DaimlerChrysler

Adaption Module as Vehicle Control
ADM2

Control Unit **Operating Manual**

Abbreviation	Meaning
ABS	Antiblock system
ADM2	Adaption module as vehicle control, new version
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 vehciles 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 ADM2 and PLD-MR
Minidiag 2	Diagnosis- and configuration unit for the ADM2

Abbreviation	Meaning
NE	Input for transmission position Neutral
PLD-MR	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

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 ADM2 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 ADM2 control unit has been developed and tested in accordance with the DaimlerChrysler 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 DaimlerChrysler engine and the ADM2 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.

DaimlerChrysler 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 ADM2 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 specially skilled persons or those who have received training from DaimlerChrysler, or by specialists employed by a workshop authorised by DaimlerChrysler.

1.5. Conversions and modifications to the ADM2

Unauthorised modifications to the ADM2 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. Organisational measures

These Operating Instructions should be handed to personnel entrusted with the operation of the ADM2 and should, whenever possible, be stored in an easily accessible place.

With the aid of these Operating Instructions, personnel must be familiarised with the operation of the ADM2, 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 ADM2 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
  MR engine control and to the ADM2 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 (DaimlerChrysler connector set).

If temperatures in excess of 80 °C (e.g. in a drying kiln) are to be expected, the control untis 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 jeapardise the engine´s operating safety.

1.9. DaimlerChrysler original parts

DaimlerChrysler 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 DaimlerChrysler.
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 DaimlerChrysler original parts.

If other parts, which have not been tested and approved by DaimlerChrysler, are installed - even if in individual circumstances they have been granted an official operating permit - DaimlerChrysler is unable to assess them or grant any form of warranty, although the company endeavours 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 ADM2, FMR and PLD-MR 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 DaimlerChrysler Service Station.

Note:
The DaimlerChrysler 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 ADM2. ADM2 fault codes and their meanings are described in chapter 9.

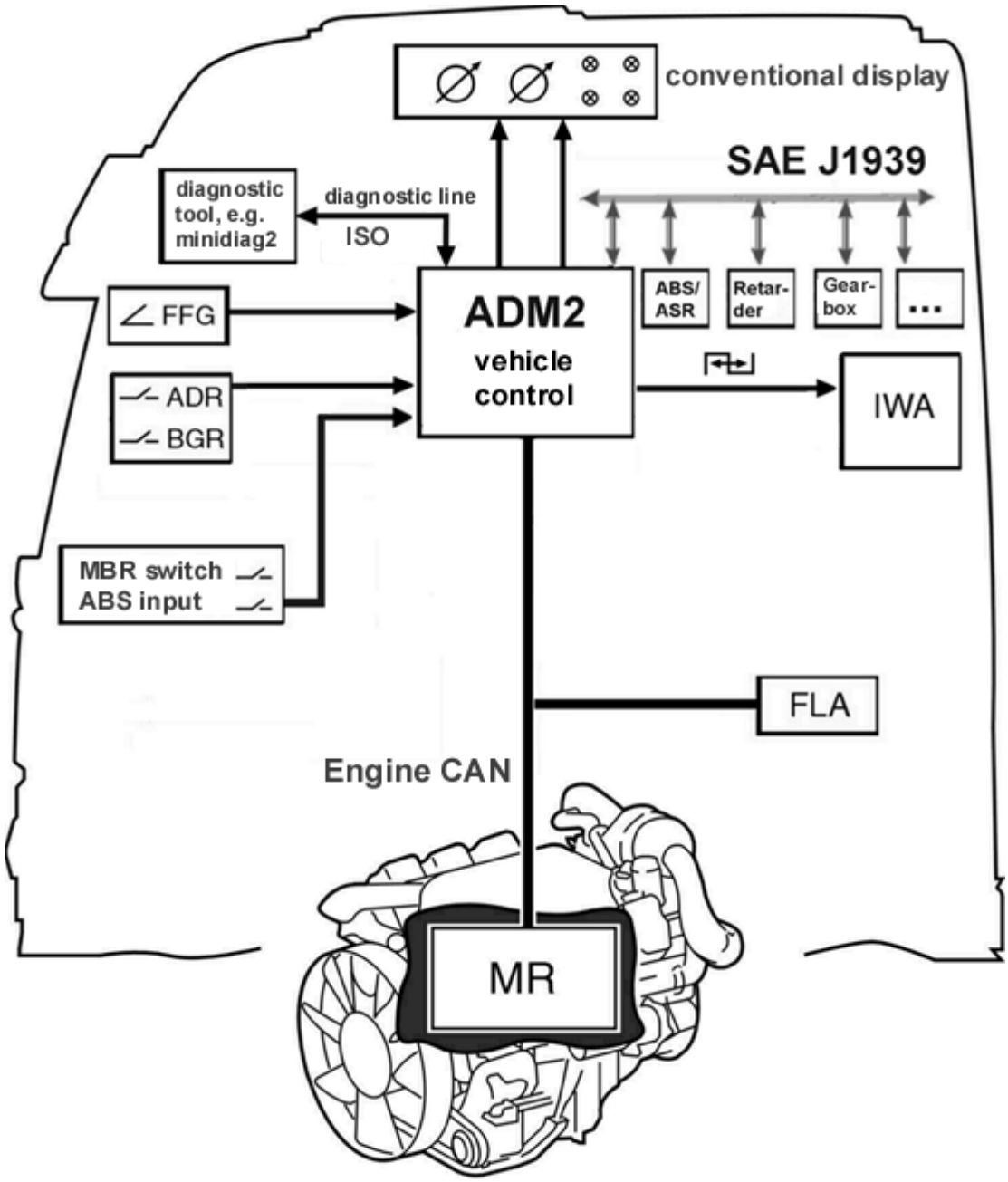
Note:
Defective units which are still within the period of warranty cover (6 months from DaimlerChrysler dispatch date) must be returned to the DaimlerChrysler field service organisation.

2. Operation

2.1. Introduction

DaimlerChrysler 500, 900 and 450 series engines are equipped with an electronic engine control (PLD-MR). The PLD-MR 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 (ADM2) contains the CAN interface required by the PLD-MR and allows the operator to implement his requirements on the engine. On the one hand the ADM2 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).



Adaption module as vehicle control (ADM2):

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 is in this case PLD-MR= Engine control for the injection principle pump-line-nozzle.
Retarder = Control unit for a retarder
SAE J1939 = Data bus according to standard SAE J1939

2.2. Tasks

The tasks of the ADM2 can be split into three areas:
- Functions
- Inputs
- Outputs

2.2.1. Functions

- Driving mode: torque demand to engine control (PLD-MR)
- PTO speed control: Specified rpm to engine control (PLD-MR).
- 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-MR
- Linking with SAE J1939 (High-Speed-CAN-Bus)

2.2.2. Inputs

The ADM2 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 ADM2 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 ADM2 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 inerference (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)

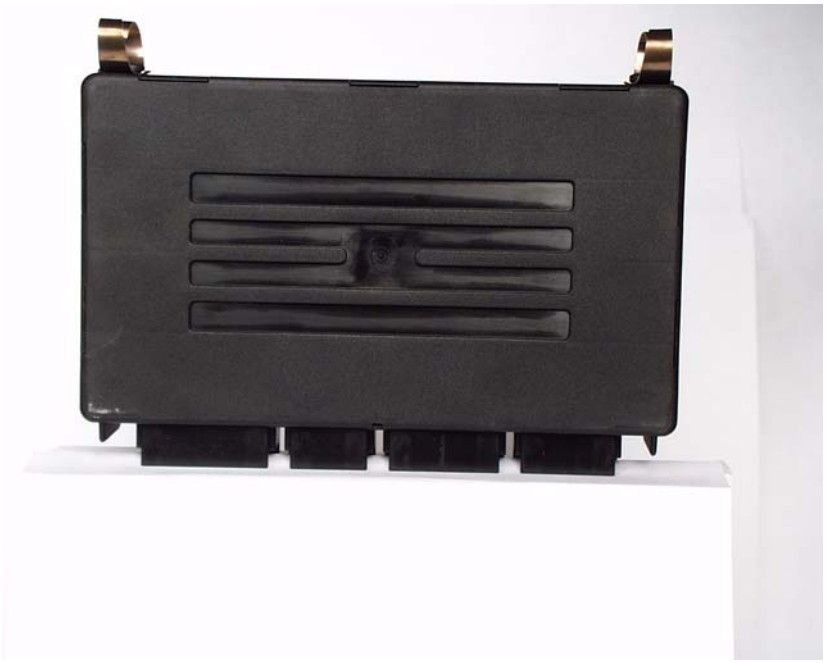
Note*: Either measuring instruments or warning lamps can be connected to the instrument outputs for oil pressure and for coolant temperature.

3. Construction

3.1. Images of the vehicle control adaption module ADM2

Diagonal view of ADM2

Black space for the type label
Connector sizes from fromt the left to the right
Connector 15 pin
Connector 18 pin
Connector 12 pin
Connector 21 pin



Installation position in the vehicle or view of rear side of the ADM2

Connector sizes from the left to the right:
Connector 21 pin
Connector 12 pin
Connector 18 pin
Connector 15 pin

View of connector side of ADM2

Connector sizes from the left to the right:
Connector 15 pin
Connector 18 pin
Connector 12 pin
Connector 21 pin

3.2. Functional description of the ADM2 pins

21 pin connector				
pin	**type**	**function**	**short cut**	**description**
21/01		battery voltage	Kl. 30	supply voltage (12V/24V)
21/02	DE	ignition (switched battery voltage)	Kl. 15	ignition switch (terminal15)
21/03		ground	Kl. 31	battery ground
21/04	A	warning lamp oil level	LA_ OELST	output active, if oil level to low. feature only avaiable 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 to low or ecu detects externel 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 gridheater	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 terminalC.
21/10				reserved

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

21 pin connector (continued)				
pin	**type**	**function**	**short cut**	**description**
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 PWMpedal 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 PWMpedal 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 service brake is depressed
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
E/A = input/output (bidirectional)
DE = digital input
AE = analog input
IE = pulse input

18 pin connector				
pin	**type**	**function**	**short cut**	**description**
18/01	A	relay 4	REL4	Output of the actual value comparator.4 (IWK4): Parameter values: 0 = kickdown position 1 = actual value tource 2 = vehicle speed 3 = engine speed 4 = coolant temperature (lamp, temp. to low) 5 = pedal torque 6 = booster air temperature 7 = warning lamp oil pressure 8 = warning lamp coolant temperature
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-	normaly open push-button for cruise control „set and decellerate“
18/05	DE	cruise control CC+	CC+	normaly open push-button for cruise control „resume and accellerate“.
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.

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

18 pin connector (continued)				
pin	**type**	**function**	**short cut**	**description**
18/13	DE	engine shutdown override	M AB SCH _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	LUEF-TER	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
E/A = input/output (bidirectional)
DE = digital input
AE = analog input
IE = pulse input

12 pin connector				
pin	**type**	**function**	**short cut**	**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 to low)
12/04	A	coolant temperature	T_MOT	low side output, short protected configurable for - analog coolant temperature gauge - warning lamp coolant temperature (temperature to low)
12/05	A	actual value output (PWM)	IWA	configurable output for actual values: 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
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	clutch linked switch 2	KUP2	feature not yet available
12/08	DE	engine-hood switch	MOKL	**##valid from the diagnosis version 204** Switch to ground. Normally open. If switch is closed: indicates opened engine-hood. Engine start via terminal 50 or J1939 ESS is locked.

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

12 pin connector (continued)				
pin	**type**	**function**	**short cut**	**description**
12/09	DE	configurable input	DSF1	configurable input, switch to ground, normally open 0 = disabled 1 = ABS 2 = Retarder 3 = Temposet (set rodspeed limit) 4 = grid heater detection 5 = minimal torque 6 = remote cab driving
12/10	DE	configurable input	DSF0	configurable input, switch to battery voltage, normally open 0 = disabled 1 = ABS 2 = Retarder 3 = Temposet (set rodspeed limit) 4 = grid heater detection 5 = minimal torque 6 = remote cab driving
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
E/A = input/output (bidirectional)
DE = digital input
AE = analog input
IE = pulse input

15 pin connector				
pin	**type**	**function**	**short cut**	**description**
15/01	DE	transmission neutral	NE	switch to ground, normally open, disables engine start, if closed
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. 0 = disabled 1 = grid heater 2 = acc. pedal idle position
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.

