is in neutral position and the parking brake is closed) 4 = enabled if park brake (PTO speed control is only enabled as long as the parking brake is closed)

Additional conditions for disabling and enabling this function can be activated with the parameters 07/04 to 07/08:

Parameter group 07:

Nr.	Parameter	Description
04	PTO Throttle Override Enable	This parameter indicates, if the engine speed in the PTO mode can be enabled to be increased with the throttle input **Parameter values:** 0 = Disable 1 = Enable engine speed in PTO mode to be increased with throttle input
05	Max. Engine Speed for Throttle Override	This parameter indicates the maximum speed when the accelerator pedal is actuated in PTO-mode.
06	PTO dropout on Service break or park brake enabled	This parameter indicates if the PTO is caused to drop out when the service brake or the park brake is actuated. **Parameter values:** 0 = No PTO drop out with Service brake or park brake enabled 1 = Causes PTO to drop out if the Service brake or the park brake is being depressed 2 = Drop out on S brake 3 = Drop out on park brake
07	PTO dropout on clutch enabled	This parameter defines, if the PTO is caused to drop out when the clutch is being depressed. **Parameter values:** 0 = No PTO drop out with clutch pedal 1 = Causes PTO to drop out if the clutch is being depressed
08	Maximum Road Speed in PTO Mode	Maximum road speed, up to which a PTO mode is possible

Up to three preset fixed speeds can be activated via the PTO switch (Pin 18/10).

Upon initial switch-on a PTO speed control is activated with the fixed speed 1.
If it is switched on and off again (less than 1 second), the nominal engine speed is set to the next nominal speed, fixed speed 2. The fixed speed 3 can be selected in the same way and thereupon it can be switched to the fixed speed 1.

The current PTO speed can be overridden with the accelerator pedal or the remote accelerator pedal, provided that they have been enabled for the PTO mode in the parameter 07/04.

The PTO speed control is switched off, as soon as the PTO switch is in the OFF position for more than one second.

The operating mode PTO via the PTO switch has priority over the driver's cab PTO via the CC tip switches.

Further modifications of the function „PTO with fixed speeds via the PTO switch" can be realized with the parameters 07/16 to 07/25:

Parameter group 07:

Nr.	Parameter	Description
16	Number of Speeds via Remote PTO (Pin 18/10)	Number of fixed speeds when activating the PTO speed control via the PTO switch: **Parameter values:** 1 = one fixed speed can be selected Parameters 07/17 to 07/19 are effective 2 = two fixed speeds can be selected Parameters 07/17 to 07/22 are effective 3 = three fixed speed can be selected Parameters 07/17 to 07/25 are effective (the generally valid and variable limits and the limits of the PLD/MR2 remain effective)
17	PTO Speed #1	Programmable speed value for fixed speed #1
18	PTO Speed #1 Governor Type	Governor type selection, if fixed speed #1 has been activated
19	PTO Speed #1 Maximum Engine Torque	Maximum engine torque, if fixed speed #1 has been activated
20	PTO Speed #2	Programmable speed value for fixed speed #2
21	PTO Speed #2 Governor Type	Governor type selection, if fixed speed #2 has been activated
22	PTO Speed #2 Maximum Engine Torque	Maximum engine torque, if fixed speed #2 has been activated
23	PTO Speed #3	Programmable speed value for fixed speed #3
24	PTO Speed #3 Governor Type	Governor selection, if fixed speed #3 has been activated
25	PTO Speed #3 Maximum Engine Torque	Maximum engine torque, if fixed speed #3 has been activated

7.2.1.3. Driving with PTO with special applications

This operating mode has to be selected, if the application has to remain permanently in the PTO mode.

A permanent operating mode „PTO speed control“ can be set for ADM3 with the parameter 21/01.

The function idle speed adjustment via CC+ and CC- remains active in this operating mode.

Parameter group 21.

Nr.	Parameter	Description
01	Droop Control Mode	Activation of the operating mode „driving with PTO speed control“ **Parameter values:** 0 = function disabled. 1 = without pedal tolerance 2 = with pedal tolerance
02	Droop Control Governor Type	Selection of the governor type for the operating mode „driving with PTO speed control
03	Droop Maximum Engine Torque	Maximum engine torque for the operating mode „driving with PTO speed control“

7.2.2. Governor types for the PTO speed control

In the PLD/MR2 different governor types can be selected via CAN for the operating mode speed control.

In ADM3 the corresponding governor types can be assigned to the respective operating modes by means of a configuration.

Driver’s cab PTO via CC switches:

The governor type selection is carried out with the parameter 7/10 (for the activation of the PTO via CC-) or with the parameter 07/13 (for the activation of the PTO via CC+).

PTO with fixed speeds via the PTO switch:

The governor type selection is realized with the parameter 07/18 (for the fixed speed #1) or with the parameter 07/21 (for the fixed speed #2) or with the parameter 07/24 (for the fixed speed #3).

Driving with PTO with special applications:

The governor type selection is realized with the parameter 21/02.

7.2.2.1. Features of the governor types

Governor Type Number	Feature	Application
01	Dynamic PID governor, with particular consideration of the large and the small signal range	PTO speed control **Standard PTO governor**
02	Highly dynamic governor related to characteristic curves	Aggregates with highly dynamic load characteristics e.g. concrete pump
03	corresponds to governor type 1, but increased dynamic due to high droop parameter	PTO speed control
04	corresponds to governor type 1, but reduced dynamic due to low droop parameter	PTO speed control
05	corresponds to governor type 1, but low dynamic due to very low droop parameter	PTO speed control
06 .. 11	Reserved speed governors for customer specific applications	Customer specific application

7.3. Accelerator pedal/Remote accelerator pedal

Risk of accident!

The accelerator pedal is a safety-relevant function for commercial vehicles. Incorrect wiring or parameter programming can seriously affect the reactions of the accelerator pedal. This can cause the driver's requirements (e.g. throttle back) not to be implemented properly or only after a delay.

Changes to the accelerator pedal parameters must only be performed by specially trained personnel or after consultation with the engine manufacturer.
It is not normally necessary to change the accelerator pedal parameters.

Only use accelerator pedals approved by Daimler. The use of any other accelerator pedal could lead to malfunctions.

The ADM3 supports analog accelerator pedals as well as accelerator pedals with PWM interface. An analog accelerator pedal is e.g. the Williams accelerator pedal, a PWM accelerator pedal is e.g. the VDO accelerator pedal.

In the case of a PWM accelerator pedal, the driver's requirements (accelerator pedal position) are identified by two electronic modules working independently of each other and transmitted via two PWM signals with mutually opposite pulse duty cycles. The evaluation electronics check the plausibility of the accelerator pedal signals and generate fault codes in the event of deviations.

In the case of an analog accelerator pedal, the driver's requirements are transmitted in the form of an analog voltage; additional switches are for the safety check.

The applied accelerator pedal has to be configured in the ADM3 (parameter11/01).

In order to increase the operational safety, accelerator pedal adjustment routines have been integrated into the ADM3. In the ADM3 no constant signal values are assigned to the accelerator pedal limit stops (idle speed, full throttle). Therefore an adjustment process is required in the case of an initial start-up, a replacement of the accelerator pedal or a replacement of the control unit.

If the ADM3 detects a fault during the accelerator pedal evaluation, limp-home routines are activated, which enable driving with restricted functions and reduced security routines. This is indicated to the driver by the fault lamp. Driving in such a limp-home routine is only authorized, if the driver is familiar with the necessary safety measures and fulfills them.

7.3.1. PWM accelerator pedal

In the case of a PWM accelerator pedal the driver's requirements (accelerator pedal position) are identified by two electronic modules working independently of each other and transmitted via two PWM signals (GAS1,GAS2) with mutually opposite pulse duty cycles.
The evaluation electronics check the plausibility of the accelerator pedal signals and generate fault codes in the event of deviations.

Inputs:

- Pin 15/05: FP+ : PWM FFG supply This output can adopt several functions through configuration, -> Parameter 02/09
- Pin 21/14: FP- : Ground accelerator pedal
- Pin 21/12: GAS1: PWM FFG, path 1
- Pin 21/13: GAS2: PWM FFG. path 2
- Pin 18/06: Accelerator pedal lockout: The accelerator pedal and the remote accelerator pedal are locked if the input is active.
- Pin 18/07: FG_Wahl: Selection remote accelerator pedal (switches over from FFG to remote accelerator pedal when actuated).

Parameter:

– 11/01 Accelerator pedal enabled:

Parameter value = 1: PWM accelerator pedal enabled
Parameter value = 2: Analog accelerator pedal enabled (preset value)

Teach-in accelerator pedal characteristic values

A diagnosis tool is required to teach-in the accelerator pedal characteristic values.
Concerning the ADM3, teach-in routines for the accelerator pedal characteristic values are available in the Stardiagnose and in Minidiag2.

The example for Minidiag2 illustrates the following proceeding:

In Minidiag2 the menu „Routines“ is selected and thereupon the submenu No.1: „Adjustment FFG“.

The minimum limit stop of the accelerator pedal (0%) is taught in first, and secondly the maximum limit stop of the accelerator pedal (100%). Please note, that the accelerator pedal has to be completely depressed, to unambiguously detect the kickdown position.

Caution: The ADM3 routine No.2 „Reset parameters to default values“ also resets the parameters of the accelerator pedal to the status „not adjusted“!

Various PWM accelerator pedal types

With the usage of a new PWM accelerator pedal type from AB Elektronik (part Nr. A 940 300 0004) the following has to be considered:

Due to a different Kickdown sensing mechanism, the default value of parameter 11/08 (PWM Pedal Kickdown Switch Off Threshold) has changed from 14% to 11%. This parameter is used in combination with automatic transmissions which use the Kickdown functionality. When performing a parameter conversion to a newer software version (9.00 and later) the default value of this parameter is changed automatically. Parameter packages delivered with software versions 9.00 and later already contain the new value.

The new default value of 11% for parameter 11/08 is compatible with the PWM accelerator pedal from VDO as well. A change of the parameter value is not absolutely necessary.

7.3.2. Analog accelerator pedal

In the case of an analog accelerator pedal the driver’s requirements are transmitted in form of an analog voltage; additional switches are for the safety check.

Inputs:

– Pin 21/09: AFP+ : Supply for analog accelerator pedal
– Pin 21/11: AFPS: Signal analog accelerator pedal
– Pin 21/14: FP- : Ground accelerator pedal
– Pin 21/12: GAS1:
– Pin 21/13: GAS2:
– Pin 18/06: Accelerator pedal lockout: accelerator pedal and remote accelerator pedal are locked if the input is active.
– Pin 18/07: FG_Wahl: Selection remote accelerator pedal (switches over from FFG to remote accelerator pedal when actuated).

Parameter:

– 11/01 Accelerator pedal enabled:

Parameter value = 1: PWM accelerator pedal enabled
Parameter value = 2: Analog accelerator pedal enabled (preset value)

The parameters of **group 11 „Accelerator Pedal“** and of **group 24 „Vehicle Parameters II“** also affect the accelerator pedal performance. It is not necessary, however, to modify these parameters.

7.3.3. Analog remote accelerator pedal (Manual throttle actuator)

Risk of accident!

Changes to the parameters of this group must only be performed by specially trained personnel or after consultation with the engine manufacturer. It is not normally necessary to change these parameters.

Inputs:

- Pin 18/17: HFG+ : Supply remote accelerator pedal
- Pin 18/18: HFGS: Signal remote accelerator pedal
- Pin 21/03: Kl. 31 : Ground
- Pin 18/06: Accelerator pedal lockout: Accelerator pedal and remote accelerator pedal are locked if the input is active.
- Pin 18/07: FG_Wahl: Selection remote accelerator pedal (switches over from FFG to remote accelerator pedal when actuated).

Parameters:

- 20/01 Enable Remote Accelerator Pedal Input
  Parameter value = 0: disable
  Parameter value = 1: enable

- 20/05 Remote accelerator pedal idle position
- 20/06 Remote accelerator pedal wide open position

The limit stops of the remote accelerator pedal for its idle position (parameter 20/05) and its wide open position (parameter 20/06) are set in the parameter group 20.

No external teach-in routine is provided for the remote accelerator pedal. After the switching-on, the maximum value is automatically adjusted, based on the set value „wide-open“ (parameter 20/06).

7.4. Engine start/stop

Risk of accident!

The functions „starter interlock“ and „engine start with automatic transmission“ are not effective in engine emergency running programs without the ADM3 control unit or if the CAN connection is defective. In such cases, the engine start is controlled only by the PLD/MR2 engine management and can no longer be influenced by the ADM3. If the drive train is closed (transmission not in neutral), the vehicle could unexpectedly start moving or set the working machine in operation, constituting a risk to life and limb.

7.4.1. Two alternatives for the engine start

Two alternative starting devices are provided:

– Start via PLD/MR2 with integrated starter safeguard function
– Start directly via terminal 50, whereby a starter protection is possible via a starter cut-off relay

The respective starting device has to be configured in the PLD/MR2.

7.4.1.1. Engine start via PLD/MR2

On Mercedes-Benz engines with the starter type JE, the engine management PLD/MR2 controls the engine start. The starter motor is actuated directly from an output of the PLD/MR2.

An engine start via the ignition lock (terminal 50) is demanded via the inputs terminal 50 of the ADM3 and the terminal 50 of the PLD/MR2 engine management. The „terminal 50“ inputs of the ADM3 and the PLD/MR2 must be wired in parallel, because the redundancy of both wires is monitored.

The starting process is monitored by the PLD/MR2

– Overload protection through limitation of the starting time
– Overspeed protection through limitation of the starter speed
– Mesh protection when the engine is running

Further protective functions in ADM3:

– Starter lockout, if the transmission is not in neutral position; it can be activated via parameter 02/01 „Transmission Type“ (parameter value=2), for an automatic transmission.

Inputs:

– Pin 15/01, NE, Neutral position
– Pin 12/01, terminal 50, input engine start

Parameters:

– 02/01 Transmission type
– 13/07 Enable Transmission Neutral Input (NE)

Output value:

– Engine start demand to PLD/MR2 via CAN connection

7.4.1.2. Engine start directly via terminal 50

In the case of Daimler engines with starter type KB, the starter is directly connected with the wire terminal 50 of the ignition lock. ADM3 enables a starter protection via an external starter cutoff relay.

An engine start can only be demanded via the ignition lock (terminal 50).

The starting process is monitored by the ADM3. A cutoff relay - which deactivates the starter in reliance on the ADM3 internal protection mechanisms - is controlled via the output Pin 15/12.

The ADM3 internal protection mechanism results in:

-Overload protection trough limitation of the starting time
-Overspeed protection through limitation of the starter speed
-Mesh protection when the engine is running

Further protective functions in ADM3:

-Starter lockout, if the transmission is not in neutral position; it can be activated via parameter 02/01 „Transmission Type“ (parameter value=2), for an automatic transmission.

Inputs:

– Pin 15/01, NE, Neutral position
– Pin 12/01, Terminal 50, input engine start

Parameters:

- 02/01 Transmission type
- 13/07 Enable Transmission Neutral Input (NE)
- 16/01 Relay 1, starter lockout

Output value:

-Pin 15/12 Relay 1, starter lockout

7.4.2. Three alternatives for engine stop

An engine stop can be initiated in three different ways:

Engine stop through deactivation of terminal 15
Engine stop via external engine stop button
Engine stop via SAE J 1939

7.4.2.1. Engine stop through deactivation of terminal 15

The engine stop is initiated by the deactivation of the control inputs Kl. 15 (terminal 15) of ADM3 and PLD/MR2.

If the ADM3 detects a deactivation of terminal 15, then the ADM3 demands zero torque quantity via CAN and the engine stops.

The instructions stated in chapter 5.3 for the connection of the terminal 15 to ADM3 must be applied (concerning the run-on phase, the input resistance, blocking diode, etc.).

Input:

– Pin 21/02: Terminal 15

Output value:

– Engine stop demand on PLD/MR2 (transmitting zero injection via engine CAN)

Compare with chapter 8.2 binary value No.7/1 zero injection.

7.4.2.2. Engine stop via the external stop button of the ADM3

Via the input switched to battery voltage (Pin 12/11), an engine stop can be initiated via an external button. As long as the button is actuated, the ADM3 demands an engine stop via CAN.
The button has to remain pressed until the engine stops. As long as the engine speed does not fall below the value 50 1/min, the injection is released again upon releasing the stop button and the engine continues running. In this way, the engine is not shut down by a short-term actuation of the external stop button.

Input value:

– Pin 12/11: Engine stop external (input switched to battery voltage)

Output value:

– Engine stop demand on PLD/MR2 (transmitting zero injection via engine CAN)

Compare with chapter 8.2 binary value No.7/1 zero injection.

7.4.2.3. Engine stop via CAN SAE J1939

An engine stop can also be initiated via CAN SAE J1939 engine stop with PGN 61184.
ADM3 demands an engine stop via CAN as long as the signal „engine stop“ is present.
The signal has to remain present until the engine stops. As long as the engine speed does not fall below the value 50 1/min, the injection is released again upon the withdrawal of the demand „engine stop“ and the engine continues running. That means that a short demand “engine stop” via CAN SAE J1939 does not lead to a stop of the engine.

Input value:

CAN SAE J1939 input, engine stop with PGN 61184

Output value:

– Engine stop demand on PLD/MR2 (transmitting zero torque quantity via engine CAN)

Compare with chapter 8.2 binary values No. 7/2 zero injection via J1939 and chapter 11 „CAN message according to SAE J1939“.

7.4.3. Service start button and service stop button at the engine block

Refer to the documentation of the PLD/MR2 engine management for further information on those two buttons!

Risk of injury!

For reasons of safety a start via the service start button at the engine block is prevented by the vehicle control ADM3, if the gear is engaged. A start via the service start button is only possible in neutral position of the transmission and only if the engine-CAN is intact (in the CAN limp home mode and in the case of an operation without CAN, no start is possible).

7.5. Engine brake (Retarder)

Risk of injury!

The engine retarder is a safety-relevant function for commercial vehicles.
Incorrect wiring or unsuitable parameter programming can make it impossible to actuate the engine retarder. The lack of, or reduction in, engine braking power could lead to the vehicle brake being overloaded.

Changes to the parameters in this group must only be performed by specially trained personnel or after consultation with the engine manufacturer. It is not normally necessary to change these parameters.

ADM3 supports engine brake systems

– exhaust flap
– decompression valve

The responding outputs for the engine brake can be configured. For engine brake configuration refer to chapter 7.5.3.
Refer for parameter settings to parameter 02/05, Engine brake outputs.

The Engine brake can be activated if the following conditions are complied:

– Driving mode, no PTO speed control
– No ABS intervention
– Engine speed higher than parameter 10/01, minimum engine speed MBR
– Accelerator pedal not further pushed down than maximum throttle position for engine brake, parameter 10/02
– Vehicle speed higher than minimum road speed for engine brake operation, parameter 10/04
– Drive train closed, which means clutch closed or torque converter lockup engaged depending on the transmission type, parameters 02/01, 13/15, J1939 CAN message ETC1

For engine brake activation refer to chapter 7.5.4 and for engine brake deactivation refer to chapter 7.5.5.

Parameters:

– 02/01 Transmission Type
– 10/01 Minimum engine speed MBR
– 10/04 Minimum road speed for engine brake operation
– 10/13 Engine Brake Configuration
– 13/15 Configuration clutch

Inputs:

– Pin 18/08 MBR_L
– Pin 18/09 MBR_H
– J1939 CAN message ETC1, signal Transmission Torque Converter lockup Engaged (Byte 1, bits 4,3)

Outputs:

– Pin 15/06 MBR_BK
– Pin 15/10 MBR_KD

7.5.1. Technical description exhaust flap

The exhaust flap is fitted into the exhaust gas pipe. The exhaust flap is controlled by a solenoid valve. If an engine brake is requested and the engine speed is above a minimum threshold, the solenoid valve is closing the exhaust flap. The exhaust flap is increasing the resistance for the exhaust gas flow.

7.5.2. Technical description decompression valve

The decompression valves are fitted to the cylinder heads. There are to ways to control the decompression valves, they are either pneumatically driven or hydraulically driven.
If an engine brake is requested and the engine speed is above a minimum threshold, a solenoid valve is activating the pneumatic circuit or the hydraulic circuit. This causes the decompression valves to be constantly open.

During the compression stroke, when the piston moves fast from the bottom dead center to the top dead center, only few air escapes through the decompression valve into the exhaust port. Consequently the required compression work is still obtained.

During the brief deadlock of the piston in the top dead center, the major part of the compressed air escapes through the decompression valve into the exhaust port. That means, the major part of the performed compression work is lost to the system.

7.5.3. Engine brake configuration

7.5.3.1. Exhaust flap only, driven by ADM3

Configuration ADM3:

Configuration Vehicle Parameters/ Engine Brake Outputs, **02/05**
Parameter value = 2 exhaust flap at ADM3

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **06/02**
parameter value = 0: disabled

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve 1, **03/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **03/02**
parameter value = 0: disabled

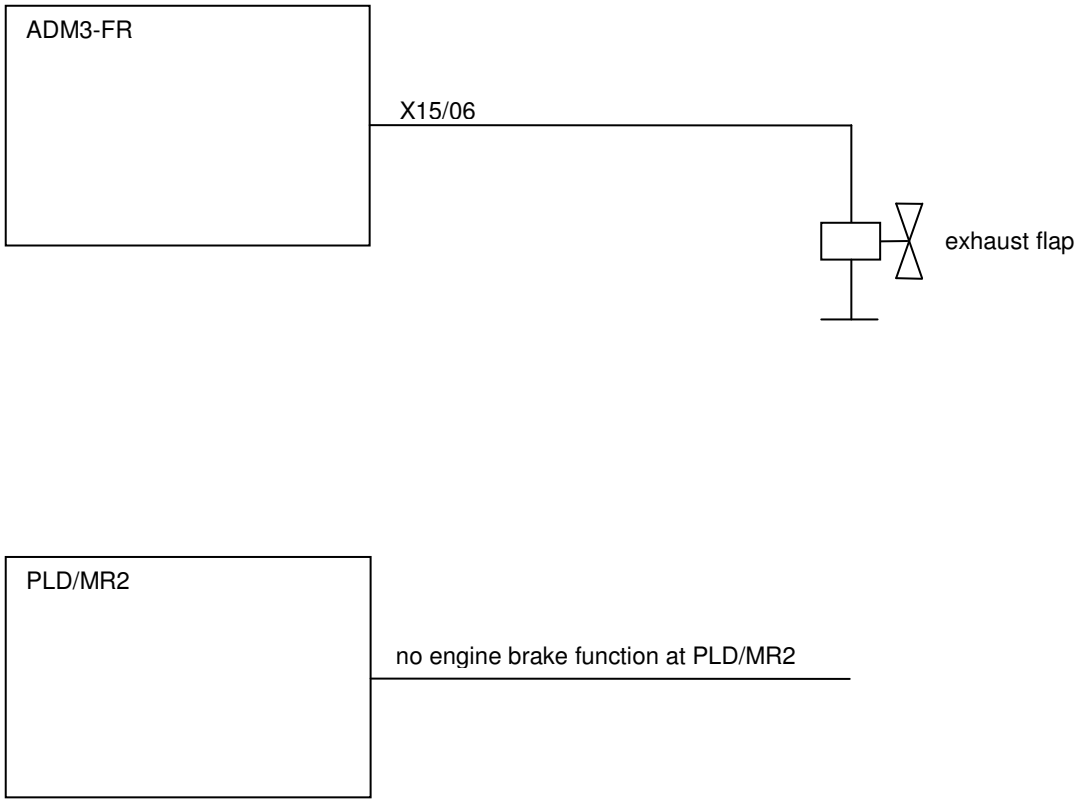


Fig. 12: Engine brake configuration: Exhaust flap only, driven by ADM3

7.5.3.2. Exhaust flap only, exhaust flap at PLD/MR2

Configuration ADM3:

Configuration Vehicle Parameters / Engine Brake Outputs, **02/05**
Parameter value = 0: disabled

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve 1, **06/01**
parameter value = 3: exhaust flap at proportional valve 1
vehicle parameter set 1/ proportional valve 2, **06/02**
parameter value = 0: disabled

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve 1, **03/01**
parameter value = 3: exhaust flap at proportional valve 1
vehicle parameter set 1/ proportional valve 2, **03/02**
parameter value = 0: disabled

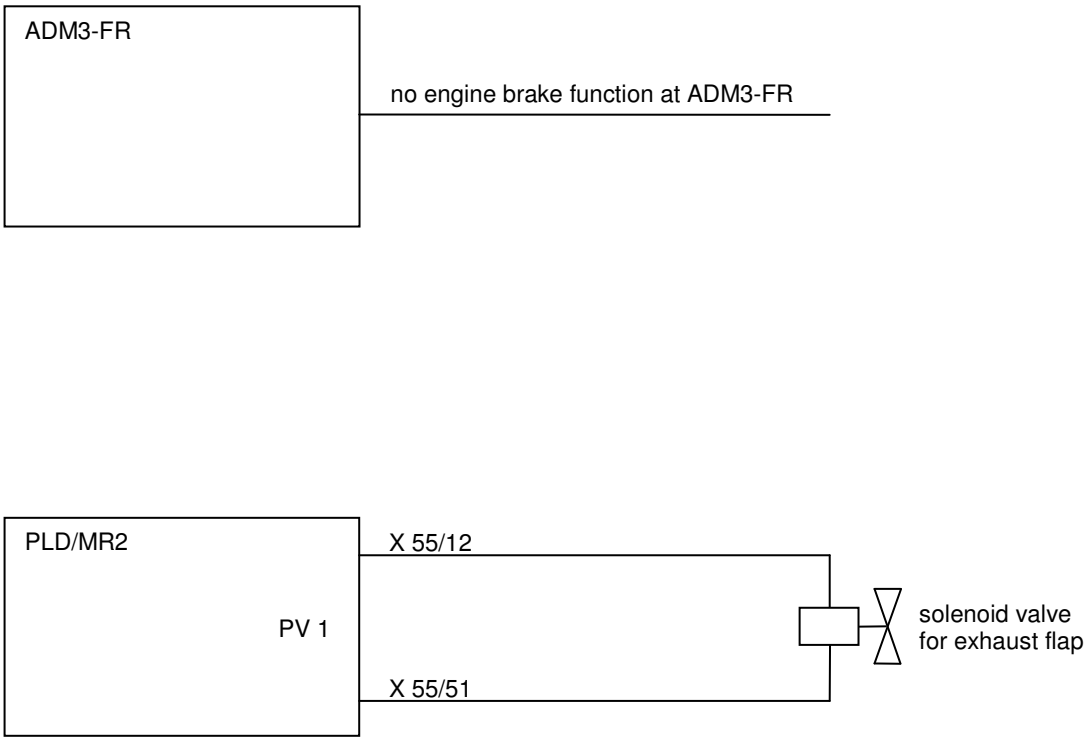


Fig. 13: Engine brake configuration: Exhaust flap only, exhaust flap at PLD/MR2

7.5.3.3. Decompression valve only, decompression valve at ADM3

Configuration ADM3:

Configuration Vehicle Parameters / Engine Brake Outputs, **02/05**
parameter value =3 decompression valve at ADM3

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **06/02**
parameter value = 0: disabled

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve 1, **03/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **03/02**
parameter value = 0: disabled

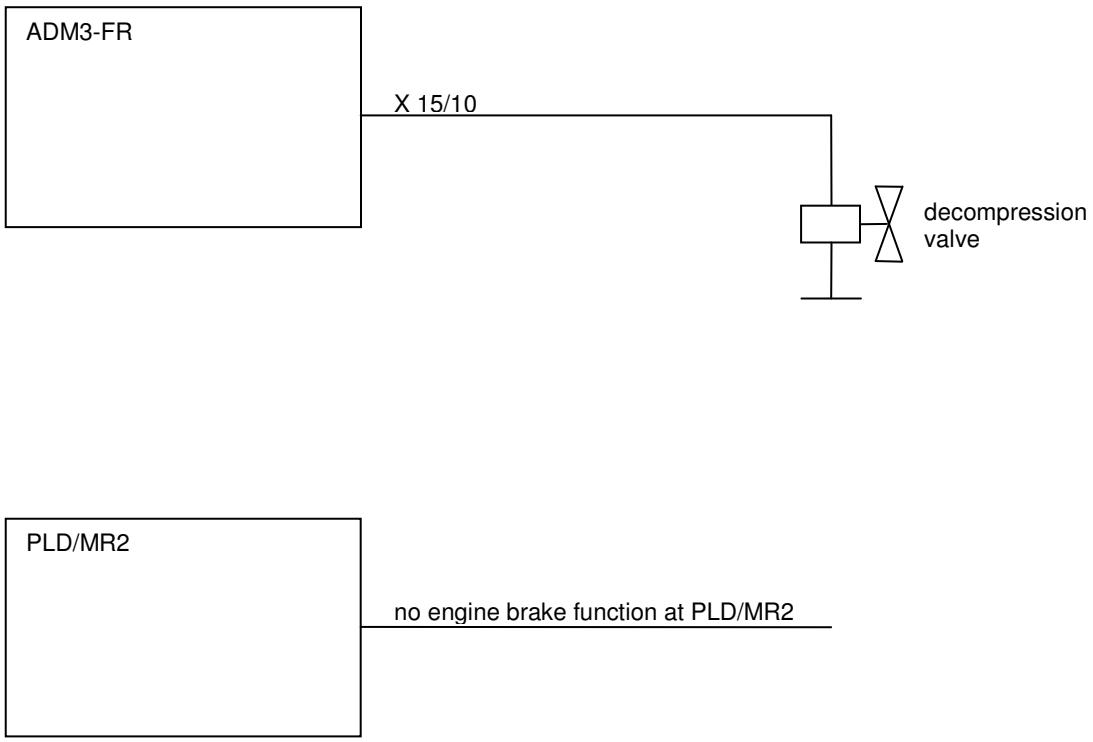


Fig. 14: Engine brake configuration: Decompression valve only, decompression valve at ADM3

7.5.3.4. Exhaust flap and decompression valve at one valve

Configuration ADM3:

Configuration Vehicle Parameters / Engine Brake Outputs, **02**/**05**
parameter value =1 exhaust flap and decompression valve at one valve

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve1, **06**/**01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve2, **06**/**02**
parameter value = 0: disabled

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve1, **03**/**01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve2, **03**/**02**
parameter value = 0: disabled

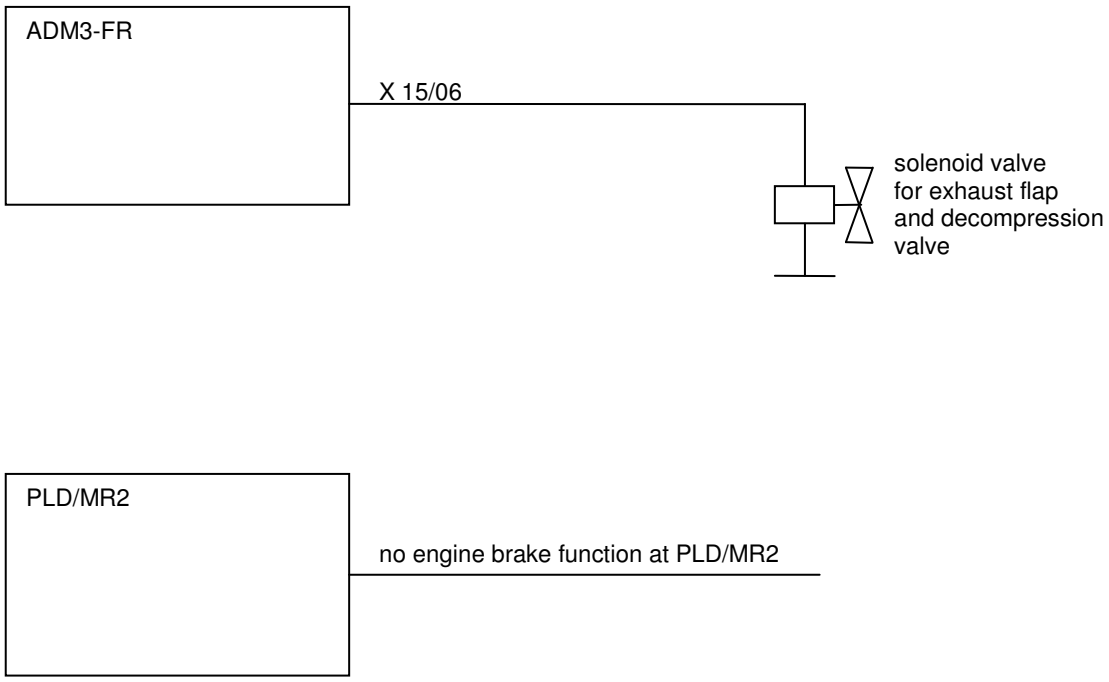


Fig. 15: Engine brake configuration: Exhaust flap and decompression valve at one valve

7.5.3.5. Exhaust flap und decompression valve at two separate valves

7.5.3.5.1. Exhaust flap und decompression valve at ADM3

Configuration ADM3:

Configuration Vehicle Parameters / Engine Brake Outputs, **02/05**
parameter value =4 exhaust flap and decompression valve at ADM3

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve1, **06/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve2, **06/02**
parameter value = 0: disabled

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve1, **03/01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve2, **03/02**
parameter value = 0: disabled

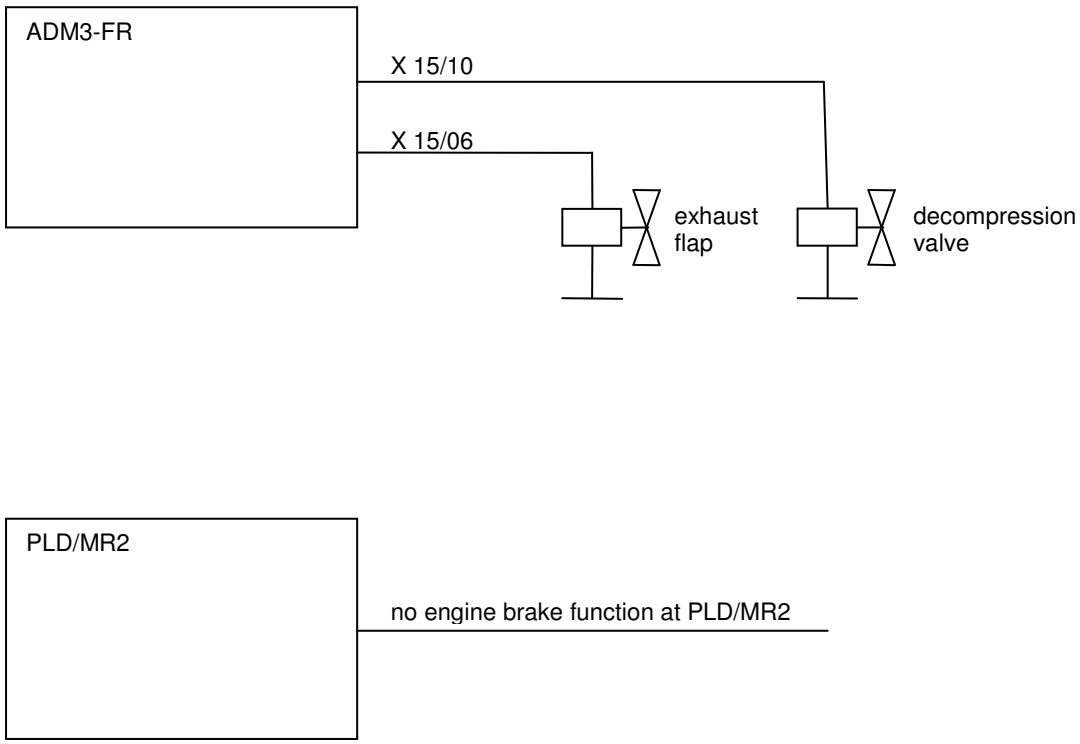


Fig. 16: Engine brake configuration: Exhaust flap and decompression valve at two separate valves

7.5.3.5.2. Exhaust flap at ADM3 and decompression valve at PLD/MR2

Configuration ADM3:

Configuration Vehicle Parameters / Configuration Engine Brake , **02**/**05**
parameter value =2 exhaust flap at ADM3

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve 1, **06**/**01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **06**/**02**
parameter value = 3: decompression valve at PLD

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve 1, **03**/**01**
parameter value = 0: disabled
vehicle parameter set 1/ proportional valve 2, **03**/**02**
parameter value = 3: decompression valve at PLD

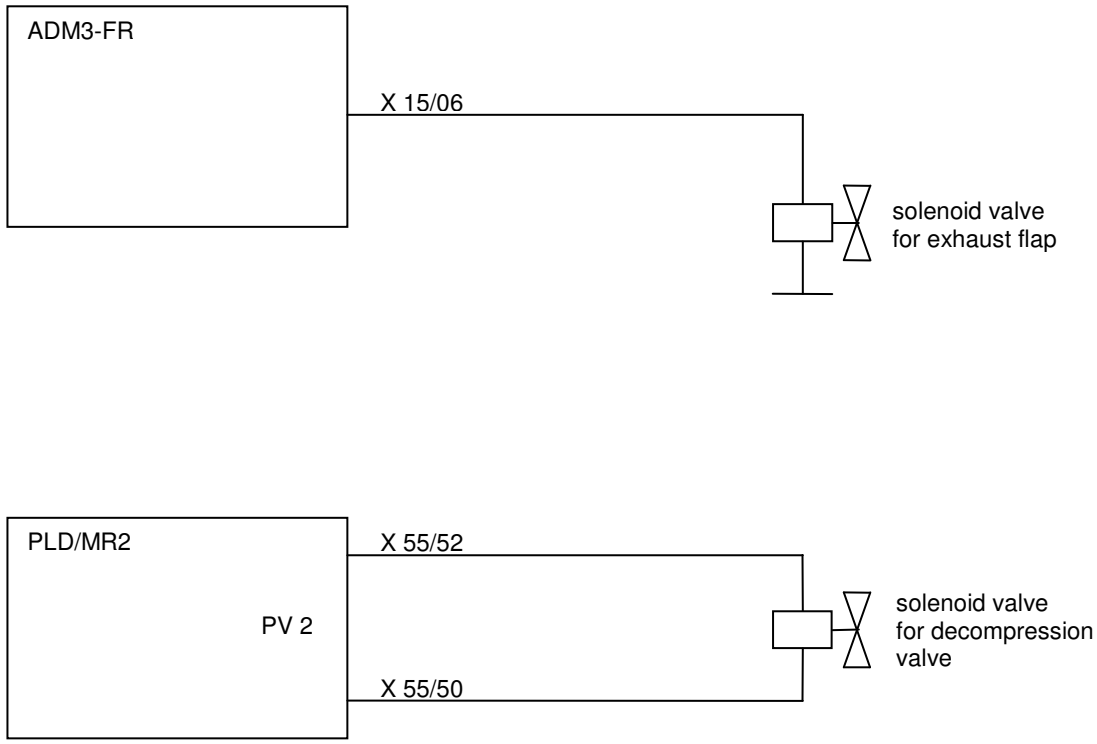


Fig. 17: Engine brake configuration: Exhaust flap at ADM3 and decompression valve at PLD/MR2

7.5.3.5.3. Exhaust flap and decompression valve at PLD/MR2

Configuration ADM3:

Configuration Vehicle Parameters / Configuration Engine Brake , **02/05**
parameter value = 0 no engine brake at ADM3

Configuration PLD (before DiagV. 23):

vehicle parameter set 1/ proportional valve 1, **06/01**
parameter value = 3: exhaust flap at PLD
vehicle parameter set 1/ proportional valve 2, **06/02**
parameter value = 3: decompression valve at PLD

Configuration MR2 (DiagV. 23 and later):

vehicle parameter set 1/ proportional valve 1, **03/01**
parameter value = 3: exhaust flap at PLD
vehicle parameter set 1/ proportional valve 2, **03/02**
parameter value = 3: decompression valve at PLD

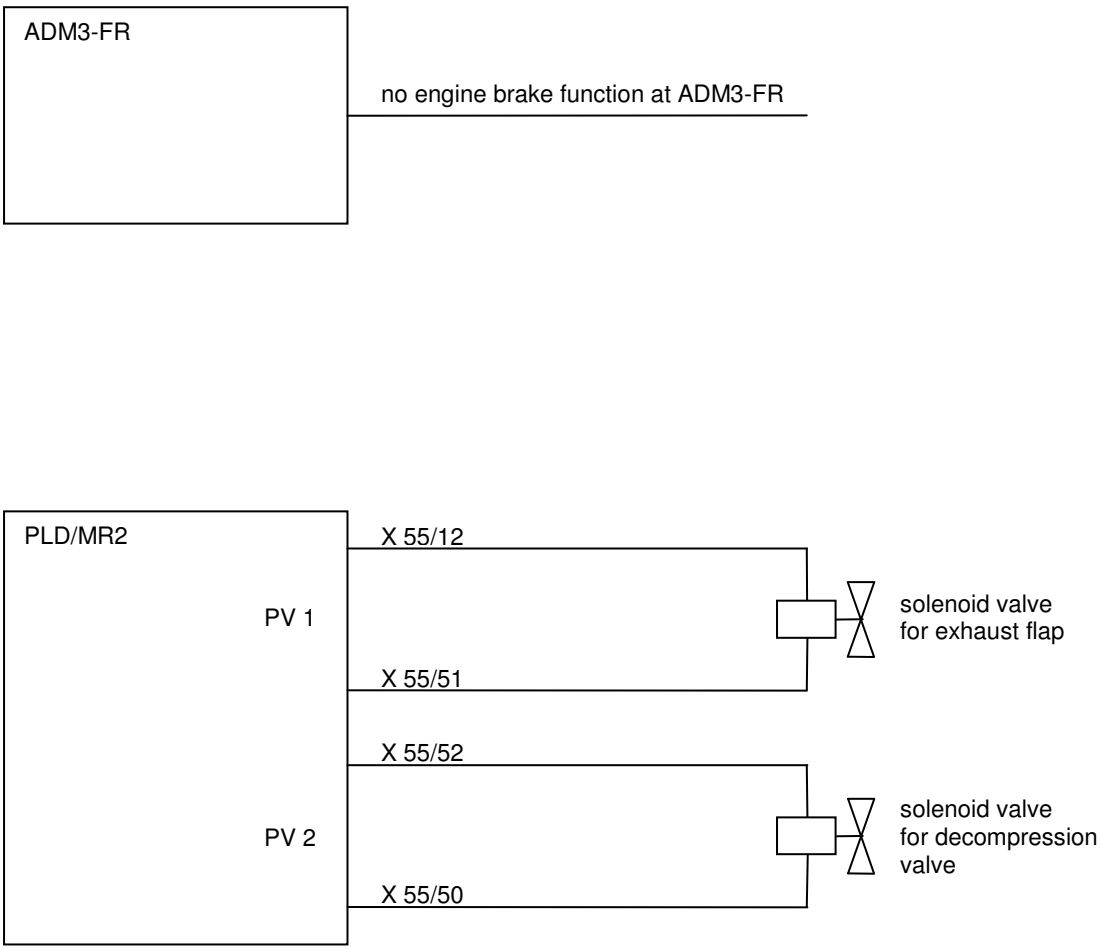


Fig. 18: Engine brake configuration: Exhaust flap and decompression valve at PLD/MR2

7.5.4. Activation of engine brake systems (Version 209)

- Engine brake activation via MBR_L and MBR_H switches at ADM3
  (normally open switches ; active, if closed to ground)

Inputs:
Pin 18/08 MBR_L
Pin 18/09 MBR_H

H L
0 0 no Engine Brake
0 1 Engine Brake step 1, decompression valve only
1 0 Engine Brake step 2, decompression valve and exhaust flap
1 1 not defined

- automatical activation on road speed limiter
  Refer to chapter 7.1.1.3

- automatical activation on cruise control
  Refer to chapter 7.1.2.1

- engine brake activation on service brake
  If engine brake on service brake is enabled, parameter 10/03, than the engine brake will be activated via service brake. The activated outputs will be locked if the parameter 10/03 is set to 1. If the parameter value is 2 the engine brake is deactivated at a release of the service brake.
  The activated engine brake outputs are the same like an activation via MBR_H switches.

- Brake torque demand via SAE J 1939

7.5.5. Deactivation of engine brake

- engine speed below value parameter 10/01, minimum engine speed MBR

- Accelerator pedal further pushed down than maximum throttle position for engine brake, parameter 10/02

- Vehicle speed below minimum road speed for engine brake operation, parameter 10/04

- if cruise control active
  Refer to chapter 7.1.2

- if PTO speed control active
  Refer to chapter 7.2

- engine brake lock out via SAE J 1939

- engine brake deactivation on release of service brake
  If engine brake on service brake is enabled, parameter 10/03 is set to 2, than the engine brake will be deactivated when the service brake is released.

7.5.6. Engine brake operation with a stalk switch

As already described in chapter 7.1.2.2. the mentioned stalk switch includes one step High for engine brake operation.
With lever position 3 (compare figure in chapter 7.1.2.2.) 18/09 is switched to ground, hence activating stage 2.
The engine brake configuration is set by parameter 10/13.
The stage mask and its factor for stage 2 is set by the parameters 10/16 and 10/17 respectively. When a turbo brake is not used the default value of parameter 10/16 (Engine Brake Stage 2 Mask = 80) needs not to be changed.

Input values:

– Pin 18/09 MBR_H

Parameters from parameter group 10:

Nr.	Parameter	Description
13	Engine Brake Configuration	Type of engine brake system **Parameter values:** 0 = compression brake and exhaust flap 1 = compression brake and turbo brake
16	Engine Brake Stage 2 Mask	Engine brake activation if MBR_L=0 and MBR_H=1 **Parameter values:** 0 = no activation 64 = decompression valve (stage 1) 80 = decompression valve and exhaust flap (stage 2) 81 = decompression valve ,exhaust flap and turbo brake (stage 3)

17	Engine Brake Stage 2 Factor	Turbo brake torque demand relative value
		If parameter 10/16 = 81 then
		parameter 10/17 can be set from 0 to 100% for turbo brake demand
		else
		parameter 10/17 has to be set on value 100%

7.6. Instruments / Displays

7.6.1. Rev counter

A signal for actuating a rev counter is provided at the output "N_MOT"(engine speed).

Input values:

– Engine speed information from PLD/MR2 via CAN connection

Parameter:

– 09/04 Engine speed display (Output N_MOT)

Output:
– Pin 12/06 N_MOT

7.6.2. Coolant temperature gauge

A signal which is compatible with temperature sensors is provided at the output "T_MOT"(coolant temperature) for connecting up a conventional analogue indicator instrument.

Input values:

–Coolant temperature information from PLD/MR2 via CAN connection

Parameter:

– 09/04 Coolant temperature Display (Output T_MOT)

Output:

– Pin 12/04 T_MOT

7.6.3. Oil pressure gauge

A signal which is compatible with oil pressure sensors is provided at the output "P_OEL"(oil pressure) for connecting up a conventional analogue indicator instrument.

Input values:

– Oil pressure information from PLD/MR2 via CAN connection

Parameter:

– 09/03 Oil pressure display (Output P_OEL)

Output:

– Pin 12/03 P_OEL

7.6.4. Coolant temperature indicator lamp

The output "T_MOT" (coolant indicator lamp) reports impermissibly high coolant temperatures. Here, the output "LA_ADM" (warning lamp) is actuated.
The temperature limit is stored in the engine data records.

Input values:

– CAN information "Coolant temperature too high" from PLD/MR2

Parameter:

- 09/04 Coolant temperature display (Output T_MOT)

Outputs:

– Pin 12/04 T_MOT
– Pin 21/06 LA_ADM

7.6.5. Oil pressure indicator lamp

The output "P_OEL" (oil pressure indicator lamp) reports impermissibly low oil pressures. Here, the output "LA_ADM" (warning lamp) is actuated.
The oil pressure limit is stored in the engine data records.

Input value:

– CAN information "Oil pressure too low“ from PLD/MR2

Parameter:

– 09/03 Oil pressure display (Output P_OEL)

Outputs:

– Pin 12/03 P_OEL
– Pin 21/06 LA_ADM

7.6.6. Oil level indicator lamp

The output "LA_OELST" (oil level indicator lamp) reports impermissibly low oil levels. Here, the output "LA_ADM"(warning lamp) is actuated.
The function "Oil level warning" is only available on engines with oil level sensor. The oil level limit is stored in the engine data records.

Beginning with diagnosis version 209 the oil level indicator lamp may also be used for indicating engine overspeed.
Depending on the value of parameter 18/13 (Oil Level Lamp Configuration, compare chapters 4.1.18 and 4.2.18) the oil level indicator lampe reports following warnings:

0 (Oil Level):	If the oil level is too low, the lamp will be illuminated, if the oil level is very low, the lamp will be flashing,
1 (Engine Overspeed):	If the current engine speed is above the maximum speed, the lamp will be illuminated,
2 (Oil Level or Engine Overspeed):	The conditions of case 0 and 1 are combined, flashing has higher priority than illuminating

Input values:

– CAN information "Oil level too low" from PLD/MR2
– Current Engine Speed from PLD/MR2

Parameters:

– 18/11 (Overspeed BR 500) or 18/12 (Overspeed BR 900) depending on the engine type
– 18/13 Oil Level Lamp Configuration

Outputs:

– Pin 21/04 LA_OELST
– Pin 21/06 LA_ADM

7.6.7. Configuration Indicator lamp and gauge

There are applications where it is necessary to have a indicator lamp and a gauge for Oil pressure and/or Coolant temperature.
Therefore it is possible to use Output REL3 and/or REL4 to drive the Oil pressure indicator lamp and/or the Coolant temperature indicator lamp. Output REL3 is configured via parameter 14/01 IWK3 and output REL4 is configured via parameter 14/10 IWK4.
In this configuration the outputs P_OEL and/or T_MOT are still available for the Oil pressure gauge and/or Coolant temperature gauge. Refer to chapter 7.6.4 and 7.6.5.

Parameter:

- 09/03 Oil pressure display (Output P_OEL)
- 09/04 Coolant temperature display (Output T_MOT)
- 14/01 Configuration (IWK3) Actual Value Comparator 3
- 14/11 Configuration (IWK4) Actual Value Comparator 4

Outputs:

- Pin 12/03 P_OEL
- Pin 12/04 T_MOT
- Pin 15/11 REL3
- Pin 18/01 REL4

7.6.8. Grid Heater indicator lamp

The Grid Heater indicator lamp indicates an active cold start device. As long as the indicator lamp is active, the engine should not be started.
The inputs DSF0 and DSF1 can be used to monitor the Grid Heater states.

Input values:

– CAN information "Cold Start device active" from PLD/MR2

Inputs:

- Pin 12/10 DSF0
- PIN 12/09 DSF1

Parameter:

- 02/07 Relay 2
- 13/06 Configuration variable inputs DSF0
- 13/07 Configuration variable inputs DSF1

Outputs:

– Pin 21/07 LA_GRID

7.6.9. Air filter indicator lamp

An air filter sensor is connected to the input LF_SE. The air filter sensor is sensing the differential pressure. If the air filter needs to be changed, the output LA_LUFT for the air filter indicator lamp will be active.

Power supply:

- Pin 18/17 HFG+, power supply remote throttle or air filter sensor
- Pin 21/03 KL 31, ground

Inputs:

- Pin 15/08 LF_SE, Air Filter Sensor

Outputs:

– Pin 21/08 LA_LUFT

7.6.10. Check engine lamp

The output "LA_ADM"(check engine lamp) reports impermissible engine operating states (e.g. oil pressure too low) and active faults which are recognized by the control unit due to the permanent monitoring of the inputs and outputs.

The output "LA_ADM" must be connected to a suitable warning lamp. If the warning lamp lights up while the engine is in operation, both the engine and the electronics must be examined.

The output "LA_ADM" is actuated if the following faults are detected:

– Coolant temperature too high or temperature signal not available
– Oil pressure too low or oil pressure signal not available
– Oil level too low

Stop the engine immediately if the coolant temperature is too high, the oil pressure too low or the oil level too low. The operating safety of the engine is endangered (risk of engine damage).

– No CAN connection to engine electronics PLD/MR2 or CAN data implausible
– Active faults in PLD/MR2 engine management fault memory, fault priority medium or high
– Active faults in ADM3-FR fault memory, fault priority medium or high

Input values:

– Engine speed information from PLD/MR2 via CAN connection
– CAN information "Coolant temperature too high“ from PLD/MR2
– CAN information "Oil pressure too low“ from PLD/MR2
– CAN information "Oil level too low“ from PLD/MR2
– CAN information "Active fault in PLD/MR2 engine management" with fault priority medium or high
– Active fault in ADM3-FR, fault priority medium or high
– CAN information "Buzzer instruction"

Parameters:

- 17/01 Enable idle shutdown
- 17/06 Warning period check engine light
- 18/01 Engine temperature
- 18/02 Coolant level
- 18/03 Oil pressure
- 18/04 Oil level
- 18/08 Warning period for check engine light

Output:

– Pin 21/06 LA_ADM

7.6.11. Stop engine lamp / Buzzer

The output "LA_STOP" reports serious faults which require the engine to be switched off immediately. Failure to switch the engine off could result in major damage to the engine, possibly even its destruction. The output "LA_STOP" must be connected. A warning buzzer or warning lamp can be connected.

Input values:

CAN instruction "Buzzer“ from PLD/MR2 in the event of:

– Overspeeding
– Oil level impermissibly low
– Oil pressure impermissibly low
– Coolant temperature impermissibly high

The limits for the values listed above are stored in the engine data records.
The sensors for Oil level, Oil pressure and Coolant temperature are connected to the PLD/MR2.

Instruction "Buzzer“ from ADM3 in the event of:

– Coolant level impermissibly low

The sensor for Coolant level is connected to the ADM3.

Parameters:

- 17/01 Enable idle shutdown
- 17/07 Warning period stop engine light
- 18/01 Engine temperature
- 18/02 Coolant level
- 18/03 Oil pressure
- 18/04 Oil level
- 18/09 Warning period stop engine light

Output:

– Pin 21/05 LA_STOP

7.7. Actual value output IWA

The actual value output is provided in the form of PWM signal at the output "IWA"(actual value output) to incorporate customer-specific electronic systems. The physical value output at IWA can be selected.
Pulse duty factors < 5% and >95% are evaluated as faults or as signal failures by the subsequent electronic circuit connected.

Parameter:

- 09/01 Actual value output IWA

Output:

– Pin 15/05 IWA

<table>
<tr><th>Nr.</th><th>Parameter</th><th>Description</th></tr>
<tr><td>01</td><td>Configuration Analog Output (IWA)
Refer to chapter 7.7 for further information about the function IWA
Parameter values:
0 = disabled
1 = throttle torque 10..90%
2 = Difference torque (external load control)
3 = throttle torque 90..10%
4 = actual torque
5 = load torque (no idle torque for automatic transmission)
6 = road speed
7 = demand speed
8 = demand speed CC+/-
9 = AGS2 transmission Temp indication lamp off
10 = AGS2 transmiss. Temp indication lamp on
11 = AdBlue level 10 – 90%</td><td>The physical value output at IWA can be selected. Pulse duty factors < 5% and >95% are evaluated as faults or as signal failures by the subsequent electronic circuit connected.
<table>
<tr><th>Value</th><th>Meaning</th><th>Remarks</th></tr>
<tr><td>0</td><td></td><td></td></tr>
<tr><td>1</td><td>Throttle torque (10% .. 90%)</td><td>Indication of accelerator pedal position idle - full throttle to 10 % .. 90 % pulse duty factor.</td></tr>
<tr><td>2</td><td>Differential torque (limit load signal)</td><td>Signal for engine load evaluation e.g. for limit load control
90%: Maximum engine torque reached (drive)
50%: Engine not under load
10%: Maximum friction torque reached</td></tr>
<tr><td>3</td><td>Throttle torque inverted (10% .. 90%)</td><td>Indication of accelerator pedal position idle - full throttle to 90 % .. 10 % pulse duty factor.</td></tr>
<tr><td>4</td><td>Actual torque</td><td>Indication of the actual engine torque 0 .. Md_{max} to 10 % .. 90% pulse duty factor</td></tr>
<tr><td>5</td><td>Load signal</td><td>Load signal for coupling an automatic transmission with PWM interface. Output value is the minimum of the active torque and set torque, which is calculated on the basis of a maximum value generation of the accelerator pedal demand and the cruise control demand</td></tr>
<tr><td>6</td><td>Road speed</td><td>Formation of an C3 signal for other electronics.
$v_{FZG}[\mathrm{km/h}] = \frac{0{,}45 * 1000}{t[\mathrm{ms}]}$
t = periodic time of signal
(with T = 2ms = constant = pulse period)</td></tr>
<tr><td>7</td><td>Nominal speed</td><td>Indication of the currently active nominal speed during PTO mode to 10% .. 90% pulse duty factor</td></tr>
<tr><td>8</td><td>Demand speed CC +/-</td><td>Special function for crawler-vehicles.
Cruise control function with CC+ / CC-
Demand speedoutput on pin 12/05</td></tr>
<tr><td>9</td><td>AGS2 transmission temp indication lamp off</td><td></td></tr>
<tr><td>10</td><td>AGS2 transmission temp indication lamp on</td><td></td></tr>
<tr><td>11</td><td>AdBlue Level</td><td>Indication of the AdBlue tank level.
10% PWM = AdBlue tank is empty
90% PWM = AdBlue tank is full</td></tr>
</table></td></tr>
</table>

7.8. Speed Signal

For the realization of the functions

–Legal maximum speed
–Programmable maximum speed

The speed signal C3/B7 of a tachograph has to be connected to input C3 (tachograph speed) of the ADM-FR. The input C3 is monitored for a short or open circuit.
If the speed signal C3/B7 is not available, a square-wave sensor can be connected to the input C3 instead. Refer to chapter 7.8.2.
The Transmission output shaft speed via SAE J1939 can also be used to generate a vehicle speed information. Refer to chapter 7.8.3.
The appropriate vehicle speed information source has to be set in parameter 08/02, speed sensor.
For applications without speed signal, the ADM-FR speed measurement function must be deactivated by appropriate parameter programming, parameter 08/02.

Parameter programming of the maximum speed (legal maximum speed) and the deactivation of the speed measurement is only possible with special authorization. Such authorization can be issued to vehicle manufacturers upon application to Daimler.

Due to European legal regulations the Speed Sensor type in parameter 08/02 can only be set to the systems 1 or 5, which are approved as calibrated systems for on-highway applications in Europe. If it is desired to change the parameter to another type (or no sensor) for use in off-highway applications or in countries outside Europe, a special password for MiniDiag is necessary.

Parameters:

– 08/02 Speed Sensor
– 03/03 Maximum road speed (legal)
– 05/03 Maximum road speed LIM0
– 05/07 Maximum road speed LIM1
– 06/05 Maximum road speed KLIMA

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.8.1. Tachograph (C3, B7)

The speed signal C3/B7 of a tachograph has to be connected to input C3 (tachograph speed) of the ADM-FR. The input C3 is monitored for a short or open circuit.

Inputs:

- Pin 15/03 C3/B7 C3 speed signal
- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

– 08/02 Speed Sensor
– 03/03 Maximum road speed (legal)
– 05/03 Maximum road speed LIM0
– 05/07 Maximum road speed LIM1
– 06/05 Maximum road speed KLIMA

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.8.2. Square-wave Sensor

If the speed signal C3/B7 is not available, a square-wave sensor can be connected to the input C3 instead. The square-wave sensor is sensing the Transmission output shaft speed. Therefore the parameter group 22 has to be applied.

Inputs:

- Pin 15/03 C3/B7 square-wave sensor
- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

- 08/02 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/05 Maximum road speed KLIMA
- 22/01 Axle ratio
- 22/02 Number of teeth
- 22/03 Tire revolutions
- 22/04 Gear ratio
- 22/05 2. Axle ratio

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.8.3. Transmission output shaft speed via SAE J1939

If the speed signal C3/B7 is not available, the Transmission output shaft speed via SAE J1939 can also be used to generate a vehicle speed information. Therefore the parameter group 22 has to be applied.

Input value:

- Transmission output shaft speed via SAE J1939 (PGN 61442)

Inputs:

- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

- 08/02 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/05 Maximum road speed KLIMA
- 22/01 Axle ratio
- 22/02 Number of teeth
- 22/03 Tire revolutions
- 22/04 Gear ratio
- 22/05 2. Axle ratio

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.8.4. Inductive Sensor

If the speed signal C3/B7 is not available, a inductive sensor can be connected to the input C3 instead. The inductive sensor is sensing the Transmission output shaft speed. Therefore the parameter group 22 has to be applied.

Inputs:

- Pin 15/03 C3/B7 inductive sensor
- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

- 08/02 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/05 Maximum road speed KLIMA
- 22/01 Axle ratio
- 22/02 Number of teeth
- 22/03 Tire revolutions
- 22/04 Gear ratio
- 22/05 2. Axle ratio

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.8.5. J1939 (TCO1) Message

If the speed signal C3/B7 is not available, the transmission output shaft speed and vehicle speed may be provided by the tachograph via the SAE J1939 message TCO1. If the parameter 08/02 is set to 5, then the transmission output shaft speed and the vehicle speed are derived from the TCO1 message.

Input value:

- Transmission output shaft speed and vehicle speed via SAE J1939 (PGN 65132)

Inputs:

- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

- 08/02 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/05 Maximum road speed KLIMA
- 22/01 Axle ratio
- 22/02 Number of teeth
- 22/03 Tire revolutions
- 22/04 Gear ratio
- 22/05 2. Axle ratio

Output value:

– Maximum Speed via required torque to PLD/MR2 via CAN connection

7.9. Limitations

7.9.1. Common Limitations

Common limitations are active in both driving mode and working speed governor mode.
The maximum values effective in parameter group 3, Common Limiters, or in the engine electronics can only be superseded by lower values, the minimum values only be higher values. Refer to Programmable Limitations chapter 7.9.2.

Parameters:

- 03/01 Minimum engine speed
- 03/02 Maximum engine speed
- 03/03 Maximum road speed
- 03/04 Maximum engine torque

7.9.2. Programmable Limitations

The inputs LIM0, LIM1 or KLIMA can be used to realize programmable limitations. The following limitations can be realized when the input is active:

– Idling speed boost e.g. when the air conditioner is switched on
– Maximum engine speed limitation e.g. for pumps or other power take-off.
– Vehicle speed limitation e.g. for road sweepers or refuse collection trucks in working mode
– Maximum torque limitation e.g. as overload protection for power take-off, transmission etc.

Programmed limitations are active in both driving mode and working speed governor mode.
The maximum values effective in parameter group 3, Common Limiters, or in the engine electronics can only be superseded by lower values, the minimum values only be higher values.

Inputs:

- Pin 18/11 LIM0
- Pin 18/12 LIM1
- Pin 18/14 KLIMA

Parameters:

- 05/01 Minimum engine speed LIM0
- 05/02 Maximum engine speed LIM0
- 05/03 Maximum road speed LIM0
- 05/04 Maximum engine torque LIM0
- 05/05 Minimum engine speed LIM1
- 05/06 Maximum engine speed LIM1
- 05/07 Maximum road speed LIM1
- 05/08 Maximum engine torque LIM1
- 06/03 Minimum engine speed KLIMA
- 06/04 Maximum engine speed KLIMA
- 06/05 Maximum road speed KLIMA
- 06/06 Maximum engine torque KLIMA

7.10. Engine Protection

7.10.1. Engine Protection Shutdown

The engine protection shutdown is intended to protect non monitored engines, e.g. emergency power units, pumps, compressor or other stationary engine applications.

Risk of accident!

For reasons of safety, an automatically engine protection shutdown is to use in commercial vehicles. If the engine is not running, there is no steering boost and no retarder for a commercial vehicle.

This function can be used to shut down the engine if at least one of the following states emerge.
Engine protection shutdown on:

– CAN information "Coolant temperature too high " from PLD/MR2
– CAN information "Oil pressure too low " from PLD/MR2
– CAN information "Oil level too low " from PLD/MR2
– "Coolant level impermissibly low " from ADM3

The limits for the values listed above are stored in the engine data records.
The sensors for Oil level, Oil pressure and Coolant temperature are connected to the PLD/MR2.
"Coolant level impermissibly low" is realized in ADM3. The sensor for Coolant level is connected to the ADM3.

There is a parameter for each of those states to activate or deactivate the engine protection shutdown.

If an engine protection shutdown is performed, the engine protection shutdown time is running down. After this time, the engine will be shutdown.
There are two different engine protection shutdown times:

- Engine protection shutdown times
- Engine protection shutdown times on Oil pressure

The indicator lamps LA_ADM, warning lamp, and LA_STOP, stop engine lamp, are active. The indication time, before engine shutdown, for the warning lamps are programmable. For more information about LA_ADM and LA_STOP, please refer to chapter 7.6.10 and 7.6.11.

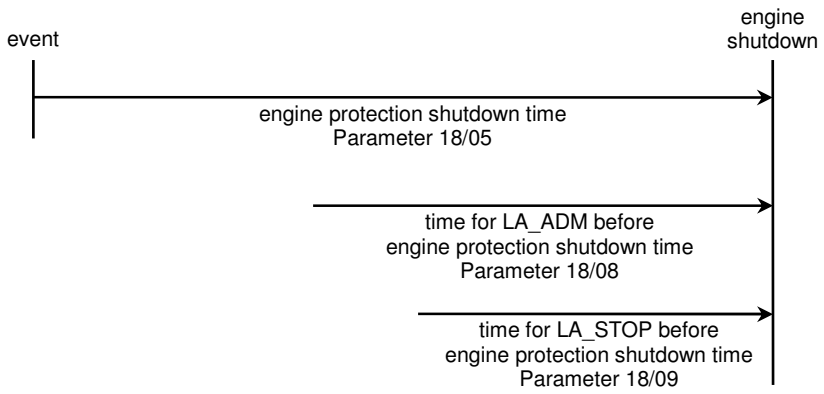


Fig. 19: Engine protection shutdown time

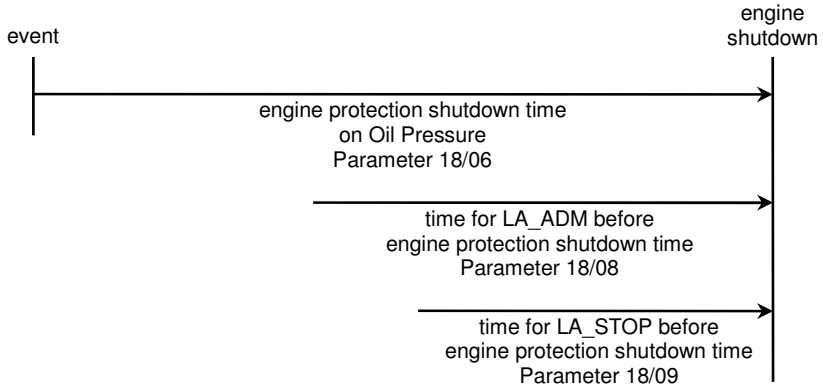


Fig. 20: Engine protection shutdown times on Oil pressure

It is possible to overwrite an engine protection shutdown in state of emergency. The shutdown overwrite is active when input M_ABSCH_SP is switched to ground.

Input:

- Pin 18/13 M_ABSCH_SP

Input values:
– CAN information "Coolant temperature too high " from PLD/MR2
– CAN information "Oil pressure too low " from PLD/MR2
– CAN information "Oil level too low " from PLD/MR2
– "Coolant level impermissibly low " from ADM3

Parameters:

- 18/01 Engine temperature
- 18/02 Coolant level
- 18/03 Oil pressure
- 18/04 Oil level
- 18/05 Engine protection shutdown time
- 18/06 Engine protection shutdown time on oil pressure
- 18/08 Warning period for Check engine lamp LA_ADM
- 18/09 Warning period for Stop engine lamp LA_STOP

Output value:

- Engine stop demand on PLD/MR2, transmitting zero torque quantity via CAN

7.10.2. Engine limp home operating mode

If a CAN failure occurs, the engine operating mode changes to engine limp home mode. The PLD/MR2 response to a CAN failure can be set in parameter 01/02.

Parameter:

- 01/02 Response PLD/MR2 if engine CAN failure

7.11. Cold start with grid heater

The ADM3 provides an integrated function for the control of an electric grid heater. The grid heater is positioned directly in the air suction channel. The Mercedes-Benz grid heater has a heater output of approx. 2 kW.

Inputs:

- Pin 12/10, digital special function 0 (DSF 0) input switched to battery voltage
- Pin 12/09, digital special function 1 (DSF 1) input switched to ground

Outputs:

-Pin 15/09, REL2, control relay 2, output switched to ground -Pin 21/07, LA_GRID, warning lamp grid heater

Wiring:

The output REL 2 (Pin 15/09) controls the high-load relay of the grid heater. The input DSF0 (with a load relay switched to battery voltage) or the DSF1 (with a load relay switched to ground)can be used for monitoring the normally open contact of the high-load relay.

The control of the Mercedes-Benz grid heater takes always place with a load relay switched to battery voltage.

Parameters:

The cold start function or the input for monitoring the high-load relay is activated by means of configuration. The temperature thresholds of the cold start function can to some degree be adapted with parameter 02/14. For example in the case of an additional use of a block heater.

- 02/07 configuration relay 2:
  parameter value 1 = grid heater
- 13/06 input DSF0:
  parameter value 4 = monitoring grid heater
- 13/07 input DSF1:
  parameter value 4 = monitoring grid heater
- 02/14 temperature correction block heater
  parameter value > 0 = The switch-on threshold of the grid heater is shifted to “warmer”.

Function:
The cold start function is an automatic flow control, which passes through the following statuses upon switching on the terminal 15/09:

Status	Explanation
0: Initialization	Upon switching on terminal 15/09 and depending on the actual coolant- and charge air temperature, the ADM3 decides if a cold start support is necessary for an engine start . If that is not the case, it is continued with status 26. Otherwise with status1, preheating. The warning lamp “grid heater” is controlled for a period of approx. 2 seconds (lamp testing).
1: Preheating (max. 30 s)	Warning lamp and grid heater relay are controlled. The starting of the engine leads to the immediate abortion of the cold start process (status 36). The warning lamp “grid heater“ goes out at the end of the preheating period: The engine is ready to start.
2: Ready to start	If no engine start takes place (engine speed zero) within 20 seconds, abortion (46), otherwise it is continued with start (3).
3: Start	If the engine start is successful, it is continued with (4) otherwise (66).
4: Post-heating	Post-heating when the engine is already running, in order to improve the emission levels.
5: Cooling	Deactivation of grid heater
6: End	Cold start has been finished successfully.
16: Abortion due to the monitoring with DSF0 and DSF1.	Abortion of cold start due to the monitoring with DSF0 and DSF1: contact load relay fixed in closed position/interrupted or diagnostic line DSF0/DSF1 interrupted/shorted.
26: End	No cold start is required, because the engine or the environment is too warm.

Status	Explanation
36: Abortion during preheating	Cold start abortion through the driver, due to an engine start during the preheating.
46: Exceeding of the time provided during start	Cold start abortion, because no engine start takes place within 20 seconds.
56: Failure during start	Cold start abortion, due to general failure (voltage supply, communication, etc.)
66: Exceeding of time provided during start	Abortion of engine start, because no engine start takes place within 40 seconds
76: Failure during start	Abortion during of the cold start, due to general failure (supply voltage, communication, etc.)
86: Failure during post-heating	Abortion of cold start, due to general failure (voltage supply, communication, etc.)
96: No increase of charge air during post-heating	Abortion, because no temperature increase of the charge air temperature can be measured

Note:

There is no functional difference between the status 6, 16, ... 96, because the cold start procedure has already been terminated. The distinction between the different statuses have only been introduced for diagnostic purposes and they make it possible to draw conclusions from the course of the cold start function. (Refer to analog value 35, status of cold start function)

Diagnostics:

If the cold start function is active, the charge air temperature, the output relay 2 and - provided that it is configured - the load circuit of the relay are monitored. The corresponding fault codes are listed in the appendix.