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

15 pole connector (continued)				
pin	**type**	**function**	**short cut**	**description**
15/11	A	relay 3	REL3	configurable low side output for actual values: (actual value comparator 3 (IWK3)) 0 = acc. pedal idle position 1 = actual torque 2 = vehicle speed 3 = engine speed 4 = coolant temperature (lamp, temp. to low) 5 = acc. pedal torque 6 = booster temperature 7 = warning lamp oil pressure 8 = warning lamp coolant temperature
15/12	A	relay 1	REL1	configurable low side output for actual values: 0 = disabled 1 = starter protection 2 = acc. pedal kick down position 3 = transmission output 1
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
E/A = input/output (bidirectional)
DE = digital input
AE = analog input
IE = pulse input

3.3. Technical data of pin assignment

Power supply						
pin	**function**	**abbrev.**	**U_{MAX}**	**U_{MIN}**	**I_{MAX}**	**further data**
21/01	battery voltage	Kl. 30	32 V at U_B=24 V, 16 V at U_B=12V	16 V at U_B=24 V, 10 V at U_B=12V	300 mA	no external load
					50 µA	ADM2 switched off
21/02	ignition (switched battery voltage)	Kl. 15	U_B			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, terminal 1/9 und 3/9.
					100 mA	short protected, ground connection for analogen 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

dynamic inputs (IE)						
pin	**funktion**	**abbrev**	**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 resistor 47 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

digital inputs (DE)							
pin	**funktion**	**abbrev**	**U_{MAX}**	**U_{MIN}**	**U_{LOW}**	**U_{HIGH}**	**further data**
21/15	service brake switch	BRE	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
21/16	park brake switch	FSBE	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/02	clutch switch	KUP1	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/04	cruise control CC-	CC-	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/05	cruise control CC+	CC+	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/06	cruise control on/off	CC_ EIN	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/07	throttle select	FG_ WAHL	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/08	engine brake low	MBR_ L	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/09	engine brake high	MBR_ H	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/10	remote PTO	PTO	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/11	limiter 0	LIM0	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm .
18/12	limiter1	LIM1	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/13	engine shutdown override	M AB SCH _SP	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/14	limiter 2 (air condition)	KLIMA	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
18/15	fan override	LUEF- TER	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm
18/16	throttle inhibit	FP_SP	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 5 kOhm

digital inputs (DE) (continued)							
pin	**funktion**	**abbrev**	**U_{MAX}**	**U_{MIN}**	**U_{LOW}**	**U_{HIGH}**	**further data**
15/01	transmission neutral	NE	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
15/02	dual speed axle	HA	U_B	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	U_B	0 V	< 3,0 V	> 7,0 V	pull up resistor 2,35 kOhm
12/10	configurable input	DSF0	U_B	0 V	< 3,5 V	> 8,2 V	pull down resistor 7,7kOhm
12/11	engine stop (external)	STOP_ EXT	U_B	0 V	< 3,5 V	> 8,2 V	pull down resistor 7,7kOhm

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

output for indicating instruments(A)							
pin	**function**	**abbrev**	**I_{MAX}**	**U_{MAX}**	**U_{MIN}**	**f**	**further data**
12/03	oil pressure	P_OEL	120 mA	U_B	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	U_B	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	U_B	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	U_B	0 V	0...8 kHz	frequency low side driver pull up resistor 4,7 kOhm, short protected

driver output (A)						
pin	**function**	**abbrev**	**I_{MAX}**	**U_{MAX}**	**P_{MAX} lamp**	**further data**
21/04	warning lamp oil level	LA_ OELST	250 mA	U_B	2 W at 12 V	low side relay driver, short protected
21/05	stop engine lamp (buzzer)	LA_ STOP	250 mA	U_B	2 W at 12 V	low side relay driver, short protected
21/06	check engine lamp (yellow)	LA_ ADM	150 mA	U_B	2 W at 12 V	low side relay driver, short protected
21/07	lamp gridheater	LA_ GRID	250 mA	U_B	2 W at 12 V	low side relay driver, short protected
21/08	warning lamp air filter	LA_ LUFT	250 mA	U_B	2 W at 12 V	low side relay driver, short protected
18/01	relay 4	REL4	1,3 A	U_B		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	U_B		high side driver
	gear output 1					high side driver
15/06	engine brake 2, exhaust flap	MBR-BK	2 A	U_B		high side relay driver
15/09	relay 2	REL2	2 A	U_B		low side relay driver, short protected
15/10	engine brake 1, constant throttle	MBR-KD	1,8 A	U_B		high side relay driver
15/11	relay 3	REL3	250 mA	U_B		low side relay driver, short protected
15/12	relay 1	REL1	1,3 A	U_B		low side relay driver, short protected

communication interface (E/A)						
pin	**function**	**abbrev**	**potential**	**U_{MAX}**	**U_{MIN}**	**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 U_B	1/3 U_B	ISO/DIS 11992, one wire capability
15/14	CAN-HF-Ground	MCAN_GND	GND			100 nF nach Masse
15/15	Engine-CAN (Low)	MCAN_L		2/3 U_B	1/3 U_B	ISO/DIS 11992, one wire capability
12/02	k-line	K_DIAG	U_B	U_B	0 V	

4. Parameter

The parameters of the ADM2 are divided into 24 groups. Each parameter group corresponds to a functional group.

4.1. List of parameters

Parameter group	Parameter	Default value	Range Min	Range Max	Unit
1 CAN configuration **(**valid from the diagnosis version 203 [with the parameters 1/03 until 1/06] onwards)** **(##valid from the diagnosis version 204) onwards**	01 One wire capability Engine CAN (MCAN) 1 = enable one wiret mode, 0 = only two wire mode	1	0	1	-
	02 SAE J1939 3. Source Address TSC1 (e.g. jack knife protection)	231	0	255	-
	03 SAE J1939 Source Address Engine**	0	0	255	-
	04 SAE J1939 Source Address Engine Brake**	15	0	255	-
	05 SAE J1939 Source Address Transmission**	3	0	255	-
	06 SAE J1939 Source Address ABS**	11	0	255	-
	07 SAE J1939 Source Address Intarder##	10	0	255	-

Parameter group	Parameter	Default value	Range Min	Range Max	Unit
2 Operating mode-configuration **(**valid from the diagnosis version 203 [with the new parameter 2/14] onwards)** **##valid from the diagnosis version 204**	01 Idle-speed adjustment/ desired idle speed single step increase/decrease	10	0	100	1/min
	02 Desired Idle Speed Ramp Rate Increase/Decrease	1	0	1000	1/min/ 10ms
	03 Maximum Adjusted Idle Speed	850	0	4000	1/min
	04 Max. Road Speed for Idle Speed Adjustment	10	0	48	km/h
	05 Transmission type: 0 = Manual Transmission 1 = Automated Shift Transmission Clutch via ETC1 2 = Automatic Transmission 3 = Automatic Transmission with standig start help## 4 = Manual Transmission with starter interlock ## 5 = Automated Shift Transmission Clutch via Pin 18/02	0	0	2	-
	06 ABS-Type: 0 = No ABS 1 = with ABS	0	0	1	-
	07 Relay 2: 0= disabled 1 = Grid Heater 2 = Accelerator Pedal Idle Position	2	0	2	-
	08 24/12 Volt use: 0= 24 V; 1=12 V	0	0	1	-
	09 Response PLD-MR if engine CAN failure (MCAN): 0 = Idle Speed 1 = Engine Stop 2 = Limp Home Speed 3 = Limp Home Speed	3	0	3	-

2 Operating mode-configuration **(**valid from the diagnosis version 203 [with the new parameter 2/14] onwards)** **##valid from the diagnosis version 204**	10 Engine Speed Limit while Engine Stop	3000	0	4000	1/min
	11 Ramp Smoke Limiter	10	0	100	Nm/10ms
	12 Configuration Output FP+: 0 = Output disabled 1 = Transmission Output1 2 = Power Supply PWM Accelerator Pedal	2	0	2	-
	13 Configuration engine brake MBR	1	0	4	-
	14 Temperature Correction Block Heater **	0	-20	20	°C
	15 Enable Free-Running diagnosis##	0	1	1	

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
3 general limitations –Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.	01 Minimum Engine Speed	500	0	4000	1/min
	02 Maximum Engine Speed	3000	0	4000	1/min
	03 Maximum Road Speed (legal)	85	48	85	km/h
	04 Maximum Engine Torque	5000	0	5000	Nm
	05 speed limiter-switch on threshold	8	0	100	km/h
	06 speed limiter-proportional part	100	0	500	Nm/km/h
	07 speed limiter-integral part	150	0	500	Nm/km/h/s
	08 speed limiter-low pass factor	0,050	0,000	1,000	-
	09 torque band engine jerking	0	0	2000	Nm
	10 coefficient engine jerking	1	1	50	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
4 Damper of engine jerking in PLD-MR –Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers.	01 activate function 0=not active 1=active	0	0	1	-
	02 droop parameter	0,30	0,00	5,00	%/1/min
	03 frequency limit	1,0	0,0	25,0	Hz
	04 maximum position accelerator pedal for damper of engine jerking	25	0	100	%
	05 maximum speed for damper of engine jerking	900	0	4000	1/min
	06 maximum torque for damper of engine jerking	50	0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
5 variable limits No. 0 (Pin LIM0) and No.1 (Pin LIM1)	01 minimum engine speed LIM0	500	0	4000	1/min
	02 maximum engine speed LIM0	4000	0	4000	1/min
	03 maximum road speed LIM0	200	0	200	km/h
	04 maximum torque LIM0	5000	0	5000	Nm
	05 minimum engine speed LIM1	500	0	4000	1/min
	06 maximum engine speed LIM1	4000	0	4000	1/min
	07 maximum road speed LIM1	200	0	200	km/h
	08 maximum torque LIM1	5000	0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
6 variable limits No. 2 (Pin KLIMA)	01 minimum engine speed Klima	500	0	4000	1/min
	02 maximum engine speed Klima	4000	0	4000	1/min
	03 maximum road speed Klima	200	0	200	km/h
	04 maximum torque Klima	5000	0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
7 Configuration PTO speed control (ADR) **(* valid only in the diagnosis version 202 with the old parameter values of 7/10)** **(** valid from the diagnosis version 203 [with the new parameter values of 7/10] onwards)**	01 PTO speed control: 0=disabled 1=enabled 2=enabled if neutral (input NE) 3=only if neutral and parking brake (input NE and FSBE)	0	0	3	-
	02 Maximum PTO Speed with CC+ Switch	3000	500	3000	1/min
	03 Minimum PTO Speed with CC- Switch	500	500	3000	1/min
	04 Speed demand through accelerator pedal 0= not active 1= active	1	0	1	-
	05 Maximum engine speed accelerator pedal if PTO	3000	0	3000	1/min
	06 PTO dropout on parking brake or service brake enabled 0= no; 1= yes	0	0	1	-
	07 PTO dropout on clutch enabled 0= no; 1= yes	0	0	1	-
	08 Maximum Road Speed in PTO Mode	10	0	128	km/h
	09 PTO Set Speed with CC-Switch	500	0	3000	1/min