The flashing of the warning lamp "grid heater" indicates a failure in the load circuit. In spite of an inactive output relay 2 - e.g. in the case of a contact fixed in closed position - an uncontrolled current feed of the grid heater can still take place. This failure can only be cleared by interrupting the grid heater power supply. Fire hazard exists, depending on the position of the grid heater or the engine!

7.12. Special functions

7.12.1. ABS

The ABS invention is deactivating the engine brake. An ABS intervention can be initialized over the configurable input DSF0 or DSF1, if the function is enabled by appropriate parameter, parameter 13/17 or 13/18, programming.

An ABS invention can also be initialized via SAE J1939. The ABS is deactivating the engine brake via TSC1 by sending a torque limitation.

Input value:

– SAE J1939, TSC1 Request torque / torque limit

Input:

- Pin 12/10 DSF0 -Pin 12/09 DSF1

Parameter

- 13/17 Configuration variable input DSF0
- 13/18 Configuration variable input DSF1

7.12.2. Conventional Retarder

The programmable input DSF0 or DSF1 is available for coupling a conventional retarder. When the input DSF0 or DSF1 is active, the information „Retarder intervention“ is transmitted to the engine control PLD/MR2. This setting only has a useful purpose on units on which the fan is controlled via the engine control PLD/MR2.

A retarder intervention is deactivating an active Cruise Control. If Automatic Cruise Resume, parameter 15/07, is enabled, a retarder intervention via input DSF0 or DSF1 causes an active Cruise Control function to switch over to a stand by mode.

Since the diagnosis version 203 it is possible to activate the fan by Retarder intervention via DSF0 or DSF1. This function is enabled by appropriate parameter programming. The parameter 19/13 is indicating the percentage of the fan power consumption if the input DSF0 is active, provided that the fan is demanded via the digital input DSF0 and DSF0 has been configured for retarder intervention. The parameter 19/14 is indicating the percentage of the fan power consumption if the input DSF1 is active, provided that the fan is demanded via the digital input DSF1 and DSF1 has been configured for retarder intervention. For further information about Automatic fan, pleas refer to chapter 7.12.3.

Inputs:

- Pin 12/10 DSF0
- Pin 12/09 DSF1

Parameters:

- 13/17 Configuration variable input DSF0
- 13/18 Configuration variable input DSF1
- 19/13 DSF0 Fan
- 19/14 DSF1 Fan
- 19/11 Hold time Fan
- 19/12 Ramp Fan
- 15/07 Automatic Cruise Resume

Output value:

- Information "Retarder intervention" transmitting to the engine control PLD/MR2 via CAN

7.12.3. Automatic Fan

The function Automatic Fan can be activated on engine brake, air conditioner, PTO and on Coolant Temperature. Automatic Fan can also be activated via input DSF0, DSF1 and LUEFTER.

Versions 207 and 209:

In these versions it is possible to activate the fan on engine brake, air conditioner, PTO, input LUEFTER, input DSF0, input DSF1 and on CAN information coolant temperature. The ADM3 is transmitting the information " Fan power consumption in percent " to the engine control PLD/MR2 via CAN. The value of the supplied "Fan power consumption" has to be set in the appropriate parameter. The PLD/MR2 is controlling the Fan.

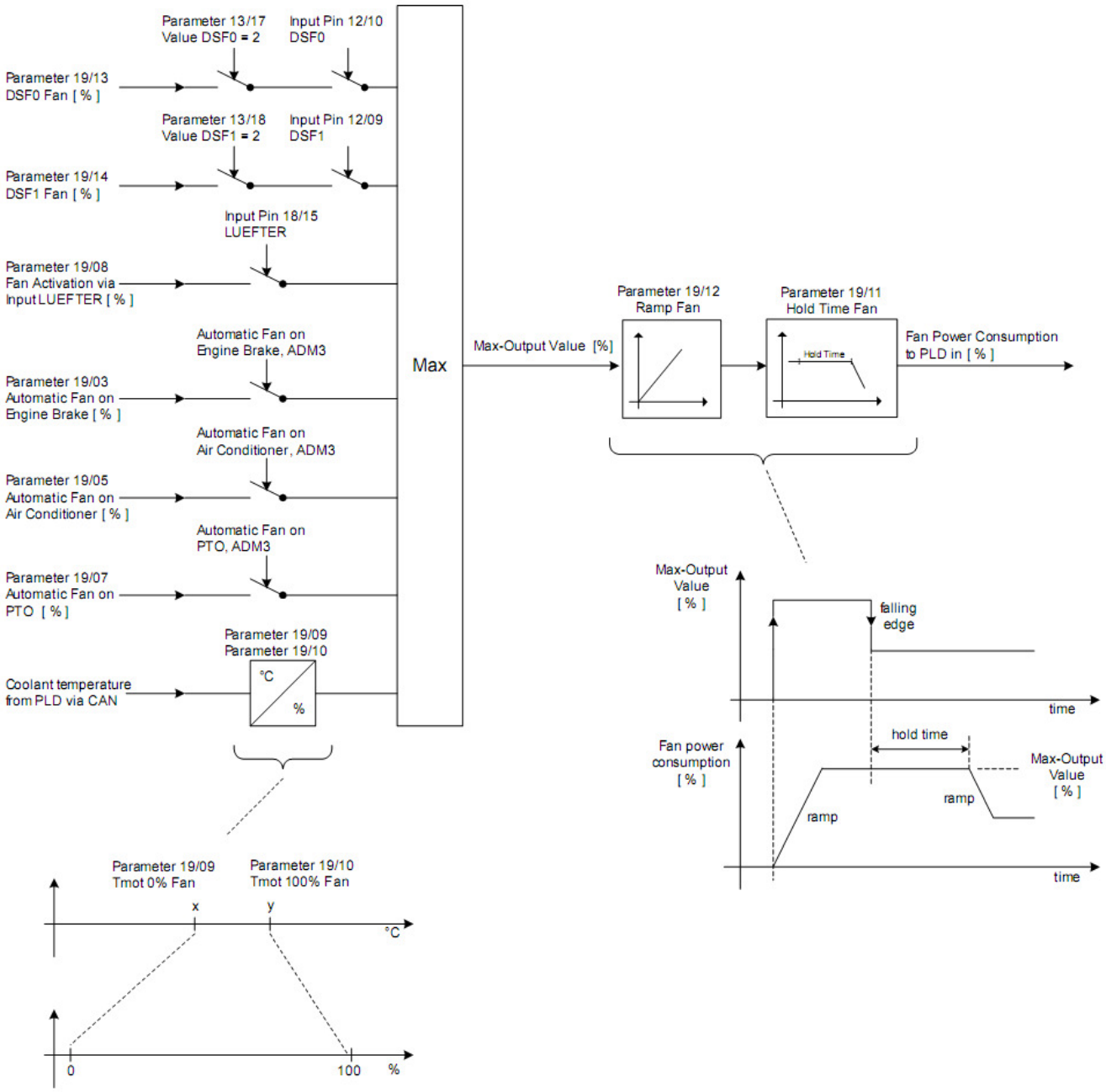


Fig. 21: Fan control strategy

Input values:

- fan activation on engine brake from ADM3
- fan activation on air conditioner from ADM3
- fan activation on PTO from ADM3
- CAN information Coolant temperature

Inputs:

- Pin 18/15 LUEFTER
- Pin 12/10 DSF0
- Pin 12/09 DSF1

Parameters:

Versions 207 and 209

- 19/01 Fan Type
- 19/02 Enable automatic fan activation on engine brake
- 19/03 Fan power on engine brake
- 19/04 Enable automatic fan activation on air conditioner
- 19/05 Fan power on air conditioner
- 19/06 Enable automatic fan activation on PTO
- 19/07 Fan power on PTO
- 19/08 Fan power on fan override
- 19/09 Coolant temperature at 0% fan
- 19/10 Coolant temperature at 100% fan
- 19/11 Hold time fan
- 19/12 Ramp fan
- 13/17 Configuration Variable Input DSF0
- 13/18 Configuration Variable Input DSF1

Output value:

Versions 207 and 209

- Information "Fan power consumption in percent" transmitting to the engine control PLD/MR2 via CAN

7.12.4. Accelerator pedal interlock

The input **Pin 18/16 (FFG interlock)** is provided for the function **accelerator pedal interlock**:
Accelerator pedal (FFG) and remote accelerator pedal (HFG) are not effective, if the input is active.

Inputs:

- Pin 12/10, digital special function 0 (DSF 0) input switched to battery voltage
- Pin 12/09, digital special function 1 (DSF 1) input switched to ground

Outputs:

-Pin 15/09, control relay 2, output switched to ground
-Pin 21/07, LA_GRID, warning lamp grid heater

Wiring:

The output REL 2 (Pin 15/09) controls the high-load relay of the grid heater.
The input DSF0 (with a load relay switched to battery voltage) or the DSF1 (with a load relay switched to ground)can be used for monitoring the normally open contact of the high-load relay.
The control of the Mercedes-Benz grid heater takes always place with a load relay switched to battery voltage.

Parameters:

The cold start function or the input for monitoring the high-load relay is activated by means of configuration. The temperature thresholds of the cold start function can to some degree be adapted with parameter 02/14. For example in the case of an additional use of a block heater.

- 02/03 configuration relay 2:
  parameter value 1 = grid heater
- 13/17 input DSF0:
  parameter value 4 = monitoring grid heater

- 13/18 input DSF1:
  parameter value 4 = monitoring grid heater
- 02/07 temperature correction block heater
  parameter value > 0 = The switch-on threshold of the grid heater is shifted to “warmer”.

Function:

The cold start function is an automatic flow control, which passes through the following statuses upon switching on the terminal 15/09:

Status	Explanation
0: Initialization	Upon switching on terminal 15/09 and depending on the actual coolant- and charge air temperature, the ADM3 decides if a cold start support is necessary for an engine start . If that is not the case, it is continued with status 26. Otherwise with status1, preheating. The warning lamp “grid heater” is controlled for a period of approx. 2 seconds (lamp testing).
1: Preheating (max. 30 s)	Warning lamp and grid heater relay are controlled. The starting of the engine leads to the immediate abortion of the cold start process (status 36). The warning lamp “grid heater“ goes out at the end of the preheating period: The engine is ready to start.
2: Ready to start	If no engine start takes place (engine speed zero) within 20 seconds, abortion (46), otherwise it is continued with start (3).
3: Start	If the engine start is successful, it is continued with (4) otherwise (66).
4: Post-heating	Post-heating when the engine is already running, in order to improve the emission levels.
5: Cooling	Deactivation of grid heater
6: End	Cold start has been finished successfully.
16: Abortion due to the monitoring with DSF0 and DSF1.	Abortion of cold start due to the monitoring with DSF0 and DSF1: contact load relay fixed in closed position/interrupted or diagnostic line DSF0/DSF1 interrupted/shorted.
26: End	No cold start is required, because the engine or the environment is too warm.
36: Abortion during preheating	Cold start abortion through the driver, due to an engine start during the preheating.
46: Exceeding of the time provided during start	Cold start abortion, because no engine start takes place within 20 seconds.
56: Failure during start	Cold start abortion, due to general failure (voltage supply, communication, etc.)
66: Exceeding of time provided during start	Abortion of engine start, because no engine start takes place within 40 seconds
76: Failure during start	Abortion during of the cold start, due to general failure (supply voltage, communication, etc.)
86: Failure during post-heating	Abortion of cold start, due to general failure (voltage supply, communication, etc.)
96: No increase of charge air during post-heating	Abortion, because no temperature increase of the charge air temperature can be measured

Note:

There is no functional difference between the status 6, 16, ... 96, because the cold start procedure has already been terminated.
The distinction between the different statuses have only been introduced for diagnostic purposes and they make it possible to draw conclusions from the course of the cold start function (refer to analog value 35, status of cold start function).

Diagnostics:

If the cold start function is active, the charge air temperature, the output relay 2 and - provided that it is configured - the load circuit of the relay are monitored. The corresponding fault codes are listed in the appendix.

The flashing of the warning lamp "grid heater" indicates a failure in the load circuit. In spite of an inactive output relay 2 - e.g. in the case of a contact fixed in closed position - an uncontrolled current feed of the grid heater can still take place. This failure can only be cleared by interrupting the grid heater power supply.
Fire hazard exists, depending on the position of the grid heater or the engine!

7.12.5. Emission related functions – AdBlue tank

Due to the emission regulations Euro 4 and Euro 5 the ADM provides additional functionality to fulfill the standards. This functionality only applies to engines which are equipped with a SCR system.

An essential part are the catalyst admixtures to the fuel with AdBlue in order to decrease the NOx-values of the emissions. Hence an additional AdBlue tank is installed in the vehicle. The tank is equipped with a liquid level sensor, the signal of this sensor is read by the PLD/MR2 control unit.

In order to provide a liquid level in liters, the ADM3 must be parameterized with the relations between resistor values and liquid levels depending on the sensor and on the actual shape of the tank. Parameter group 14 of the ADM3. The parameters 14/20 to 14/74 contain the AdBlue tank and sensor related values.

After ignition on the engine control unit PLD/MR2 is provided with the parameters and calculates a catalyst level. When reaching a reserve or empty level the ADM3 is informed by the PLD/MR2. This information is used to drive a special AdBlue level warning lamp in the vehicle.

Emission related functionality requires also a malfunction indicator lamp (MIL). It is recommended to connect the MIL to one of the relays 1 or 2 or 4, because they provide a relay diagnosis in contrast to relay 3.

The catalyst tank level and FMI values corresponding to a reached reserve level or empty level are offered in the SAE J1939 message Tank Information 1 (PGN 65110).

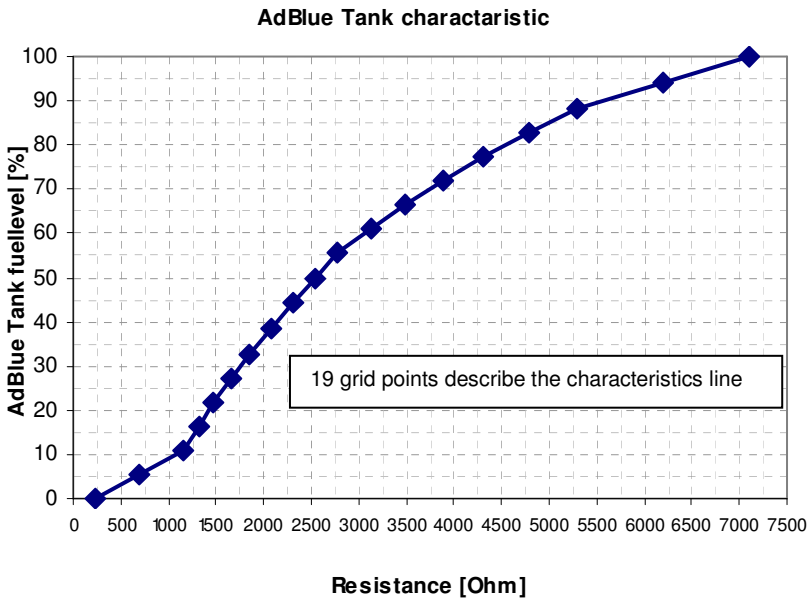
The catalyst tank level will be provided as a PWM signal on PIN 12/05 if the parameter 9/01 is set to 11.

Input values:

– AdBlue tank level in percent from PLD/MR2 via CAN connection
– CAN information of status AdBlue warning level lamp
– CAN information of status malfunction indicator lamp (MI-lamp)

Parameters from parameter group 14:

Nr.	Parameter	Description
20	AdBlue Number of CAN messages	Number of Can messages needed to describe the AdBlue characteristic
21	AdBlue Tank-ID	AdBlue Tank ID, valid Identification must be < 50001
22	AdBlue Tankcapacity	Fuel capacity of the AdBlue tank
23	AdBlue reserve fuel	AdBlue level for Reserve Warning
24	AdBlue empty fuel	AdBlue level for Empty Warning
25	Diesel reserve fuel	Diesel level for Reserve Warning
26	Diesel empty fuel	Diesel level foe Empty Warning
27	Damping AdBlue consumption	Damping for AdBlue consumption
28	Damping Diesel consumption	Damping for Diesel consumption
29	Damping AdBlue level	Damping for the AdBlue level
31	Battery cutoff switch / GGVS	Described the **Parameter values:** 0 = Without Battery cutoff switch / GGVS 1 = Battery cutoff switch / GGVS 2 = Not defined 3 = s.n.v.
32	NOx torque reduction	Reduction of the maximum available torque in percent of the maximum torque (reference torque of the engine), FDOK protected parameter!
34	Resistance 1	Describes the characteristics of the AdBlue Tank and the level sensor 19 grid points describe the AdBlue Tank characteristics lines The grid points should be strictly monotonic (decreasing or increasing) If not all grid points are used, it is necessary to fill up the unused points with the last valid values
35	Level 1	
36	Resistance 2	
37	Level 2	
38	Resistance 3	
39	Level 3	
40	Resistance 4	
41	Level 4	

Nr.	Parameter	Description
42	Resistance 5	 Example of an AdBlue characteristics line with all 19 grid points
43	Level 5	
44	Resistance 6	
45	Level 6	
46	Resistance 7	
47	Level 7	
48	Resistance 8	
49	Level 8	
50	Resistance 9	
51	Level 9	
52	Resistance 10	
53	Level 10	
54	Resistance 11	
55	Level 11	
56	Resistance 12	
57	Level 12	
58	Resistance 13	
59	Level 13	
60	Resistance 14	
61	Level 14	
62	Resistance 15	
63	Level 15	
64	Resistance 16	
65	Level 16	
66	Resistance 17	
67	Level 17	
68	Resistance 18	
69	Level 18	
70	Resistance 19	
71	Level 19	
72	Lower faulty Resistance	A valid resistance value must be higher than this parameter
73	Upper faulty Resistance	A valid resistance value must be lower than this parameter
74	Diesel Tank capacity	Fuel capacity for the diesel tank

Output:

- SAE J1939 CAN message Tank Information 1 with signals:
  catalyst tank level in percent and
  FMI to catalyst tank level warning status

– Pin 15/12 REL1: AdBlue level warning lamp (parameter 16/01 set to 8) or
MI-lamp (parameter 16/01 set to 7)

– Pin 15/09 REL2: AdBlue level warning lamp (parameter 02/03 set to 7) or
MI-lamp (parameter 02/03 set to 6)

– Pin 15/11 REL3: AdBlue level warning lamp (parameter 14/01 set to 12) or
MI-lamp (parameter 14/01 set to 11)

– Pin 18/01 REL4: AdBlue level warning lamp (parameter 14/10 set to 13) or
MI-lamp (parameter 14/10 set to 12)

– Pin 12/05 IWA: AdBlue level with a range from 10 to 90% (parameter 09/01 set to 11)

7.12.6. Emission related functions – NOx torque reduction

In the Euro4/5 standards limits are defined for the NOx emissions of a vehicle. Due to the standard a signal is provided to the driver and later on a reduction of the maximum available torque of the engine. Be aware, that this functionaility only applies to engines which are equipped with a SCR system.

The percentage of the torque reduction is defined in parameter 14/32, the parameter is FDOK protected and has a default value of 60%.

The ADM3 is informed about the status of a torque limitation by the PLD/MR2 control unit. This information is used to drive a NOx lamp in the vehicle using one of the four output relays. The status information is also offered in the SAE J1939 CAN message Auxiliary Input/Output Status 1 (PGN 65241).

The actual available torque of the engine as a percentage of the reference torque is considered in the SAE J1939 CAN message Engine Configuration 1. In the case of a torque limitation the speed/torque diagram is truncated to the parameterized value.

Input values:

– Status of NOx torque limitation from PLD/MR2 via CAN connection

Parameter from parameter group 14:

Nr.	Parameter	Description
32	NOx torque reduction	Reduction of the maximum available torque in percent of the maximum torque (reference torque of the engine), FDOK protected parameter!

Output:

- SAE J1939 CAN message Auxiliary Input/Output Status 1, signal status NOx torque limitation (Byte 4, Bits 4,3) with the values: 0 = not active (NOx lamp off),
  1 = active (NOx lamp on),
  2 = active after next vehicle start (NOx lamp flashing)

– Pin 15/12 REL1: NOx lamp (parameter 16/01 set to 9)

– Pin 15/09 REL2: NOx lamp (parameter 02/03 set to 8)

– Pin 15/11 REL3: NOx lamp (parameter 14/01 set to 13)

– Pin 18/01 REL4: NOx lamp (parameter 14/10 set to 14)

7.12.7. TSC1 Speed Control and Speed Limitation

Depending on parameters in group 22 (TSC1 Limiter Governor (n max)) the speed governors for maximum engine speed limitation and engine speed control are selected.

Limitation of maximum engine speed

The governors for maximum engine speed limitation are chosen with the parameters 22/01 to 22/04, each of them dedicated to the source of the respective TSC1 message. 22/01 is responsible for the sender ABU (Antilock Braking System), 22/02 for TCU (Transmission), 22/03 for KWS (Third Source as defined in parameter 01/03), 22/04 for ACC (Adaptive Cruise Control).

The governors for the maximum engine speed limitation are allocated to the ADM3 and the PLD/MR2 depending on the following settings of the parameters 22/01 to 22/04:

Nr.	Parameter	Description
01	Governor TSC1 Transmission	Governor for torque speed control transmission limitation.
02	Governor TSC1 ABS	Governor torque speed control ABS limitation.
03	Governor TSC1 Jack Knife	Governor torque speed control Jack Knife limitation.

Nr.	Parameter	Description
04	Governor TSC1 ACC	Governor torque speed control ACC limitation.

Parameter values:
0 .. 5 ADM3 controls the maximum engine speed by calculation of an appropriate requested torque
- 0 .. 3 Control conditions according to the settings of SAE J1939/71 SPN 696
- 4 Control for driving off when equipped with an automated Eaton transmission
- 5 Engine speed limitation for Adaptive Cruise Control

6 .. 15 PLD/MR2 controls the maximum engine speed after receiving the maximum speed from the ADM3
- 6 .. 11 Not valid
- 14 PLD/MR2 internal limitation governor with droop compensation calculated by the ADM3
- 15 PLD/MR2 internal limitation governor without droop compensation

Engine speed control

The governors for the engine speed request are chosen with the parameters 22/20 to 22/23, each of them corresponding to the respective speed control condition 0 to 3 of SAE J1939/71 SPN 696.

The governors for the speed control conditions are allocated to the ADM3 and the PLD/MR2 depending on the following settings of the parameters 22/20 to 22/23:

Nr.	Parameter	Description
20	Speed Gov# TSC1 condition #0	MR speed governor# which is used for TSC1 requested speed control condition #0. See J1939/71 SPN 696
21	Speed Gov# TSC1 condition #1	MR speed governor# which is used for TSC1 requested speed control condition #1. See J1939/71 SPN 696
22	Speed Gov# TSC1 condition #2	MR speed governor# which is used for TSC1 requested speed control condition #2. See J1939/71 SPN 696
23	Speed Gov# TSC1 condition #3	MR speed governor# which is used for TSC1 requested speed control condition #3. See J1939/71 SPN 696

Parameter values:
16 ADM3 controls engine speed by calculation of an appropriate requested torque
0 .. 15 PLD/MR2 controls engine speed after receiving the requested speed from the ADM3
- 0 Governor for gear synchronsisation
- 1 .. 5 Depending on the PLD/MR2 parameters for engine speed control
- 6 Governor for gear synchronsisation, not to be used for other purposes
- 7 .. 11 Depending on PLD/MR2 parameterisation
- 12 Not valid because of lacking control for this value (idle with locked torque request)
- 15 Driving mode with idle speed control

The following figures show the I-component and the P-component of the control torque in percent over the engine speed difference for the respective governor (“LLR” meaning idle control, “Regler” with subsequent number representing the governor number).

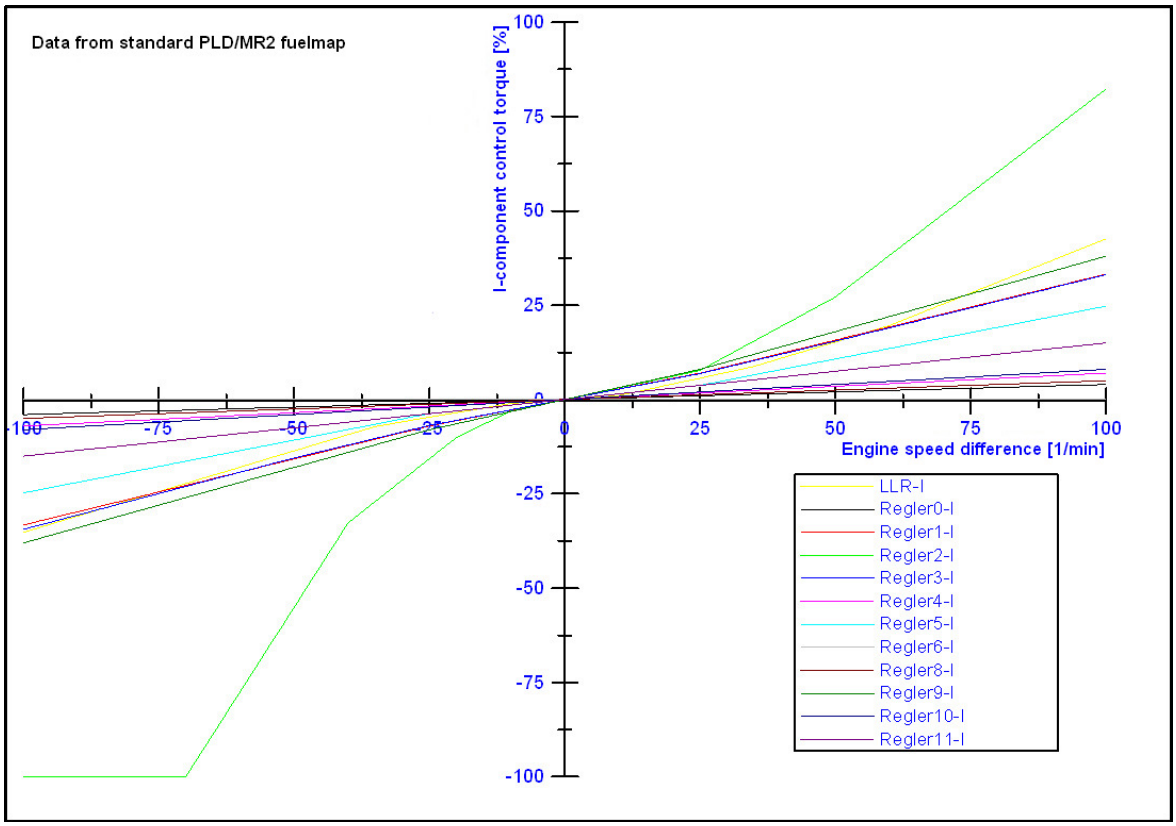


Fig. 22: I-component of control torque for engine speed control

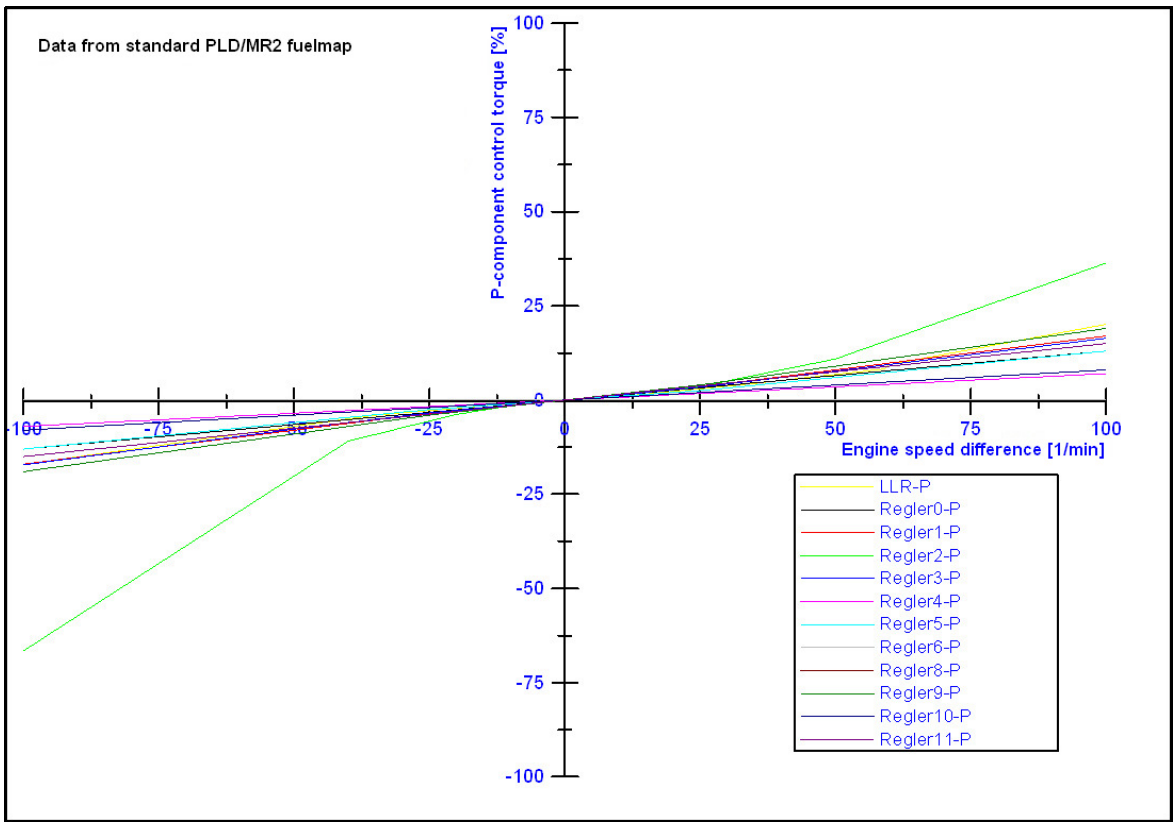


Fig. 23: P-component of control torque for engine speed control

7.12.8. Securing of TSC1 message from third source

For special applications it is possible to secure the acceptance of the J1939 CAN message TSC1 from a third source.
By setting parameter 13/37 to 2 the TSC1 message is only accepted for an additionally activated input DSF2 (Pin 12/07).

Input values:

– J1939 CAN message TSC1
– Pin 12/07 DSF2: clutch linked switch 2, currently used as common digital input

Parameter from parameter group 13:

Nr.	Parameter	Description
37	Input DSF2	**Parameter value:** 2 = Enable TSC1 from SA3

7.12.9. Power Rating with DSF2

For special purposes power rating of the engine is possible by activation of an input to the ADM3.
When parameter 13/37 (Input DSF2) is set to 4 (Power Rating with DSF2) and Pin 12/07 (DSF2) is activated the maximum torque curve is decreased by multiplicating a defined factor for 16 engine speed values. The parameters 8 to 55 of group 24 (Vehicle Parameters II) define these multiplicators.
When parameter 13/37 is not set to 4, then the torque curve defined by parameter 24/06 is activated, when driving in cruise control mode, the torque curve defined by parameter 24/07.

Input values:

– Pin 12/07 DSF2

Parameter from parameter group 13:

Nr.	Parameter	Description
37	Input DSF2	**Parameter value:** 4 = Power Rating with DSF2

Parameters from parameter group 24:

Nr.	Parameter	Description
06	Power Rating Selection	**Parameter value:** 0 = MR torque curve (max. torque).
07	Power Rating with Cruise Control	**Parameter values:** 0 = MR torque curve (max. torque) 4 = use the curve chosen with 24/6
08 - 23	Power Rating Curve 1 Values 0-15	PLD/MR2 torque curve (max. torque).
24 - 39	Power Rating Curve 2, Values 0-15	
40 - 55	Power Rating Curve 3, Values 0-15	

7.13. Diagnosis

7.13.1. K-Line Diagnosis

The ADM3-FR and PLD/MR2 engine management diagnosis wire K-DIAG must be connected to the 14-pin central diagnosis connector in accordance with the electrical wiring diagrams.

Parameters, actual values and fault codes can be read out from the ADM3-FR and PLD/MR2 using Daimler diagnosis tools (e.g. minidiag2) at the diagnosis connector.

Input/output:

– Pin 12/02 K-DIAG

7.13.2. J1939 Diagnosis

In addition to the above described K-DIAG diagnosis with e.g. minidiag2 diagnosis may be performed via J1939 CAN as well. The ADM3-FR supplies several CAN messages according to the standard SAE-J1939/73.
For detailled information about the following messages please refer to chapter 11.6. (CAN message details of diagnostic messages).

DM1 – Active Diagnostic Trouble Codes:

Usage: This message broadcasts the currently active fault codes, each fault described by SPN and FMI according to chapter 9. (Fault Codes).
In contrast to reading out fault codes with minidiag2 the fault codes from the ADM3-FR and the PLD/MR2 are sent together.
The ADM3-FR provides a DM1 receive message too which is used to receive an amber warning lamp status from the TCU.

Update rate: The broadcast message is sent whenever an error occurs and at a normal update rate of 1s thereafter and on request using PGN 59904 too. If necessary (that means in the case of more than one error) the message is sent in multi package format.

Contents: The message contains the active fault codes (SPN, FMI, occurrence count) and lamp information (malfunction indicator lamp, red stop lamp, amber warning lamp, protect lamp).

DM2 – Previously Active Diagnostic Trouble Codes:

Usage: This message broadcasts the previously active fault codes from the ADM3-FR and the PLD/MR2, each fault described by SPN and FMI according to chapter 9. (Fault Codes).

Update rate: The broadcast message is sent on request using PGN 59904. If necessary (that means in the case of more than one error) the message is sent in multi package format.

Contents: The message contains the previously active fault codes (SPN, FMI, occurrence count) and lamp information (malfunction indicator lamp, red stop lamp, amber warning lamp, protect lamp).

DM3 – Diagnostic Data Clear/Reset Of Previously Active DTCs:

Usage: On a request using PGN 59904 containing the PGN 65228, requests to the Engine / ADM3 (Default Address 0x00) clears active and previously active fault codes of the ADM3-FR (in contrast to only the previously active fault codes as described in the SAE-J1939/73 standard). This request is answered with an ACK. Requests to the Engine Brake / Retarder (Default Address 0x0F) are answered with a NACK.

Update rate: On request

Contents: The DM3 message contains no signals, its PGN is part of the respective request using PGN 59904.

DM4 – Freeze Frame Parameters:

Usage: This message broadcasts freeze frame data for up to 16 active or previously active fault codes. The DM4 message is a multi package message, each fault code derives in 13 Bytes length as part of the message. As for the messages DM1 and DM2 fault codes from the ADM3-FR and the PLD/MR2 are sent together.

Update rate: The message is sent on request using PGN 59904. Requests which are received within a 2s active J1939 bus are answered with a NACK.

Contents: The message contains the SPNs and FMIs and occurrence counts of the fault codes as for the DM1 and DM2 message and the freeze frame data which are Engine Torque Mode, Boost, Engine Speed, Engine Percent Load, Engine Coolant Temperature, Vehicle Speed.

DM11 – Diagnostic Clear/Reset For Active DTCs:

Usage: On a request using PGN 59904 and containg the PGN 65235 for DM11, requests to the Engine / ADM3 and the Engine Brake / Retarder are answered with a NACK causing no cleraing of fault codes. In order to clear fault codes please use the DM3 message.

Update rate: On request

Contents: The DM11 message contains no signals, the PGN is part of the request message.

DM13 – Stop Start Broadcast:

Usage: The signals of this receive message cause a stop or start of broadcasting over the bus types J1939 and J1587. On reception of a Stop Broadcast signal the ADM3-FR stops sending of its messages at the addressed bus. The current implementation does not make use of a sequence of receive messages to stop broadcasts as described in SAE-J1939/73, a suspend message is not sent by the ADM3-FR as well.

Update rate: The DM13 message has to be sent every 5s, after a timeout of 6s the ADM3-FR leaves the status of stopped broadcast and begins to send messages again.

Contents: The message contains Stop/Start signals for various bus types – J1939, J1587 and Current Data Link (interpreted as J1939) are used by the ADM3-FR – and the Hold Signal.

7.13.3. Diagnosis of J1939 CAN messages and signals

The ADM3-FR is capable of performing diagnosis of J1939 messages and signals. By setting parameter 01/17 to 1, J1939 messages and signals are diagnosed depending on the current parameter set. In the case of active or previously active diagnostic trouble codes these can be read by Minidiag or the respective J1939 CAN messages DM1 and DM2.