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
7 Configuration PTO speed control (ADR) **(* valid only in the diagnosis version 202 with the old parameter values of 7/10)** **(** valid from the diagnosis version 203 [with the new parameter values of 7/10] onwards)**	10)PTO Governor Type with CC- Switch	1	0	14	*
		1	1	5	**
	11 Maximum PTO Torque with CC- Switch	5000	0	5000	Nm
	12 PTO Set Speed with CC+ Switch	500	0	3000	1/min
	13 PTO Governor Type with CC+ Switch	1	0	14	*
		1	1	5	**
	14 Maximum PTO Torque with CC+ Switch	5000	0	5000	Nm
	15 PTO Ramp rate	1000	25	2500	1/min/s
	16 Number of Speeds via Remote PTO	1	1	3	-
	17 PTO Speed #1	950	500	3000	1/min
	18 PTO Speed #1 Governor Type	1	0	14	*
		1	1	5	**
	19 PTO Speed #1 Maximum Engine Torque	5000	0	5000	Nm
	20 PTO Speed #2	1250	500	3000	1/min
	21 PTO Speed #2 Governor Type	1	1	14	*
		1	1	5	**
	22 PTO Speed #2 Maximum Engine Torque	5000	0	5000	Nm
	23 PTO Speed #3	1850	500	3000	1/min
	24 PTO Speed #3 Governor Type	1	1	14	*
		1	1	5	**
	25 PTO Speed #3 Maximum Engine Torque	5000	0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
8 speed signal	01 speed sensor: 0= disabled, no speed signal, 1= C3 2= Square-wave sensor 3= via SAE J1939 ETC1 (output shaft speed) **##valid from the diagnosis version 204** 4= inductive sensor 5= via SAE J1939 TCO1 (vehicle speed and output shaft speed)	1	0	3	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
9 Actual value output **##valid from the diagnosis version 204**	01 Configuration actual value output (IWA): 0= no output 1= throttle torque (10 ... 90 %) 2= differential torque (limit load signal) 3= throttle torque inverted (90 ... 10 %) 4= actual torque 5= load signal (automatic transmission) 6= road speed 7= nominal speed 8= Tipptastenfahren ##	1	0	7 8##	-
	02 engine speed display output N_MOT (correlation of frequency to engine speed refer to chapter 4.2)	2173	200	15000	-
	03 oil pressure display output P_OEL 0= lamp 1= 5 bar instrument 2= 10 bar instrument	1	0	2	-
	04 coolant temperature display output T_MOT 0= lamp 1= instrument	1	0	1	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
10 Configuration engine brake — Adjustment of parameters 10/01 until 10/21 only in driving test and only through skilled workers with know-how in control engineering **(For the parameters 10/11 until 10/21 compare with standard SAE J1939/71, edition 10/1998)**	01 minimum engine speed MBR	1100	0	4000	1/min
	02 Maximum Throttle Position for Engine Brakes (MBR)	4	0	100	%
	03 Enable Engine Brakes on Service Braking 0 = disable; 1 = enable	0	0	1	
	04 Minimum Road Speed for Engine Brake Operation	0	0	200	km/h
	05 Enable Engine Brake on Cruise Control 0 = disable; 1= enable	0	0	1	-
	06 Cruise control MBR_L On	5	0	48	km/h
	07 Cruise control MBR_L Off	2	0	48	km/h
	08 Cruise control MBR_H On	7	0	48	km/h
	09 Cruise control MBR_H Off	5	0	48	km/h
	10 Speed limitation with engine brake 0 km/h = Off	5	0	48	km/h
	11 Type engine brake, refer to standard SAE J1939 chapter 5.2.2.2 and chapter 5.2.2.3 3 = MBR_KD (constantly open valve) 4 = MBR_BK (engine retarder flap) 255= not defined	255	0	255	-
	12 Steps engine brake info for SAE J1939 data bus, standard - chapter 5.2.1.50 0= continuously 1..n= 1-.. n step 255= not defined	255	0	255	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
10 Configuration engine brake — Adjustment of parameters 10/01 until 10/21 only in driving test and only through skilled workers with know-how in control engineering —The basic values of parameters 10/11 until 10/12 indicate, that their value is not defined, so that all these values have to be parameterized. **(For the parameters 10/11 until 10/21 compare with the standard SAE J1939/ 71, edition 10/1998).**	13 Reference braking torque info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.49		0	5000	Nm
	14 Engine speed1 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.41		0	4000	1/min
	15 Torque 1 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.45		0	5000	Nm
	16 Engine speed 2 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.43		0	4000	1/min
	17 Torque 2 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.46		0	5000	Nm
	18 Engine speed 3 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.44		0	4000	1/min
	19 Torque 3 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.47		0	5000	Nm
	20 Engine speed 4 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.44		0	4000	1/min
	21 Engine speed 4 info MBR-characteristic curve to SAE J1939 data bus, Chapter 5.2.1.47		0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
10 Configuration engine brake **(For the parameters 10/11 until 10/21 compare with the standard SAE J1939/ 71, edition 10/1998).** **##valid from the diagnosis version 204**	22 Cruise control both MBR_L and MBRH On ##	10	0	48	km/h
	23 Cruise control both MBR_L and MBRH Off ##	6	0	48	km/h
	24 Engin brake configuration ##	0	0	1	
	25 Engine brake stage 1 mask	64	0	255	
	26 Engine brake stage 1 factor	100	0	100	%
	27 Engine brake stage 2 mask	80	0	255	
	28 Engine brake stage 2 factor	100	0	100	%
	29 Engine brake stage 3 mask	80	0	255	
	30 Engine brake stage 3 factor	100	0	100	%
	31 Engine brake transmission mask	64	0	255	
	32 Engine brake transmission factor	100	0	100	%

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
11 Configuration accelerator pedal — Adjustment of parameters 11/01 until 11/08 only in driving test and only through skilled workers with know-how in control engineering **(* valid only for the diagnosis version 202 without the parameters 11/20 until 11/24)** —The parameters 11/09 until 11/10 can only be read and not be parameterized. —Adjustment of parameters 11/20 until 11/24 only in driving test and only through skilled workers with know-how in control engineering **(** valid from diagnosis version 203 [with the new parameters 11/20 until 11/24 and the now disabled parameters 11/09, 11/10 and 11/19] onwards)**	01 Accelerator Pedal Type: 0 = not available 1 = PWM FFG 2 = analog FFG Type 1 **##valid from the diagnosis version 204** 3 = analog FFG Type 1	2	0	2 3##	-
	02 Analog FFG Kickdown	22	0	40	%
	03 Limp Home Engine Speed	1300	0	4000	1/min
	04 Limp Home Ramp On	250	0	1000	1/min/s
	05 Limp Home Ramp Off	100	0	1000	1/min/s
	06 Ramp FFG limp-home Off	50	0	100	%/s
	07 PWM Pedal Kickdown Switch On	4	0	40	%
	08 PWM FFG Kickdown Off	14	0	40	%
	09 *analog FFG taught-in, Parameter can only be read!	0	0	1	-
	10 *PWM FFG taught-in, Parameter can only be read!	0	0	1	-
	20 FFG Low-pass Filter Tau Large Signal Range **	0,00	0,00	10,00	s
	21 FFG Low-pass Filter Tau Small Signal Range **	0,00	0,00	10,00	s
	22 FFG Low-pass Filter Small Signal Range **	0	0	100	%
	23 Accelerator Pedal Ramp % Up **	0	0	100	%/10ms
	24 Accelerator Pedal Ramp % Down	0	0	100	%/10ms

Parameter group	Parameter	Default value	Range Min	Range Max	Unit
12 Configuration torque reversing damper	01 Torque threshold	25	0	5000	Nm
	02 Hysteresis	50	0	5000	Nm
	03 negativ e gradient inside band	1	0	5000	Nm/10ms
	04 positive gradient inside band	5	0	5000	Nm/10ms
	05 positive gradient outside band	45	0	5000	Nm/10ms

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
13 Configuration inputs **(**valid from the diagnosis version 203 [with the parameters 13/08 and 13/09 and the new values 5 and 6 of the parameters 13/06 and 13/07] onwards)** **(##valid from the diagnosis version 204**	01 Sensor coolant level, input KW_SE: 0= no sensor 1= sensor available	0	0	1	-
	02 Air filter sensor input LF_SE: 0= no sensor 1= sensor available	0	0	1	-
	03 Service break, input BRE: 0= not available 1= available	1	0	1	-
	04 Transmission neutral position, input NE: 0= not available 1= Pin 15/01 **##** **0=J1939 ETC2 current gear** **1 = Pin 15/10**	1	0	1	-

13 Configuration inputs **(**valid from the diagnosis version 203 [with the parameters 13/08 and 13/09 and the new values 5 and 6 of the parameters 13/06 and 13/07] onwards)** **(##valid from the diagnosis version 204**	05 Parking brake, input FSBE: 0= not available 1= available	1	0	1	-
	06 Configuration variable input DSF0: 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 crane cab engine##	0	0	6	-
	07 Configuration variable input DSF1: 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 crane cab engine##	1	0	6	-
	08 switchable torque demand with DSF0 **	-5000	-5000	5000	Nm
	09 switchable torque demand with DSF1 **	-5000	-5000	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
14 Switching threshold relay 3 + relay 4	01 Configuration (IWK3) actual value comparator 3: 0= FFG idle position 1= actual torque 2= road speed 3= engine speed 4= coolant temperature 5= FFG torque 6= boost pressure 7= warning lamp oil pressure 8= warning lamp coolant temperature	0	0	8	-
	02 IWK3 torque M	4999	0	5000	Nm
	03 IWK3 hysteresis M	50	0	5000	Nm
	04 IWK3 speed v	150	0	150	km/h
	05 IWK3 hysteresis v	5	0	150	km/h
	06 IWK3 engine speed n	3998	0	4000	1/min
	07 IWK3 hysteresis n	50	0	4000	1/min
	08 IWK3 temperature	200	-50	200	°C
	09 IWK3 hysteresis T	5	0	200	°C
	10 Configuration (IWK4) actual value comparator 4: 0= FFG kickdown position 1= actual torque 2= road speed 3= engine speed 4= coolant temperature 5= FFG torque 6= boost temperature 7= warning lamp oil pressure 8= warning lamp coolant temperature	0	0	8	-
	11 IWK4 torque M	4999	0	5000	Nm
	12 IWK4 hysteresis M	50	0	5000	Nm
	13 IWK4 speed v	150	0	150	km/h
	14 IWK4 hysteresis v	5	0	150	km/h
	15 IWK4 speed n	3998	0	4000	1/min
	16 IWK4 hysteresis n	50	0	4000	1/min

14 Switching threshold relay 3 + relay 4	17 IWK4 temperature	200	-50	200	°C
	18 IWK4 hysteresis T	5	0	200	°C

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
15 Cruise control	01 minimum speed for cruise control	48	38	152	km/h
	02 maximum speed for cruise control	152	48	152	km/h
	03 step speed CC+	2	0	10	km/h
	04 step speed CC-	2	0	10	km/h
	05 ramp up	2	0	20	km/h/s
	06 ramp down	2	0	20	km/h/s
	07 automatic resumption after gear shift: 0=not active 1=active	0	0	1	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
16 Configuration relay1 — Adjustment of parameters 16/01 and 16/18 until 16/20 only in driving test and only through skilled workers with know-how in control engineering	01 relay 1: 0= not active 1= starter protection 2= FFG kickdown position 3= transmission output1	2	0	3	-
	18 maximum starting time	30	0	120	s
	19 minimum speed	80	0	500	1/min
	20 switch-off time	1	0	30	s

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
17 Idle shoutdown —Adjustment of parameters 17/01 until 17/09 only in driving test and only through skilled workers with know-how in control engineering	01 Idle shoutdown: 0 = disable 1 = enable	0	0	1	-
	02 Maximum Idle Time	60	1	1000	s
	03 PTO-Shutdown: 0 = disable 1 = enable	0	0	1	
	04 PTO Shutdown Time	60	1	100	s
	05 Torque Threshold for PTO Shutdown	100	0	5000	Nm
	06 Warning period Check Engine Light	20	3	120	s
	07 Warning period Stop Engine Light	10	3	120	s
	08 Minimum Coolant Temperature for Engine Shutdown	-10	-40	200	°C
	09 Shutdown Override, Input MABSCH_SP: 0 = disable 1 = enable	1	0	1	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
18 Engine Protection Shutdown  —Adjustment of parameters 18/01 until 18/09 only in driving test and only through skilled workers with know-how in control engineering	01 Engine Temperature: 0 = disable 1 = enable	0	0	1	-
	02 Coolant Level: 0 = disable 1 = enable	0	0	1	-
	03 Oil Pressure: 0 = disable 1 = enable	0	0	1	-
	04 Oil Level: 0 = disable 1 = enable	0	0	1	-
	05 Engine Protection Shutdown Time	60	1	120	s
	06 Engine Protection Time on Oil Pressure	30	1	120	s
	07 Counter of Engine Protection Shutdown Overrides	0	0	255	-
	08 Warning Period for Check Engine Light	20	3	120	s
	09 Warning period Engine Stop Light	10	3	120	s