Three different failure causes have to be regarded:
– a message containing the desired signal is missing,
  this causes an ADM3 fault code with FMI 9 (Abnormal Update Rate) for the signal,
– a signal is marked as not available,
  this causes an ADM3 fault code with FMI 9 (Signal not Available),
– a signal is marked erratic,
  this causes an ADM3 fault code with FMI 19 (Received Network Data In Error).

Following conditions have to be fulfilled to activate J1939 diagnosis:
– sufficient battery voltage of 11.5V (for a nominal battery voltage of 12V) or 18V (for a nominal value of 24V) minimum,
– ignition on for at least 1s,
– J1939 bus active for at least 250ms,
– no J1939 bus off,
– engine running for at least 10s or engine speed equals zero,
– parameter 01/17 set to 1.

Input values:

– J1939 CAN messages

Output values:

– ADM3 fault codes (Minidiag or J1939 diagnostic messages DM1/DM2)

Parameter from parameter group 1:

Nr.	Parameter	Description
17	J1939 Timeout Detection	Activation of diagnosis for J1939 CAN signals. Signals are checked for “Not defined” (FMI 19) and “Signal Not Available” (FMI 09), missing messages lead to FMI 09 for signals that are used for the current parameter configuration **Parameter values:** 0 = not active 1 = active

7.13.4. Malfunction Indicator Lamp

The malfunction indicator lamp, abbreviated with MIL, is used due to OBD regulations. The lamp can be connected to one of the 4 relays of the ADM3. However it is recommended to use relay 1 or 2 or 4, because these relays can be checked for errors (shorted or open circuit).
The status of the MIL is received from the engine controller over the Low-Speed CAN. With this information the MIL is driven, when connected to one of the 4 relays. Additionally the MIL-status is sent back to the engine controller over the Low-Speed CAN and is transmitted on J1939-CAN. If the MI-lamp is connected to relay 1 or 2 or 4 and diagnosis of the respective relay, which drives the MIL shows an error, the MIL status will be transmitted back to the engine controller as “off” on the Low-Speed CAN and on the J1939-CAN in the messages DM1 and DM2. In the case the MI-Lamp is connected to relay 3 or it is parametered to none of the relays, then the MIL status is mirrored back on the Low-Speed CAN and transmitted unchanged on the J1939-CAN.

Input values:

– Low-Speed CAN message containing MIL status

Output values:

– Relays 1 to 4
– MIL status in J1939-CAN messages DM1 and DM2
– Low Speed CAN message

Parameters:

- 02/03 Configuration Relay 2 / Grid heater
  parameter value = 6 (MI-Lamp)
- 14/01 Configuration Relay 3 (IWK3)
  parameter value = 11 (MI-Lamp)
- 14/10 Configuration Relay 4 (IWK4)
  parameter value = 12 (MI-Lamp)
- 16/01 Output Relay 1 /Starter Lockout
  parameter value = 7 (MI-Lamp)

8. Actual Values

Following abbreviations are used in the following tables:

Abbreviation	Description	Values
V	Visible	Y = Yes N = No
S	Signed	S = Signed U = Unsigned

8.1. Analog Values

Nr.	Name	Abbreviation	V	S	Range min	Range max	Unit	Description	Pin
1	Analog Accelerator Pedal (AFPS)	Analog Acc. Pedal	Y	U	0	100	%		21/11
2	Supply Analog Acc. Pedal (AFP+)	Supply Analog Pedal	Y	U	4,500	5,500	V	Nominal value = 5.000V	21/09
3	Analog Remote Pedal (HFGS)	Analog Remote Pedal	Y	U	0	100	%		18/18
4	Supply Analog Remote Pedal (HFG+)	Supply Remote Pedal	Y	U	4,500	5,500	V		18/17
5	Selected Pedal Value	Selected Pedal Value	Y	U	0	100	%		-
6	Calculated Pedal Torque Value	Calc. Pedal Torque	Y	S	-5000	5000	Nm		-
7	Actual Engine Speed	Actual Engine Speed	Y	U	0	3000	1/min		-
8	Actual Torque	Actual Torque	Y	S	-5000	5000	Nm		-
9	Friction Torque	Friction Torque	Y	S	-5000	0	Nm		-
10	Governor Type	Governor Type	Y	U	0	15	-	0 .. 5 = PTO governor 6 .. 7 = Reserved 8 .. 14 = Not defined 15 = Torque governor	-
11	Demand Engine Speed	Demand Engine Speed	Y	U	0	3000	1/min		-
12	Demand Engine Torque	Demand Engine Torque	Y	S	-5000	5000	Nm		-
13	Minimum Engine Speed	Minimum Engine Speed	Y	U	0	3000	1/min		-
14	Maximum Engine Speed	Maximum Engine Speed	Y	U	0	3000	1/min		-
15	Road Speed	Road Speed	Y	U	0	150	km/h		-
16	Set Speed Cruise Control	Set Speed Cruise C.	Y	U	0	150	km/h		-
17	Voltage Coolant Level Sensor	Voltage Coolant Level	Y	U	0	5,000	V		-
18	Coolant level	Coolant Level	Y	U	0	3		0 = Switch defective 1 = Warning 2 = Pre warning 3 = Coolant level normal	-
19	Voltage Air Filter Sensor	Voltage Air Filter	Y	U	0	5,000	V		-
20	Pressure Air Filter Sensor	Pressure Air Filter	Y	U	-	-	kPa		-
21	Coolant Temperature	Coolant Temperature	Y	S	-40	150	°C		
22	Oil Pressure	Oil Pressure	Y	U	0	5000	mbar		-
23	Oil Temperature	Oil Temperature	Y	S	-40	150	°C		-
24	Voltage Terminal 15	Voltage Terminal 15	Y	U	0	30,000	V	Ignition	21/02
25	Voltage Terminal 30	Voltage Terminal 30	Y	U	0	30,000	V		21/01
26	VSS Frequency	VSS Frequency	Y	U	0	10000	Hz	Frequency at Pin 15/3 Vehicle Speed Sensor	15/03
27	VSS Diagnosis Level	VSS Diagnosis Level	Y	U	0	5,000	V	Level at Pin 15/3 Vehicle Speed Sensor	-

Nr.	Name	Abbreviation	V	S	Range min	Range max	Unit	Description	Pin
28	SAE J1939 Current Active TSC1 Sender	J1939 Active TSC1	Y	U	0	255	-		-
29	SAE J1939 Demand Engine Speed	J1939 dem. Speed	Y	U	0	3000	1/min		-
30	SAE J1939 Demand Torque	J1939 Dem. Torque	Y	S	-125	125	%		-
31	SAE J1939 Maximum Engine Speed	J1939 Max. Speed	Y	U	0	3000	1/min		-
32	SAE J1939 Maximum Torque	J1939 Max. Torque	Y	S	-125	125	%		-
33	PWM Pedal Signal GAS1	PWM Pedal GAS1	Y	U	0	100	%	Idle: 10% .. 30% o.k, Max. Load: 40%..90% o.k.	21/12
34	PWM Pedal Signal GAS2	PWM Pedal GAS2	Y	U	0	100	%	Idle: 10% .. 30% o.k. Max. Load: 40%..90% o.k.	21/13
35	Status Grid Heater	Status Grid Heater	Y	U	0	6	-	0 = Disabled 1 = Preheating phase 2 = Ready for starting 3 = Starting 4 = Postheating phase 5 = Cooling off phase 6 = End	-
36	Boost Temperature	Boost Temperature	Y	S	-50	200	°C		-
37	IWA output	IWA output	Y	U	0	100	%		12/05
38	Software Version	Software Version	Y	U	-	-	-		-
39	Actual Torque corrected	Actual Torque corr.	Y	S	-5000	5000	Nm		-
40	Reference Torque	Reference Torque	Y	U	0	5000	Nm	J1939 Engine Configuration Reference Torque	-
41	Abs.max. Engine Torque	Abs.max. Engine Torque	Y	U	0	5000	Nm		-
42	EEC1, SA controlling device	EEC1, SA contr. dev.	Y	U	0	255	-	EEC1, Byte 6	-
43	ERC1, SA controlling device	ERC1, SA cont. dev.	Y	U	0	255	-	ERC1, Byte 5	-
44	Torque of Inertia J1939	Torque of Inertia	Y	U	0,00	10,00	kgm^2	Engine Torque of Inertia J1939 Engine Conf. Map (PGN 65251)	-
45	Max.Retarder Torque	Max.Retarder Torque	Y	U	-	-	Nm	Status-dependent maximum engine brake torque	-
46	ER Torque Curve	ER Torque learned	Y	U	-	-	-	0 = not learned 1 = learned (OK)	-
47	ECU-Hardware	ECU-Hardware	Y	U	-	-	-	Hardware configuration / Connectors mounted on ECU	-
48	Power rating, requested engine map	requested engine map	Y	U	0	14	-		-
49	Power rating, actual engine map	actual engine map	Y	U	0	14	-		-
50	Fuel Filter	Fuel Filter	Y	U	-	-	kPa		-
51	Nmax Gov0 rpm	Nmax Gov0 rpm	Y	U	-	-	rpm		-
52	Nmax Gov1 rpm	Nmax Gov1 rpm	Y	U	-	-	rpm		-
53	Nmax Gov2 rpm	Nmax Gov2 rpm	Y	U	-	-	rpm		-
54	Nmax Gov3 rpm	Nmax Gov3 rpm	Y	U	-	-	rpm		-
55	Nmax Gov4 rpm	Nmax Gov4 rpm	Y	U	-	-	rpm		-
56	Transmission Input Speed	Transm. Input Speed	Y	U	-	-	rpm		-
57	Transmission Input Sensor Frequency	Transm. Input S_Freq	Y	U	-	-	Hz		-
58	Engine Type	Engine Type	Y	U	-	-	BR		-
59	Ambient Air Temperature	Ambient Air Temp.	Y	S	-273	1735	°C		-

8.2. Binary Values

Nr.	Name	Abbreviation	Status 00/01	Description	Pin
1/1	Terminal 15	Terminal 15	Off/On	Ignition	21/02
1/2	Service Brake	Service Brake	Off/On	-	21/15
1/3	Park Brake	Park Brake	Off/On	-	21/16
1/4	Clutch	Clutch	Closed/ Open	-	18/02
2/1	Cruise Control Switch CC-	Cruise Control CC-	Off/On	On = Set and Decelerate	18/04
2/2	Cruise Control Switch CC+	Cruise Control CC+	Off/On	On = Resume and accelerate	18/05
2/3	Cruise Control Switch CC_EIN	Cruise Control CC_EIN	Off/On	On = Enable Cruise Control	18/06
2/4	Throttle Select Switch FG_WAHL	Throttle Select	Off/On	Off = accelerator pedal On = remote pedal	18/07
3/1	Engine Brake Low MBR_L	Engine Brake Low	Off/On	-	18/08
3/2	Engine Brake High MBR_H	Engine Brake High	Off/On	-	18/09
3/3	PTO Control Set Switch	PTO Set Switch	Off/On		18/10
3/4	Limiter0 Set Switch	Limiter0 Set Switch	Off/On	-	18/11
4/1	Limiter1 Set Switch	Limiter1 Set Switch	Off/On	-	18/12
4/2	Shutdown Override MABSCH_SP	Shutdown Override	Off/On	-	18/13
4/3	Limiter Klima Set Switch	Limiter Klima Switch	Off/On	-	18/14
4/4	Fan	Fan	Off/On	-	18/15
5/1	Acceleretor Pedal Lockout	Acc. Pedal Lockout	No/Yes	On active input acc. pedal and remote pedal are disabled.	18/16
5/2	Transmission Neutral NE	Transm. Neutral	Off/On	-	15/01
5/3	Rear Axle HA	Rear Axle	Off/On	-	15/02
5/4	ABS	ABS	Off/On	SAE J1939, preliminary	-
6/1	GAS2 (analog throttle)	GAS2 (IVS 1)	Off/On	Idle validation switch 1 of analog throttle	21/13
6/2	GAS1 (analog throttle)	GAS1 (IVS 2)	Off/On	Idle validation switch 2 of analog throttle	21/12
6/3	engine brake(s) off	eng. brake(s) v. J19	No/Yes	shutdown via SAE J1939	-
6/4	Kickdown	Kickdown	No/Yes	throttle pedal	-
7/1	zero Injection	zero injection	No/Yes	Engine stop demand on PLD/MR2 via engine-CAN, ref. Chapter 7 of manual	-
7/2	zero injection via J1939	zero injection J1939	No/Yes	Engine stop demand via SAE J1939 with PGN 61184, ref. Chapter 7 and 11 of manual	-
7/3	starter signal (Kl. 50)	starter signal (Kl. 50)	Off/On	starter signal (Ignition key)	12/01
7/4	DSF0	DSF0	Off/On	configurable input DSF0	12/10
8/1	DSF1	DSF1	Off/On	configurable input DSF1	12/09
8/2	MBR-BK	MBR-BK	Off/On	Exhaust brake valve	15/06
8/3	MBR-KD	MBR-KD	Off/On	Decompression valve	15/10
8/4	relay 1	relay 1	Off/On		15/12
9/1	relay 2	relay 2	Off/On		15/09
9/2	relay 3	relay 3	Off/On		15/11
9/3	relay 4	relay 4	Off/On		18/01
9/4	engine hood (bus)	engine hood (bus)	Off/On		12/08
10/1	CC Pause	CC Pause	Off/On	only via J1939 CC or stalk switch	-
10/2	status road speed limiter	stat. road speed lim	Off/On		-
10/3	reserved	reserved	0/1		-
10/4	Transponder	Transponder	Off/On		
11/1	reserved	reserved	-		-
11/2	DSF2 Status	DSF2 Status	Off/On	configurable input DSF2	12/07

9. Fault codes

9.1. Fault codes diagnosis version 209

The background colour is used to indicate the newly supported or changed fault codes since diagnosis version 207.
The background colour indicates PLD/MR2 fault codes which are received from the PLD/MR2 control unit and are broadcasted by the ADM over J1939.

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
51 / 0	-	Engine Throttle Position	Above Measuring Range		LSCAN-MR
51 / 1	-	Engine Throttle Position	Below Measuring Range		LSCAN-MR
51 / 2	-	Engine Throttle Position	Performance, Measuring Range Not Plausible		LSCAN-MR
51 / 3	-	Engine Throttle Position Sensor	Circuit High		LSCAN-MR
51 / 4	-	Engine Throttle Position Sensor	Circuit Low		LSCAN-MR
51 / 7	-	Engine Throttle Position	Defective		LSCAN-MR
51 / 13	-	Engine Throttle Position	Position Not Learned		LSCAN-MR
69 / 9	17309	Two Speed Axle Switch	Abnormal Update Rate		CAN-J1939
69 / 19	17319	Two Speed Axle Switch	Received Network Data in Error		CAN-J1939
70 / 9	17409	Parking Brake Switch	Abnormal Update Rate		CAN-J1939
70 / 19	17419	Parking Brake Switch	Received Network Data in Error		CAN-J1939
84 / 3	10103	Vehicle Speed (C3 or J1939)	Open Circuit	- Check wiring	15/03
84 / 9	10109	Vehicle Speed (C3 or J1939)	Abnormal Update Rate		CAN-J1939
84 / 14	10114	Vehicle Speed (C3 or J1939)	Signal Not Plausible	- Check wiring	15/03
84 / 19	10119	Vehicle Speed (C3 or J1939)	Received Network Data in Error		CAN-J1939
91 / 0	10200	Accelerator Pedal (AFPS or J1939)	Not Adjusted	- Restart accelerator pedal adjustment routine - Check wiring - Limit value idle operation position: 5,0 V - Limit value kickdown position: 4,9 V	21/11
91 / 3	10203	Accelerator Pedal (AFPS or J1939)	Voltage too High	- Pedal unit exchange, if defective - check wiring - Limit value idle operation position: 5,0 V - Limit value kickdown position: 4,9 V	21/11
91 / 4	10204	Accelerator Pedal (AFPS or J1939)	Voltage too Low	- Pedal unit exchange, if defective - Check wiring - Limit value idle operation position: 5,0 V - Limit value kickdown position: 4,9 V	21/11
91 / 9	10209	Accelerator Pedal (AFPS or J1939)	Abnormal Update Rate		CAN-J1939
91 / 19	10219	Accelerator Pedal (AFPS or J1939)	Received Network Data in Error		CAN-J1939
94 / 0	-	Fuel Pressure	Circuit High Input		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
94 / 1	-	Fuel Pressure	Circuit Low Input		LSCAN-MR
94 / 2	-	Fuel Pressure	Range/Performance		LSCAN-MR
94 / 3	-	Fuel Pressure	Open Circuit		LSCAN-MR
94 / 4	-	Fuel Pressure	Shorted To Ground		LSCAN-MR
94 / 14	-	Fuel Pressure	Pressure Too High/Too Low		LSCAN-MR
96 / 9	17509	Fuel Level	Abnormal Update Rate		CAN-J1939
96 / 19	17519	Fuel Level	Received Network Data in Error		CAN-J1939
98 / 0	10400	Oil Level (from PLD/MR2)	Oil Level too High	- Oil discharge with to strong overstocking. - Remark: This problem can occur also if in PLD/MR2 the false type of oil pan were programmed.	PLD/MR2
98 / 1	10401	Oil Level (from PLD/MR2)	Low Oil Level	- Refill oil	PLD/MR2
98 / 2	-	Oil Level (from PLD/MR2)	Data Erratic, Oil Level too High or too Low, Not Plausible		LSCAN-MR
98 / 3	-	Oil Level (from PLD/MR2)	Voltage Below		LSCAN-MR
98 / 4	-	Oil Level (from PLD/MR2)	Voltage Above		LSCAN-MR
98 / 5	-	Oil Level (from PLD/MR2)	Open Circuit		LSCAN-MR
98 / 14	10414	Oil Level (from PLD/MR2)	Oil Level too Low	- Refill oil - Remark: This problem can occur also if in PLD/MR2 the false type of oil pan were programmed.	PLD/MR2
100 / 1	10501	Oil Pressure (from PLD/MR2)	Low Oil Pressure	- Check oil pump and oil circuit	PLD/MR2
100 / 1	-	Oil Pressure (from PLD/MR2)	Oil Pressure too Low		LSCAN-MR
100 / 2	-	Oil Pressure (from PLD/MR2)	Range/Performance		LSCAN-MR
100 / 3	-	Oil Pressure (from PLD/MR2)	High Voltage		LSCAN-MR
100 / 4	-	Oil Pressure (from PLD/MR2)	Low Voltage		LSCAN-MR
100 / 14	10514	Oil Pressure (from PLD/MR2)	Oil Pressure too Low	- Check oil pump and oil circuit.	PLD/MR2
102 / 0	-	Turbo Charger/ Supercharger	Overboost Condition		LSCAN-MR
102 / 1	-	Turbo Charger/ Supercharger	Boost System Performance		LSCAN-MR
102 / 2	-	Turbo Charger/ Supercharger	Boost Sensor “A” Circuit Range/Performance		LSCAN-MR
102 / 3	-	Turbo Charger/ Supercharger	Boost Sensor “A” Circuit High		LSCAN-MR
102 / 4	-	Turbo Charger/ Supercharger	Boost Sensor “A” Circuit Low		LSCAN-MR
102 / 7	-	Turbo Charger/ Supercharger	Boost System Performance, Bypass Valve – Mechanical		LSCAN-MR
102 / 13	-	Turbo Charger/ Supercharger	Underboost, Boost System Performance		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
103 / 3	-	Turbo Charger Speed Sensor	Circuit Low		LSCAN-MR
103 / 4	-	Turbo Charger Speed Sensor	Circuit High		LSCAN-MR
103 / 7	-	Turbo Charger Speed Sensor	Signal Timeout, no revolution on charger 1		LSCAN-MR
103 / 14	-	Generator Speed Sensing	Signal Timeout, no revolution on charger 2		LSCAN-MR
105 / 0	-	Intake Air Temperature	Temperature Too high		LSCAN-MR
105 / 3	-	Intake Air Temperature Sensor 1	Circuit High		LSCAN-MR
105 / 4	-	Intake Air Temperature Sensor 1	Circuit Low		LSCAN-MR
107 / 0	10800	Air Filter Sensor (LF_SE)	Differential Pressure too High	- Check wiring.	15/08
107 / 3	10803	Air Filter Sensor (LF_SE)	Open Circuit	- Check wiring.	15/08
107 / 4	10804	Air Filter Sensor (LF_SE)	Short Circuit to Ground	- Check wiring.	15/08
110 / 0	-	Coolant Temperature (from PLD/MR2)	High Coolant Temperature	- Cooling-water level and cooling circuit check.	LSCAN-MR
110 / 3	-	Coolant Temperature (from PLD/MR2)	Sensor 1 Circuit High		LSCAN-MR
110 / 4	-	Coolant Temperature (from PLD/MR2)	Sensor 1 Circuit Low		LSCAN-MR
110 / 14	10914	Coolant Temperature (from PLD/MR2)	Coolant Temperature too High	- Cooling-water level and cooling circuit check.	PLD/MR2
111 / 1	11001	Coolant Level Sensor (KW_SE)	Low Coolant Level	- Refill coolant - Check wiring	15/07
111 / 3	11003	Coolant Level Sensor (KW_SE)	Open Circuit	- Check wiring - Voltage must be larger than 2,0 V.	15/07
111 / 4	11004	Coolant Level Sensor (KW_SE)	Short Circuit to Ground	- Check wiring.	15/07
111 / 14	11014	Coolant Level Sensor (KW_SE)	Coolant Level too Low	- Refill coolant - Check wiring	15/07
158 / 0	11100	Battery Voltage Switched (Terminal 15)	Over Voltage	- Check battery voltage - Check parameter 2/08 (24V/12V selection)	21/02
158 / 1	11101	Battery Voltage Switched (Terminal 15)	Under Voltage	- Check battery voltage - Check parameter 2/08 (24V/12V selection)	21/02
158 / 2	-	Battery Voltage Switched (Terminal 15)	Inconsistent		LSCAN-MR
158 / 14	-	Battery Voltage Switched (Terminal 15)	Starter Switch Inconsistent		LSCAN-MR
161 / 9	17609	Transmission Input Shaft Speed	Abnormal Update Rate		CAN-J1939
161 / 19	17619	Transmission Input Shaft Speed	Received Network Data in Error		CAN-J1939
168 / 3	-	System Voltage	Voltage High		LSCAN-MR
168 / 4	-	System Voltage	Voltage Low		LSCAN-MR
171 / 2	-	Ambient Air Temperature	Sensor Circuit Range/Performance		LSCAN-MR
171 / 9	-	Ambient Air Temperature	Lost Message		LSCAN-MR
171 / 9	16609	Ambient Air Temperature	Abnormal Update Rate		CAN-J1939
171 / 19	16619	Ambient Air Temperature	Received Network Data in Error		CAN-J1939

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
173 / 0	-	Engine Exhaust Gas Temperature	Above Nominal Value		LSCAN-MR
173 / 15	-	Engine Exhaust Gas Temperature	Too High		LSCAN-MR
174 / 3	-	Fuel Temperature Sensor “A”	Circuit High Input		LSCAN-MR
174 / 4	-	Fuel Temperature Sensor “A”	Circuit Low Input		LSCAN-MR
175 / 3	-	Engine Oil Temperature Sensor	Circuit High		LSCAN-MR
175 / 4	-	Engine Oil Temperature Sensor	Ciruit Low		LSCAN-MR
190 / 0	-	Engine Speed	Engine Overspeed Condition		LSCAN-MR
191 / 9	17709	Transmission Output Shaft Speed	Abnormal Update Rate		CAN-J1939
191 / 19	17719	Transmission Output Shaft Speed	Received Network Data in Error		CAN-J1939
354 / 3	-	Ambient Air Combi Sensor, Part Humidity	Circuit High		LSCAN-MR
354 / 4	-	Ambient Air Combi Sensor, Part Humidity	Circuit Low		LSCAN-MR
523 / 9	17809	Transmission Current Gear	Abnormal Update Rate		CAN-J1939
523 / 19	17819	Transmission Current Gear	Received Network Data in Error		CAN-J1939
524 / 9	17909	Transmission Selected Gear	Abnormal Update Rate		CAN-J1939
524 / 19	17919	Transmission Selected Gear	Received Network Data in Error		CAN-J1939
558 / 1	11701	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Signals Equal but Should Not	- Check wiring	21/12 and 21/13
558 / 5	11705	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Switches Open Circuit	- Check wiring - Pedal unit exchange, if defective	21/12 and 21/13
558 / 9	11709	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Abnormal Update Rate		CAN-J1939
558 / 12	11712	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Switches Closed	- check wiring - Pedal unit exchange, if defective	21/12 and 21/13
558 / 19	11719	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Received Network Data in Error		CAN-J1939
559 / 9	18009	Accelerator Pedal Kickdown Switch	Abnormal Update Rate		CAN-J1939
559 / 19	18019	Accelerator Pedal Kickdown Switch	Received Network Data in Error		CAN-J1939
573 / 9	18109	Transmission Torque Converter Lockup Engaged	Abnormal Update Rate		CAN-J1939
573 / 19	18119	Transmission Torque Converter Lockup Engaged	Received Network Data in Error		CAN-J1939
574 / 9	18209	Transmission Shift In Process	Abnormal Update Rate		CAN-J1939
574 / 19	18219	Transmission Shift In Process	Received Network Data in Error		CAN-J1939
596 / 9	18309	Cruise Control Enable Switch	Abnormal Update Rate		CAN-J1939

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
596 / 19	18319	Cruise Control Enable Switch	Received Network Data in Error		CAN-J1939
597 / 9	18409	Brake Switch	Abnormal Update Rate		CAN-J1939
597 / 19	18419	Brake Switch	Received Network Data in Error		CAN-J1939
598 / 9	18509	Clutch Switch	Abnormal Update Rate		CAN-J1939
598 / 19	18519	Clutch Switch	Received Network Data in Error		CAN-J1939
599 / 9	11809	Cruise Control Switch CC-(Set + Coast)	Abnormal Update Rate (Set Switch)		CAN-J1939
599 / 12	11812	Cruise Control Switch CC-(Set + Coast)	Both Switches CC- and CC+ Closed	- Check wiring - Check cruise control switch	18/04 and 18/05
599 / 14	11814	Cruise Control Switch CC-(Set + Coast)	Plausibility Check Failed (Check Stalk Switch Wiring)	- Check wiring of stalk switch - Check parameter 13/37	18/04 and 12/07
599 / 19	11819	Cruise Control Switch CC-(Set + Coast)	Received Network Data in Error		CAN-J1939
600 / 9	18609	Cruise Control Coast (Decelerate) Switch	Abnormal Update Rate		CAN-J1939
600 / 19	18619	Cruise Control Coast (Decelerate) Switch	Received Network Data in Error		CAN-J1939
601 / 9	11909	Cruise Control Switch CC+ (Res + Acc)	Abnormal Update Rate (Resume Switch)		CAN-J1939
601 / 12	11912	Cruise Control Switch CC+ (Res + Acc)	Both Switches CC+ and CC- Closed	- Check wiring - Check cruise control switch	18/04 and 18/05
601 / 14	11914	Cruise Control Switch CC+ (Res + Acc)	Plausibility Check Failed (Check Stalk Switch Wiring)	- Check wiring of stalk switch - Check parameter 13/37	18/05 and 12/07
601 / 19	11919	Cruise Control Switch CC+ (Res + Acc)	Received Network Data in Error		CAN-J1939
602 / 9	18709	CCVS Cruise Control Accelerate Switch	Abnormal Update Rate or Signal Not Available		CAN-J1939
602 / 19	18719	CCVS Cruise Control Accelerate Switch	Received Network Data in Error		CAN-J1939
609 / 0	-	Anti Theft Device	Immobilizer Number of Keys Limited to 8		LSCAN-MR
609 / 2	12002	PLD/MR2 Error	Unknown Cause	- Check PLD/MR2 Error Codes	PLD/MR2
609 / 9	-	Anti Theft Device	Immobilizer TPC Signal Error Starter Line		LSCAN-MR
609 / 11	-	PLD/MR2, Anti Theft Device	Data Map Manipulated, Immobilizer Automatically Activated		LSCAN-MR
609 / 12	-	PLD/MR2, Barometric Pressure Circuit, Controller #2	PLD/MR2 Bad Device, Pressure Sensor Open Circuit or Shorted to Ground, Auxiliary Voltage 8,5V Defective, Common Internal Error, Boot Load Data, Boot Block Defective, Flash Memory Defective, , No Application Software In Flash Application Software Defective, Flash Not Erasable		LSCAN-MR
609 / 13	-	PLD/MR2	No. Of Cylinders Not Corresponding To Engine Type		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
609 / 14	-	PLD/MR2, Anti Theft Device	PLD/MR2 Bad Device, RAM Area, Starter Driver, Set of Maps, EEPROM Checksums, High Side Driver, No. of Cylinder Immobilizer Response Counter Overflow		LSCAN-MR
611 / 4	-	Oil Separator	Circuit Low		LSCAN-MR
611 / 12	-	Oil Separator	Circuit High		LSCAN-MR
620 / 3	12103	Supply Analog Accelerator Pedal (AFP+)	Voltage too High	- Supply voltage > 5,2 V.	21/09
620 / 4	12104	Supply Analog Accelerator Pedal (AFP+)	Voltage too Low	- Supply voltage < 4,8 V.	21/09
625 / 2	12202	CAN Link ADM3 – PLD/MR2	No Communication with PLD/MR2	- Check wiring (engine CAN) - Check configuration: PLD/MR2 parameter (../..) and ADM3 parameter 01/01 to be set to equal functionality (0ne wire capability)	-
625 / 14	-	CAN Link ADM3 – PLD/MR2	One Wire Mode	- Check wiring (engine CAN) - Check configuration: PLD/MR2 parameter (../..) and ADM3 parameter 01/01 to be set to equal functionality (0ne wire capability)	LSCAN-MR
630 / 2	-	Control Module	Module Performance		LSCAN-MR
630 / 9	-	Control Module	Vehicle Options Error	- Check Engine Brake Parameters	LSCAN-MR
632 / 5	-	Fuel Shutoff Valve "A" Control	Circuit Open		LSCAN-MR
636 / 1	-	Crankshaft Position Sensor “A”	Circuit Range/Perforamnce		LSCAN-MR
636 / 3	-	Crankshaft Position Sensor “A”	Open Circuit		LSCAN-MR
636 / 4	-	Crankshaft Position Sensor “A”	Low Input		LSCAN-MR
636 / 7	-	Crankshaft Position	Camshaft Position Correlation (Bank 1 Sensor)		LSCAN-MR
636 / 8	-	Crankshaft Position Sensor “A” Circuit	Time Out		LSCAN-MR
636 / 14	-	Crankshaft Position Sensor “A”	Polarity Error		LSCAN-MR
639 / 2	14902	SAE J1939 Interface	At Least One J1939 Message is Missing	- Check wiring - Check other Control Units on J1939	CAN-J1939
651 / 3	-	Injector Cylinder 1	Circuit High		LSCAN-MR
651 / 4	-	Injector Cylinder 1	Circuit Low		LSCAN-MR
651 / 5	-	Injector Cylinder 1	Open Circuit		LSCAN-MR
651 / 6	-	Injector Cylinder 1	Shorted Circuit		LSCAN-MR
651 / 7	-	Injector Cylinder 1	Injection Timing, No Plunger		LSCAN-MR
651 / 12	-	Injector Cylinder 1	Idle Control At Limit		LSCAN-MR
651 / 14	-	Injector Cylinder 1	Cylinder Correction At Limit		LSCAN-MR
652 / 3	-	Injector Cylinder 2	Circuit High		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
652 / 4	-	Injector Cylinder 2	Circuit Low		LSCAN-MR
652 / 5	-	Injector Cylinder 2	Open Circuit		LSCAN-MR
652 / 6	-	Injector Cylinder 2	Shorted Circuit		LSCAN-MR
652 / 7	-	Injector Cylinder 2	Injection Timing, No Plunger		LSCAN-MR
652 / 12	-	Injector Cylinder 2	Idle Control At Limit		LSCAN-MR
652 / 14	-	Injector Cylinder 2	Cylinder Correction At Limit		LSCAN-MR
653 / 3	-	Injector Cylinder 3	Circuit High		LSCAN-MR
653 / 4	-	Injector Cylinder 3	Circuit Low		LSCAN-MR
653 / 5	-	Injector Cylinder 3	Open Circuit		LSCAN-MR
653 / 6	-	Injector Cylinder 3	Shorted Circuit		LSCAN-MR
653 / 7	-	Injector Cylinder 3	Injection Timing, No Plunger		LSCAN-MR
653 / 12	-	Injector Cylinder 3	Idle Control At Limit		LSCAN-MR
653 / 14	-	Injector Cylinder 3	Cylinder Correction At Limit		LSCAN-MR
654 / 3	-	Injector Cylinder 4	Circuit High		LSCAN-MR
654 / 4	-	Injector Cylinder 4	Circuit Low		LSCAN-MR
654 / 5	-	Injector Cylinder 4	Open Circuit		LSCAN-MR
654 / 6	-	Injector Cylinder 4	Shorted Circuit		LSCAN-MR
654 / 7	-	Injector Cylinder 4	Injection Timing, No Plunger		LSCAN-MR
654 / 12	-	Injector Cylinder 4	Idle Control At Limit		LSCAN-MR
654 / 14	-	Injector Cylinder 4	Cylinder Correction At Limit		LSCAN-MR
655 / 3	-	Injector Cylinder 5	Circuit High		LSCAN-MR
655 / 4	-	Injector Cylinder 5	Circuit Low		LSCAN-MR
655 / 5	-	Injector Cylinder 5	Open Circuit		LSCAN-MR
655 / 6	-	Injector Cylinder 5	Shorted Circuit		LSCAN-MR
655 / 7	-	Injector Cylinder 5	Injection Timing, No Plunger		LSCAN-MR
655 / 12	-	Injector Cylinder 5	Idle Control At Limit		LSCAN-MR
655 / 14	-	Injector Cylinder 5	Cylinder Correction At Limit		LSCAN-MR
656 / 3	-	Injector Cylinder 6	Circuit High		LSCAN-MR
656 / 4	-	Injector Cylinder 6	Circuit Low		LSCAN-MR
656 / 5	-	Injector Cylinder 6	Open Circuit		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
656 / 6	-	Injector Cylinder 6	Shorted Circuit		LSCAN-MR
656 / 7	-	Injector Cylinder 6	Injection Timing, No Plunger		LSCAN-MR
656 / 12	-	Injector Cylinder 6	Idle Control At Limit		LSCAN-MR
656 / 14	-	Injector Cylinder 6	Cylinder Correction At Limit		LSCAN-MR
657 / 5	-	Injector Cylinder 7	Open Circuit		LSCAN-MR
657 / 6	-	Injector Cylinder 7	Shorted Circuit		LSCAN-MR
657 / 7	-	Injector Cylinder 7	Injection Timing, No Plunger		LSCAN-MR
657 / 12	-	Injector Cylinder 7	Idle Control At Limit		LSCAN-MR
657 / 14	-	Injector Cylinder 7	Cylinder Correction At Limit		LSCAN-MR
658 / 5	-	Injector Cylinder 8	Open Circuit		LSCAN-MR
658 / 6	-	Injector Cylinder 8	Shorted Circuit		LSCAN-MR
658 / 7	-	Injector Cylinder 8	Injection Timing, No Plunger		LSCAN-MR
658 / 12	-	Injector Cylinder 8	Idle Control At Limit		LSCAN-MR
658 / 14	-	Injector Cylinder 8	Cylinder Correction At Limit		LSCAN-MR
677 / 3	-	Output Relay 1 (PLD/MR2)	Shorted To High		LSCAN-MR
677 / 3	13303	Output Relay 1 (REL 1)	Open Circuit	- Check wiring - Check relay 1	15/12
677 / 4	13304	Output Relay 1 (REL 1)	Short Circuit to Ground	- Check wiring - Check relay 1	15/12
677 / 7	-	Output Relay 1 (PLD/MR2)	Starter Stick, Does not Engage		LSCAN-MR
677 / 14	-	Output Relay 1 (PLD/MR2)	Starter Relay Stick		LSCAN-MR
697 / 3	-	Proportional Valve 1	Circuit High, Shorted To Battery Voltage Bank 1		LSCAN-MR
697 / 4	-	Proportional Valve 1	Shorted To Ground Bank 1		LSCAN-MR
697 / 5	-	Proportional Valve 1	Open Circuit		LSCAN-MR
697 / 6	-	Proportional Valve 1	Shorted To Ground		LSCAN-MR
698 / 3	-	Proportional Valve 2	Shorted To Battery Voltage		LSCAN-MR
698 / 5	-	Proportional Valve 2	Open Circuit		LSCAN-MR
698 / 6	-	Proportional Valve 2	Shorted To Ground		LSCAN-MR
699 / 3	-	Proportional Valve 3	Shorted To Battery Voltage		LSCAN-MR
699 / 5	-	Proportional Valve 3	Open Circuit		LSCAN-MR
699 / 6	-	Proportional Valve 3	Shorted To Ground		LSCAN-MR
700 / 3	-	Proportional Valve 4	Shorted To Battery Voltage		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
700 / 5	-	Proportional Valve 4	Open Circuit		LSCAN-MR
700 / 6	-	Proportional Valve 4	Shorted To Ground		LSCAN-MR
705 / 3	-	Proportional Valve 5	Shorted To Battery Voltage, Shorted To UB Bank 2		LSCAN-MR
705 / 4	-	Proportional Valve 5	Shorted To Ground, Shorted To Ground Bank 2		LSCAN-MR
706 / 3	-	Proportional Valve 6	Open Circuit		LSCAN-MR
706 / 5	-	Proportional Valve 6	Shorted To Battery Voltage		LSCAN-MR
706 / 6	-	Proportional Valve 6	Shorted To Ground		LSCAN-MR
723 / 3	-	Camshaft Position Sensor “A” (Bank 1 or Single Sensor)	Open Circuit		LSCAN-MR
723 / 4	-	Camshaft Position Sensor “A” (Bank 1 or Single Sensor)	Shorted To Ground		LSCAN-MR
723 / 8	-	Camshaft Position Sensor “A” (Bank 1 or Single Sensor)	Time Out		LSCAN-MR
723 / 14	-	Camshaft Position Sensor “A” (Bank 1 or Single Sensor)	Polarity Error, Pins Swapped		LSCAN-MR
729 / 3	14003	Intake Air Heater (MBR_KD)	Open Circuit	- Check wiring - Check solenoid valve	15/10
729 / 4	14004	Intake Air Heater (MBR_KD)	Short Circuit to Ground	- Check wiring - Check solenoid valve	15/10
729 / 5	-	Intake Air Heater (PLD/MR2)	Circuit Open		LSCAN-MR
729 / 12	-	Intake Air Heater (PLD/MR2)	Circuit Universal Troubles		LSCAN-MR
730 / 0	13900	Output Relay 2 (REL 2)	Grid Heater: No Increasing Boost Temperature After Activation	- Check wiring - Check relay 2 - Check grid heater	15/09
730 / 1	13901	Output Relay 2 (REL 2)	Grid Heater: Relay Permanently Closed	- Check wiring - Check relay 2	15/09
730 / 2	13902	Output Relay 2 (REL 2)	Grid Heater: Relay Permanently Open	- Check wiring - Check relay 2	15/09
730 / 3	13903	Output Relay 2 (REL 2)	Voltage too High when Activated	- Check wiring	15/09
730 / 4	13904	Output Relay 2 (REL 2)	Voltage too Low when Activated	- Check wiring - Check relay 2	15/09
870 / 3	-	SCR Diffusor Heating, Heater Regeneration System	Circuit High		LSCAN-MR
870 / 4	-	SCR Diffusor Heating, Heater Regeneration System	Circuit Low		LSCAN-MR
870 / 5	-	SCR Diffusor Heating	Circuit Open		LSCAN-MR
904 / 9	18809	Front Axle Speed	Abnormal Update Rate		CAN-J1939
904 / 19	18819	Front Axle Speed	Received Network Data in Error		CAN-J1939
925 / 3	-	SCR Module Proportional Valve Bank	Circuit High		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
925 / 4	-	SCR Module Proportional Valve Bank	Circuit Low		LSCAN-MR
973 / 9	18909	Engine Retarder Selection	Abnormal Update Rate		CAN-J1939
973 / 19	18919	Engine Retarder Selection	Received Network Data in Error		CAN-J1939
974 / 2	14202	Remote Throttle Pedal (HFG)	Supply Voltage Out of Range (Pin HFG+)	- Limit values for the supply voltage of the HFG: Minimum value: 4,8 V and maximum value: 5,2 V.	18/17
974 / 3	14203	Remote Throttle Pedal (HFG)	Voltage too High	- Check wiring - Check remote pedal	18/18
974 / 4	14204	Remote Throttle Pedal (HFG)	Voltage too Low	- Check wiring - Check remote pedal	18/18
986 / 1	-	Fan Speed	Speed Too Low		LSCAN-MR
986 / 9	-	Fan Speed	Time Out		LSCAN-MR
1004 / 3	14403	Output Relay 4 (REL 4)	Open Circuit	- Check wiring - Check relay 4	18/01
1004 / 4	14404	Output Relay 4 (REL 4)	Short Circuit to Ground	- Check wiring - Check relay	18/01
1005 / 3	14503	Output PWM Pedal Supply or Transmission (FP+)	Open Circuit	- Check wiring.	15/05
1005 / 4	14504	Output PWM Pedal Supply or Transmission (FP+)	Short Circuit to Ground	- Check wiring.	15/05
1015 / 1	15001	PWM Accelerator Pedal (PWM FFG)	No Supply Voltage at Pin FP+	- Check wiring	15/05
1015 / 3	15003	PWM Accelerator Pedal (PWM FFG)	No Signal at Path 2 (GAS2)	- Check wiring - Pins 21/13, 15/05 , 21/14.	
1015 / 4	15004	PWM Accelerator Pedal (PWM FFG)	No Signal at Path 1 (GAS1)	- Check wiring - Pins 21/12, 15/05 , 21/14	
1015 / 5	15005	PWM Accelerator Pedal (PWM FFG)	Not Adjusted	- Restart accelerator pedal adjustment routine	-
1015 / 6	15006	PWM Accelerator Pedal (PWM FFG)	Idle Position Out of Adjusted Range	- Restart accelerator pedal adjustment routine	-
1015 / 7	15007	PWM Accelerator Pedal (PWM FFG)	Out of Adjusted Range	- Restart accelerator pedal adjustment routine	-
1072 / 3	10003	Decompression Brake Valve (MBR_KD)	Open Circuit	- Check wiring - Check solenoid valve	15/10
1072 / 4	10004	Decompression Brake Valve (MBR_KD)	Short Circuit to Ground	- Check wiring - Check solenoid valve	15/10
1074 / 3	14603	Exhaust Brake Valve (MBR_BK)	Open Circuit	- Check wiring - Check exhaust brake valve	15/06
1074 / 3	-	Exhaust Brake Valve (PLD/MR2)	Circuit High		LSCAN-MR
1074 / 4	14604	Exhaust Brake Valve (MBR_BK)	Short Circuit to Ground	- Check wiring - Check exhaust brake valve	15/06
1074 / 4	-	Exhaust Brake Valve (PLD/MR2)	Circuit Low		LSCAN-MR
1074 / 5	-	Exhaust Brake Valve (PLD/MR2)	Circuit Open		LSCAN-MR
1074 / 12	-	Exhaust Brake Valve (PLD/MR2)	Performance		LSCAN-MR
1127 / 1	-	Intake Throttle Turbocharger	Underboost		LSCAN-MR
1132 / 0	-	Intake Air Temperature Sensor 2	Circuit High		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
1132 / 1	-	Intake Air Temperature Sensor 2	Circuit Low		LSCAN-MR
1132 / 3	-	Intake Air Temperature Sensor 2	Circuit High		LSCAN-MR
1132 / 4	-	Intake Air Temperature Sensor 2	Circuit Low		LSCAN-MR
1136 / 0	-	Engine ECU Temperature	Temperature too High		LSCAN-MR
1136 / 1	-	Engine ECU Temperature	Temperature too Low		LSCAN-MR
1184 / 0	-	Engine Turbocharger 1 Turbine Outlet Tempeature	Temperature Too High		LSCAN-MR
1184 / 2	-	Engine Turbocharger 1 Turbine Outlet Tempeature	Not Plausible		LSCAN-MR
1184 / 3	-	Engine Turbocharger 1 Turbine Outlet Tempeature	Circuit High		LSCAN-MR
1184 / 4	-	Engine Turbocharger 1 Turbine Outlet Tempeature	Circuit Low		LSCAN-MR
1213 / 12	-	Malfunction Indicator Lamp (MIL)	Control Circuit		LSCAN-MR
1227 / 7	-	Constant Throttle System	System Performance		LSCAN-MR
1231 / 9	-	High Speed CAN Communication Bus	Lost Communication		LSCAN-MR
1268 / 3	-	Engine Ignition Coil #1	Circuit High		LSCAN-MR
1268 / 4	-	Engine Ignition Coil #1	Circuit Low		LSCAN-MR
1268 / 5	-	Engine Ignition Coil #1	Open Circuit		LSCAN-MR
1269 / 3	-	Engine Ignition Coil #2	Circuit High		LSCAN-MR
1269 / 4	-	Engine Ignition Coil #2	Circuit Low		LSCAN-MR
1269 / 5	-	Engine Ignition Coil #2	Open Circuit		LSCAN-MR
1270 / 3	-	Engine Ignition Coil #3	Circuit High		LSCAN-MR
1270 / 4	-	Engine Ignition Coil #3	Circuit Low		LSCAN-MR
1270 / 5	-	Engine Ignition Coil #3	Open Circuit		LSCAN-MR
1271 / 3	-	Engine Ignition Coil #4	Circuit High		LSCAN-MR
1271 / 4	-	Engine Ignition Coil #4	Circuit Low		LSCAN-MR
1271 / 5	-	Engine Ignition Coil #4	Open Circuit		LSCAN-MR
1272 / 3	-	Engine Ignition Coil #5	Circuit High		LSCAN-MR
1272 / 4	-	Engine Ignition Coil #5	Circuit Low		LSCAN-MR
1272 / 5	-	Engine Ignition Coil #5	Open Circuit		LSCAN-MR
1273 / 3	-	Engine Ignition Coil #6	Circuit High		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
1273 / 4	-	Engine Ignition Coil #6	Circuit Low		LSCAN-MR
1273 / 5	-	Engine Ignition Coil #6	Open Circuit		LSCAN-MR
1387 / 2	-	Reductant Pressure Sensor	Circuit Range/Performance		LSCAN-MR
1387 / 3	-	Reductant Pressure Sensor	Circuit High		LSCAN-MR
1387 / 4	-	Reductant Pressure Sensor	Circuit Low		LSCAN-MR
1390 / 0	-	Engine Fuel Valve 1 Inlet Absolute Pressure	Above Measuring Range		LSCAN-MR
1390 / 1	-	Engine Fuel Valve 1 Inlet Absolute Pressure	Below Measuring Range		LSCAN-MR
1390 / 17	-	Engine Fuel Valve 1 Inlet Absolute Pressure	Too Low		LSCAN-MR
1623 / 9	19009	Tachograph Output Shaft Speed	Abnormal Update Rate		CAN-J1939
1623 / 19	19019	Tachograph Output Shaft Speed	Received Network Data in Error		CAN-J1939
1624 / 9	19109	Tachograph Vehicle Speed	Abnormal Update Rate		CAN-J1939
1624 / 19	19119	Tachograph Vehicle Speed	Received Network Data in Error		CAN-J1939
1633 / 9	19209	Cruise Control Pause Switch	Abnormal Update Rate		CAN-J1939
1633 / 14	19214	Cruise Control Pause Switch	Plausibility Check Failed (Check Stalk Switch Wiring)	- Check wiring of stalk switch - Check parameter 13/37	18/06 and 12/07
1633 / 19	19219	Cruise Control Pause Switch	Received Network Data in Error		CAN-J1939
1636 / 3	-	Ambient Air Combi Sensor, Part Temperature	Circuit High		LSCAN-MR
1636 / 4	-	Ambient Air Combi Sensor, Part Temperature	Circuit Low		LSCAN-MR
1695 / 0	-	Engine Exhaust Gas Oxygen Sensor (Lambda Sensor) Fueling Correction	Control Deviation Too High		LSCAN-MR
1695 / 2	-	Engine Exhaust Gas Oxygen Sensor (Lambda Sensor) Fueling Correction	Drift Not Plausible		LSCAN-MR
1716 / 9	19309	Retarder Selection, non-engine	Abnormal Update Rate		CAN-J1939
1716 / 19	19319	Retarder Selection, non-engine	Received Network Data in Error		CAN-J1939
1761 / 1	-	Reductant Level	Level Low		LSCAN-MR
1761 / 3	-	Reductant Level Sensor	Circuit High		LSCAN-MR
1761 / 4	-	Reductant Level Sensor	Circuit Low		LSCAN-MR
1908 / 3	-	SCR Air Pressure Shut-Off Valve Solenoid	Circuit High		LSCAN-MR
1908 / 4	-	SCR Air Pressure Shut-Off Valve Solenoid	Circuit Low		LSCAN-MR
1908 / 5	-	SCR Air Pressure Shut-Off Valve Solenoid	Circuit Open		LSCAN-MR
2436 / 9	-	Generator Speed Sensing	Signal-Timeout		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
2791 / 0	-	Exhaust Gas Recirculation	Temperature Sensor Circuit High		LSCAN-MR
2791 / 1	-	Exhaust Gas Recirculation	Temperature Sensor Circuit Low		LSCAN-MR
2791 / 2	-	Exhaust Gas Recirculation	System Performance, Temperature Diagnosis		LSCAN-MR
2791 / 7	-	Exhaust Gas Recirculation	System Performance, Universal Control Error		LSCAN-MR
2791 / 12	-	Exhaust Gas Recirculation	Temperature Too High/Too Low		LSCAN-MR
2797 / 3	-	Engine Injector Group 1	Circuit High		LSCAN-MR
2797 / 4	-	Engine Injector Group 1	Circuit Low		LSCAN-MR
2797 / 5	-	Engine Injector Group 1	Open Circuit		LSCAN-MR
2797 / 9	-	Engine Injector Group 1, Cylinder Contribution/Balance	Timeout		LSCAN-MR
2798 / 3	-	Engine Injector Group 2	Circuit High		LSCAN-MR
2798 / 4	-	Engine Injector Group 2	Circuit Low		LSCAN-MR
2798 / 5	-	Engine Injector Group 2	Open Circuit		LSCAN-MR
3031 / 3	-	Reductant Tank Temperature Sensor	Circuit High		LSCAN-MR
3031 / 4	-	Reductant Tank Temperature Sensor	Circuit Low		LSCAN-MR
3031 / 7	-	Reductant Tank Temperature Sensor	Circuit		LSCAN-MR
3050 / 7	-	NOx Emission SCR Catalyst	SCR Catalyst Error		LSCAN-MR
3050 / 13	-	SCR System Calibration	Calibration Error		LSCAN-MR
3217 / 0	-	Aftertreatment 1 Intake %O2 (Lambda Sensor)	Above Measuring Range		LSCAN-MR
3217 / 1	-	Aftertreatment 1 Intake %O2 (Lambda Sensor)	Below Measuring Range		LSCAN-MR
3217 / 2	-	Aftertreatment 1 Intake %O2 (Lambda Sensor)	Not Plausible		LSCAN-MR
3219 / 1	-	NOx Sensor	Operation Temperature Not Reached		LSCAN-MR
3220 / 9	-	NOx Concentration	Lost Message		LSCAN-MR
3222 / 0	-	Aftertreatment 1 Intake Gas Sensor (Lambda Sensor) Heater Preliminary FMI	Above Measuring Range		LSCAN-MR
3222 / 1	-	Aftertreatment 1 Intake Gas Sensor (Lambda Sensor) Heater Preliminary FMI	Below Measuring Range		LSCAN-MR
3222 / 2	-	Aftertreatment 1 Intake Gas Sensor (Lambda Sensor) Heater Preliminary FMI	Measuring Range Not Plausible		LSCAN-MR
3224 / 3	-	NOx Sensor	Circuit High (Bank 1)		LSCAN-MR
3224 / 4	-	NOx Sensor	Circuit Low (Bank 1)		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
3224 / 16	-	NOx Emission	Level 2 Exceeded		LSCAN-MR
3226 / 15	-	NOx Emission	Increased Raw Emission		LSCAN-MR
3234 / 2	-	NOx Sensor (Bank 1)	Circuit Range/Performance		LSCAN-MR
3234 / 12	-	NOx Emission NOx Sensor	Sensor Error		LSCAN-MR
3234 / 13	-	NOx Sensor	Sensor Readiness Error		LSCAN-MR
3242 / 3	-	Diesel Oxidation Catalyst Inlet Temperature Sensor	Circuit High		LSCAN-MR
3242 / 4	-	Diesel Oxidation Catalyst Inlet Temperature Sensor	Circuit Low		LSCAN-MR
3246 / 1	-	Diesel Particulate Filter Operation Temperature	Temperature Not Reached		LSCAN-MR
3250 / 3	-	Diesel Oxidation Catalyst Outlet Temperature Sensor	Circuit High		LSCAN-MR
3250 / 4	-	Diesel Oxidation Catalyst Outlet Temperature Sensor	Circuit Low		LSCAN-MR
3251 / 0	-	Diesel Particulate Filter Differential Pressure	Pressure Too High		LSCAN-MR
3251 / 1	-	Diesel Particulate Filter Differential Pressure	Pressure Too Low		LSCAN-MR
3251 / 7	-	Diesel Particulate Filter	Component Not Present		LSCAN-MR
3251 / 15	-	Diesel Particulate Filter Regeneration	Regeneration Insuffcient		LSCAN-MR
3361 / 3	-	Reductant Injector (Bank 1 Unit 1), Prop. Valve 7	Circuit High		LSCAN-MR
3361 / 4	-	Reductant Injector (Bank 1 Unit 1), Prop. Valve 7	Circuit Low		LSCAN-MR
3361 / 5	-	Reductant Injector (Bank 1 Unit 1), Prop. Valve 7	Circuit / Open		LSCAN-MR
3363 / 3	-	Reductant Tank Heating Solenoid Valve	Circuit High		LSCAN-MR
3363 / 4	-	Reductant Tank Heating Solenoid Valve	Circuit Low		LSCAN-MR
3363 / 5	-	Reductant Tank Heating Solenoid Valve	Circuit Open		LSCAN-MR
3363 / 7	-	Prop. Valve 8, Reductant Tank Heating Solenoid Valve	Circuit, Component Defective		LSCAN-MR
3464 / 2	-	Intake Throttle Highside Transistor	Control Module Performance		LSCAN-MR
3464 / 3	-	Intake Throttle Direction Signal	Circuit High		LSCAN-MR
3464 / 4	-	Intake Throttle Direction Signal	Circuit Low		LSCAN-MR
3464 / 6	-	Intake Throttle Direction Signal	Command Current Too High		LSCAN-MR
3465 / 3	-	Intake Throttle	Circuit Open		LSCAN-MR
3465 / 4	-	Intake Throttle	Circuit Low		LSCAN-MR
3465 / 5	-	Intake Throttle	Circuit High		LSCAN-MR
3485 / 2	-	Reductant Injection Air Pressure Sensor	Circuit Range/Performance		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
3485 / 3	-	Reductant Injection Air Pressure Sensor	Circuit High		LSCAN-MR
3485 / 4	-	Reductant Injection Air Pressure Sensor	Circuit Low		LSCAN-MR
3509 / 2	-	5V Output Reference Voltage 1	Voltage Too High/Too Low		LSCAN-MR
3510 / 2	-	5V Output Reference Voltage 2	Voltage Too High/Too Low		LSCAN-MR
3511 / 5	-	Sensor Reference Voltage “A”	Circuit Open		LSCAN-MR
3512 / 5	-	Sensor Reference Voltage “B”	Circuit Open		LSCAN-MR
3513 / 5	-	Sensor Reference Voltage “C”	Circuit Open		LSCAN-MR
3515 / 3	-	Reductant Temperature Sensor	Circuit High Input		LSCAN-MR
3515 / 4	-	Reductant Temperature Sensor	Circuit Low Input		LSCAN-MR
3516 / 1	-	NOx Emission Reducant Dosing	Unsufficient Reductant Dosing		LSCAN-MR
3516 / 14	-	NOx Emission Reductant Dosing	Reductant Quality/Unsufficient Reductant Dosing/SCR Catalyst Error		LSCAN-MR
3516 / 18	-	NOx Emission Reductant Dosing	Reductant Quality/Unsufficient Reductant Dosing		LSCAN-MR
3520 / 18	-	NOx Emission Reductant	Reductant Quality		LSCAN-MR
3597 / 2	-	Proportional Valve Bank 1	Control Module Performance		LSCAN-MR
3597 / 3	-	Proportional Valve Bank 1	Circuit High		LSCAN-MR
3597 / 4	-	Proportional Valve Bank 1	Circuit Low		LSCAN-MR
3605 / 3	-	Coolant Pump Control	Circuit High		LSCAN-MR
3605 / 4	-	Coolant Pump Control	Circuit Low		LSCAN-MR
3605 / 5	-	Coolant Pump Control	Circuit Open		LSCAN-MR
3609 / 2	-	Diesel Particulate Filter Inlet Pressure Sensor	Circuit Range/Performance		LSCAN-MR
3609 / 3	-	Diesel Particulate Filter Inlet Pressure Sensor	Circuit High		LSCAN-MR
3609 / 4	-	Diesel Particulate Filter Inlet Pressure Sensor	Circuit Low		LSCAN-MR
3610 / 2	-	Diesel Particulate Filter Outlet Pressure Sensor	Circuit Range/Performance		LSCAN-MR
3610 / 3	-	Diesel Particulate Filter Outlet Pressure Sensor	Circuit High		LSCAN-MR
3610 / 4	-	Diesel Particulate Filter Outlet Pressure Sensor	Circuit Low		LSCAN-MR
3673 / 0	-	Engine Throttle Position 2	Above Measuring Range		LSCAN-MR
3673 / 1	-	Engine Throttle Position 2	Below Measuring Range		LSCAN-MR
3673 / 2	-	Engine Throttle Position 2	Measuring Range Not Plausible		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
3826 / 0	-	Average Reductant Consumption	Consumption Too High		LSCAN-MR
3826 / 1	-	Average Reductant Consumption	Consumption Too Low		LSCAN-MR
3828 / 0	-	Current Reductant Consumption	Consumption Too High		LSCAN-MR
3828 / 1	-	Current Reductant Consumption	Consumption Too Low		LSCAN-MR
4332 / 12	-	Aftertreatment 1 SCR System State	Control Module Performance		LSCAN-MR
4334 / 7	-	SCR Dosing Unit	Air Route Plugged		LSCAN-MR
4334 / 10	-	Reductant Pressure System	Pressure Decrease Too Low (Shut Off Sequence)		LSCAN-MR
4334 / 12	-	SCR Dosing Unit	Pressure Route Plugged		LSCAN-MR
4334 / 18	-	Reductant Pressure System	Reductant Pressure Too Low		LSCAN-MR
4335 / 0	-	SCR Air Pressure System	Pressure Too High		LSCAN-MR
4335 / 1	-	SCR Air Pressure System	Pressure Too Low		LSCAN-MR
4335 / 7	-	SCR Air Pressure System	Missing Air Supply		LSCAN-MR
4335 / 14	-	SCR Air Pressure System	Draining Pressure Pipe Not Performed		LSCAN-MR
4336 / 3	-	SCR Air Pressure Control Valve Solenoid	Circuit Low		LSCAN-MR
4336 / 4	-	SCR Air Pressure Control Valve Solenoid	Circuit High		LSCAN-MR
4336 / 5	-	SCR Air Pressure Control Valve Solenoid	Circuit Open		LSCAN-MR
4354 / 3	-	SCR Reductant Pipe Heating	Circuit High		LSCAN-MR
4354 / 4	-	SCR Reductant Pipe Heating	Circuit Low		LSCAN-MR
4354 / 5	-	SCR Reductant Pipe Heating	Circuit Open		LSCAN-MR
4354 / 7	-	SCR Reductant Pipe Heating	Circuit		LSCAN-MR
4360 / 0	-	SCR Catalyst Temperature Before Catalyst	Temperature Too High		LSCAN-MR
4360 / 2	-	Catalyst Temperature Sensors	Range/Performance		LSCAN-MR
4360 / 15	-	SCR Catalyst Temperature	Level 1 Exceeded		LSCAN-MR
4360 / 16	-	SCR Catalyst Temperature	Level 2 Exceeded		LSCAN-MR
4363 / 0	-	SCR Catalyst Temperature Behind Catalyst	Temperature Too High		LSCAN-MR
4364 / 15	-	NOx Emission	Level 1 Exceeded		LSCAN-MR
4364 / 16	-	NOx Emission	Level 2 Exceeded		LSCAN-MR
4375 / 0	-	Reductant Pressure System Pump	Current Too High		LSCAN-MR
4375 / 3	-	Reductant Supply Control	Curcuit High		LSCAN-MR

ADM3 fault code (J1939) SPN / FMI	ADM3 fault code (K-line)	Fault location	Fault description	Remedial action	Pin
4375 / 4	-	Reductant Supply Control	Curcuit Low		LSCAN-MR
4375 / 5	-	Reductant Supply Control	Curcuit Open		LSCAN-MR
4794 / 14	-	Aftertreatment 1 SCR Catalyst System	Component Not Present		LSCAN-MR
4809 / 3	-	Catalyst Temperature Sensor (Bank 1 Sensor 1)	Circuit High Input		LSCAN-MR
4809 / 4	-	Catalyst Temperature Sensor (Bank 1 Sensor 1)	Circuit Low Input		LSCAN-MR
4810 / 3	-	Catalyst Temperature Sensor (Bank 1 Sensor 2)	Circuit High		LSCAN-MR
4810 / 4	-	Catalyst Temperature Sensor (Bank 1 Sensor 2)	Circuit Low		LSCAN-MR
520192 / 9	19409	Engine Start Stop Signals	Abnormal Update Rate		CAN-J1939
520192 / 19	19419	Engine Start Stop Signals	Received Network Data in Error		CAN-J1939
520230 / 0	-	SCR Pressure Accumulator Bubble Pressure	Pressure Too High		LSCAN-MR
520230 / 2	-	SCR Pressure Accumulator Bubble Pressure	Pressure Outside Range		LSCAN-MR
520258 / 7	-	SCRT System Component	Component Not Present		LSCAN-MR
520259 / 2	-	SCRT Temperature Sensors Pair A	Circuit Range/Performance		LSCAN-MR
520260 / 2	-	SCRT Temperature Sensors Pair B	Circuit Range/Performance		LSCAN-MR
520262 / 14	-	SCR System EGA	Disabled Mannhem- or Wörth-Function		LSCAN-MR
520263 / 9	-	Automatic Compression Detection Function	Timeout		LSCAN-MR
520263 / 14	-	Automatic Compression Detection Function	Cancelling		LSCAN-MR

9.2. Fault codes listed by K-line code

ADM3 fault code (K-line)	ADM3 fault code (J1939) SPN / FMI	Fault location	Fault description
10003	1072 / 3	Decompression Brake Valve (MBR_KD)	Open Circuit
10004	1072 / 4	Decompression Brake Valve (MBR_KD)	Short Circuit to Ground
10103	84 / 3	Vehicle Speed (C3 or J1939)	Open Circuit
10109	84 / 9	Vehicle Speed (C3 or J1939)	Abnormal Update Rate
10114	84 / 14	Vehicle Speed (C3 or J1939)	Signal Not Plausible
10119	84 / 19	Vehicle Speed (C3 or J1939)	Received Network Data in Error
10200	91 / 0	Accelerator Pedal (AFPS or J1939)	Not Adjusted
10203	91 / 3	Accelerator Pedal (AFPS or J1939)	Voltage too High
10204	91 / 4	Accelerator Pedal (AFPS or J1939)	Voltage too Low
10209	91 / 9	Accelerator Pedal (AFPS or J1939)	Abnormal Update Rate
10219	91 / 19	Accelerator Pedal (AFPS or J1939)	Received Network Data in Error
10400	98 / 0	Oil Level (from PLD/MR2)	Oil Level too High
10401	98 / 1	Oil Level (from PLD/MR2)	Low Oil Level
10414	98 / 14	Oil Level (from PLD/MR2)	Oil Level too Low
10501	100 / 1	Oil Pressure (from PLD/MR2)	Low Oil Pressure
10514	100 / 14	Oil Pressure (from PLD/MR2)	Oil Pressure too Low
10800	107 / 0	Air Filter Sensor (LF_SE)	Differential Pressure too High
10803	107 / 3	Air Filter Sensor (LF_SE)	Open Circuit
10804	107 / 4	Air Filter Sensor (LF_SE)	Short Circuit to Ground
10914	110 / 14	Coolant Temperature (from PLD/MR2)	Coolant Temperature too High
11001	111 / 1	Coolant Level Sensor (KW_SE)	Low Coolant Level
11003	111 / 3	Coolant Level Sensor (KW_SE)	Open Circuit
11004	111 / 4	Coolant Level Sensor (KW_SE)	Short Circuit to Ground
11014	111 / 14	Coolant Level Sensor (KW_SE)	Coolant Level too Low
11100	158 / 0	Battery Voltage Switched (Terminal 15)	Over Voltage
11101	158 / 1	Battery Voltage Switched (Terminal 15)	Under Voltage
11701	558 / 1	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Signals Equal but Should not
11705	558 / 5	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Switches Open Circuit
11709	558 / 9	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Abnormal Update Rate
11712	558 / 12	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Both Switches Closed
11719	558 / 19	Accelerator Pedal Idle Switch (GAS1 + GAS2 or J1939)	Received Network Data in Error
11809	599 / 9	Cruise Control Switch CC- (Set + Coast)	Abnormal Update Rate (Set Switch)
11812	599 / 12	Cruise Control Switch CC- (Set + Coast)	Both Switches CC- and CC+ Closed
11814	599 / 14	Cruise Control Switch CC- (Set + Coast)	Plausibility Check Failed (Check Stalk Switch Wiring)
11819	599 / 19	Cruise Control Switch CC- (Set + Coast)	Received Network Data in Error
11909	601 / 9	Cruise Control Switch CC+ (Res + Acc)	Abnormal Update Rate (Resume Switch)
11912	601 / 12	Cruise Control Switch CC+ (Res + Acc)	Both Switches CC+ and CC- closed
11914	601 / 14	Cruise Control Switch CC+ (Res + Acc)	Plausibility Check Failed (Check Stalk Switch Wiring)
11919	601 / 19	Cruise Control Switch CC+ (Res + Acc)	Received Network Data in Error
12002	609 / 2	PLD/MR2 Error	Unknown Cause
12103	620 / 3	Supply Analog Accelerator Pedal (AFP+)	Voltage too High
12104	620 / 4	Supply Analog Accelerator Pedal (AFP+)	Voltage too Low
12202	625 / 2	CAN Link ADM3 – PLD/MR2	No Communication with PLD/MR2
13303	677 / 3	Output Relay 1 (REL 1)	Open Circuit

ADM3 fault code (K-line)	ADM3 fault code (J1939) SPN / FMI	Fault location	Fault description
13304	677 / 4	Output Relay 1 (REL 1)	Short Circuit to Ground
13900	730 / 0	Output Relay 2 (REL 2)	Grid Heater: No Increasing Boost Temperature After Activation
13901	730 / 1	Output Relay 2 (REL 2)	Grid Heater: Relay Permanently Closed
13902	730 / 2	Output Relay 2 (REL 2)	Grid Heater: Relay Permanently Open
13903	730 / 3	Output Relay 2 (REL 2)	Voltage too High when Activated
13904	730 / 4	Output Relay 2 (REL 2)	Voltage too Low when Activated
14003	729 / 3	Intake Air Heater (MBR_KD)	Open Circuit
14004	729 / 4	Intake Air Heater (MBR_KD)	Short Circuit to Ground
14202	974 / 2	Remote Throttle Pedal (HFG)	Supply Voltage Out of Range (Pin HFG+)
14203	974 / 3	Remote Throttle Pedal (HFG)	Voltage too High
14204	974 / 4	Remote Throttle Pedal (HFG)	Voltage too Low
14403	1004 / 3	Output Relay 4 (REL 4)	Open circuit
14404	1004 / 4	Output Relay 4 (REL 4)	Short Circuit to Ground
14503	1005 / 3	Output PWM Pedal Supply or Transmission (FP+)	Open Circuit
14504	1005 / 4	Output PWM Pedal Supply or Transmission (FP+)	Short Circuit to Ground
14603	1074 / 3	Exhaust Brake Valve (MBR_BK)	Open Circuit
14604	1074 / 4	Exhaust Brake Valve (MBR_BK)	Short Circuit to Ground
14902	639 / 2	SAE J1939 Interface	At Least One J1939 Message is Missing
15001	1015 / 1	PWM Accelerator Pedal (PWM FFG)	No Supply Voltage at Pin FP+
15003	1015 / 3	PWM Accelerator Pedal (PWM FFG)	No Signal at Path 2 (GAS2)
15004	1015 / 4	PWM Accelerator Pedal (PWM FFG)	No Signal at Path 1 (GAS1)
15005	1015 / 5	PWM Accelerator Pedal (PWM FFG)	Not Adjusted
15006	1015 / 6	PWM Accelerator Pedal (PWM FFG)	Idle Position Out of Adjusted Range
15007	1015 / 7	PWM Accelerator Pedal (PWM FFG)	Out of Adjusted Range
16609	171 / 9	Ambient Air Temperature	Abnormal Update Rate
16619	171 / 19	Ambient Air Temperature	Received Network Data in Error
17309	69 / 9	Two Speed Axle Switch	Abnormal Update Rate
17319	69 / 19	Two Speed Axle Switch	Received Network Data in Error
17409	70 / 9	Parking Brake Switch	Abnormal Update Rate
17419	70 / 19	Parking Brake Switch	Received Network Data in Error
17509	96 / 9	Fuel Level	Abnormal Update Rate
17519	96 / 19	Fuel Level	Received Network Data in Error
17609	161 / 9	Transmission Input Shaft Speed	Abnormal Update Rate
17619	161 / 19	Transmission Input Shaft Speed	Received Network Data in Error
17709	191 / 9	Transmission Output Shaft Speed	Abnormal Update Rate
17719	191 / 19	Transmission Output Shaft Speed	Received Network Data in Error
17809	523 / 9	Transmission Current Gear	Abnormal Update Rate
17819	523 / 19	Transmission Current Gear	Received Network Data in Error
17909	524 / 9	Transmission Selected Gear	Abnormal Update Rate
17919	524 / 19	Transmission Selected Gear	Received Network Data in Error
18009	559 / 9	Accelerator Pedal Kickdown Switch	Abnormal Update Rate
18019	559 / 19	Accelerator Pedal Kickdown Switch	Received Network Data in Error
18109	573 / 9	Transmission Torque Converter Lockup Engaged	Abnormal Update Rate
18119	573 / 19	Transmission Torque Converter Lockup Engaged	Received Network Data in Error
18209	574 / 9	Transmission Shift in Process	Abnormal Update Rate
18219	574 / 19	Transmission Shift in Process	Received Network Data in Error
18309	596 / 9	Cruise Control Enable Switch	Abnormal Update Rate
18319	596 / 19	Cruise Control Enable Switch	Received Network Data in Error
18409	597 / 9	Brake Switch	Abnormal Update Rate