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
19 Automatic Fan Activation	01 Enable Automatic Fan Activation on Engine Brake				
	ADM2, Diag.-Vers. 202: 0 = disable 1 = enable	0	0	1	-
	ADM2, Diag.-Vers. 203: Percentage of the fan power,	0	0	100	%
	02 Enable Automatic Fan Activation on Air Conditioner				

19 Automatic Fan Activation	ADM2, Diag.-Vers. 202: 0 = disable 1 = enable	0	0	1	-
	ADM2, Diag.-Vers. 203: Percentage of the fan power,	0	0	100	%
	03 Enable Automatic Fan Activation on PTO				
	ADM2, Diag.-Vers. 202: 0 = disable 1 = enable	0	0	1	-
	ADM2, Diag.-Vers. 203: Percentage of the fan power,	0	0	100	%
	ADM2, Diag.-Vers. 202: 04 Switch On Temperature Automatic Fan	40	-40	200	°C
	ADM2, Diag.-Vers. 203: 04 Tmot 0% Fan	80			
	ADM2, Diag.-Vers. 202: 05 Switch Off Temperature Automatic Fan	37	-40	200	°C
	ADM2, Diag.-Vers. 203: 05 Tmot 100% Fan	100			
	ADM2, Diag.-Vers. 203: 06 DSF0 Fan	50	0	100	%
	07 DSF1 Fan ADM2, Diag.-Vers. 203:	50	0	100	%
	08 Hold Time Fan ADM2, Diag.-Vers. 203:	10	0	600	s
	09 Ramp Fan ADM2, Diag.-Vers. 203:	25	1	100	%/s
	10 Fan Activation via Input Fan ADM2, Diag.-Vers. 203:	100	0	100	%

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
20 Remote Accelerator Pedal —Adjustment of parameters 20/02 until 20/06 only in driving test and only through skilled workers with know-how in control engineering	01 Remote Accelerator Pedal: 0 = disable 1 = enable	0	0	1	-
	02 Delay Time for Remote Accelerator Pedal Calibration	1,00	0,00	5,00	s
	03 Maximum Change of Remote Accelerator Pedal Wide Open	1	0	15	%
	04 Remote Accelerator Pedal Signal Filter	0,500	0,000	1,000	-
	05 Remote Accelerator Pedal Idle Position	10	0	20	%
	06 Remote Accelerator Pedal Wide Open Position	78	70	85	%

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
21 Driving Mode with PTO	ADM2, Diag.-Vers. 202: 01 Activate Driving Mode with PTO: 0 = disable 1 = enable	0	0	1	*
	ADM2, Diag.-Vers. 203: 01 Activate Driving Mode with PTO: 0 = disable 1 = without pedal free travel 2 = with pedal free travel	0	0	2	**
	02 Driving Mode PTO Governor Type	1	0	15	*
	03 Driving Mode PTO Maximum Torque	5000	0	5000	Nm

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
22 vehicle speed sensor	01 Axle Ratio	5,290	1,000	20,000	-
	02 Number of Teeth	16	0	250	-
	03 Tire Revolutions	312	160	1599	1/km
	04 Gear Ratio	1,000	0,100	2,550	-
	05 2. Axle Ratio (Rear Axle)	5,290	1,000	20,000	-

Parameter group	Parameter	Basic value	Range Min	Range Max	Unit
24 Accelerator Pedal Extra —Adjustment of parameters 24/01 until 24/05 only in driving test and only through skilled workers with know-how in control engineering	01 Torque Ramp	1	0	5000	Nm/ 100 ms
	02 Accelerator Pedal Minimum Speed	0	0	100	%
	03 Accelerator Pedal Maximum Speedl	100	0	100	%
	04 P-Faktor	4000	20	20000	-
	05 Accelerator Pedal Filter	0,500	0,000	1,000	-

Parameter group 23: Speed limiter extra:
Access to this group is not possible.

4.2. Description of parameters

1 CAN Configuration	
Parameter	**Description**
01 One wire capability Engine CAN (MCAN) 1 = enable one wire mode, 0 = only two wire mode	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 ADM2 and the engine control PLD-MR 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 ADM2 and the engine control PLD-MR must have identical settings.
02 SAE J1939 3. Source Address TSC1 (e.g. jack knife protection)	Programmable source address of jack knife protection on SAE J1939 data bus.
03 SAE J1939 Source Address Engine**	Programmable source address of the respective participant on the data bus SAE J1939. **** These addresses are not programmable until the diagnosis version 203 of the ADM2 .**
04 SAE J1939 Source Address Engine Brake **	
05 SAE J1939 Source Address Transmission**	
06 SAE J1939 Source Address ABS**	
07 SAE J1939 Source Address Intarder (ETC1)##	**##These addresses are not programmable until the diagnosis version 204 of the ADM2 .** This adress is used for receiving J1939 ETC1 (PGN 64440)

2 Configuration driving mode

The vehicle control adaption module (ADM2) 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 ADM2 determines an engine torque nominal value based on the accelerator pedal position, and transmits this value to the engine electronics PLD-MR 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.

Parameter	Description
01 Idle-speed adjustment/ 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 cruise-control tip switches and is of the same size when increasing with CC+ and decreasing with CC-
02 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.
03 Maximum Adjusted Idle Speed	Upper final value of idle speed adjustment.
04 Max. Road Speed for Idle Speed Adjustment	Limit speed of the vehicle, up to which the idle-speed adjustment is enabled.

2 Configuration driving mode (continued)	
Parameter	**Description**
05 Transmission type: 0 = Manual Transmission 1 = Automated Shift Transmission 2 = Automatic transmission **##valid from the diagnosis version 204:** 05 Transmission type: 0 = Manual Transmission 1 = Automated Shift Transmission Clutch via ETC1 2 = Automatic Transmission 3 = Automatic Transmission with standig start help## 4 = Manual Transmission with starter interlock ## 5 = Automated Shift Transmission Clutch via Pin 18/02	**Parameter values 0 or 1:** An engine start via terminal 50 is always possible, independent of the neutral position of the transmission, input NE. **Parameter value 2:** An engine start via the input terminal 50 is only possible, if the input NE (neutral position) is active. **##valid from the diagnosis version 204:** **A) Starter interlock function:** **Parameter value 0:** An engine start via terminal 50 or J1939 ESS is always possible, independent of the neutral information **Parameter value 1 to 5:** 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, 4 or 5:** Pin 18/02 Clutch switch is encountered. **Parameter value 1:** Clutch information is read from J1939 ETC1. **Parameter value 2or 3:** No clutch information available. **C) Standing start help function** **Parameter value 0,1, 3, 4 or 5:** Function enabled. **Parameter value 2:** Function disabled.
06 ABS-Type: 0 = without ABS 1 = with ABS	This parameter indicates if an ABS is installed.
07 Relay 2: 0= disabled 1 = Grid Heater 2 = Accelerator Pedal Idle Position	**Parameter value 0:** The power stage output for the relay 2 is not active. **Parameter value 1:** The power stage output controls a grid heater via a relay. **Parameter value 2:** The power stage output is active when aceleration pedal idle position
08 24/12 Volt use: 0= 24 V; 1=12 V	Vehicle electric system selection: Parameter value = 0 if 24V (preset value) Parameter value = 1 if 12V
09 Response PLD-MR if engine CAN failure (MCAN): 0 = Idle Speed 1 = Engine Stop 2 = Limp Home Speed 3 = Limp Home Speed	Response PLD-MR if engine CAN failure **Parameter value 0:** Engine switches over to idle running **Parameter value 1:** Engine will shut down **Parameter value 2/3:** 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.
10 Engine Speed Limit while vehicle Stop	While vehicle stop the engine speed is limited to the value which has been defined here

<table>
<tr><th colspan="2">2 Configuration driving mode (continued)</th></tr>
<tr><th>Parameter</th><th>Description</th></tr>
<tr><td>11 Ramp Smoke Limiter</td><td>The accelerator pedal is enabled in a limited way via a ramp, if the clutch is open and the accelerator pedal (FFG) is actuated.</td></tr>
<tr><td>12 Configuration Output FP+:
0 = Output disabled
1= Transmission Output 1
2 = Power Supply PWM Accelerator Pedal</td><td>Parameter value 0: The power stage output is unassigned (inactive).
Parameter value 1: The power stage output is a switching output for the modulation valve of an automatic transmission (e.g. Allison).
Parameter value 2: The power stage output is the power supply for the accelerator pedal.</td></tr>
<tr><td>13 Configuration engine brake MBR</td><td>The following engine brake configurations are possible, depending on this parameter:

<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 single valve at the ADM2</td></tr>
<tr><td>2</td><td>1 Valve (BK)</td><td>Output open</td><td>Engine retarder flap at ADM2 and decompression valve at PLD-MR</td></tr>
<tr><td>3</td><td>Output open</td><td>1 Valve (KD)</td><td>Decompression valve at ADM2</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 ADM2.</td></tr>
</table></td></tr>
<tr><td>14 Temperature Correction Block Heater **

**This parameter is not available until the diagnosis version 203 of the ADM2</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>
<tr><td>15 Enable Free-Running diagnosis

##This parameter is not available until the diagnosis version 204 of the ADM2</td><td>If value is set to 1, and no diagnostic tool like MiniDiag2 is connected to Pin 12/02 then then ADM2 Free-Running telegram is transmitted via K-Line (Pin 12/02).

If value is set to 0 no free running is supported.

In both cases: If MiniDiag2 is connected to the ADM2, then MiniDiag communication is started.</td></tr>
</table>

3 Generally valid limits

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-MR to the extent that maximum values are reduced and minimum values increased.

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-MR. 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-MR. 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 adaption module (ADM2) 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 authorisation. This authorisation can be issued to vehicle manufacturers upon application to DaimlerChrysler. The set value is always valid and can only be superseded by lower vehicle speeds using the programmable limitations.
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-MR. The set value is always valid and can only be superseded by lower torques using the programmable limitations.

3 Generally valid limits (continued)	
Parameter	**Description**
05 Road Speed Limiter Switch on threshold	This parameter indicates the switch-on threshold for the speed limiter, i.e. the speed (below the maximum speed), which activates the limiter.  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.
06 Road Speed Limiter Proportional Part	This parameter indicates the governor factor of the proportional part of the speed limiter.  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.
07 Road Speed Limiter Integral Part	This parameter inicates the governor factor of the integral part of the speed limiter.  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.
08 Road Speed Limiter Low pass factor	This parameter indicates the low pass factor of the speed limiter.  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.
09 torque band engine jerking (thrust jerking)	This parameter indicates the torque band for the engine jerking. (engine jerking is caused by transmission play while driving around zero torque, torque reversing)  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.
10 coefficient engine jerking (thrust jerking)	This parameter indicates the coefficient for the engine jerking. (engine jerking is caused by transmission play while driving around zero torque, torque reversing)  Adjustment of parameters 3/05 until 3/10 only in driving test and only through skilled workers with know-how in control engineering.

4 Damper of engine jerking in PLD-MR	
Parameter	**Description**
01 Activate Function	The damper of engine jerking is switched on with this parameter.  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.
02 droop control	This parameter indicates the gain of the governor for the damper of engine jerking.  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.
03 Frequency limit	This parameter indicates the frequency limit of the governor for the damper of engine jerking  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.
04 Maximum Position Accelerator Pedal for Damper of Engine Jerking	This parameter indicates the maximum position of the accelerator pedal for the damper of engine jerking .  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.
05 Maximum Speed for Damper of Engine Jerking	This parameter indicates the maximum speed for the damper of engine jerking  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.
06 Maximum Torque for Damper of Engine Jerking	This parameter indicates the maximue torque for the damper of engine jerking.  Adjustment of parameters 4/01 until 4/06 only in driving test and only through skilled workers with know-how in control engineering.

5 Variable limits No. 0 (Pin LIM0) and No. 1 (Pin 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 internal limit values.

Limit values of the parameter group 3 (general limits) and
limit values of the parameter group 5 and 6 (variable limits)

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).

6 Variable limits No. 2 (idle speed increase) (Pin KLIMA)

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 internal limit values.

Limit values of the parameter group 3 (general limits) and
limit values of the parameter group 5 and 6 (variable limits)

Parameter	Description
01 Minimum Engine Speed KLIMA	Definition of an idling speed increase. The set value is selected via input KLIMA (limit 2), air conditioner.
02 Maximum Engine Speed KLIMA	Definition of engine speed limitation. The set value is selected via input KLIMA (limit 2), air conditioner.
03 Maximum Road Speed KLIMA	Definition of a reduced maximum speed. The set value is selected via input KLIMA (limit 2), air conditioner.
04 Maximum Engine Torque KLIMA	Definition of torque limitation. The set value is selected via input KLIMA (limit 2), air conditioner.

7 Configuration PTO speed control (ADR)

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 ADM2 and transmitted to the engine electronics PLD-MR 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 1 to 5)

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.

Parameter	Description
01 PTO speed control: 0 = disabled 1 = enabled 2 = enabled if neutral (input NE) 3 = enabled if neutral and parking brake (input NE and FSBE)	**Parameter value 0:** PTO speed control is disabled **Parameter value 1:** PTO speed control is enabled **Parameter value 2:** PTO speed control is only enabled as long as the transmission is in neutral position **Parameter value 3:** PTO speed control is only enabled as long as the transmission is in neutral position and the parking brake is closed.

7 Configuration PTO speed control (ADR) (continued)	
Parameter	**Description**
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 Speed Demand through Accelerator Pedal	This parameter indicates, if the engine speed in the PTO mode can be enabled to be increased with the throttle input
05 Maximum Engine Speed Accelerator Pedal if PTO	This parameter indicates the maximum speed when the accelerator pedal is actuated in PTO-mode.
06 PTO dropout on Parking Brake or Service Brake enabled	This parameter indicates if the PTO is caused to drop out when the service brake or the park brake is actuated.
07 PTO dropout on clutch enabled	This parameter defines, if the PTO is caused to drop out when 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 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 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 Configuration PTO speed control (ADR) (continued)	
Parameter	**Description**
16 Number of Speeds via Remote PTO	**Number of fixed speeds** when activating the PTO speed control via the PTO switch: **Parameter value = 1:** one fixed speed can be selected Parameters 7/17 to 7/19 are effective **Parameter value = 2:** two fixed speeds can be selected Parameters 7/17 to 7/22 are effective **Parameter value = 3:** three fixed speed can be selected Parameters 7/17 to 7/25 are effective (the generally valid and variable limits and the limits of the PLD 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

8 Vehicle Speed Sensor Configuration

This group contains the speed determination parameters.
To implement a speed limitation, the ADM2 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 8 for either square-wave sensor (if parameter 8/01 with the value=2) or for SAE J1939 data bus (if parameter 8/01 with the value=3).

Parameter	Description
01 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 authorisation. Such authorisation can be issued to vehicle manufacturers upon application to DaimlerChrysler. Programmable values: 0 = disabled, no speed signal, e.g. for stationary operation 1 = C3 (B7) - speed signal from tachograph output 2 = Square-wave sensor (e.g. HALL sensor) 3 = Transmission output shaft speed via SAE J1939 ETC1 (output shaft speed) **##valid from the diagnosis version 204:** 4= Inductive sensor (sine-wave sensor) 5= SAE J1939 TCO1 (output shaft speed and vehicle speed)

9 Actual value output	
Parameter	**Description**
01 Actual value output *Refer to chapter 7.7 for further information about the function „IWA“*	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. Programmable values: **Value** / **Meaning** / **Remark** 0 — no output 1 — Throttle torque (10 % ...90 %) — Indication of accelerator pedal position idle - full throttle to 10 % ...90 % pulse duty factor. 2 — Differential torque (limit load signal) — 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 3 — Throttle torque inverted (90 % ...10 %) — Indication of accelerator pedal position idle - full throttle to 90 % ...10 % pulse duty factor. 4 — Actual torque — Indication of the actual engine torque 0 ... M max to 10 % ...90 % pulse duty factor. 5 — Load signal — Load signal for coupling an automatic transmission with PWM interface. Output value is the minimum of the active torque and a set torque, which is calculated on the basis of a maximum value generation of the accelerator pedal demand and the cruise control demand. 6 — Road speed — Formation of a C3 signal for other electronics. v_{FZG} [km/h] = 0,45 * 1000/ t [ms] t = periodic time of signal (with T = 2 ms = constant = pulse period) 7 — Nominal speed — Indication of the currently active nominal speed during PTO mode to 10%...90% pulse duty factor. **##valid from the diagnosis version 204:** 8 — Tipptastenfahren — Special function for vehicles with hydraulic drive. 10%...90% pulse duty factor.

9 Actual value output (continued)	
Parameter	**Description**
02 Engine Speed Display Output N_MOT *Refer to chapter 7.6.1 „Display Engine Speed " for further information about this function.*	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. $f_{MOT}[Hz] = k \bullet \frac{n_{MOT}[min^{-1}]}{6000}$ f_{MOT} : Frequency at output N_MOT k : Impulse number tachometer, number of impulses per 100 revolutions n_{MOT}: Current engine speed, actual value
03 Oil Pressure Display Output P_OEL *Refer to chapter 7.6.3; 7.6.5 or 7.6.7 for further information about this function.*	Configuration of the output P_OEL (oil pressure), according to the analog oil-pressure display: **Parameter value = 0:** Warning lamp is connected to the output **Parameter value = 1:** Analog 5 bar display connected: Oil pressure (bar) / Reference resistance (Ohm) 0 / 10 1 / 48 2 / 82 3 / 116 4 / 151 5 / 184 **Parameter value = 2:** Analog 10 bar display connected: Oil pressure (bar) / Reference resistance (Ohm) 0 / 10 2 / 52 4 / 88 6 / 124 8 / 155 10 / 184
04 Coolant Temperature Display Output T_MOT *Refer to chapter 7.6.2. ; 7.6.4. or 7.6.7. for further information about this function.*	Configuration of the output T_MOT (coolant temperature) according to the connected analog coolant-temperature display: **Parameter value = 0:** Warning lamp connected to the output. **Parameter value = 1:** Analog display connected: Temperature (°C) / Reference resistance (ohm) 40 / 287,4 60 / 134 80 / 69,1 100 / 38,5 120 / 22,7

10 Configuration 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 personel or after consultation with the engine manufacturer.
It is not normally necessary to change these parameters.

Parameter	Description
01 Minimum Engine Speed MBR	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 Braking 0 = disable; 1 = enable	This parameter specifies, if the engine brake is activated by the 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 Cruise Control 0 = disable; 1= enable	An automatic activation of the engine brake during cruise control operation is enabled by this parameter.
06 Cruise Control 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.
07 Cruise Control MBR_L OFF	
08 Cruise Control MBR_H On	
09 Cruise control MBR_H Off	
10 Speed limitation with Engine Brake 0 km/h = Off	Engine brakes will be automatically activated, if vehicle speed exceeds set speed threshold. This parameter indicates the speed threshold. 0: Function deactivated

10 Configuration engine brake(continued)	
Parameter	**Description**
11 Type engine brake	refer to standard SAE 1939 chapter 5.2.2.2 and chapter 5.2.2.3 3 = MBR_KD (constantly open valve) 4 = MBR_BK (engine retarder flap) 255= not defined
22 Cruise Control stage 3 (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). **##valid from the diagnosis version 204**
23 Cruise Control stage 3 (both MBR_H and MBR_L) off ##	
24 Engine brake configuration ##	Type of engine brake system: 0 = compression brake and exhaust flap 1 = compression brake and turbo brake
25 Engine brake stage 1 mask ##	Engine brake activation if MBR_L=1 and MBR_H=0 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)

26 Engine brake stage 1 factor
 	
##
	Turbo brake torque demand relative value
	
	If parameter 10/25 = 81 then
	parameter 10/26 can be set from 0 to 100% for turbo brake demand
	else
	parameter 10/26 has to be set on value 100%

27 Engine brake stage 2 mask ##	Engine brake activation if MBR_L=0 and MBR_H=1 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)

28 Engine brake stage 2 factor
 	
##
	Turbo brake torque demand relative value
	
	If parameter 10/27 = 81 then
	parameter 10/28 can be set from 0 to 100% for turbo brake demand
	else
	parameter 10/28 has to be set on value 100%

29 Engine brake stage 3mask ##	Engine brake activation if MBR_L=1 and MBR_H=1 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)

10 Configuration engine brake(continued)	
Parameter	**Description**

30 Engine brake stage 3 factor
 	
##
	Turbo brake torque demand relative to value
	
	If parameter 10/29 = 81 then
	parameter 10/30 can be set from 0 to 100% for turbo brake demand
	else
	parameter 10/30 has to be set on value 100%

31 Engine brake on transmissio request ##	Engine brake activation via J1939 TSC1 from transmission 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)

32 Engine brake on transmission request factor
 	
##
	Turbo brake torque demand relative value
	
	If parameter 10/31 = 81 then
	parameter 10/32 can be set from 0 to 100% for turbo brake demand
	else
	parameter 10/32 has to be set on value 100%

11 Configuration 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.

Parameter	Description
01 Accelerator Pedal Type: 0 = not available 1 = PWM FFG 2 = analog FFG	In general the accelerator pedal serves for the transfer of the driver´s requirements to the engine. **Parameter value 0:** System without accelerator pedal Evaluation and monitoring of the FFG-signals are deactivated. **Parameter value 1:** PWM accelerator pedal activated, e.g. VDO-Sensor **Parameter value 2:** analog accelerator pedal activated, e.g. Williams-Pedal
02 Analog FFG 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 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 inplausible values, but the idle validation switches do still adopt plausible conditions (comp. the double-function of the „Pin Gas 1“ or „Pin Gas2“, chapter 3.2).
04 Limp Home Ramp On	Speed ramp for the transition from normal operation to limp home operating mode
05 Limp Home Ramp Off	Speed ramp for the transition from limp home operating mode to normal operation
06 Ramp FFG limp-home Off	Release via a ramp, if the FFG fault cleares
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.

11 Configuration accelerator pedal (continued)	
Parameter	**Description**
09 *Analog Accelerator Pedal adjusted (Parameter only readable!)	**In the case of an initial start-up or a replacement of the accelerator pedal or the control unit, the accelerator pedal has to be adjusted.** The analog accelerator pedal and the PWM accelerator pedal are subject to the same **adjusting process**! **Shut off the engine first, because the accelerator pedal can only be adjusted during engine standstill.** The following devices are required to adjust the accelerator pedal: 1. Voltage supply for ADM2 2. ADM2 control unit 3. Analog FFG or PWM FFG 4. minidiag2 diagnosis unit In minidiag2 the menu No. 3 „Routines“ is selected and afterwards the submenu No. 1 „Adjust Accelerator Pedal“. The minimum limit stop of the accelerator pedal (0%) is taught in first, and secondly the maximum limit stop of the accelerator pedal (100%). Ensure that the accelerator pedal is completely depressed, in order to unambiguously evaluate the kickdown position . **Caution: The ADM2 routine No.2 „Reset parameters to default values“ does also reset the parameters of the accelerator pedal to a non adjusted status!**
10 *PWM Accelerator Pedal adjusted (Parameter only readable!) **(* valid for the diagnosis version 202 of the ADM2 without the paramters 11/20 to 11/24)**	
20 ** FFG Low-pass Filter Tau Large Signal Range	**(** valid for the diagnosis version 203 of the ADM2 with the parameters 11/20 to 11/24 and the now blocked parameters 11/09, 11/10, 11/19)** The parameters 11/20 to 11/22 are the filters for the signal changes of the accelerator 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.
21 ** FFG Low-pass Filter Tau Small Signal Range	
22 ** FFG Low-pass Filter Small Signal Range	
23 **Accelerator Pedal Ramp % Up	**(** valid for the diagnosis version 203 of the ADM2 with the parameters 11/20 to 11/24 and the now blocked parameters 11/09, 11/10, 11/19).** There are applications, where it is necessary to ramp up und down the accelerator pedal signal with different gradients.
24 ** Accelerator Pedal Ramp % Down	

12 Configuration torque reversing damper 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)	
Parameter	**Description**
01 Torque Threshold	Torque band around zero torque.. This parameter is for the optimization of the torque reversing damper. It is not normally necessary to change this value.
02 Hysteresis	Hysteresis for the torque band around zero torque. This parameter is for the optimization of the torque reversing damper. It is not normally necessary to change this value.
03 Negative Gradient (dM/dt < 0) inside Band	This parameter is for the optimization of the torque reversing damper. It is not normally necessary to change this value.
04 Positive Gradient (dM/dt > 0) inside Band	
05 Positive Gradient (dM/dt > 0) outside Band	

13 Configuration Inputs The parameters in this group define the functions of analog and digital inputs of the ADM2.	
Parameter	**Description**
01 Sensor Coolant Level, Input KW_SE	In this case the parameter value = 1 indicates, that an input for the coolant level sensor is available.
02 Air Filter Sensor, Input LF_SE	In this case the parameter value = 1 indicates, that an input for the air filter sensor is available.
03 Service Brake, Input BRE	In this case the parameter value = 1 indicates, that an input for the switching state of the service brake is available.
04 Transmission Neutral Position, Input NE J1939 ETC2	In this case the parameter value = 1 indicates, that an input for the sensing of the neutral position of the transmission is available. **##valid from the diagnosis version 204:** **Value = 0 indicates, that the neutral information is read from J1939, ETC1, Byte 4** **Value = 1indicates, that the neutral information is read from Pin 15/01**
05 Parking Brake, Input FSBE	In this case the parameter value = 1 indicates, that an input for the switching state of the parking brake is available.