ADM3 fault code (K-line)	ADM3 fault code (J1939) SPN / FMI	Fault location	Fault description
18419	597 / 19	Brake Switch	Received Network Data in Error
18509	598 / 9	Clutch Switch	Abnormal Update Rate
18519	598 / 19	Clutch Switch	Received Network Data in Error
18609	600 / 9	Cruise Control Coast (Decelerate) Switch	Abnormal Update Rate
18619	600 / 19	Cruise Control Coast (Decelerate) Switch	Received Network Data in Error
18709	602 / 9	Cruise Control Accelerate Switch	Abnormal Update Rate
18719	602 / 19	Cruise Control Accelerate Switch	Received Network Data in Error
18809	904 / 9	Front Axle Speed	Abnormal Update Rate
18819	904 / 19	Front Axle Speed	Received Network Data in Error
18909	973 / 9	Engine Retarder Selection	Abnormal Update Rate
18919	973 / 19	Engine Retarder Selection	Received Network Data in Error
19009	1623 / 9	Tachograph Output Shaft Speed	Abnormal Update Rate
19019	1623 / 19	Tachograph Output Shaft Speed	Received Network Data in Error
19109	1624 / 9	Tachograph Vehicle Speed	Abnormal Update Rate
19119	1624 / 19	Tachograph Vehicle Speed	Received Network Data in Error
19209	1633 / 9	Cruise Control Pause Switch	Abnormal Update Rate
19214	1633 / 14	Cruise Control Pause Switch	Plausibility Check Failed (Check Stalk Switch Wiring)
19219	1633 / 19	Cruise Control Pause Switch	Received Network Data in Error
19309	1716 / 9	Retarder Selection, non-engine	Abnormal Update Rate
19319	1716 / 19	Retarder Selection, non-engine	Received Network Data in Error
19409	520192 / 9	Engine Start Stop Signals	Abnormal Update Rate
19419	520192 / 19	Engine Start Stop Signals	Received Network Data in Error

10. Routines for ADM3

Following abbreviations are used in the following tables:

Abbreviation	Description	Values
U	User Authorization	N = No P = Plant S = Service C = Customer O Others
V	Visible	Y = Yes N = No
P	Password protected	Y = Yes N = No

10.1. Routines for ADM3, Diagnosis version 209

Nr.	Routine name	Abbreviation	U	V	P	Description	Pin
1	acc. pedal adjustment	acc.pedal adjust.	N	Y	N	if initial start-up, ecu or acc. pedal change With an initial start up of ADM3 or with an accelerator pedal exchange the accelerator pedal needs to be adjusted.	21/12 or 21/13
2	set all parameter on default	set param on default	S	Y	Y	Set all parameters back to default value.	-
3	activate oil level lamp	oil level lamp	N	Y	N	ADM3 output test. Refer to chapter 7.6.	21/04
4	activate stop engine lamp red	engine lamp red	N	Y	N		21/05
5	activate check engine lamp yellow	engine lamp yellow	N	Y	N		21/06
6	wait to start lamp	wait to start lamp	N	Y	N		21/07
7	activate air filter lamp	air filter lamp	N	Y	N		21/08
8	activate starter lockout	starter lockout	N	Y	N	ADM3 output test of relay 1. Refer to chapter 4.2.	15/12
9	valve flame start	valve flame start	N	Y	N	ADM3 output test of relay 2. Refer to chapter 4.2.	15/09
10	activate relay 3	relay 3	N	Y	N	ADM3 output test of relay 3. Refer to chapter 4.2.	15/11
11	acc. bus shutdown	acc. bus shutdown	N	Y	N	ADM3 output test of relay 4. Refer to chapter 4.2.	18/01
12	activate MBR_BK	MBR_BK	N	Y	N		15/06
13	activate grid heater relay (MBR_KD)	grid heater relay	N	Y	N	ADM3 output test. Refer to chapter 7.5.	15/10
14	activate IWA output	IWA output	N	Y	N	ADM3 output test. Refer to chapter 7.7.	12/05
15	activate engine speed gauge	engine speed gauge	N	Y	N	ADM3 output test. Refer to chapter 7.6.	12/06
16	activate cool.temp.gauge/lamp	cool.temp.gauge	N	Y	N	ADM3 output test. Refer to chapter 7.6.	12/04
17	activate oil pressure gauge/ lamp	oil pressure gauge	N	Y	N	ADM3 output test. Refer to chapter 7.6.	12/03
18	activate protection function	activate protection	N	Y	N		
19	enable access to protected parameters	enable access	N	Y	N		
20	show activated protection functions	show activ.functions	N	Y	N		
21	backdoor function	backdoor function	N	Y	N		
22	read full version	read full version	N	Y	N		
25	protection + default	protection + default	S	Y	N		
26	read/write VIN	read/write/VIN	S	Y	N		
27	MAS-after run time	MAS-after run time	S	Y	N		

11. CAN Messages according to SAE J1939

11.1. Abbreviations

The abbreviations for the following tables are as follows

Direct.	message direction as seen from ADM
Def.	default value
☜	receive message
✉	send message
M	Status (in column Type)
S	Measured (in column Type)
√	message signal supported by ADM (in column State)
-	message signal not supported by ADM (in column State)
xx	source address (hexadecimal)
yy	destination address (hexadecimal)
	new since ADM operating manual 7.03 (marked in overview)

11.2. Applicable versions of the J1939 standard

The list of CAN messages refers to the SAE J1939 standard and subsets. Following versions of the standard were used for documentation

SAE 1939-21	December 2006
SAE 1939-71	November 2006
SAE 1939-73	September 2006
SAE 1939-81	May 2003

11.3. Default source addresses

Name	Abbreviation	Default Address
Engine / ADM	POW	0 / 0x00
Transmission	TCU	3 / 0x03
Transmission Retarder / Intarder	INT	10 / 0x0A
Antilock Braking System	ABU	11 / 0x0B
Engine Brake / Retarder	RET	15 / 0x0F
Cruise Control Source Address 1	CC1	23 / 0x17
3. Source	ADR3	30 / 0x1E
Electronic Brake Controller 1	EBC	33 / 0x21
Ambient Temperature	TEMP	33 / 0x21
Cruise Control Source Address 2	CC2	33 / 0x21
Adaptive Cruise Control	ACC	42 / 0x2A
Cruise Control Source Address 3	CC3	49 / 0x31

11.4. Overview of J1939 CAN messages

11.4.1. Miscellaneous messages

Nr.	Abbrev.	Name	Identifier	PGN	Sender	Repetition rate	Direct.
1	TSC1	Torque/Speed Control 1 (to Engine)	0x0C00yyxx	0 / 0x0	xx = TCU, ABU, ADR3, ACC, yy = POW	10ms	☞
2	TSC1	Torque/Speed Control 1 (to Retarder)	0x0C00yyxx	0 / 0x0	xx = TCU, ABU, ADR3, ACC, yy = RET	50ms	☞
3	RESET	Reset	0x1CDEyyxx	56832 / 0xDE00	xx = any, yy = POW, RET	when needed	☞
4	ACK / NACK	Acknowledgement: Acknowledge, Not Acknowledge, Access Denied, Cannot Respond	0x18E8yyxx	59392 / 0xE800	xx = POW, RET, yy = 0xFF (global)	upon reception of PGN that requires acknowledgment	✉
5	REQ	Request PG	0x18EAyyxx	59904 / 0xEA00	xx = any, yy = 0xFF (global)	per user requirements	☞
6	TP.DT	Transport Protocol – Data Transfer	0x18EByyxx	60160 / 0xEB00	xx = POW, yy = TCU, ACC, any, 0xFF (global)	per PGN to be transferred	✉
7	TP.CM	Transport Protocol – Connection Management	0x18ECyyxx	60416 / 0xEC00	xx = POW, yy = TCU, ACC, any, 0xFF (global)	per PGN to be transferred	☞, ✉
8	ACL	Address Claimed, Cannot Claim Address	0x18EEFFxx	60928 / 0xEE00	xx = POW, RET, 0xFE (cannot claim)	as required	☞, ✉
9	ESS	Proprietary A	0x0CEFyyxx	61184 / 0xEF00	xx = TCU, ABU, ADR3, yy = POW	50ms	☞
10	KWP	Proprietary A from Minidiag	0x0CEFyyxx	61184 / 0xEF00	xx = 0xF1 (Minidiag), yy = POW	request	☞
11	KWP	Proprietary A to Minidiag	0x0CEFyyxx	61184 / 0xEF00	xx = POW, yy = 0xF1 (Minidiag)	on request	✉
12	PropA	Proprietary A	0x0CEFyyxx	61184 / 0xEF00	xx = any, yy = POW	request	☞
13	ERC1	Electronic Retarder Controller 1	0x18F000xx	61440 / 0xF000	xx = INT	100ms	☞
14	ERC1	Electronic Retarder Controller 1	0x18F000xx	61440 / 0xF000	xx = RET	100ms	✉
15	EBC1	Electronic Brake Controller 1	0x18F001xx	61441 / 0xF001	xx = EBC	100ms	☞
16	EBC1	Electronic Brake Controller 1	0x18F001xx	61441 / 0xF001	xx = POW	100ms	✉
17	ETC1	Electronic Transmission Controller 1	0x0CF002xx	61442 / 0xF002	xx = TCU	10ms	☞
18	EEC2	Electronic Engine Controller 2	0x0CF003xx	61443 / 0xF003	xx = 0x01 (upper structure), ADR3, 0x21 (body controller)	50ms, on request	☞
19	EEC2	Electronic Engine Controller 2	0x0CF003xx	61443 / 0xF003	xx = POW	50ms, on request	✉
20	EEC1	Electronic Engine Controller 1	0x0CF004xx	61444 / 0xF004	xx = POW	10ms, on request	✉
21	ETC2	Electronic Transmission Controller 2	0x18F005xx	61445 / 0xF005	xx = TCU	100ms	☞
22	ETC7	Electronic Transmission Controller 7	0x18FE4Axx	65098 / 0xFE4A	xx = TCU	100ms	☞
23	TI1	Tank Information 1	0x18FE56xx	65110 / 0xFE56	xx = POW	1s	✉
24	TCO1	Tachograph	0x0CFE6Cxx	65132 / 0xFE6C	xx = any (tachograph)	50ms	☞
25	ACC1	Adaptive Cruise Control	0x10FE6Fxx	65135 / 0xFE6F	x = ACC	100ms	☞
26	EBC2	Wheel Speed Information	0x18FEBFxx	65215 / 0xFEBF	xx =ABU	100ms	☞
27	AUXIO1	Auxiliary Input /Output Status	0x18FED9xx	65241 / 0xFED9	xx = POW	100ms	✉
28	SOFT	Software Identification	0x18FEDAxx	65242 / 0xFEDA	xx = POW	on request	✉
29	EEC3	Electronic Engine Controller 3	0x18FEDFxx	65247 / 0xFEDF	xx = POW	250ms, on request	✉

Nr.	Abbrev.	Name	Identifier	PGN	Sender	Repetition rate	Direct.
30	VD	Vehicle Distance	0x18FEE0xx	65248 / 0xFEE0	xx = POW	100ms, on request	✉
31	RC	Retarder Configuration	0x18FEE1xx	65249 / 0xFEE1	xx = RET	5s, on request, broadcast message	✉
32	EC1	Engine Configuration 1	0x18FEE3xx	65251 / 0xFEE3	xx = POW	5s, on request broadcast message	✉
33	HOURS	Engine Hours, Revolutions	0x18FEE5xx	65253 / 0xFEE5	xx = POW	on request	✉
34	LFC	Fuel Consumption (Liquid)	0x18FEE9xx	65257 / 0xFEE9	xx = POW	on request	✉
35	CI	Component Identification	0x18FEEBxx	65259 / 0xFEEB	xx = POW	on request, broadcast message	✉
36	ET1	Engine Temperature 1	0x18FEEExx	65262 / 0xFEEE	xx = POW	1s, on request	✉
37	EFL/P1	Engine Fluid Level / Pressure 1	0x18FEEFxx	65263 / 0xFEEF	xx = POW	500ms, on request	✉
38	PTO	Power Takeoff Information	0x18FEF0xx	65264 / 0xFEF0	xx = POW	100ms	✉
39	CCVS	Cruise Control / Vehicle Speed	0x18FEF1xx	65265 / 0xFEF1	xx = CC1, CC2, CC3	100ms	☞
40	CCVS	Cruise Control / Vehicle Speed	0x18FEF1xx	65265 / 0xFEF1	xx = POW	100ms, on request	✉
41	LFE	Fuel Economy (Liquid)	0x18FEF2xx	65266 / 0xFEF2	xx = POW	100ms, on request	✉
42	AMB	Ambient Conditions	0x18FEF5xx	65269 / 0xFEF5	xx = TEMP	1s	☞
43	AMB	Ambient Conditions	0x18FEF5xx	65269 / 0xFEF5	xx = POW	1s	✉
44	IC1	Inlet / Exhaust Conditions 1	0x18FEF6xx	65270 / 0xFEF6	xx = POW	500ms	✉
45	VEP1	Vehicle Electrical Power 1	0x18FEF7xx	65271 / 0xFEF7	xx = POW	1s, on request	✉
46	DD	Dash Display	0x18FEFCxx	65276 / 0xFEFC	xx = any (dashboard)	1s	☞

11.4.2. Diagnostic messages

Nr.	Abbrev.	Name	Identifier	PGN	Sender	Repetition rate	Direct.
1	DM13	Diagnostic Message 13, Stop Start Broadcast	0x18DFyyxx	57088 / 0xDF00	xx = any, yy = POW, RET	whenever stop/start broadcast event is necessary, Hold Signal every 5s for maintainance of modified state	☞
2	DM1	Diagnostic Message 1 – Active Diagnostic Trouble Codes	0x18FECAxx	65226 / 0xFECA	xx = TCU	whenever DTC becomes active, thereafter 1s	☞
3	DM1	Diagnostic Message 1 – Active Diagnostic Trouble Codes	0x18FECAxx	65226 / 0xFECA	xx = POW	whenever DTC becomes active, thereafter 1s	✉
4	DM2	Diagnostic Message 2, Previously Active Diagnostic Trouble Codes	0x18FECBxx	65227 / 0xFECB	xx = POW	on request using PGN 59904	✉
5	DM3	Diagnostic Message 3, Diagnostic Data Clear/Reset Of Previously Active DTCs	0x18FECCxx	65228 / 0xFECC	xx = POW, RET	on request using PGN 59904	✉
6	DM4	Diagnostic Message 4, Freeze Frame Parameters	0x18FECDxx	65229 / 0xFECD	xx = POW	on request using PGN 59904	✉
7	DM11	Diagnostic Message 11, Diagnostic Data Clear/Reset For Active DTCs	0x18FED3xx	65235 / 0xFED3	xx = POW, RET	on request using PGN 59904	✉

11.5. CAN message details of miscellaneous messages

11.5.1. TSC1 – Torque/Speed Control 1 (to Engine)

Identifier			Repetition rate			Standard	ADM Direction
0x0C00yyxx			10ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
0 = 0x0	8	3	0	0	0	Destination Address: yy = POW (Def. 0x00)	xx = TCU (Def. 0x03), ABU (Def. 0x0B), ADR3 (Def. 0x1E), ACC (Def. 0x2A)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Engine Override Control Mode	695	S	00b .. 11b, 00 Override disabled – Disable any existing control commanded by the source of this command 01 Speed control – Govern speed to the included “desired speed” value 10 Torque control – Control torque to the included “desired torque” value 11 Speed/Torque limit control – Limit speed and/or torque based on the included limit values. The speed limit governor is a droop governor where the speed limit value defines the speed at the maximum torque available during this operation	√
1	4,3	2 bits	Engine Requested Speed Control Conditions	696	S	00b .. 11b, 00 Transient Optimized for driveline disengaged and non-lockup conditions 01 Stability Optimized for driveline disengaged and non-lockup conditions 10 Stability Optimized for driveline engaged and/or in lockup condition 1 (e.g., vehicle driveline) 11 Stability Optimized for driveline engaged and/or in lockup condition 2 (e.g., PTO driveline)	√
1	6,5	2 bits	Override Control Mode Priority	897	S	00b .. 11b, 00 Highest priority 01 High priority 10 Medium priority 11 Low priority	√
1	8,7		Not defined				
3,2		2 Bytes	Engine Requested Speed/Speed Limit	898	S	0 .. 8031.875rpm, 0.125 rpm/bit, 0 offset	√
4		1 Byte	Engine Requested Torque/Torque Limit	518	S	-125 .. 125% 1%/bit, -125% offset operational range: 0 .. 125%	√
5	3..1	3 bits	TSC1 Transmission Rate	3349	S	000b .. 111b, 000 1000 ms transmission rate 001 750 ms transmission rate 010 500 ms transmission rate 011 250 ms transmission rate 100 100 ms transmission rate 101 50 ms transmission rate 110 20 ms transmission rate 111 Use standard TSC1 transmission rates of 10 ms to engine	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5	8..4	5 bits	TSC1 Control Purpose	3350	S	0 .. 31, 00000 P1 = Accelerator Pedal/Operator Selection 00001 P2 = Cruise Control 00010 P3 = PTO Governor 00011 P4 = Road Speed Governor 00100 P5 = Engine Protection 00101 .. 11110 P6-P31 = Reserved for SAE Assignment 11111 P32 = Temporary Power Train Control (Original use of TSC1 Command)	-
8..6			Not defined				

11.5.2. TSC1 – Torque/Speed Control 1 (to Retarder)

Identifier			Repetition rate			Standard	ADM Direction
0x0C00yyxx			50ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
0 = 0x0	8	3	0	0	0	Destination Address: yy = RET (Def. 0x0F)	xx = TCU (Def. 0x03), ABU (Def. 0x0B), ADR3 (Def. 0x1E), ACC (Def. 0x2A)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Engine Override Control Mode	695	S	00b .. 11b, 00 Override disabled – Disable any existing control commanded by the source of this command 01 Speed control – Govern speed to the included “desired speed” value 10 Torque control – Control torque to the included “desired torque” value 11 Speed/Torque limit control – Limit speed and/or torque based on the included limit values. The speed limit governor is a droop governor where the speed limit value defines the speed at the maximum torque available during this operation	√
1	4,3	2 bits	Engine Requested Speed Control Conditions	696	S	00b .. 11b, 00 Transient Optimized for driveline disengaged and non-lockup conditions 01 Stability Optimized for driveline disengaged and non-lockup conditions 10 Stability Optimized for driveline engaged and/or in lockup condition 1 (e.g., vehicle driveline) 11 Stability Optimized for driveline engaged and/or in lockup condition 2 (e.g., PTO driveline)	√
1	6,5	2 bits	Override Control Mode Priority	897	S	00b .. 11b, 00 Highest priority 01 High priority 10 Medium priority 11 Low priority	√
1	8,7		Not defined				
3,2		2 Bytes	Engine Requested Speed/Speed Limit	898	S	0 .. 8031.875rpm, 0.125 rpm/bit, 0 offset	-
4		1 Byte	Engine Requested Torque/Torque Limit	518	S	-125 .. 125% 1%/bit, -125% offset operational range : -125 .. 0%	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5	3..1	3 bits	TSC1 Transmission Rate	3349	S	000b .. 111b, 000 1000 ms transmission rate 001 750 ms transmission rate 010 500 ms transmission rate 011 250 ms transmission rate 100 100 ms transmission rate 101 50 ms transmission rate 110 20 ms transmission rate 111 Use standard TSC1 transmission rates of 10 ms to engine	-
5	8..4	5 bits	TSC1 Control Purpose	3350	S	0 .. 31, 00000 P1 = Accelerator Pedal/Operator Selection 00001 P2 = Cruise Control 00010 P3 = PTO Governor 00011 P4 = Road Speed Governor 00100 P5 = Engine Protection 00101 .. 11110 P6-P31 = Reserved for SAE Assignment 11111 P32 = Temporary Power Train Control (Original use of TSC1 Command)	-
8..6			Not defined				

11.5.3. RESET – Reset

Identifier			Repetition rate			Standard	ADM Direction
0x1CDEyyxx			when needed			SAE J1939-71	☜
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
56832 = 0xDE00	8	7	0	0	222	Destination Address: yy = POW (Def.0x00), RET (Def. 0x0F)	xx = any

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Trip Group 1	988	S	compare SAE J1939-71/Appendix SPN 988 – Trip Group 1 00b .. 11b, 4 states/2bit, 0 offset 00b Take no action 01b Reset 10b Reserved 11b Not applicable	√
1	4,3	2 bits	Trip Group 2 – Proprietary	989	S	00b .. 11b, 4 states/2bit, 0 offset 00b Take no action 01b Reset 10b Reserved 11b Not applicable	-
2		1 Byte	Service Component Identification	1584	M	0 .. 250ID, 1 ID/bit, 0 offset	-
3	2,1	2 bits	Engine Build Hours Reset	1211		00b .. 11b, 4 states/2bit, 0 offset 00b Do not reset 01b Reset 10b Reserved 11b Take no action	-
3	4,3	2 bits	Steerin Straight Ahead Position Reset	3600		00b .. 11b, 4 states/2bit, 0 offset 00b Take no action – Do not Reset 01b Reset 10b Reserved, take no action 11b Not applicable	-
8..4			Not defined				

11.5.4. ACK / NACK – Acknowledgment

Identifier			Repetition rate			Standard	ADM Direction
0x18E8yyxx			upon reception of PGN that requires this form of acknowledgment			SAE J1939-21	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
59392 = 0xE800	8	6	0	0	232	Destination Address: yy = any	xx = POW (Def. 0x00), RET (Def. 0x0F)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Control Byte			compare SAE J1939-21/5.4.4 0 .. 3, 0 Positive Acknowledgment (ACK) 1 Negative Acknowledgment (NACK) 2 Access Denied 3 Cannot Respond 4 .. 255 Reserved for SAE assignment	√
Positive Acknowledgment (ACK): Control Byte = 0							√
2		1 Byte	Group Function Value (if applicable)			compare SAE J1939-21/5.4.4 0 .. 250, 0 .. 250 Definition is specific to the individual PGN, when applicable, most often it is located as the first byte in the data field of the applicable Group Function PG 251 .. 255 Follows conventions in SAE J1939-71	-
4,3			Reserved for assignment by SAE			compare SAE J1939-21/5.4.4 set to 0xFF	
5		1 Byte	Address Acknowledged			compare SAE J1939-21/5.4.4	-
8..6		3 Bytes	Parameter Group Number of requested information			compare SAE J1939-21/5.4.4	√
Negative Acknowledgment (NACK): Control Byte = 1							√
2		1 Byte	Group Function Value (if applicable)			compare SAE J1939-21/5.4.4 0 .. 250, 0 .. 250 Definition is specific to the individual PGN, when applicable, most often it is located as the first byte in the data field of the applicable Group Function PG 251 .. 255 Follows conventions in SAE J1939-71	-
4,3			Reserved for assignment by SAE			compare SAE J1939-21/5.4.4 set to 0xFF	
5		1 Byte	Address Negative Acknowledgement			compare SAE J1939-21/5.4.4	-
8..6		3 Bytes	Parameter Group Number of requested information			compare SAE J1939-21/5.4.4	√
Access Denied (PGN supported but security denied access): Control Byte = 2							√
2		1 Byte	Group Function Value (if applicable)			compare SAE J1939-21/5.4.4 0 .. 250, 0 .. 250 Definition is specific to the individual PGN, when applicable, most often it is located as the first byte in the data field of the applicable Group Function PG 251 .. 255 Follows conventions in SAE J1939-71	-
4,3			Reserved for assignment by SAE			compare SAE J1939-21/5.4.4 set to 0xFF	
5		1 Byte	Address Access Denied			compare SAE J1939-21/5.4.4	-
8..6		3 Bytes	Parameter Group Number of requested information			compare SAE J1939-21/5.4.4	√
Cannot Respond (PGN supported but ECU is busy and cannot respond now, re-request the data at a later time): Control Byte = 3							√
2		1 Byte	Group Function Value (if applicable)			compare SAE J1939-21/5.4.4 0 .. 250, 0 .. 250 Definition is specific to the individual PGN, when applicable, most often it is located as the first byte in the data field of the applicable Group Function PG 251 .. 255 Follows conventions in SAE J1939-71	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4,3			Reserved for assignment by SAE			compare SAE J1939-21/5.4.4 set to 0xFF	
5		1 Byte	Address Busy			compare SAE J1939-21/5.4.4	-
8..6		3 Bytes	Parameter Group Number of requested information			compare SAE J1939-21/5.4.4	√

11.5.5. REQ – Request

Identifier			Repetition rate			Standard	ADM Direction
0x18EAyyxx			per user requirements (recommended not more than 2 or 3 timer per second)			SAE J1939-21	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
59904 = 0xEA00	3	6	0	0	234	Destination Address: yy = 0xFF (global)	xx = any

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	8..1	8 bits	Parameter Group Number being requested: Group Extension	-		compare SAE J1939-21/5.4.2, if PDU Format is less than 240, then this value is set to 0, else to the value of the PDU Specific	√
2	8..1	8 bits	Parameter Group Number being requested: PDU Format	-		compare SAE J1939-21/5.4.2	√
3	1	1 bit	Parameter Group Number being requested: Data Page Bit	-		compare SAE J1939-21/5.4.2	√
3	2	1 bit	Parameter Group Number being requested: Extended Data Page Bit	-		compare SAE J1939-21/5.4.2	√
3	8..3	6 bits	set to zero	-		compare SAE J1939-21/5.4.2 set to 0	√

11.5.6. TP.DT – Transport Protocol - Data Transfer

Identifier			Repetition rate			Standard	ADM Direction
0x18EByyxx			per PGN to be transferred			SAE J1939-21	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
60160 = 0xEB00	8	6 (Def. 7)	0	0	235	Destination Address: yy = TCU (Def. 0x03), ACC (Def. 0x2A), any, 0xFF (global)	xx = POW (Def. 0x00), RET (Def. 0x0F)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Sequence Number			compare SAE J1939-21/5.10.4	√
2..8		7 Bytes	Packaged Data			compare SAE J1939-21/5.10.4, Last packet of a multipacket Parameter Group may require less than 8 Bytes, extra Bytes set to 0xFF	√

11.5.7. TP.CM – Transport Protocol - Connection Management

Identifier			Repetition rate			Standard	ADM Direction
0x18ECyyxx			per PGN to be transferred			SAE J1939-21	👂, ✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
60416 = 0xEC00	8	6 (Def. 7)	0	0	236	Destination Address: yy = TCU (Def. 0x03), ACC (Def. 0x2A), any, 0xFF (global)	xx = POW (Def. 0x00), RET (Def. 0x0F) (if sending else vice versa)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Control Byte			compare SAE J1939-21/5.10.3 16 .. 17, 19, 32, 255 0 .. 15, 18, 20 .. 31, 33 .. 254 reserved for SAE assignment 16 Destination Specific Request_To_Send (RTS) 17 Destination Specific Clear_To_Send (CTS) 19 End_of_Message_Acknowledge 32 Broadcast Announce Message 255 Connection Abort	√
Connection Mode Request to Send (TP.CM_RTS): Control Byte = 16							✉
3,2		2 Bytes	Total message size, number of Bytes			9 .. 1785, 0 .. 8, 1786 .. 65535 not allowed	√
4		1 Byte	Total number of packets			2 .. 255, 0 not allowed	√
5		1 Byte	Maximum number of packets that can be sent in response to one CTS			2 .. 255, 0 .. 1 not allowed	√
8..6		3 Bytes	Parameter Group Number of requested information				√
Connection Mode Clear to Send (TP.CM_CTS): Control Byte = 17							👂
2		1 Byte	Number of packets that can be sent			0 .. 255	√
3		1 Byte	Next packet number to be sent			1 .. 255, 0 not allowed	√
5,4		2 Bytes	Reserved for SAE assignment			set to 0xFF	
8..6		3 Bytes	Parameter Group Number of the packaged message				√
End of Message Acknowledgment (TP.CM_EndOfMsgACK): Control Byte = 19							👂
3,2		2 Bytes	Total message size, number of Bytes			9 .. 1785, 0 .. 8, 1786 .. 65535 not allowed	-
4		1 Byte	Total number of packets			2 .. 255, 0 not allowed	-
5		1 Byte	Reserved for SAE assignment			set to 0xFF	
8..6		3 Bytes	Parameter Group Number of the packaged message				√
Broadcast Announce Message (TP.CM_BAM): Control Byte = 32							✉
3,2		2 Bytes	Total message size, number of Bytes			9 .. 1785, 0 .. 8, 1786 .. 65535 not allowed	√
4		1 Byte	Total number of packets			2 .. 255, 0 not allowed	√
5		1 Byte	Reserved for SAE assignment			set to 0xFF	
8..6		3 Bytes	Parameter Group Number of the packaged message				√
Connection Abort (TP.Conn_Abort): Control Byte = 255							👂, ✉

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2		1 Byte	Connection Abort reason			1 .. 255, 1 Already in one or more connection managed sessions and cannot support another 2 System resources were needed for another task so this connection managed session was terminated 3 A timeout occurred and this is the connection abort to close the session 4 .. 250 Reserved for SAE assignment 251 .. 255 Per J1939-71 definitions	-
5..3		3 Bytes	Reserved for SAE assignment			set to 0xFF	
8..6		3 Bytes	Parameter Group Number of the packaged message				√

11.5.8. ACL – Address Claimed/Cannot Claim

Identifier			Repetition rate			Standard	ADM Direction
0x18EEFFxx			as required			SAE J1939-81	☜, ✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
60928 = 0xEE00	8	6	0	0	238	255 (global address) (if sending else vice versa)	xx = POW (Def. 0x00), RET (Def. 0x0F), 0xFE (cannot claim)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
3, 2, 1	5..1 8..1 8..1	21 bits	Identity Number	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
4, 3	8..1 8..6	11 bits	Manufacturer Code	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
5	3..1	3 bits	ECU Instance	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
5	8..4	5 bits	Function Instance	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
6	8..1	8 bits	Function	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
7	1		Reserved	-		compare SAE 1939-81/4.2.2 and 4.1.1 should be set to 0	√
7	8..2	7 bits	Vehicle System	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
8	4..1	4 bits	Vehicle System Instance	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
8	7..5	3 bits	Industry Group	-		compare SAE 1939-81/4.2.2 and 4.1.1	√
8	8	1 bit	Arbitrary Address Capable	-		compare SAE 1939-81/4.2.2 and 4.1.1 0b .. 1b 1b ECU is capable to resolve address conflict with an ECU whose NAME has a higher priority	√

11.5.9. ESS – Proprietary A (Engine Start/Stop)

Identifier			Repetition rate			Standard	ADM Direction
0x0CEFyyxx			50ms			SAE J1939-21	☜
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61184 = 0xEF00	8	3 (Def. 6)	0	0	239	Destination Address: yy = POW (Def. 0x00)	xx = TCU (Def. 0x03), ABU (Def. 0x0B), ADR3 (Def. 0x1E)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Engine Start/Stop Inhibit Fuel Injection	-	S	00b .. 11b, 4 states/2bit, 0 offset 00b Do not inhibit Fuel Injection 01b Inhibit Fuel Injection 10b Not defined 11b Signal not available	√
1	4,3	2 bits	Engine Start/Stop Engine Start	-	S	00b .. 11b, 4 states/2bit, 0 offset 00b No Engine Start 01b Engine Start 10b Not defined 11b Signal not available	√
1	6,5	2 bits	Engine Start/Stop Inhibit Engine Start	-	S	00b .. 11b, 4 states/2bit, 0 offset 00b Do not inhibit Engine Start 01b Inhibit Engine Start 10b Not defined 11b Signal not available	√
1	8,7		Not defined				
2	2,1	2 bits	Engine Start/Stop Engine Shut Down Override	-	S	00b .. 11b, 4 states/2bit, 0 offset 00b Highest priority 01b Engine Shut down override 10b Not defined 11b Signal not available	√
2	8..3		Not defined				
8..3			Not defined				

11.5.10. KWP – Proprietary A from Minidiag

Identifier			Repetition rate			Standard	ADM Direction
0x0CEFyyxx			request			SAE J1939-21	☞
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61184 = 0xEF00	8	3 (Def. 6)	0	0	239	Destination Address: yy = POW (Def. 0x00)	xx = 0xF1 (Minidiag)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Destination Identifier	-	S	0 .. 255, 35 To Vehicle Control Unit 168 To Transmission Control Unit else Default	√
2		1 Byte	Instruction	-	S	0x00 .. 0xFF, 0x14 Delete Error Memory 0x21 Read Memory 0x22 Read Data 0x23 Read Random Access Memory 0x27 Access Permission 0x2E Write Data or Change of Parameter in Service Mode 0x31 Start Routines 0x34 Download Init 0x35 Upload Init 0x36 Up/Down Transfer 0x37 Up/Down End 0x3B Write Access Date 0x3E Tester present, Prevention of Timeout 0xA1 Read Error Memory one by one 0xAB Write Parameter Groups 0xAE Reset Parameters to Default values 0x81 Write Instruction to Buffer 0x82 Write Instruction to Buffer else Request not supported	√
8..3		6 Bytes	Data	-		0x00 .. 0xFF for each Byte	√

11.5.11. KWP – Proprietary A to Minidiag

Identifier			Repetition rate			Standard	ADM Direction
0x0CEFyyxx			on request			SAE J1939-21	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61184 = 0xEF00	8	3 (Def. 6)	0	0	239	Destination Address: yy = 0xF1 (Minidiag)	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Destination Identifier	-	S	0 .. 255, 35 To Vehicle Control Unit 98 Sequence Telegram (ASCII) 168 To Transmission Control Unit else Default	√
2		1 Byte	Instruction	-	S	0x00 .. 0xFF, 0x11 Infotext for Sequence Telegram (ASCII) 0x14 Delete Error Memory 0x21 Read Memory 0x22 Read Data 0x23 Read Random Access Memory 0x27 Access Permission 0x2E Write Data or Change of Parameter in Service Mode 0x31 Start Routines 0x34 Download Init 0x35 Upload Init 0x36 Up/Down Transfer 0x37 Up/Down End 0x3B Write Access Date 0x3E Tester present, Prevention of Timeout 0xA1 Read Error Memory one by one 0xAB Write Parameter Groups 0xAE Reset Parameters to Default values 0x81 Write Instruction to Buffer 0x82 Write Instruction to Buffer else Request not supported	√
8..3		6 Bytes	Data	-		0x00 .. 0xFF for each Byte	√

11.5.12. PropA – Proprietary A

Identifier			Repetition rate			Standard	ADM Direction
0x0CEFyyxx			request			SAE J1939-71	☜
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61184 = 0xEF00	8	3 (Def. 6)	0	0	239	Destination Address: yy = POW (Def. 0x00)	xx = any

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
8..1		8 Bytes	free	-			

11.5.13. ERC1 – Electronic Retarder Controller 1 (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x18F000xx			100ms			SAE J1939-71	☜
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61440 = 0xF000	8	6	0	0	240	0	xx = INT (Def. 0x0A)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4..1	4 bits	Retarder Torque Mode	900	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Low idle governor/no request – no braking (default mode) 0001b Accelerator pedal/operator selection 0010b Cruise control 0011b PTO governor 0100b Road speed governor 0101b ASR control 0110b Transmission control 0111b ABS control 1000b Torque limiting 1001b High speed governor 1010b Braking system 1011b Remote accelerator 1100b Service procedure 1101b Not defined 1110b Other 1111b Not available	-
1	6,5	2 bits	Retarder Enable – Brake Assist Switch	571	M	00b .. 11b, 4 states/2 bit, 0 offset 00b Retarder – brake assist disabled 01b Retarder – brake assist enabled 10b Error 11b Not available	-
1	8,7	2 bits	Retarder Enable – Shift Assist Switch	572	M	00b .. 11b, 4 states/2 bit, 0 offset 00b Retarder – shift assist disabled 01b Retarder – shift assist enabled 10b Error 11b Not available	-
2		1 Byte	Actual Retarder – Percent Torque	520	M	-125 .. 125%, 1%/bit, -125% offset operational range: -125% .. 0%	-
3		1 Byte	Intended Retarder Percent Torque	1085	S	-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	-
4	2,1	2 bits	Engine Coolant Load Increase	1082	S	00b .. 11b, 4 states/2 bit, 0 offset 00b No coolant load increase 01b Coolant load increase possible 10b Error 11b Not available	-
4	4,3	2 bits	Retarder Requesting Brake Light	1667	S	0 .. 3, 4 states/2bit, 0 offset	-
4	8..5		not defined				
5		1 Byte	Source Address of Controlling Device for Retarder Control	1480	S	0 .. 255, 1 source address/bit, 0 offset, operational range: 0 .. 253	-
6		1 Byte	Drivers Demand Retarder – Percent Torque	1715	S	-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	-
7		1 Byte	Retarder Selection, non-engine	1716	M	0 .. 100%, 0.4%/bit, 0 offset	√
8		1 Byte	Actual Maximum Available Retarder – Percent Torque	1717	M	-125 .. 125%, 1%/bit, 0 offset, operational range: -125 .. 0%	-