06 Configuration Variable
Input DSF0:
0 = Disable
1 = Enable ABS Input
2 = Enable Retarder Input
3 = Enable Temposet
4=Enablegridheatemonitoring
5 = switchable torque demand**
6 = Drive on super structure**
7 = Throttle inhibit crane cab engine##

(valid from the diagnosis version 203 of the ADM2 with the values 5 and 6 of the parameter 13/06 and 13/07)**

(## valid from diagnosis version 204)

Refer to chapter 7 for further information about the function of ABS, Retarder, Temposet and grid heater.

Depending on the setting of this parameter, certain functions are activated with the high side digital input DSF0 (special function 0)

Programmable values:

Value	Meaning	Remarks
0	Input DSF0	not active
1	ABS intervention	Input DSF0 is available for coupling ofconventional ABS control unit. When input DSF0 is active, the engine brake outputs are deactivated.
2	Retarder intervention	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 PLDMR This setting only has a useful purpose on units on which the fan is controlled via the engine control PLDMR.
3	Temposet	The input DSF0 is available for setting and deleting a temporary maximum speed. The temposet speed is also deleted when actuating the kickdown.
4	Monitoring Grid Heater	The input DSF0 monitors the function of the grid heater.
5	Switchable Torque Demand	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)).
6	Super Structure	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 drivingengine with the FFG in the super structure by actuating the switch DSF0.

<table>
<tr>
<td>continued

06 Configuration Variable

7 = Throttle inhibit crane cab engine##

(## valid from diagnosis version 204)</td>
<td>7 throttle inhibit crane cab engine</td>
<td>If the switch is actuated, then accelerator pedal signal is only directed to IWA and relay 3 and 4.
For IWAsee: actual value output, pin 12/05 and parameter 9/01 values 1, 3, 7 and 8.
For relay 3 see parameter 14/01 (value = 5).
For relay 4see parameter 14/10 (value = 5).
If switch is actuated, all other functions are not supported with accelerater pedal signal. E.g. driving mode is disabled.</td>
</tr>
<tr>
<td>07 Configuration Variable
Input DSF1:
0 = Disable
1 = Enable ABS Input
2 = Enable Retarder Input
3 = Enable Temposet
4 = Enable grid heater monitoring
5 = switcheable torque demand**
6 = Drive on super structure**
7 = Throttle inhibit crane cab engine##

(** valid from the diagnosis version 203 of the ADM2 onwards, <u>with the values 5 and 6</u> of the parameter 13/06 and 13/07)

(## valid from diagnosis version 204)

Refer to chapter 7 for further information about the functions ABS, retarder, temposet and grid heater.</td>
<td colspan="2">Depending on this parameter certain functions are activated with the low side digital input DSF1(special function 1).

Programmable values:

<table>
<tr><th>Value</th><th>Meaning</th><th>Remark</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-MR
This setting only has a useful purpose on units on which the fan is controlled via the engine control PLD-MR.</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 the grid heater.</td></tr>
<tr><td>5</td><td>Switcheable Torque Demand</td><td>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>
</table>
</td>
</tr>
</table>

continued 07 Configuration Variable Input DSF1: 6 = Drive on super structure** 7 = Throttle inhibit crane cab engine## **(** valid from the diagnosis version 203 of the ADM2 onwards, with the values 5 and 6 of the parameter 13/06 and 13/07)** **(## valid from diagnosis version 204)**	6	Super Structure	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 drivingengine with the FFG in the super structure by actuating the switch DSF1.
	7	throttle inhibit crane cab engine	If the switch is actuated, then accelerator pedal signal is only directed to IWA and relay 3 and 4. For IWAsee: actual value output, pin 12/05 and parameter 9/01 values 1, 3, 7 and 8. For relay 3 see parameter 14/01 (value = 5). For relay 4see parameter 14/10 (value = 5). If switch is actuated, all other functions are not supported with accelerater pedal signal. E.g. driving mode is disabled.

13 Configuration Inputs (continued)	
Parameter	**Description**
08 Switchable torque demand-via DSF0	Parameter to set torque demand value, which is used if Parameter 13/06 is set to value 5 and digital input DSF0 is active.
09 Switchable torque demand-via DSF1	Parameter to set torque demand value, which is used if Parameter 13/07 is set to value 5 and digital input DSF1 is active.

4.2. Description of parameters (continued)

14 Switching Thresholds Relay 3 + Relay 4

The parameters of this group define two actual value comparators (IWK). These comperatorscan 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.

Parameter	Description
01 Configuration (IWK3) Actual Value Comparator 3: 0 = FFG Idle Position 1 = Actual Torque 2 = Road Speed 3 = Engine Speed 4 = Coolant Temperature 5 = FFG Torque 6 = Boost Temperature 7 = Warning Lamp Oil Pressure 8 = Warning Lamp Coolant Temperature	Parameters for „REL 3“ digital output configuration (output relay 3). Programmable values: **Value** / **Meaning** / **Remark** 0 / FFG idle position / „REL3“ output is active, provided, that the accelerator pedal is in the idle position. 1 / M_{actual} > M_KOMP3 / 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 „02 IWK3 torque M“ and „03 IWK3 hysteresis M“. 2 / V_{actual} > V_KOMP3 / 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 „04 IWK3 speed 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“. 3 / N_{actual} > N_KOMP3 / 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“. 4 / T_{actual} > T_KOMP3 / 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 „08 IWK3 coolant 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“.

14 Switching Thresholds Relay 3 + Relay 4 (continued)	
Parameter	**Description**
01 Configuration (IWK3) Actual Value Comparator 3: 0 = FFG Idle Position 1 = Actual Torque 2 = Road Speed 3 = Engine Speed 4 = Coolant Temperature 5 = FFG Torque 6 = Boost Temperature 7 = Warning Lamp Oil Pressure 8 = Warning Lamp Coolant Temperature	5 M_{actual} > M_KOMP3 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 peda 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 „02 IWK3 torque M“ and „03 IWK3 hysteresis M“. 6 T_{actual} > T_KOMP3 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 „08 IWK3 temperature“. . 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“. 7 The function 7 enables the control of a warning lamp for oil pressure via the output REL3. 8 The function 8 enables the control of a warning lamp for coolant temperature via the output REL3.
02 IWK3: Torque M	Definition of the reference value for the actual engine torque.
03 IWK3: Hysteresis M	Definition of the hysteresis for the comparison of the actual engine torque with „02 IWK3 torque M“
04 IWK3: Road Speed v	Definition of the reference value for the actual road speed.
05 IWK3: Hysteresis v	Definition of the hysteresis for the comparison of the actual road speed with „04 IWK3 road speed“
06 IWK3: Engine Speed n	Definition of the reference value for the actual engine speed.
07 IWK3: Hysteresis n	Definition of the hysteresis for the comparison of the actual engine speed with „06 IWK3 engine speed n“.
08 IWK3: Temperature	Definition of the reference value for the actual coolant temperature or the actual boost temperature.
09 IWK3: Hysteresis T	Definition of the hysteresis for the comparison of the actual coolant temperature or the actual boost temperature with „08 IWK3 temperature“

14 Switching thresholds Relay 3 + Relay 4 (continued)

Parameter	Description
10 Configuration (IWK4) Actual Value Comparatorr 4: 0 = FFG Kickdown Position 1 = Actual Torque 2 = Road Speed 3 = Engine Speed 4 = Coolant Temperature 5 = FFG Torque 6 = Boost Temperature 7= Warning Lamp Oil Pressure 8 = Warning Lamp Coolant Temperature	Parameters for „REL4“ digital output configuration (output relay 4) Programmable values: **Value** / **Meaning** / **Remark** 0 / FFG Kickdown Position / The output „REL4“ is active, provided that the acceleration pedal is in the kickdown position. 1 / M_{actual} > M_KOMP4 / 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 „11 IWK4 torque M“ and „12 IWK4 hysteresis M“. 2 / V_{actual} > V_KOMP4 / Comparison of the actual road speed with the values „13 IWK4 road 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 „14 IWK4 hysteresis v“. 3 / N_{actual} > N_KOMP4 / 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“. 4 / T_{actual} > T_KOMP4 / Comparison of actual coolant temperature withthe values „17 IWK4 coolant temperature“ and „18 IWK4 hysteresis T“. The output „REL4“ is active, provided that the actualcoolant 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“.

14 Switching Thresholds Relay 3 + Relay 4 (continued)	
Parameter	**Description**
10 Configuration (IWK4) Actual Value Comparator 4: 0 = FFG Kickdown Position 1 = Actual Torque 2 = Road Speed 3 = Engine Speed 4 = Coolant Temperature 5 = FFG Torque 6 = Boost Temperature 7 = Warning Lamp Oil Pressure 8 = Warning Lamp Coolant Temperature	5 M_{actual} > M_KOMP4 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 „11 IWK4 torque M“ and „12 IWK4 hysteresis M“. 6 T_{actual} > T_KOMP4 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 „17 IWK4 temperature“. The output „REL4“ is not active, provided that the actual boost temeperature is less than the difference between „17 IWK4 termperature“ and „18 IWK4 hysteresis T“. 7 The function 7 enables the control of a warning lamp for oil pressure via the output REL4 8 The function 8 enables the control of a warning lamp for coolant temperature via the output REL4.
11 IWK4: Torque M	Definition of the reference value for the actual engine torque or FFG torque.
12 IWK4: Hysteresis M	Definition of the hysteresis for the comparison of the actual engine torque or FFG torque with „11 IWK4 torque M“.
13 IWK4: Road Speed v	Definition of the reference value for the actual road speed.
14 IWK4: Hysteresis v	Definition of the hysteresis for the comparison of the actual road speed with „13 IWK4 road speed v“.
15 IWK4: Engine Speed n	Definition of the reference value for the actual engine speed.
16 IWK4: Hysteresis n	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 T	Definition of the hysteresis for the comparison of the actual coolant temperature or the actual boost temperature with „17 IWK4 temperature“.

15 Configuration Cruise Control

The cruise control is switched on with the cruise-control switch CC_ON (Pin 18/06) and it remains switched on. Thereupon 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.

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 2/04).
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 3/03).
03 Single-step Cruise Set Speed Increment 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 Single-step Cruise Set Speed Decrement 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 Automatic Cruise Resume Function after Gear Shift: 0 = disable 1 = enable	Activation of an automatic cruise-control resume after a gear shift.

16 Configuration Relay 1

Adjustment of the parameters 16/01 and 16/18 to 16/20 only in driving test and only through skilled workers with know-how in control engineering.

Parameter	Description
01 Relay 1: 0 = disable 1 = Starter Lockout 2 = FFG Kickdown Position 3 = Transmission Output 1	**Parameter value 0:** The driver stage output for the relay 1 is unassigned. **Parameter value 1:** The output takes on the starter lockout function. **Parameter value 2:** The accelerator pedal is in the kickdown position. **Parameter value 3:** The driver stage output controls a modulation valve e.g. for an Allison automatic transmission
18 Maximum Starter Crank Time	These parameters are **relevant, if** the starter is wired via ADM2. In this case the starter lockout takes place via the ADM2. The parameters are **not relevant, if** the starter is wired via the engine management PLD-MR. In this case the starter lockout takes place via the PLD-MR.
19 Minimum Engine Speed	
20 Lockout Time	

17 Idle Shutdown


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

Parameter	Description
Enable Idle Shutdown 01 Idle shoutdown: 0 = disable 1 = enable	The idle shutdown is enabled by this parameter.
02 Maximum Idle Time	This parameter determines the maximum idle time until the idle shutdown.
03 PTO-Shutdown: 0 = disable 1 = enable	This parameter activates the idle shutdown, provided that the application has been in the PTO mode and the engine has been idling last.
04 PTO Shutdown Time	This parameter determines the maximum time of the PTO operation until the PTO shutdown.
05 Torque Threshold for PTO Shutdown	This parameter determines the torque threshold, up to which a PTO shutdown is activated.
06 Warning period Check Engine Light	Warning period of the Check Engine Light prior to engine shutdown
07 Warning period Stop Engine Light	Warning period of Stop Engine Light prior to engine shutdown.
08 Minimum Coolant Temperature for Engine Shutdown	Minimum coolant temperature up to which an engine shutdown is activated.
09 Shutdown Override, Input MABSCH_SP: 0 = disable 1 = enable	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.

18 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.

Parameter	Description
01 Engine Temperature: 0 = disable 1 = enable	Engine protection shutdown on engine temperature fault indication.
02 Coolant Level: 0 = disable 1 = enable	Engine protection shutdown on coolant level fault indication.
03 Oil Pressure: 0 = disable 1 = enable	Engine protection shutdown on oil pressure fault indication.
04 Oil Level: 0 = disable 1 = enable	Engine protection shutdown on oil level fault indication.
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 enigne shutdown was prevented by the switch „shutdown override“ (Pin 18/13).
08 Warning Period for Check Engine Light	Warning period for check engine light. Time for the check engine light to flash prior to shutdown.
09 Warning period Engine Stop Light	Selection of the warning period of the engine stop light. Time for Engine Stop Light to flash prior to shutdown.

19 Automatic Fan Activation *Refer to chapter 7.12.3 „Fan demand“ for further information on the fan activation function.*	
Parameter	**Description**
01 Enable Automatic Fan Activation on Engine Brake	Automatic fan activation in the case of engine brake operation (MBR)
ADM2, Diag.-Vers. 202: 0 = disable, 1 = enable	A distinction is only made between: Fan activation yes (= enable) or no (= disable).
ADM2, Diag.-Vers. 203:	Selection of the percentage of the fan power consumption on engine brake.
02 Enable Automatic Fan Activation on Air Conditioner:	Automatic fan activation in the case of air conditioner operation
ADM2, Diag.-Vers. 202: 0 = disable 1 = enable	A distinction is only made between: Fan activation yes (= enable) or no (= disable).
ADM2, Diag.-Vers. 203:	Selection of the percentage of the fan power consumption on air conditioner.
03 Enable Automatic Fan Activation on PTO:	Enable automatic fan activation on PTO speed control (ADR operation)
ADM2, Diag.-Vers. 202: 0 = disable 1 = enable	A distinction is only made between: Fan activation yes (= enable) or no (= disable).
ADM2, Diag.-Vers. 203:	Selection of the percentage of the fan power consumption on PTO speed control
04 Switch On Temperature Automatic Fan ADM2, Diag.-Vers. 202:	Selection of the switch on temperature of the fan.
04 Tmot 0% Fan ADM2, Diag.-Vers. 203:	Selection of the coolant temperature if the fan is OFF (0% fan power consumption)
05 Switch Off Temperature Automatic Fan ADM2, Diag.-Vers. 202:	Selection of the switch off temperature of the fan.
05 Tmot 100% Fan ADM2, Diag.-Vers. 203:	Selection of the coolant temperature if the fan is ON (100% fan power consumption)
06 DSF0 Fan ADM2, Diag.-Vers. 203:	This parameter indicates 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 (parameter 13/06, value=2).
07 DSF1 Fan ADM2, Diag.-Vers. 203:	This parameter indicates the percentage of the fan power consumption if the input DSF1 is active, provided that the fan is demanded via digital input DSF1 and if DSF1 has been configured for retarder intervention (parameter 13/07, value=2).

08 Hold Time Fan ADM2, Diag.-Vers. 203:	Maximum value generation based on the parameters 19/1 to19/3, 19/6 and 19/7, 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.
09 Ramp Fan ADM2, Diag.-Vers. 203:	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.
10 Fan Activation via Input LUEFTER ADM2, Diag.-Vers. 203:	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).

20 Remote accelerator pedal (HFG)

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 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.

Parameter	Description
01 Remote Accelerator Pedal: 0 = disable 1 = enable	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.
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!**

21 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 internal limit values, limit values of the parameter group 3 (general limits) and limit values of the parameter group 5 and 6 (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“.

Parameter	Description
01 Activate Driving Mode with PTO: 0 = disable 1 = without pedal free travel 2 = with pedal free travel	Activation of the operating mode „driving with PTO speed control“ Parameter value = 0: function disabled Parameter value = 1: Parameter value = 2:
02 Driving Mode PTO Governor Type	Selection of the governor type for the operating mode „driving with PTO speed control“
03 Driving Mode PTO Maximum Torque	Maximum engine torque for the operating mode „driving with PTO speed control“

22 Configuration vehicle speed sensor

This parameter group is applied, if there is no C3 speed signal, and the transmission output speed is selected by the **CAN SAE J1939 (PGN 61442)** or the speed is selected by the square wave sensor.

The parameter group 22 only becomes active with the corresponding configuration of the parameter group 8 for either square-wave sensor (if parameter 8/01 with value=2) or for SAE J1939 data bus (if parameter 8/01 with value=3). For the application of the CAN SAE J1939 without the parameter 22/02, refer to chapter 7.8.3.

Parameter	Description
01 Axle Ratio	Axle ration of rear axle
02 Number of Teeth	Number of output shaft teeth
03 Tire Revolutions	Tire revolutions per kilometer
04 Gear Ratio	Top gear ratio of the transmission. It is used for the speed limitation in the case of an defective sensor.
05 2. Axle Ratio (Rear Axle)	2nd gear ratio

Parameter group 23: Speed limiter extra:
Access to this group is not possible.

24 Accelerator pedal extra

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

Risk of accident!

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. 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.

Parameter	Description
01 Torque Ramp	Selection of the torque ramp for the accelerator pedal.
02 Accelerator Pedal Minimum Speed	Definition of the minimum engine speed of the accelerator pedal as a percentage of the full deflection. The reference point (0%) is the minimum limit stop of the accelerator pedal.
03 Accelerator Pedal Maximum Speed	Definition of the maximum speed of the accelerator pedal as a percentage of the full deflection. The reference point (0%) is the minimum limit stop of the accelerator pedal.
04 P-Factor	Adjustment of the parameters 24/01 to 24/05 only in driving test and only through skilled workers with know-how in control engineering.
05 Accelerator Pedal Filter	

5. Fitting and connecting

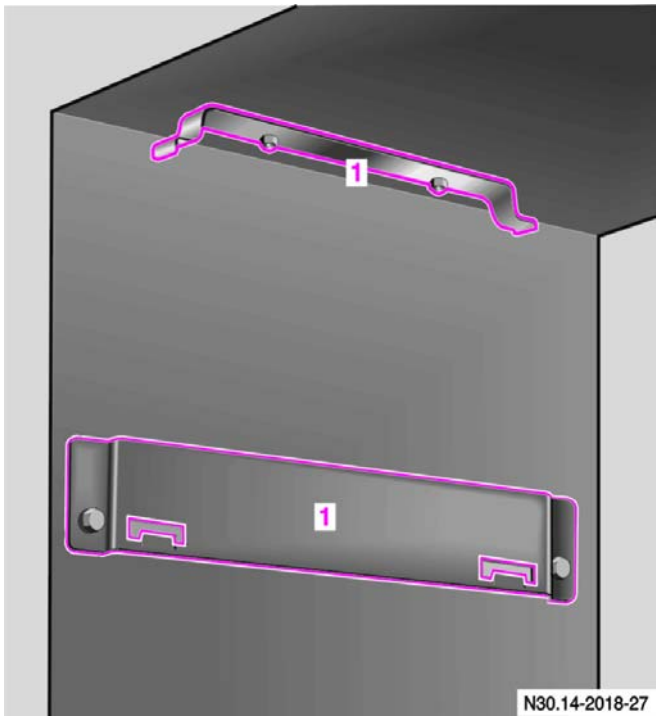
5.1. Operating data

Protection rating of ADM2 with plugged-on connector sockets: IP 30:

Ambient temperature for use and storage of ADM2:
- operating temperature range: von -40 °C bis +70 °C
- storage temperature range: von -50 °C bis +80 °C

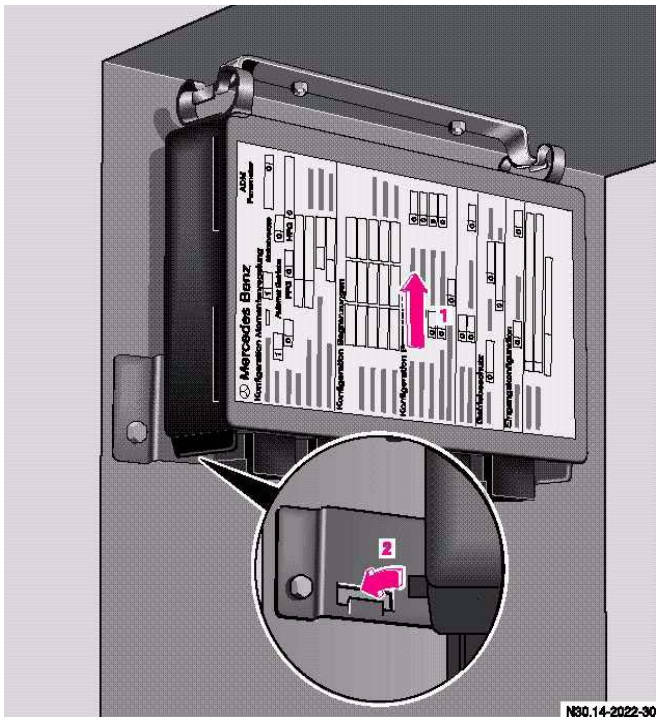
5.2. Installation

Install the ADM2 on a flat surface in a dry place with the connectors facing downwards:
Fit the central diagnosis socket in an easily accessible place.



Nr. 1 Brackets

Only use DaimlerChrysler brackets for the installation of the ADM2. This will guarantee that the ADM2 is securely mounted.

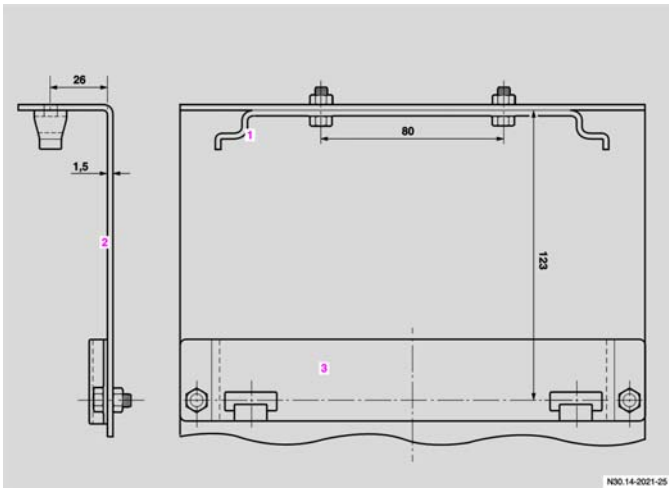


To install:

1 Press the ADM2 against the upper bracket with the mounting springs
2 Guide the support lugs into the recesses in the lower bracket.