11.5.14. ERC1 – Electronic Retarder Controller 1 (send)

Identifier			Repetition rate			Standard	ADM Direction
0x18F000xx			100ms			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61440 = 0xF000	8	6	0	0	240	0	xx = RET (Def. 0x0F)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4..1	4 bits	Retarder Torque Mode	900	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Low idle governor/no request – no braking (default mode) 0001b Accelerator pedal/operator selection 0010b Cruise control 0011b PTO governor 0100b Road speed governor 0101b ASR control 0110b Transmission control 0111b ABS control 1000b Torque limiting 1001b High speed governor 1010b Braking system 1011b Remote accelerator 1100b Service procedure 1101b Not defined 1110b Other 1111b Not available	√
1	6,5	2 bits	Retarder Enable – Brake Assist Switch	571	M	00b .. 11b, 4 states/2 bit, 0 offset 00b Retarder – brake assist disabled 01b Retarder – brake assist enabled 10b Error 11b Not available	√
1	8,7	2 bits	Retarder Enable – Shift Assist Switch	572	M	00b .. 11b, 4 states/2 bit, 0 offset 00b Retarder – shift assist disabled 01b Retarder – shift assist enabled 10b Error 11b Not available	√
2		1 Byte	Actual Retarder – Percent Torque	520	M	-125 .. 125%, 1%/bit, -125% offset operational range: -125% .. 0%	√
3		1 Byte	Intended Retarder Percent Torque	1085	S	-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	-
4	2,1	2 bits	Engine Coolant Load Increase	1082	S	00b .. 11b, 4 states/2 bit, 0 offset 00b No coolant load increase 01b Coolant load increase possible 10b Error 11b Not available	-
4	4,3	2 bits	Retarder Requesting Brake Light	1667	S	0 .. 3, 4 states/2bit, 0 offset	-
4	8..5		not defined				
5		1 Byte	Source Address of Controlling Device for Retarder Control	1480	S	0 .. 255, 1 source address/bit, 0 offset, operational range: 0 .. 253	√
6		1 Byte	Drivers Demand Retarder – Percent Torque	1715	S	-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	-
7		1 Byte	Retarder Selection, non-engine	1716	M	0 .. 100%, 0.4%/bit, 0 offset	-
8		1 Byte	Actual Maximum Available Retarder – Percent Torque	1717	M	-125 .. 125%, 1%/bit, 0 offset, operational range: -125 .. 0%	-

11.5.15. EBC1 – Electronic Brake Controller 1 (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x18F001xx			100ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61441 = 0xF001	8	6	0	0	240	1	xx = EBC (Def. 0x21)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	ASR Engine Control Active	561	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR engine control passive but installed 01 ASR engine control active 10 Reserved 11 Not available	-
1	4,3	2 bits	ASR Brake Control Active	562	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR brake control passive but installed 01 ASR brake control active 10 Reserved 11 Not available	-
1	6,5	2 bits	Anti-Lock Braking (ABS) Active	563	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ABS passive but installed 01 ABS active 10 Reserved 11 Not available	-
1	8,7	2 bits	EBS Brake Switch	1121	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Brake pedal is not being pressed 01 Brake pedal is being pressed 10 Error 11 Not available	-
2		1 Byte	Brake Pedal Position	521	M	0 .. 100%, 0.4%/bit, 0 offset	-
3	2,1	2 bits	ABS Off-road Switch	575	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ABS off-road switch passive 01 ABS off-road switch active 10 Error 11 Not available	-
3	4,3	2 bits	ASR Off-road Switch	576	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR off-road switch passive 01 ASR off-road switch active 10 Error 11 Not available	-
3	6,5	2 bits	ASR “Hill Holder” Switch	577	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR “hill holder” switch passive 01 ASR “hill holder” switch active 10 Error 11 Not available	-
3	8,7	2 bits	Traction Control Override Switch	1238	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available or not installed	-
4	2,1	2 bits	Accelerator Interlock Switch	972	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4	4,3	2 bits	Engine Derate Switch	971	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
4	6,5	2 bits	Engine Auxiliary Shutdown Switch	970	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
4	8,7	2 bits	Remote Accelerator Enable Switch	969	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
5		1 Byte	Engine Retarder Selection	973	M	0 .. 100%, 0.4%/bit, 0 offset	√
6	2,1	2 bits	ABS Fully Operational	1243	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Not Fully Operational 01 Fully Operational 10 Reserved 11 Not available	-
6	4,3	2 bits	EBS Red Warning Signal	1439	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
6	6,5	2 bits	ABS/EBS Amber Warning Signal (Powered Vehicle)	1438	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
6	8,7	2 bits	ATC/ASR Information Signal	1793	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
7		1 Byte	Source Address of Controlling Device for Brake Control	1481	S	0 .. 255, 1 source address/bit, 0 offset, operational range: 0 .. 253	-
8	2,1		not defined				
8	4,3	2 bits	Halt Brake Switch	2911	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Halt brake switch passive 01 Halt brake switch active 10 Error 11 Not available	-
8	6,5	2 bits	Trailer ABS Status	1836	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Trailer ABS Status Information Available But Not Active 01 Trailer ABS Active 10 Reserved 11 Trailer ABS Status Information Not Available or Parameter Not Supported	-
8	8,7	2 bits	Tractor-Mounted Trailer ABS Warning Signal	1792	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-

11.5.16. EBC1 – Electronic Brake Controller 1 (send)

Identifier			Repetition rate			Standard	ADM Direction
0x18F001xx			100ms			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61441 = 0xF001	8	6	0	0	240	1	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	ASR Engine Control Active	561	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR engine control passive but installed 01 ASR engine control active 10 Reserved 11 Not available	-
1	4,3	2 bits	ASR Brake Control Active	562	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR brake control passive but installed 01 ASR brake control active 10 Reserved 11 Not available	-
1	6,5	2 bits	Anti-Lock Braking (ABS) Active	563	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 ABS passive but installed 01 ABS active 10 Reserved 11 Not available	√
1	8,7	2 bits	EBS Brake Switch	1121	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Brake pedal is not being pressed 01 Brake pedal is being pressed 10 Error 11 Not available	-
2		1 Byte	Brake Pedal Position	521	M	0 .. 100%, 0.4%/bit, 0 offset	-
3	2,1	2 bits	ABS Off-road Switch	575	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ABS off-road switch passive 01 ABS off-road switch active 10 Error 11 Not available	-
3	4,3	2 bits	ASR Off-road Switch	576	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR off-road switch passive 01 ASR off-road switch active 10 Error 11 Not available	-
3	6,5	2 bits	ASR “Hill Holder” Switch	577	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 ASR “hill holder” switch passive 01 ASR “hill holder” switch active 10 Error 11 Not available	-
3	8,7	2 bits	Traction Control Override Switch	1238	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available or not installed	-
4	2,1	2 bits	Accelerator Interlock Switch	972	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4	4,3	2 bits	Engine Derate Switch	971	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
4	6,5	2 bits	Engine Auxiliary Shutdown Switch	970	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
4	8,7	2 bits	Remote Accelerator Enable Switch	969	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Error 11 Not available	-
5		1 Byte	Engine Retarder Selection	973	M	0 .. 100%, 0.4%/bit, 0 offset	-
6	2,1	2 bits	ABS Fully Operational	1243	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Not Fully Operational 01 Fully Operational 10 Reserved 11 Not available	-
6	4,3	2 bits	EBS Red Warning Signal	1439	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
6	6,5	2 bits	ABS/EBS Amber Warning Signal (Powered Vehicle)	1438	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
6	8,7	2 bits	ATC/ASR Information Signal	1793	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-
7		1 Byte	Source Address of Controlling Device for Brake Control	1481	S	0 .. 255, 1 source address/bit, 0 offset, operational range: 0 .. 253	-
8	2,1		not defined				
8	4,3	2 bits	Halt Brake Switch	2911	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Halt brake switch passive 01 Halt brake switch active 10 Error 11 Not available	-
8	6,5	2 bits	Trailer ABS Status	1836	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Trailer ABS Status Information Available But Not Active 01 Trailer ABS Active 10 Reserved 11 Trailer ABS Status Information Not Available or Parameter Not Supported	-
8	8,7	2 bits	Tractor-Mounted Trailer ABS Warning Signal	1792	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Off 01 On 10 Reserved 11 Take no action	-

11.5.17. ETC1 – Electronic Transmission Controller 1

Identifier			Repetition rate			Standard	ADM Direction
0x0CF002xx			10ms			SAE J1939-71	☞
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61442 = 0xF002	8	3	0	0	240	2	xx = TCU (Def. 0x03)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Transmission Driveline Engaged	560	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Driveline disengaged 01 Driveline engaged 10 Error 11 Not available	-
1	4,3	2 bits	Transmission Torque Converter Lockup Engaged	573	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Torque converter lockup disengaged 01 Torque converter lockup engaged 10 Error 11 Not available	√
1	6,5	2 bits	Transmission Shift In Process	574	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Shift is not in process 01 Shift in process 10 Error 11 Not available	√
1	8,7		not defined				
3,2		2 Bytes	Transmission Output Shaft Speed	191	M	0 .. 8031.75rpm, 0.125rpm/bit, 0 offset	√
4		1 Byte	Percent Clutch Slip	522	M	0 .. 100%, 0.4%/bit, 0 offset	-
5	2,1	2 bits	Engine Momentary Overspeed Enable	606	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Momentary engine overspeed is disabled 01 Momentary engine overspeed is enabled 10 Reserved 11 Take no action	√
5	4,3	2 bits	Progressive Shift Disable	607	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Progressive shift is not disabled 01 Progressive shift is disabled 10 Reserved 11 Take no action	-
5	8..5		not defined				
7,6		2 Bytes	Transmission Input Shaft Speed	161	M	0 .. 8031.75rpm, 0.125rpm/bit, 0 offset	√
8		1 Byte	Source Address of Controlling Device for Transmission Control	1482	S	0 .. 255, 1 source address/bit, 0 offset, operational range: 0 .. 253	-

11.5.18. EEC2 – Electronic Engine Controller 2 (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x0CF003xx			50ms, on request			SAE J1939-71	☞
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61443 = 0xF003	8	3	0	0	240	3	xx = 0x01 (upper structure), ADR3 (Def. 0x1E), 0x21 (body controller)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Accelerator Pedal 1 Low Switch	558	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Accelerator pedal 1 not in low idle condition 01 Accelerator pedal 1 in low idle condition 10 Error 11 Not available	√
1	4,3	2 bits	Accelerator Pedal Kickdown Switch	559	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Kickdown passive 01 Kickdown active 10 Error 11 Not available	√
1	6,5	2 bits	Road Speed Limit Status	1437	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Active 01 Not Active 10 Error 11 Not available	-
1	8,7	2 bits	Accelerator Pedal 2 Low Idle Switch	2970	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Accelerator pedal 2 not in low idle condition 01 Accelerator pedal 2 in low idle condition 10 Error 11 Not available	-
2		1 Byte	Accelerator Pedal Position 1	91	M	0 .. 100%, 0.4%/bit, 0 offset	√
3		1 Byte	Engine Percent Load At Current Speed	92	S	0 .. 250%, 1%/bit, 0 offset, operational range: 0 .. 125%	-
4		1 Byte	Remote Accelerator Pedal Position	974	M	0 .. 100%, 0.4%/bit, 0 offset	-
5		1 Byte	Accelerator Pedal Position 2	29	M	0 .. 100%, 0.4%/bit, 0 offset	-
6	2,1	2 bits	Vehicle Acceleration Rate Limit Status	2979	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Limit not active 01 Limit active 10 Reserved 11 Not available	-
6	8..3		not defined				
7		1 Byte	Actual Maximum Available Engine – Percent Torque	3357	M	0 .. 100%, 0.4%/bit, 0 offset	-
8			not defined				

11.5.19. EEC2 – Electronic Engine Controller 2 (send)

Identifier			Repetition rate			Standard	ADM Direction
0x0CF003xx			50ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61443 = 0xF003	8	3	0	0	240	3	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Accelerator Pedal 1 Low Switch	558	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Accelerator pedal 1 not in low idle condition 01 Accelerator pedal 1 in low idle condition 10 Error 11 Not available	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4,3	2 bits	Accelerator Pedal Kickdown Switch	559	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Kickdown passive 01 Kickdown active 10 Error 11 Not available	√
1	6,5	2 bits	Road Speed Limit Status	1437	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Active 01 Not Active 10 Error 11 Not available	√
1	8,7	2 bits	Accelerator Pedal 2 Low Idle Switch	2970	M	00b .. 11b, 4 states/2 bit, 0 offset, 00 Accelerator pedal 2 not in low idle condition 01 Accelerator pedal 2 in low idle condition 10 Error 11 Not available	-
2		1 Byte	Accelerator Pedal Position 1	91	M	0 .. 100%, 0.4%/bit, 0 offset	√
3		1 Byte	Engine Percent Load At Current Speed	92	S	0 .. 250%, 1%/bit, 0 offset, operational range: 0 .. 125%	√
4		1 Byte	Remote Accelerator Pedal Position	974	M	0 .. 100%, 0.4%/bit, 0 offset	-
5		1 Byte	Accelerator Pedal Position 2	29	M	0 .. 100%, 0.4%/bit, 0 offset	-
6	2,1	2 bits	Vehicle Acceleration Rate Limit Status	2979	S	00b .. 11b, 4 states/2 bit, 0 offset, 00 Limit not active 01 Limit active 10 Reserved 11 Not available	√
6	8..3		not defined				
7		1 Byte	Actual Maximum Available Engine – Percent Torque	3357	M	0 .. 100%, 0.4%/bit, 0 offset	-
8			not defined				

11.5.20. EEC1 – Electronic Engine Controller 1

Identifier			Repetition rate			Standard	ADM Direction
0x0CF004xx			10ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61444 = 0xF004	8	3	0	0	240	4	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4..1	4 bits	Engine Torque Mode	899	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Low idle governor/no request (default mode) 0001b Accelerator pedal/operator selection 0010b Cruise control 0011b PTO governor 0100b Road speed governor 0101b ASR control 0110b Transmission control 0111b ABS control 1000b Torque limiting 1001b High speed governor 1010b Braking system 1011b Remote accelerator 1100b Service procedure 1101b Not defined 1110b Other 1111b Not available	√
1	8..5		not defined				
2		1 Byte	Driver's Demand Engine – Percent Torque	512	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
3		1 Byte	Actual Engine – Percent Torque	513	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
5,4		2 Bytes	Engine Speed	190	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
6		1 Byte	Source Address of Controlling Device for Engine Control	1483	S	0 .. 255, 1 source address/bit,0 offset, operational range: 0 .. 253	√
7	4..1	4 bits	Engine Starter mode	1675	S	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Start not requested 0001b Starter active, gear not engaged 0010b Starter active, gear engaged 0011b Start finished, starter not active after having been actively engaged (after 50ms mode goes to 0000b) 0100b Starter inhibited due to engine already running 0101b Starter inhibited due to engine not ready for start (preheating) 0110b Starter inhibited due to driveline engaged or other transmission inhibit 0111b Starter inhibited due to active immobilizer 1000b Starter inhibited due to starter over-temp 1001b-1011b Reserved 1100b Starter inhibited – reason unknown 1101b Error (legacy implementation only, use 1110b) 1110b Error 1111b Not available	-
8		1 Byte	Engine Demand – Percent Torque	2432		-125 .. 125%, 1%/bit, -125% offset	√

11.5.21. ETC2 – Electronic Transmission Controller 2

Identifier			Repetition rate			Standard	ADM Direction
0x18F005xx			100ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
61445 = 0xF005	8	6	0	0	240	5	xx = TCU (Def. 0x03)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Transmission Selected Gear	524	S	-125 .. 125, 1 gear value/bit, -125 offset, operational range: -125 .. 125, negative values are reverse gears, positive values are forward gears, zero is neutral, 251 (0xFB) is park	√
3,2		2 Bytes	Transmission Actual Gear Ratio	526	M	0 .. 64.255, 0.001/bit, 0 offset	-
4		1 Byte	Transmission Current Gear	523	M	-125 .. 125, 1 gear value/bit, -125 offset, operational range: -125 .. 125, negative values are reverse gears, positive values are forward gears, zero is neutral, 251 (0xFB) is park	√
6,5		2 Bytes	Transmission Requested Range	162	S	0 .. 255 per Byte, ASCII characters, 0 offset, characters may include P, Rx, Rx-1 .. R2, R1, Nx, Nx-1 .. N2, N, D, D1, D2, .., Dx, L, L1, L2 .., Lx-1, 1, 2, 3, .., if only one character is used, the second character shall be used and the first shall be a space (ASCII 32) or a control character (ASCII 0 to 31)	-
8,7		2 Bytes	Transmission Current Range	163	S	0 .. 255 per Byte, ASCII characters, 0 offset, characters may include P, Rx, Rx-1 .. R2, R1, Nx, Nx-1 .. N2, N, D, D1, D2, .., Dx, L, L1, L2 .., Lx-1, 1, 2, 3, .., if only one character is used, the second character shall be used and the first shall be a space (ASCII 32) or a control character (ASCII 0 to 31)	-

11.5.22. ETC7 – Electronic Transmission Controller 7

Identifier			Repetition rate			Standard	ADM Direction
0x18FE4Axx			100ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65098 = 0xFE4A	8	6	0	0	254	74	xx = TCU (Def. 0x03)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4..1		Not defined				
1	6,5	2 bits	Transmission Requested Range Display Blank State	1850	S	00b .. 11b, 4 states/2bit, 0 offset 00b Inactive, Transmission Requested Range display should not be blanked 01b Active, Transmission Requested Range display should be blanked 10b Reserved 11b Take no action	-
1	8,7	2 bits	Transmission Requested Range Display Flash State	1849	S	00b .. 11b, 4 states/2bit, 0 offset 00b Inactive, Transmission Requested Range display should not be flashing 01b Active, Transmission Requested Range display should be flashing 10b Reserved 11b Take no action	-
2	2,1	2 bits	Transmission Ready for Brake Release	3086	S	00b .. 11b, 4 states/2bit, 0 offset 00b Transmission Not Ready for Brake Release 01b Transmission Ready for Brake Release 10b Reserved 11b Don't Care	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2	4,3	2 bits	Active Shift Console Indicator	2945	S	00b .. 11b, 4 states/2bit, 0 offset 00b Primary shift console is active 01b Secondary shift console is active 10b Reserved 11b Not available	-
2	6,5	2 bits	Transmission Engine Crank Enable	2900	S	00b .. 11b, 4 states/2bit, 0 offset 00b Cranking disabled, engine cranking is prohibited by the transmission 01b Cranking enabled, engine cranking is allowed by the transmission 10b Error 11b Not available	√
2	8,7	2 bits	Transmission Shift Inhibit Indicator	1851	S	00b .. 11b, 4 states/2bit, 0 offset 00b Inactive, shift is not inhibited 01b Active, shift is inhibited 10b Reserved 11b Take no action	-
3	2,1	2 bits	Transmission Mode 4 Indicator	2539	S	00b .. 11b, 4 states/2bit, 0 offset 00b Transmission Mode 4 not active 01b Transmission Mode 4 active 10b Error 11b Not available	-
3	4,3	2 bits	Transmission Mode 3 Indicator	2538	S	00b .. 11b, 4 states/2bit, 0 offset 00b Transmission Mode 3 not active 01b Transmission Mode 3 active 10b Error 11b Not available	-
3	6,5	2 bits	Transmission Mode 2 Indicator	2537	S	00b .. 11b, 4 states/2bit, 0 offset 00b Transmission Mode 2 not active 01b Transmission Mode 2 active 10b Error 11b Not available	-
3	8,7	2 bits	Transmission Mode 1 Indicator	2536	S	00b .. 11b, 4 states/2bit, 0 offset 00b Transmission Mode 1 not active 01b Transmission Mode 1 active 10b Error 11b Not available	-
4		1 Byte	Transmission Requested Gear Feedback	3289	S	-125 .. 125, 1 gear value/bit, -125 offset	-
8..5			Not defined				

11.5.23. TI1 – Tank Information 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FE56xx			1s			SAE J1939-71, SAE J1939-73	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65110 = 0xFE56	8	6	0	0	254	86	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Catalyst Tank Level	1761	M	0 .. 100%, 0.4%/bit, 0 offset, 0% Empty 100% Full	√
2		1 Byte	Catalyst Tank Temperature	3031	M	-40 .. 210°C, 1°C/bit, -40°C offset	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4,3		2 Bytes	Catalyst Tank Level 2	3517	M	0 .. 6425.5mm, 0.1mm/bit, 0 offset	-
5	5..1	5 bits	Catalyst Tank Level Preliminary FMI	3532	S	0 .. 31, applicable to either the catalyst tank level 1 or catalyst tank level 2 parameters 0 Data Valid but Above Normal Operational Range – Most Severe Level 1 Data Valid but Below Normal Operational Range – Most Severe Level 2 Data Erratic, Intermittent, or Incorrect 3 Voltage Above Normal, or Shorted to High Source 4 Voltage Below Normal, or Shorted to Low Source 5 Current Below Normal or Open Circuit 6 Current Above Normal or Grounded Circuit 7 Mechanical System not Responding or Out of Adjustment 8 Abnormal Frequency or Pulse Width or Period 9 Abnormal Update Rate 10 Abnormal Rate of Change 11 Root Cause Not Known 12 Bad Intelligent Device or Component 13 Out of Calibration 14 Special Instructions 15 Data Valid but Above Normal Operating Range – Least Severe Level 16 Data Valid but Above Normal Operating Range – Moderately Severe Level 17 Data Valid but Below Normal Operating Range – Least Severe Level 18 Data Valid but Below Normal Operating Range – Moderately Severe Level 19 Received Network Data in Error 20 Data Drifted High 21 Data Drifted Low 22 .. 30 Reserved for SAE Assignment 31 Condition Exists, Not Available when associated SPN is also not available	√
5	8..6		Not defined				
8..6			Not defined				

11.5.24. TCO1 – Tachograph

Identifier			Repetition rate			Standard	ADM Direction
0x0CFE6Cxx			50ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65132 = 0xFE6C	8	3	0	0	254	108	xx = any (tachograph)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	3..1	3 bits	Driver 1 Working State	1612	S	000b .. 111b, 8 steates/3bit, 0 offset 000b Rest – sleeping 001b Driver available – short break 010b Work – loading, unloading, working in an office 011b Drive – behind wheel 100b .. 101b Reserved 111b Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	6..4	3 bits	Driver 2 Working State	1613	S	000b .. 111b, 8 steates/3bit, 0 offset 000b Rest – sleeping 001b Driver available – short break 010b Work – loading, unloading, working in an office 011b Drive – behind wheel 100b .. 101b Reserved 111b Not available	-
1	8,7	2 bits	Vehicle Motion	1611	M	00b .. 11b, 4 states/2bit, 0 offset 00b Vehicle motion not detected 01b Vehicle motion detected 10b Error 11b Not available	-
2	4..1	4 bits	Driver 1 Time Related States	1617	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Normal/No limits reached 0001b Limit #1 – 15min before 4½h 0010b Limit #2 – 4½h reached 0011b Limit #3 – 15min before 9h 0100b Limit #4 – 9h reached 0101b Limit #5 – 15min before 16h (not having 8h rest during the last 24h) 0110b Limit #6 – 16h reached 0111b .. 1100b Reserved 1101b Other 1110b Error 1111b Not available	-
2	6,5	2 bits	Driver Card, Driver 1	1615	M	00b .. 11b, 4 states/2bit, 0 offset 00b Driver card not present 01b Driver card present 10b Error 11b Not available	-
2	8,7	2 bits	Vehicle Overspeed	1614	M	00b .. 11b, 4 states/2bit, 0 offset 00b No overspeed 01b Overspeed 10b Error 11b Not available	-
3	4..1	4 bits	Driver 2 Time Related States	1618	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Normal/No limits reached 0001b Limit #1 – 15min before 4½h 0010b Limit #2 – 4½h reached 0011b Limit #3 – 15min before 9h 0100b Limit #4 – 9h reached 0101b Limit #5 – 15min before 16h (not having 8h rest during the last 24h) 0110b Limit #6 – 16h reached 0111b .. 1100b Reserved 1101b Other 1110b Error 1111b Not available	-
3	6,5	2 bits	Driver Card, Driver 2	1616	M	00b .. 11b, 4 states/2bit, 0 offset 00b Driver card not present 01b Driver card present 10b Error 11b Not available	-
3	8,7		Not defined				
4	2,1	2 bits	System Event	1622	S	00b .. 11b, 4 states/2bit, 0 offset 00b No tachograph event 01b Tachograph event 10b Error 11b Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4	4,3	2 bits	Handling Information	1621	S	00b .. 11b, 4 states/2bit, 0 offset 00b No handling information 01b Handling information 10b Error 11b Not available	-
4	6,5	2 bits	Tachograph Performance	1620	S	00b .. 11b, 4 states/2bit, 0 offset 00b Normal performance 01b Performance analysis 10b Error 11b Not available	-
4	8,7	2 bits	Direction Indicator	1619	M	00b .. 11b, 4 states/2bit, 0 offset 00b Forward 01b Reverse 10b Error 11b Not available	-
6,5		2 Bytes	Tachograph Output Shaft Speed	1623	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
8,7		2 Bytes	Tachograph Vehicle Speed	1624	M	0 .. 250.996rpm, 1/256km/h/bit, 0 offset	√

11.5.25. ACC1 – Adaptive Cruise Control

Identifier			Repetition rate			Standard	ADM Direction
0x10FE6Fxx			100ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65135 = 0xFE6F	8	4	0	0	254	111	xx = ACC (Def. 0x2A)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Speed of Forward Vehicle	1586	M	0 .. 250km/h, 1km/h/bit, 0 offset 0xFF No vehicle detected	-
2		1 Byte	Distance to Forward Vehicle	1587	M	0 .. 250m, 1m/bit, 0 offset 0xFF Not vehicle detected	-
3		1 Byte	Adaptive Cruise Control Set Speed	1588	S	0 .. 250km/h, 1km/h/bit, 0 offset operational range: 0 .. 120km/h	-
4	3..1	3 bits	Adaptive Cruise Control Mode	1590	S	000b .. 111b, 8 states/3bit, 0 offset 000b Off (Standby, enabled, ready for activation) 001b Speed control active 010b Distance control active 011b Overtake mode 100b Hold mode 101b Finish mode 110b Disabled or error condition 111b Not available/not valid	√
4	6..4	3 bits	Adaptive Cruise Control Set Distance Mode	1589	S	000b .. 111b, 8 states/3bit, 0 offset 000b ACC Distance mode #1 (largest distance) 001b ACC Distance mode #2 010b ACC Distance mode #3 011b ACC Distance mode #4 100b ACC Distance mode #5 (shortest distance) 101b Conventional cruise control mode 110b Error condition 111b Not available/not valid	-
4	8,7		Not defined				

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
6,5		2 Bytes	Road Curvature	1591	S	-250 .. 251.992 1/km, 1/128 1/km/bit, -250 1/km offset, positive values for left curves	-
7	2,1	2 bits	ACC Target Detected	1798	S	00b .. 11b, 4 states/2bit, 0 offset 00b No targets detected 01b Target detected 10b Reserved 11b Take no action	-
7	4,3	2 bits	ACC System Shutoff Warning	1797	S	00b .. 11b, 4 states/2bit, 0 offset 00b ACC SSOW not active 01b ACC SSOW active 10b Reserved 11b Take no action	-
7	6,5	2 bits	ACC Distance Alert Signal	1796	S	00b .. 11b, 4 states/2bit, 0 offset 00b ACC DAS not active 01b ACC DAS active 10b Reserved 11b Take no action	-
7	8,7		Not defined				
8			Not defined				

11.5.26. EBC2 – Wheel Speed Information

Identifier			Repetition rate			Standard	ADM Direction
0x18FEBFxx			100ms			SAE J1939-71	☞
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65215 = 0xFEBF	8	6	0	0	254	191	xx = ABU (Def. 0x0B)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2,1		2 Bytes	Front Axle Speed	904	M	0 .. 250.996km/h, 1/256km/h/bit, 0 offset	√
3		1 Byte	Relative Speed; Front Axle, Left Wheel	905	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-
4		1 Byte	Relative Speed; Front Axle, Right Wheel	906	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-
5		1 Byte	Relative Speed; Rear Axle #1, Left Wheel	907	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-
6		1 Byte	Relative Speed; Rear Axle #1, Right Wheel	908	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-
7		1 Byte	Relative Speed; Rear Axle #2, Left Wheel	909	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-
8		1 Byte	Relative Speed; Rear Axle #2, Right Wheel	910	M	-7.8125 .. 7.8125km/h, 1/16km/h/bit, -7.8125km/h offset	-

11.5.27. AUXIO1 – Auxiliary Input/Output Status 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FED9xx			100ms			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65241 = 0xFED9	8	6	0	0	254	217	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Engine Protection Shut Down		S	00b .. 11b, 4 states/2bit, 0 offset 00b Not active 01b Active 10b Error 11b Not available	√
1	4,3	2 bits	Engine Idle Shut Down		S	00b .. 11b, 4 states/2bit, 0 offset 00b Engine idle shut down not active 01b Engine idle shut down active, zero fuel quantity 10b Error 11b Not available	√
1	6,5	2 bits	Engine PTO Low Load Shut Down		S	00b .. 11b, 4 states/2bit, 0 offset 00b Engine PTO low load shut down not active 01b Engine PTO low load shut down active, zero fuel quantity 10b Error 11b Not available	√
1	8,7	2 bits	Engine Shut Down Override		S	00b .. 11b, 00b Highest priority 01b Engine Shut down override 10b Not defined 11b Signal not available	√
2	2,1	2 bits	Special Function DSF1 – ABS active		S	00b .. 11b, 4 states/2bit, 0 offset 00b Not active 01b Active 10b Error 11b Not available	√
2	4,3	2 bits	Special Function DSF0 – Engine Start		S	00b .. 11b, 4 states/2bit, 0 offset 00b Not active 01b Active 10b Error 11b Not available	√
2	6,5	2 bits	Throttle Selection		S	00b .. 11b, 4 states/2bit, 0 offset 00b Analog hand throttle not active 01b Analog hand throttle active 10b Error 11b Not available	√
2	8,7	2 bits	Throttle Inhibit		S	00b .. 11b, 4 states/2bit, 0 offset 00b Not throttle inhibit 01b Throttle inhibit, only low idle speed possible 10b Error 11b Not available	√
3	2,1	2 bits	Grid Heater Indicator LA_GRID		S	00b .. 11b, 4 states/2bit, 0 offset 00b Grid heater indicator not active 01b Grid heater indicator active 10b Error 11b Not available	√
3	4,3	2 bits	Limiter KLIMA		S	00b .. 11b, 4 states/2bit, 0 offset 00b Limiter switch air condition not active 01b Limiter switch air condition active 10b Error 11b Not available	√
3	6,5	2 bits	Limiter LIM1		S	00b .. 11b, 4 states/2bit, 0 offset 00b Dual road speed limiter not active 01b Dual road speed limiter active 10b Error 11b Not available	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
3	8,7	2 bits	Limiter LIM0		S	00b .. 11b, 4 states/2bit, 0 offset 00b Limiter 2 not active 01b Limiter 2 active 10b Error 11b Not available	√
4	2,1	2 bits	AdBlue Level Warning		S	00b .. 11b, 4 states/2bit, 0 offset 00b AdBlue minimum level not reached 01b AdBlue minimum level reached 10b AdBlue empty 11b Not available	√
4	4,3	2 bits	Status NOx Torque Limitation		S	00b .. 11b, 4 states/2bit, 0 offset 00b Torque reduction not active 01b Torque reduction active 10b Torque reduction active after next vehicle start 11b Not available	√
4	8..5		Not defined				
8..5			Not defined				

11.5.28. SOFT – Software Identification

Identifier			Repetition rate			Standard	ADM Direction
0x18FEDAxx			on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65242 = 0xFEDA	8	6	0	0	254	218	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Number of Software Identification Fields	965	M	0 .. 250steps, 1 step/bit, 0 offset, operational range: 0 .. 125	√
2,3		2 Bytes	Software Identification – Software Version	234	M	0 .. 255/Byte, ASCII, 0 offset	√
4,5		2 Bytes	Software Identification – Special Software Version	234	M	0 .. 255/Byte, ASCII, 0 offset	√
6		1 Byte	Software Identification – Sub1 Version	234	M	0 .. 255/Byte, ASCII, 0 offset	√
7		1 Byte	Software Identification – Sub2 Version	234	M	0 .. 255/Byte, ASCII, 0 offset	√
8		1 Byte	Software Identification - Delimiter	234	M	0x2A ASCII for '*'	√

11.5.29. EEC3 – Electronic Engine Controller 3

Identifier			Repetition rate			Standard	ADM Direction
0x18FEDFxx			250ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65247 = 0xFEDF	8	6	0	0	254	223	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Nominal Friction – Percent Torque	514	S	-125 .. 125%, 1%/bit, -125% offset	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
3,2		2 Bytes	Engine's Desired Operating Speed	515	S	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
4		1 Byte	Engine's Desired Operating Speed Asymmetry Adjustment	519	S	0 .. 250, 1/bit, 0 offset >125 operation of the engine higher than its indicated desired speed preferred <125 operation of the engine lower than its indicated desired speed preferred	-
5		1 Byte	Estimated Engine Parasitic Losses – Percent Torque	2978	S	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125% 251 All parasitic losses calculated by the engine are included in the engine's nominal friction percent torque	-
7,6		2 Bytes	Aftertreatment 1 Exhaust Gas Mass Flow	3236	M	0 .. 12851kg/h, 0.2kg/h/bit, 0 offset	-
8	2,1	2 bits	Aftertreatment 1 Intake Dew Point	3237	S	00b .. 11b, 4 states/2bit, 0 offset 00b Not exceeded the dew point 01b Exceeded the dew point 10b Error 11b Not available	-
8	4,3	2 bits	Aftertreatment 1 Exhaust Dew Point	3238	S	00b .. 11b, 4 states/2bit, 0 offset 00b Not exceeded the dew point 01b Exceeded the dew point 10b Error 11b Not available	-
8	6,5	2 bits	Aftertreatment 2 Intake Dew Point	3239		00b .. 11b, 4 states/2bit, 0 offset 00b Not exceeded the dew point 01b Exceeded the dew point 10b Error 11b Not available	-
8	8,7	2 bits	Aftertreatment 2 Exhaust Dew Point	3240		00b .. 11b, 4 states/2bit, 0 offset 00b Not exceeded the dew point 01b Exceeded the dew point 10b Error 11b Not available	-

11.5.30. VD – Vehicle Distance

Identifier			Repetition rate			Standard	ADM Direction
0x18FEE0xx			100ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65248 = 0xFEE0	8	6	0	0	254	224	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4..1		4 Bytes	Trip Distance	244	M	0 .. 526385151.9km, 0.125km/bit, 0 offset	√
8..5		4 Bytes	Total Vehicle Distance	245	M	0 .. 526385151.9km, 0.125km/bit, 0 offset	√

11.5.31. RC – Retarder Configuration

Identifier			Repetition rate			Standard	ADM Direction
0x18FEE1xx			5s, on request, broadcast message			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65249 = 0xFEE1	19	6	0	0	254	225	xx = RET (Def. 0x0F)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	4..1	4 bits	Retarder Type	901	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b Electric/Magnetic 0001b Hydraulic 0010b Cooled Friction 0011b Compression Release (Engine retarder) 0100b Exhaust 0101b .. 1101b Not defined 1110b Other 1111b Not available	√
1	8..5	4 bits	Retarder Location	902	M	0000b .. 1111b, 16 states/4bit, 0 offset 0000b (Primary) Engine Compression Release Brake (Engine rpm) 0001b (Primary) Engine Exhaust Brake (Exhaust pressure) 0010b (Primary) Transmission Input (Engine rpm) 0011b (Secondary) Transmission Output (Output Shaft rpm) 0100b (Secondary) Driveline (Output Shaft rpm) 0101b Trailer (Vehicle speed) 0110b .. 1101b Not defined 1110b Other 1111b Not available	√
2		1 Byte	Retarder Control Method (Retarder Configuration)	557	M	0 .. 250 steps, 1 step/bit, 0 offset, operational range: 0 Continuous control 1 On/Off control 2 .. 250 Number of steps	√
4,3		2 Bytes	Retarder Speed At Idle, Point 1 (Retarder Configuration)	546	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
5		1 Byte	Percent Torque At Idle, Point 1 (Retarder Configuration)	551	M	-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	√
7,6		2 Bytes	Maximum Retarder Speed, Point 2 (Retarder Configuration)	548		0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
8		1 Byte	Percent Torque At Maximum Speed, Point 2 (Retarder Configuration)	552		-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	√
10,9		2 Bytes	Retarder Speed At Point 3 (Retarder Configuration)	549		0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
11		1 Byte	Percent Torque At Point 3 (Retarder Configuration)	553		-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	√
13, 12		2 Bytes	Retarder Speed At Point 4 (Retarder Configuration)	550		0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
14		1 Byte	Percent Torque At Point 4 (Retarder Configuration)	554		-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	√
16, 15		2 Bytes	Retarder Speed At Peak Torque, Point 5 (Retarder Configuration)	547		0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
18, 17		2 Bytes	Reference Retarder Torque (Retarder Configuration)	556		0 .. 64255Nm, 1Nm/bit, 0 offset	√
19		1 Byte	Percent Torque At Peak Torque, Point 5 (Retarder Configuration)	555		-125 .. 125%, 1%/bit, -125% offset, operational range: -125 .. 0%	√

11.5.32. EC1 – Engine Configuration 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FEE3xx			5s, on request, broadcast message			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65251 = 0xFEE3	34[1]	6	0	0	254	227	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2,1		2 Bytes	Engine Speed At Idle, Point 1 (Engine Configuration)	188	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
3		1 Byte	Engine Percent Torque At Idle, Point 1 (Engine Configuration)	539	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
5,4		2 Bytes	Engine Speed At Point 2 (Engine Configuration)	528	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
6		1 Byte	Engine Percent Torque At Point 2 (Engine Configuration)	540	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
8,7		2 Bytes	Engine Speed At Point 3 (Engine Configuration)	529	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
9		1 Byte	Engine Percent Torque At Point 3 (Engine Configuration)	541	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
11, 10		2 Bytes	Engine Speed At Point 4 (Engine Configuration)	530	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
12		1 Byte	Engine Percent Torque At Point 4 (Engine Configuration)	542	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
14, 13		2 Bytes	Engine Speed At Point 5 (Engine Configuration)	531	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
15		1 Byte	Engine Percent Torque At Point 5 (Engine Configuration)	543	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	√
17, 16		2 Bytes	Engine Speed At High Idle, Point 6 (Engine Configuration)	532	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
19, 18		2 Bytes	Engine Gain (Kp) Of The Endspeed Governor (Engine Configuration)	545	M	0 .. 50.2%/rpm, 1/1280%/rpm/bit, 0 offset, KP = delta Torque / delta Speed	-
21, 20		2 Bytes	Engine Reference Torque (Engine Configuration)	544	M	0 .. 64255Nm, 1Nm/bit, 0 offset	√
23, 22		2 Bytes	Engine Maximum Momentary Override Speed, Point 7 (Engine Configuration)	533	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
24		1 Byte	Engine Maximum Momentary Override Time Limit (Engine Configuration)	534	M	0 .. 25s, 0.1s/bit, 0 offset, operational range: 0 .. 25s 0 No override of high idle allowed 255 Not applicable (no time restriction)	√
25		1 Byte	Engine Requested Speed Control Range Lower Limit (Engine Configuration)	535	M	0 .. 2500rpm, 10rpm/bit, 0 offset	-
26		1 Byte	Engine Requested Speed Control Range Upper Limit (Engine Configuration)	536	M	0 .. 2500rpm, 10rpm/bit, 0 offset	-
27		1 Byte	Engine Requested Torque Control Range Lower Limit (Engine Configuration)	537	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	-
28		1 Byte	Engine Requested Torque Control Range Upper Limit (Engine Configuration)	538	M	-125 .. 125%, 1%/bit, -125% offset, operational range: 0 .. 125%	-

[1] Due to compatibility reasons with other electronic control units the message data length is truncated to 34 Bytes according to the SAE J1939-71 rev.2003 standard, newer versions of the standard provide up to 39 Bytes.

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
30, 29		2 Bytes	Engine Extended Range Requested Speed Control Range Upper Limit (Engine Configuration)	1712	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	-
32, 31		2 Bytes	Engine Moment of Inertia	1794	M	0 .. 257.02kgm², 0.004kgm²/bit, 0 offset	√
34, 33		2 Bytes	Engine Default Torque Limit	1846	M	0 .. 64255Nm, 1Nm/bit, 0 offset	-

11.5.33. HOURS – Engine Hours, Revolutions

Identifier			Repetition rate			Standard	ADM Direction
0x18FEE5xx			on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65253 = 0xFEE5	8	6	0	0	254	229	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4..1		4 Bytes	Engine Total Hours of Operation	247	M	0 .. 210554060.75h, 0.05h/bit, 0 offset	√
8..5		4 Bytes	Engine Total Revolutions	249	M	0 .. 4211081215000r, 1000r/bit, 0 offset	-

11.5.34. LFC – Fuel Consumption (Liquid)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEE9xx			on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65257 = 0xFEE9	8	6	0	0	254	233	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4..1		4 Bytes	Engine Trip Fuel	182	M	0 .. 2105540607.5L, 0.5L/bit, 0 offset	√
8..5		4 Bytes	Engine Total Fuel Used	250	M	0 .. 2105540607.5L, 0.5L/bit, 0 offset	√

11.5.35. CI – Component Identification

Identifier			Repetition rate			Standard	ADM Direction
0x18FEEBxx			on request, broadcast message			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65259 = 0xFEEB	18	6	0	0	254	235	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
-		5 Bytes	Make	586	M	0 .. 255 per Byte, ASCII, 0 offset	-
-		1 Byte	Delimiter			ASCII for '*'	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5..1		5 Bytes	Model	587	M	0 .. 255 per Byte, ASCII, 0 offset 'MRCBN'	√
6		1 Byte	Delimiter			ASCII for '*'	√
9..7		3 Bytes	Serial Number – Manufacturing Date	588	M	0 .. 255 per Byte, ASCII, 0 offset	√
10		1 Byte	Delimiter			ASCII for '*'	√
16.. 11		6 Bytes	Unit Number – Engine Number	233	M	0 .. 255 per Byte, ASCII, 0 offset	√
17		1 Byte	Delimiter			ASCII for '*'	√
18		1 Byte	Delimiter			ASCII for '*'	√

11.5.36. ET1 – Engine Temperature 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FEEExx			1s, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65262 = 0xFEEE	8	6	0	0	254	238	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Engine Coolant Temperature	110	M	-40 .. 210°C, 1°C/bit, -40°C offset	√
2		1 Byte	Engine Fuel Temperature 1	174	M	-40 .. 210°C, 1°C/bit, -40°C offset	√
4,3		2 Bytes	Engine Oil Temperature 1	175	M	-273 .. 1735°C, 0.03125°C/bit, -273°C offset	√
6,5		2 Bytes	Engine Turbocharger Oil Temperature	176	M	-273 .. 1735°C, 0.03125°C/bit, -273°C offset	-
7		1 Byte	Engine Intercooler Temperature	52	M	-40 .. 210°C, 1°C/bit, -40°C offset	-
8		1 Byte	Engine Intercooler Thermostat Opening	1134	M	0 .. 100%, 0.4%/bit, 0 offset	-

11.5.37. EFL/P1 – Engine Fluid Level/Pressure 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FEEFxx			500ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65263 = 0xFEEF	8	6	0	0	254	239	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Engine Fuel Delivery Pressure	94	M	0 .. 1000kPa, 4kPa/bit, 0 offset	-
2		1 Byte	Engine Extended Crankcase Blow-by Pressure	22	M	0 .. 12.5kPa, 0.05kPa/bit, 0 offset	-
3		1 Byte	Engine Oil Level	98	M	0 .. 100%, 0.4%/bit, 0 offset	√
4		1 Byte	Engine Oil Pressure	100	M	0 .. 1000kPa, 4kPa/bit, 0 offset	√
6,5		2 Bytes	Engine Crankcase Pressure	101	M	-250kPa .. 251.99kPa, 1/128kPa/bit, -250kPa offset	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
7		1 Byte	Engine Coolant Pressure	109	M	0 .. 500kPa, 2kPa/bit, 0 offset	-
8		1 Byte	Engine Coolant Level	111	M	0 .. 100%, 0.4%/bit, 0 offset	√

11.5.38. PTO – Power Takeoff Information

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF0xx			100ms			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65264 = 0xFEF0	8	6	0	0	254	240	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Power Takeoff Oil Temperature	90	M	-40 .. 210°C, 1°C/bit, -40°C offset	-
3,2		2 Bytes	Power Takeoff Speed	186	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	-
5,4		2 Bytes	Power Takeoff Set Speed	187	M	0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	-
6	2,1	2 bits	Engine PTO Enable Switch	980	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	√
6	4,3	2 bits	Engine Remote PTO Preprogrammed Speed Control Switch	979	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
6	6,5	2 bits	Engine Remote PTO Variable Speed Control Switch	978	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
6	8,7		Not defined				
7	2,1	2 bits	Engine PTO Set Switch	984	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	√
7	4,3	2 bits	Engine PTO Coast/Decelerate Switch	983	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
7	6,5	2 bits	Engine PTO Resume Switch	982	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
7	8,7	2 bits	Engine PTO Accelerate Switch	981	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
8	2,1	2 bits	Operator PTO Memory Select Switch	2897	M	00b .. 11b, 4 states/2bit, 0 offset 00b PTO set speed memory 1 selected 01b PTO set speed memory 2 selected 10b Error 11b Not available	-
8	4,3	2 bits	Remote PTO preprogrammed speed control switch #2	3447	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	6,5	2 bits	Auxiliary Input Ignore Switch	3448	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	8,7		Not defined				

11.5.39. CCVS – Cruise Control/Vehicle Speed (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF1xx			100ms			SAE J1939-71	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65265 = 0xFEF1	8	6	0	0	254	241	xx = CC1 (Def. 0x17), CC2 (Def. 0x21), CC3 (Def. 0x31)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Two Speed Axle Switch	69	M	00b .. 11b, 4 states/2bit, 0 offset 00b Low speed range 01b High speed range 10b Error 11b Not available	√
1	4,3	2 bits	Parking Brake Switch	70	M	00b .. 11b, 4 states/2bit, 0 offset 00b Parking brake not set 01b Parking brake set 10b Error 11b Not available	√
1	6,5	2 bits	Cruise Control Pause Switch	1633	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error indicator 11b Take no action	√
1	8,7	2 bits	Park Brake Release Inhibit Request	3807	S	00b .. 11b, 4 states/2bit, 0 offset 00b Park brake release inhibit not requested 01b Park brake release inhibit requested 10b SAE reserved 11b Unavailable	-
3,2		2 Bytes	Wheel-Based Vehicle Speed	84	M	0 .. 250.996km/h, 1/256km/h/bit, 0 offset	√
4	2,1	2 bits	Cruise Control Active	595	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control switched off 01b Cruise control switched on 10b Error 11b Not available	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4	4,3	2 bits	Cruise Control Enable Switch	596	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control disabled 01b Cruise control enabled 10b Error 11b Not available	√
4	6,5	2 bits	Brake Switch	597	M	00b .. 11b, 4 states/2bit, 0 offset 00b Brake pedal released 01b Brake pedal depressed 10b Error 11b Not available	√
4	8,7	2 bits	Clutch Switch	598	M	00b .. 11b, 4 states/2bit, 0 offset 00b Clutch pedal released 01b Clutch pedal depressed 10b Error 11b Not available	√
5	2,1	2 bits	Cruise Control Set Switch	599	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘set’ 01b Cruise control activator in position ‘set’ 10b Error 11b Not available	√
5	4,3	2 bits	Cruise Control Coast (Decelerate) Switch	600	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘coast’ 01b Cruise control activator in position ‘coast’ 10b Error 11b Not available	√
5	6,5	2 bits	Cruise Control Resume Switch	601	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘resume’ 01b Cruise control activator in position ‘resume’ 10b Error 11b Not available	√
5	8,7	2 bits	Cruise Control Accelerate Switch	602	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘accelerate’ 01b Cruise control activator in position ‘accelerate’ 10b Error 11b Not available	√
6		1 Byte	Cruise Control Set Speed	86	M	0 .. 250km/h, 1km/h/bit, 0 offset	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
7	5..1	5 bits	PTO State	976	S	00000b .. 11111b, 32 states/5bit, 0 offset 00000b Off/Disabled 00001b Hold 00010b Remote Hold 00011b Standby 00100b Remote Standby 00101b Set 00110b Decelerate/Coast 00111b Resume 01000b Accelerate 01001b Accelerator Override 01010b Preprogrammed set speed 1 01011b Preprogrammed set speed 2 01100b Preprogrammed set speed 3 01101b Preprogrammed set speed 4 01110b Preprogrammed set speed 5 01111b Preprogrammed set speed 6 10000b Preprogrammed set speed 7 10001b Preprogrammed set speed 8 10010b PTO set speed memory 1 10011b PTO set speed memory 2 10100b .. 11110b Not defined 11111b Not available	-
7	8..6	3 bits	Cruise Control States	527	S	000b .. 111b, 8 states/3bit, 0 offset 000b Off/Disabled 001b Hold 010b Accelerate 011b Decelerate/Coast 100b Resume 101b Set 110b Accelerator Override 111b Not available	-
8	2,1	2 bits	Engine Idle Increment Switch	968	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	4,3	2 bits	Engine Idle Decrement Switch	967	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	6,5	2 bits	Engine Test Mode Switch	966	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	8,7	2 bits	Engine Shutdown Override Switch	1237	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-

11.5.40. CCVS – Cruise Control/Vehicle Speed (send)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF1xx			100ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65265 = 0xFEF1	8	6	0	0	254	241	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Two Speed Axle Switch	69	M	00b .. 11b, 4 states/2bit, 0 offset 00b Low speed range 01b High speed range 10b Error 11b Not available	√
1	4,3	2 bits	Parking Brake Switch	70	M	00b .. 11b, 4 states/2bit, 0 offset 00b Parking brake not set 01b Parking brake set 10b Error 11b Not available	√
1	6,5	2 bits	Cruise Control Pause Switch	1633	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error indicator 11b Take no action	-
1	8,7	2 bits	Park Brake Release Inhibit Request	3807	S	00b .. 11b, 4 states/2bit, 0 offset 00b Park brake release inhibit not requested 01b Park brake release inhibit requested 10b SAE reserved 11b Unavailable	-
3,2		2 Bytes	Wheel-Based Vehicle Speed	84	M	0 .. 250.996km/h, 1/256km/h/bit, 0 offset	√
4	2,1	2 bits	Cruise Control Active	595	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control switched off 01b Cruise control switched on 10b Error 11b Not available	√
4	4,3	2 bits	Cruise Control Enable Switch	596	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control disabled 01b Cruise control enabled 10b Error 11b Not available	√
4	6,5	2 bits	Brake Switch	597	M	00b .. 11b, 4 states/2bit, 0 offset 00b Brake pedal released 01b Brake pedal depressed 10b Error 11b Not available	√
4	8,7	2 bits	Clutch Switch	598	M	00b .. 11b, 4 states/2bit, 0 offset 00b Clutch pedal released 01b Clutch pedal depressed 10b Error 11b Not available	√
5	2,1	2 bits	Cruise Control Set Switch	599	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘set’ 01b Cruise control activator in position ‘set’ 10b Error 11b Not available	√
5	4,3	2 bits	Cruise Control Coast (Decelerate) Switch	600	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘coast’ 01b Cruise control activator in position ‘coast’ 10b Error 11b Not available	√
5	6,5	2 bits	Cruise Control Resume Switch	601	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position ‘resume’ 01b Cruise control activator in position ‘resume’ 10b Error 11b Not available	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5	8,7	2 bits	Cruise Control Accelerate Switch	602	M	00b .. 11b, 4 states/2bit, 0 offset 00b Cruise control activator not in position 'accelerate' 01b Cruise control activator in position 'accelerate' 10b Error 11b Not available	√
6		1 Byte	Cruise Control Set Speed	86	M	0 .. 250km/h, 1km/h/bit, 0 offset	√
7	5..1	5 bits	PTO State	976	S	00000b .. 11111b, 32 states/5bit, 0 offset 00000b Off/Disabled 00001b Hold 00010b Remote Hold 00011b Standby 00100b Remote Standby 00101b Set 00110b Decelerate/Coast 00111b Resume 01000b Accelerate 01001b Accelerator Override 01010b Preprogrammed set speed 1 01011b Preprogrammed set speed 2 01100b Preprogrammed set speed 3 01101b Preprogrammed set speed 4 01110b Preprogrammed set speed 5 01111b Preprogrammed set speed 6 10000b Preprogrammed set speed 7 10001b Preprogrammed set speed 8 10010b PTO set speed memory 1 10011b PTO set speed memory 2 10100b .. 11110b Not defined 11111b Not available	√
7	8..6	3 bits	Cruise Control States	527	S	000b .. 111b, 8 states/3bit, 0 offset 000b Off/Disabled 001b Hold 010b Accelerate 011b Decelerate/Coast 100b Resume 101b Set 110b Accelerator Override 111b Not available	√
8	2,1	2 bits	Engine Idle Increment Switch	968	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	√
8	4,3	2 bits	Engine Idle Decrement Switch	967	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	√
8	6,5	2 bits	Engine Test Mode Switch	966	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-
8	8,7	2 bits	Engine Shutdown Override Switch	1237	M	00b .. 11b, 4 states/2bit, 0 offset 00b Off 01b On 10b Error 11b Not available	-

11.5.41. LFE – Fuel Economy (Liquid)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF2xx			100ms, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65266 = 0xFEF2	8	6	0	0	254	242	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2,1		2 Bytes	Engine Fuel Rate	183	M	0 .. 3212.75L/h, 0.05L/h/bit, 0 offset	√
4,3		2 Bytes	Engine Instantaneous Fuel Economy	184	M	0 .. 125.5km/L, 1/512km/L/bit, 0 offset	√
6,5		2 Bytes	Engine Average fuel Economy	185	M	0 .. 125.5km/L, 1/512km/L/bit, 0 offset	√
7		1 Byte	Engine Throttle Position	51	M	0 .. 100%, 0.4%/bit, 0 offset	-
8		1 Byte	Engine Throttle Position	3673	M	0 .. 100%, 0.4%/bit, 0 offset	-

11.5.42. AMB – Ambient Conditions (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF5xx			1s			SAE J1939-71	🖝
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65269 = 0xFEF5	8	6	0	0	254	245	xx = TEMP (Def. 0x21)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Barometric Pressure	108	M	0 .. 125kPa, 0.5kPa/bit, 0 offset	-
3,2		2 Bytes	Cab Interior Temperature	170	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	-
5,4		2 Bytes	Ambient Air Temperature	171	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	√
6		1 Byte	Engine Air Inlet Temperature	172	M	-40 .. 210℃, 1℃/bit, -40℃ offset	-
8,7		2 Bytes	Road Surface Temperature	79	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	-

11.5.43. AMB – Ambient Conditions (send)

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF5xx			1s			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65269 = 0xFEF5	8	6	0	0	254	245	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Barometric Pressure	108	M	0 .. 125kPa, 0.5kPa/bit, 0 offset	√
3,2		2 Bytes	Cab Interior Temperature	170	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5,4		2 Bytes	Ambient Air Temperature	171	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	√
6		1 Byte	Engine Air Inlet Temperature	172	M	-40 .. 210℃, 1℃/bit, -40℃ offset	-
8,7		2 Bytes	Road Surface Temperature	79	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	-

11.5.44. IC1 – Inlet/Exhaust Conditions

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF6xx			500ms			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65270 = 0xFEF6	8	6	0	0	254	246	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Engine Particulate Trap Inlet Pressure	81	M	0 .. 125kPa, 0.5kPa/bit, 0 offset	-
2		1 Byte	Engine Intake Manifold #1 Pressure	102	M	0 .. 500kPa, 2kPa/bit, 0 offset	√
3		1 Byte	Engine Intake Manifold 1 Temperature	105	M	-40 .. 210℃, 1℃/bit, -40℃ offset	√
4		1 Byte	Engine Air Inlet Pressure	106	M	0 .. 500kPa, 2kPa/bit, 0 offset	-
5		1 Byte	Engine Air Filter 1 Differential Pressure	107	M	0 .. 12.5kPa, 0.05kPa/bit, 0 offset	√
7,6		2 Bytes	Engine Exhaust Gas Temperature	173	M	-273 .. 1735℃, 0.03125℃/bit, -273℃ offset	-
8		1 Byte	Engine Coolant Filter Differential Pressure	112	M	0 .. 125kPa, 0.5kPa/bit, 0 offset	-

11.5.45. VEP1 – Vehicle Electrical Power 1

Identifier			Repetition rate			Standard	ADM Direction
0x18FEF7xx			1s, on request			SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65271 = 0xFEF7	8	6	0	0	254	247	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Net Battery Current	114	M	-125 .. 125A, 1A/bit, -125A offset	-
2		1 Byte	Alternator Current	115	M	0 .. 250A, 1A/bit, 0 offset	-
4,3		2 Bytes	Charging System Potential (Voltage)	167	M	0 .. 3212.75V, 0.05V/bit, 0 offset	-
6,5		2 Bytes	Battery Potential / Power Input 1	168	M	0 .. 3212.75V, 0.05V/bit, 0 offset	√
8,7		2 Bytes	Keyswitch Battery Potential	158	M	0 .. 3212.75V, 0.05V/bit, 0 offset	√

11.5.46. DD – Dash Display

Identifier			Repetition rate			Standard	ADM Direction
0x18FEFCxx			1s			SAE J1939-71	☜
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65276 = 0xFEFC	8	6	0	0	254	252	xx = any (dashboard)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Washer Fluid Level	80	M	0 .. 100%, 0.4%/bit, 0 offset	-
2		1 Byte	Fuel Level	96	M	0 .. 100%, 0.4%/bit, 0 offset	√
3		1 Byte	Engine Fuel Filter Differential Pressure	95	M	0 .. 500kPa, 2kPa/bit, 0 offset	-
4		1 Byte	Engine Oil Filter Differential Pressure	99	M	0 .. 125kPa, 0.5kPa/bit, 0 offset	-
6,5		2 Bytes	Cargo Ambient Temperature	169	M	-273 .. 1735°C, 0.03125°C/bit, -273°C offset	-
8,7			Not defined				

11.6. CAN message details of diagnostic messages

11.6.1. DM13 – Diagnostic Message 13, Stop Start Broadcast

Identifier			Repetition rate			Standard	ADM Direction
0x18DFyyxx			sent whenever a Stop or Start Broadcast is necessary, Hold Signal every 5s for maintainance of modified state			SAE J1939-73, SAE J1939-21	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
57088 = 0xDF00	8	6	0	0	223	Destination Address: yy = POW (Def. 0x00), RET (Def. 0x0F)	xx = any

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	SAE J1939 Network #1, Primary vehicle network	639	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	√
1	4,3	2 bits	SAE J1922	622	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-
1	6,5	2 bits	SAE J1587	608	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	√
1	8,7	2 bits	Current Data Link	1230	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	√
2	2,1	2 bits	Other, Manufacture Specified Port	1234	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-
2	4,3	2 bits	SAE J1850	1233	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-
2	6,5	2 bits	ISO 9141	1232	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-
2	8,7	2 bits	SAE J1939 Network #2	1231	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-
3	2,1	2 bits	SAE Reserved				
3	4,3	2 bits	SAE Reserved				
3	6,5	2 bits	SAE Reserved				
3	8,7	2 bits	SAE J1939 Network #3	1235	S	00b .. 11b 00b Stop Broadcast 01b Start Broadcast 10b Reserved 11b Don't Care/take no action (leave as is)	-

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
4	4..1	4 bits	Suspend Signal	2618	S	0000b .. 1111b 0000b Indefinite suspension of all broadcasts 0001b Indefinite suspension of some broadcasts 0010b Temporary suspension of all broadcasts 0011b Temporary suspension of some broadcasts 0100b .. 1101b SAE Reserved 1110b Resumin normal broadcast pattern 1111b Not Available	-
4	8..5	4 bits	Hold Signal[2]	1236	S	0000b .. 1111b 0000b All Devices 0001b Devices whose broadcast state has been modified 0010b .. 1110b Reserved 1111b Not Available	√
6..5		2 Bytes	Suspend Duration	2619	S	0 .. 64255 seconds, 1sec/bit, 0 offset	-
8..7			SAE Reserved				

11.6.2. DM1 – Diagnostic Message 1, Active Diagnostic Trouble Codes (receive)

Identifier			Repetition rate			Standard	ADM Direction
0x18FECAxx			whenever a DTC becomes an active fault and at a normal update rate of 1s thereafter			SAE J1939-73	
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65226 = 0xFECA	8 (Def. variable)	6	0	0	254	202	xx = TCU (Def. 0x03)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Protect Lamp Status	987	S	00b .. 01b 00b Lamp Off 01b Lamp On	-
1	4,3	2 bits	Amber Warning Lamp Status	624	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	6,5	2 bits	Red Stop Lamp Status	623	S	00b .. 01b 00b Lamp Off 01b Lamp On	-
1	8,7	2 bits	Malfunction Indicator Lamp Status	1213	S	00b .. 10b 00b Lamp Off 01b Lamp On 10b Short MIL for WWH OBD (for WWH OBD discriminatory systems, not applicable for other OBD non-discriminatory systems)	-
2	2,1	2 bits	Flash Protect Lamp	3041	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	-
2	4,3	2 bits	Flash Amber Warning Lamp	3040	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	-

[2] The current implementation does not interpret a sequence of messages to stop broadcasts of specific nodes as described in SAE J1939-73, rather the addressed network and the hold signal have to be sent in the same message

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
2	6,5	2 bits	Flash Red Stop Lamp	3039	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	-
2	8,7	2 bits	Flash Malfunction Indicator Lamp	3038	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Class C DTC (for WWH OBD discriminatory display Systems, not applicable for other OBD non-discriminatory display systems) 11b Unavailable / Do Not Flash	-
5 4 3	8..6 8..1 8..1	19 bits	Suspect Parameter Number (SPN)	1214	S	0 .. 524287, 1 SPN/bit	√
5	5..1	5 bits	Failure Mode Identifier (FMI)	1215	S	0 .. 31, 1 FMI/bit	-
6	7..1	7 bits	Occurrence Count	1216	S	0 .. 126, 1 Occurrence count/bit 127 Indicating not available	-
6	8	1 bit	SPN Conversion Method	1706	S	0 SPN represented as Intel format for all 19 bits 1 SPN assumed to be sent most significant bit first or SPN represented as Intel format for most significant 16 bits with 3 least significant bits of 19 bits in with FMI value or SPN represented as Intel format with all 19 bits (least significant sent first)[3]	√
8..7			Not defined				

11.6.3. DM1 – Diagnostic Message 1, Active Diagnostic Trouble Codes (send)

Identifier			Repetition rate			Standard	ADM Direction
0x18FECAxx			on request using PGN 59904 and at a normal update rate of 1s[4]			SAE J1939-73	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65226 = 0xFECA	8 (Def. variable)	6	0	0	254	202	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Protect Lamp Status	987	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	4,3	2 bits	Amber Warning Lamp Status	624	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	6,5	2 bits	Red Stop Lamp Status	623	S	00b .. 01b 00b Lamp Off 01b Lamp On	√

[3] The SPN Conversion Method is applicable by parameter 01/18 (0 = Version 2, 1 = Version 4) as defined in SAE J1939-73 chapter 5.7.1.11 in contrast to the signal where 0 means Version 4 and 1 means Version 1 or 2 or 3

[4] Changed on recommendation of SAE J1939/73 to broadcasting even when there are no active faults, in this case Bytes 3..6 are filled with 0, Bytes 7 and 8 with 0xFF

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	8,7	2 bits	Malfunction Indicator Lamp Status	1213	S	00b .. 10b 00b Lamp Off 01b Lamp On 10b Short MIL for WWH OBD (for WWH OBD discriminatory systems, not applicable for other OBD non-discriminatory systems) – not supplied	√
2	2,1	2 bits	Flash Protect Lamp	3041	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	-
2	4,3	2 bits	Flash Amber Warning Lamp	3040	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	√
2	6,5	2 bits	Flash Red Stop Lamp	3039	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	√
2	8,7	2 bits	Flash Malfunction Indicator Lamp	3038	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Class C DTC (for WWH OBD discriminatory display Systems, not applicable for other OBD non-discriminatory display systems) 11b Unavailable / Do Not Flash	√
5 4 3	8..6 8..1 8..1	19 bits	Suspect Parameter Number (SPN)	1214	S	0 .. 524287, 1 SPN/bit	√
5	5..1	5 bits	Failure Mode Identifier (FMI)	1215	S	0 .. 31, 1 FMI/bit	√
6	7..1	7 bits	Occurrence Count	1216	S	0 .. 126, 1 Occurrence count/bit 127 Indicating not available	√
6	8	1 bit	SPN Conversion Method	1706	S	0 SPN represented as Intel format for all 19 bits 1 SPN assumed to be sent most significant bit first or SPN represented as Intel format for most significant 16 bits with 3 least significant bits of 19 bits in with FMI value or SPN represented as Intel format with all 19 bits (least significant sent first)	√
8..7			Not defined				

11.6.4. DM2 – Diagnostic Message 2, Previously Active Diagnostic Trouble Codes

Identifier			Repetition rate			Standard	ADM Direction
0x18FECBxx			on request using PGN 59904			SAE J1939-73	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65227 = 0xFECB	8 (Def. variable)	6	0	0	254	203	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1	2,1	2 bits	Protect Lamp Status	987	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	4,3	2 bits	Amber Warning Lamp Status	624	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	6,5	2 bits	Red Stop Lamp Status	623	S	00b .. 01b 00b Lamp Off 01b Lamp On	√
1	8,7	2 bits	Malfunction Indicator Lamp Status	1213	S	00b .. 10b 00b Lamp Off 01b Lamp On 10b Short MIL for WWH OBD (for WWH OBD discriminatory systems, not applicable for other OBD non-discriminatory systems) – not supplied	√
2	2,1	2 bits	Flash Protect Lamp	3041	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	-
2	4,3	2 bits	Flash Amber Warning Lamp	3040	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	√
2	6,5	2 bits	Flash Red Stop Lamp	3039	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Reserved 11b Unavailable / Do Not Flash	√
2	8,7	2 bits	Flash Malfunction Indicator Lamp	3038	S	00b .. 11b see SAE J1939-73 / Table 5 for Lamp Command And Lamp Flash Dependency Definition 00b Slow Flash (1 Hz, 50% duty cycle) 01b Fast Flash (2 Hz or faster, 50% duty cycle) 10b Class C DTC (for WWH OBD discriminatory display Systems, not applicable for other OBD non-discriminatory display systems) 11b Unavailable / Do Not Flash	√
5 4 3	8..6 8..1 8..1	19 bits	Suspect Parameter Number (SPN)	1214	S	0 .. 524287, 1 SPN/bit	√
5	5..1	5 bits	Failure Mode Identifier (FMI)	1215	S	0 .. 31, 1 FMI/bit	√
6	7..1	7 bits	Occurrence Count	1216	S	0 .. 126, 1 Occurrence count/bit 127 Indicating not available	√

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
6	8	1 bit	SPN Conversion Method	1706	S	0 SPN represented as Intel format for all 19 bits 1 SPN assumed to be sent most significant bit first or SPN represented as Intel format for most significant 16 bits with 3 least significant bits of 19 bits in with FMI value or SPN represented as Intel format with all 19 bits (least significant sent first)[5]	√
8..7			Not defined				

11.6.5. DM3 – Diagnostic Message 3, Diagnostic Data Clear/Reset Of Previously Active DTCs

Identifier			Repetition rate			Standard	ADM Direction
0x18FECCxx			on request using PGN 59904, a NACK is required if PG is not supported[6]			SAE J1939-73, SAE J1939-21	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65228 = 0xFECC	0	6	0	0	254	204	xx = POW (Def. 0x00), RET (Def. 0x0F)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State

11.6.6. DM4 – Diagnostic Message 4, Freeze Frame Parameters

Identifier			Repetition rate			Standard	ADM Direction
0x18FECDxx			on request using PGN 59904, a NACK is required if PG is not supported			SAE J1939-73, SAE J1939-71	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65229 = 0xFECD	variable[7]	6	0	0	254	205	xx = POW (Def. 0x00)

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
1		1 Byte	Freeze Frame Length	1217	S	0 .. 255, 1 Byte/bit	√
4 3 2	8..6 8..1 8..1	19 bits	Suspect Parameter Number (SPN)	1214	S	0 .. 524287, 1 SPN/bit	√
4	5..1	5 bits	Failure Mode Identifier (FMI)	1215	S	0 .. 31, 1 FMI/bit	√
5	7..1	7 bits	Occurrence Count	1216	S	0 .. 126, 1 Occurrence count/bit 127 Indicating not available	√

[5] Compare footnote 3 for send message DM1
[6] DM3 requests to POW clear all DTCs (active and previously active) and are answered with an ACK, requests to RET are answered with a NACK
[7] No Manufacturer Specific Information is sent, therefore the Freeze Frame Length derives as 13 Bytes per DTC, both active and previously active DTCs are sent in this message

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State
5	8	1 bit	SPN Conversion Method	1706	S	0 SPN represented as Intel format for all 19 bits 1 SPN assumed to be sent most significant bit first or SPN represented as Intel format for most significant 16 bits with 3 least significant bits of 19 bits in with FMI value or SPN represented as Intel format with all 19 bits (least significant sent first)[8]	√
6		1 Byte	Engine Torque Mode	899	M	see SAE J1939-71: 0000b .. 1111b, 16 states/4bit, 0 offset 0000b Low idle governor/no request (default mode) 0001b Accelerator pedal/operator selection 0010b Cruise control 0011b PTO governor 0100b Road speed governor 0101b ASR control 0110b Transmission control 0111b ABS control 1000b Torque limiting 1001b High speed governor 1010b Braking system 1011b Remote accelerator 1100b Service procedure 1101b Not defined 1110b Other 1111b Not available	√
7		1 Byte	Boost	102	M	see SAE J1939-71: Engine Intake Manifold #1 Pressure 0 .. 500kPa, 2kPa/bit, 0 offset	√
9,8		2 Bytes	Engine Speed	190	M	see SAE J1939-71: 0 .. 8031.875rpm, 0.125rpm/bit, 0 offset	√
10		1 Byte	Engine Percent Load	92	M	see SAE J1939-71: Engine Percent Load At Current Speed 0 .. 250%, 1%/bit, 0 offset, operational range: 0 .. 125%	√
11		1 Byte	Engine Coolant Temperature	110	M	see SAE J1939-71: -40 .. 210°C, 1°C/bit, -40°C offset	√
13, 12		2 Bytes	Vehicle Speed	84	M	see SAE J1939-71: Wheel Based Vehicle Speed 0 .. 250km/h, 0,00390625km/h/bit, 0 offset	√
n.. 14		n-13 Bytes	Manufacturer Specific Information				-

11.6.7. DM11 – Diagnostic Message 11, Diagnostic Clear/Reset For Active DTCs

Identifier			Repetition rate			Standard	ADM Direction
0x18FED3xx			on request using PGN 59904, a NACK is required if PG is not supported[9]			SAE J1939-73, SAE J1939-21	✉
Parameter Group Number	**Data Length**	**Priority**	**Extended Data Page**	**Data Page**	**PDU Format**	**PDU Specific**	**Sender Address**
65235 = 0xFED3	0	6	0	0	254	211	xx = POW (Def. 0x00), RET (Def. 0x0F)

[8] Compare footnote 3 for send message DM1
[9] DM11 requests to POW and RET are answered with a NACK, please use DM3 requests to POW to clear all DTCs

Byte	Bit	Length	Signal Name	Spn	Type	Operating Data Range	State