To remove:

Press the ADM2 against the upper bracket with the mounting springs
until the support lugs can be taken from the recesses in the lower bracket.



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.

Fitting position in the vehicle or the rear of the ADM2

connector size from the left to the righ
- 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 ADM2 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-MR and ADM2.

Observe the following guidelines when connecting up the ADM2:

- Only use DaimlerChrysler star quad cables to wire up CAN connections.
  These cables are specially designed for vehicle CAN application (EMC).
- The CAN connection between the PLD-MR and ADM2 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 ADM2, in order to preserve these new values when the ADM2 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 ADM2 and PLD-MR 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 ADM2)
- Reset all parameter values to their default values (as routine of ADM2)
- Parameter programming of ADM2

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 ADM2 and the associated inputs/input data, outputs/output data and parameters.

7.1. Driving mode and PTO speed control

The vehicle control adatption module (ADM2) differentiates between the **driving mode** and the **PTO speed control (ADR operation).**

In the operating state „**driving mode“** the ADM2 preselects the status „torque demand“ from the MR engine management. ADM2 determines a nominal engine torque and transmits simultaneously a minimum engine speed and a maximum engine speed to the MR engine management.

In the operating state **„PTO speed control“,** the ADM2 preselects the status „speed control“ from the MR engine management. The ADM2 determines a nominal speed and transmits simultaneously a governor type and a maximum torque to the MR engine management.

The limits preset in the MR 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 ADM2. 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 ADM2 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 ADM2 default setting a nominal value demand is provided on the basis of the evaluation of an accelerator pedal. ADM2 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 MR.

The ADM2 calculates a nominal torque value for the MR engine management on the basis of the accelerator pedal position, the remote accelerator pedal or a SAE J1939 demand, and transmits it to the MR 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 3 „Generally valid limitations“** or **group 5 „Variable limitations“ No.0 and No.1** or **group 6 „Variable limitations“ No.2.** The MR-internal limit values are also effective.

7.1.1.1. Idle speed adjustment

The MR 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 switch 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 2:

Parameter group 2:

Parameter	Description
01 Single Step Idle Speed Adjustment	The 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 in the off position. This parameter indicates the step size, which applies to both tip switches and is of the same size when increasing with CC+ and decreasing with CC-.
02 Ramp Idle Speed Adjustment	This parameter determines the ramp, with which the idle speed is adjusted when the tip switches are actuated continuously.
03 Maximum Idle Speed	Maximum value of the idle speed adjustment.
04 Limit Speed for Idle Speed Adjustment	Limit speed of the vehicle up to which the idle adjustment is authorized.

7.1.1.2. Vehicle speed limiting

The vehicle control adaption module (ADM2) 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 3/03.
This parameter value is set to 85km/h and can only be changed with the relevant authorisation.
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 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 abour „Engine Brake“ refer to chapter 7.5

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

Parameter

- 3/03 Maximum road speed (legal)
  parameter value = 85 km/h

- 10/10 Speed limitation with Engine Brake
  parameter value = 0 km/h

7.1.1.3. Vehicle speed limiting with engine brake

The vehicle control adaption module (ADM2) 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 3/03.
This parameter value is set to 85km/h and can only be changed with the relevant authorisation.
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 eingine brake is activated (value parameter 10/10 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 10/10. Speed limitation with eingine brake activates always all configured engine brakes.

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

Parameter

- 3/03 Maximum road speed (legal)
  parameter value = 85 km/h

- 10/10 Speed limitation with Engine Brake
  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 ADM2 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 MR, 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:

Parameter	Description
01 Minimum Speed for Cruise Control	This parameter indicates the minimum speed which is required to set the cruise control.
02 Maximum Speed for the Cruise Control.	This parameter indicates the maximum speed up to which the cruise control can be set. It is possible up to the legal maximum speed (parameter 3/03).
03 Step Size Cruise Set Speed Increment CC+	This parameter determines the step size for the cruise-control tip switch CC+. It is usually of the same size like the step size of CC-.
04 Step Size Cruise Set Speed Decrement CC-	This parameter determines the step size for the cruise-control tip switch CC-. 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 Auto Resume after Gear Shift: 0 = disable, 1 = enable	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 ADM2 authorizes an additional activation of the engine brake, if the set speed is exceeded during downhill driving.

Parameter group 10 (configuration engine brake) determines how the engine brake supports the cruise control. The parameter 10/05 (value=1) determines that the engine brake is automatically activated if the vehicle exceeds a preset value.

The parameters 10/06 to 10/09 are the cut-in and cut-off speeds (threshold values) for the engine brake step 1 (MBR_L) and engine brake step 2 (MBR_H). In this case the parameter values are the differential speeds referred to the set speed of the cruise control.

The differential speed in parameter 10/06 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 10/07.

The differential speed in parameter 10/08 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 prameter 10/09.

The parameter values 10/06, 10/07, 10/08 , 10/09 of the engine brake, must only be performed by specially trained personnel or after consultation with the engine manufacturer. It is not normally necessary to change these parameters.

7.1.2.2. Temposet function

ADM2 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)

- 13/06 DSF0:
  Parameter value 3 = temposet
- 13/07 DSF1:
  Parameter value 3 = 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 (ADM2) 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 ADM2 in the PTO mode is the engine speed. Simultaneously a governor type and a maximum engine torque is transmitted to the MR.

The nominal speed value is determined by the ADM2 on the basis of the input values listed below, and transmitted to the PDL-MR 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 3 „Generally valid limits“** or **group 5 „Variable limits“ No.0 and No.1** or g**roup 6 „Variable limits“** 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 „driver´s cab PTO speed control“ is enabled with the parameter 07/01 :

Parameter value = 0: PTO speed control disabled
Parameter value = 1: PTO mode is always authorized
Parameter value = 2: PTO mode is only authorized, as long as the transmission is in neutral position
Parameter value = 3: PTO mode is only authorized, as long as the transmission is in neutral position and 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).

ADM2 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 07/10.

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 „driver´s cab PTO“ can be realized with the parameters 07/02 to 07/15.

Parameter group 7:

02 Maximum PTO-Speed with CC+ Switch	Maximum engine speed which can be reached for the PTO mode, when increasing the nominal speed via the cruise-control tip switch CC+.
03 Minimum PTO-Speed with CC- Switch	Minimum speed which can be reached for the PTO mode, when decreasing the nominal speed via the cruise-control tip switch CC- .
04 Speed demand through accelerator pedal	This parameter indicates, if the PTO speed can be demanded by the accelerator pedal or not.
05 Maximum Speed Accelerator Pedal if PTO	This parameter indicates the maximum engine speed when the accelerator pedal is actuated in the PTO mode.
06 PTO dropout on Service Brake or Parking Brake enabled	This parameter indicates, if the PTO mode can be interrupted when the parking brake or the service brake is actuated.
07 PTO dropout on clutch enabled	This parameter indicates, if the PTO mode can be interrupted when the clutch is actuated.
08 Maximum Road Speed in PTO Mode	Maximum road speed, up to which a PTO mode is possible.
09 Starting speed when PTO activation via CC+	Starting speed, if the PTO mode has been activated via CC+
10 Governor type when PTO activation via CC+	Selection of the governor type, if PTO mode has been activated via CC+
11 Maximum Torque when PTO activation via CC+	Maximum torque, if PTO mode has been activated via CC+
12 Starting speed when PTO activation via CC-	Starting speed, if PTO mode has been activated via CC-
13 Governor Type when PTO activation via CC-	Selection of the governor type, if PTO has been activated via CC-
14 Maximum torque when PTO activation via CC-	Maximum torque, if PTO 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:

Parameter value = 0: PTO mode is disabled
Parameter value = 1: PTO mode is always authorized
Parameter value = 2: PTO mode is only authorized, as long as the transmission is in neutral position
Parameter value = 3: PTO mode is only authorized as long as the transmission is in neutral position and the parking brake is closed.

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

04 Speed demand through accelerator pedal	This parameter indicates, if the PTO speed can be demanded with the accelerator pedal.
05 Maximum Speed Accelerator Pedal if PTO	This parameter indicates the maximum engine speed when the accelerator pedal is actuated in the PTO mode.
06 PTO Dropout on Parking Brake or Service Brake enabled.	This parameter indicates, if the PTO mode can be interrupted when the parking brake or the service brake is actuated.
07 PTO dropout on clutch enabled	This parameter indicates if the PTO mode can be interrupted when the clutch is actuated
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 7:

16 Number of Fixed Speeds if Activation via Input PTO	**Number of fixed speeds** if activation of the PTO speed control via the PTO switch: **Parameter value = 1:** one fixed speed can be selected Parameters 7/17 to 7/19 are effective **Parameter value = 2:** two fixed speeds can be selected Parameters 7/17 to 7/22 are effective **Parameter value = 3:** one fixed speed can be selected Parameters 7/17 to 7/25 are effective (the generally valid and variable limits and the limits of the PLD remain active)
17 PTO Speed #1	Programmable speed value for fixed speed #1
18 PTO Speed #1 Governor Type	Selection of the governor type, 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	Selection of the governor type, 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	Selection of the governor type, 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 ADM2 with the parameter 21/01.

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

Parameter group 21.

01 Enable driving with PTO	Activation of the operating mode driving with PTO speed control Parameter value = 0: Function disabled Parameter value = 1: function activated, accelerator pedal in idle position, is assigned to the speed value, set via CC+ or CC- Parameter value = 2: function activated, accelerator pedal in idle position, is assigned to the idle speed value
02 Driving with PTO Governor Type	Selection of the governor type for the operating mode driving with PTO speed control
03 Driving with PTO Maximum Engine Torque	Maximum engine torque in the operating mode driving with PTO speed control

7.2.2. Governor types for the PTO speed control

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

In ADM2 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 07/10 (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
0	Dynamic PID governor, if necessary with automatic activation of the engine brake	Engine speed adaptation when shifting gears.
1	Dynamic PID governor, with particular consideration of the large and the small signal range.	PTO speed control **Standard PTO governor**
2	Highly dynamic governor related to characteristic curves	Aggregates with highly dynamic load characteristics e.g. concrete pump
3	corresponds to governor type 1, but increased dynamic due to high droop parameter	PTO speed control
4	corresponds to governor type 1, but reduced dynamic due to low droop parameter	PTO speed control
5	corresponds to governor type 1, but low dynamic due to very low droop parameter	PTO speed control
15	Characteristics like speed governor the maximum speed limiter becomes effective in the breakaway range of the engine.	PTO speed control PTO speed control with the use of the breakaway range of the engine control (nominal speed to maximum speed)

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 DaimlerChrysler. The use of any other accelerator pedal could lead to malfunctions.

The ADM2 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 ADM2 (parameter11/01).

In order to increase the operational safety, accelerator pedal adjustment routines have been integrated into the ADM2. In the ADM2 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 ADM2 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 02/12
- 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 ADM2, 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 ADM2 routine No.2 „Reset parameters to default values“ also resets the parameters of the accelerator pedal to the status „not adjusted“!
This affects the parameters 11/09 „Analog accelerator pedal adjusted“ (parameter only readable!) and 11/10 “PWM accelerator pedal adjusted“ (parameter only readable!).

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
Parameter value = 2: analog accelerator pedal enabled (preset value)

The parameters of **group 11 „accelerator pedal“** and of **group 24 „accelerator pedal extra“** 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).

Parameter

- 20/01 Remote accelerator pedal enabled
  Parameter value = 0: Remote accelerator pedal disabled
  Parameter value = 1: Remote accelerator pedal enabled

- 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 programme without the ADM2 control unit or if the CAN connection is defective. In such cases, the engine start is controlled only by the PLD-MR engine management and can no longer be influenced by the ADM2. 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-MR 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-MR

Parameter 06/09 of the PLD-MR:
Parameter value = 0 indicates start via PLD-MR(JE),
Parameter value = 1 indicates starter directly connected with terminal 50 (KB)

7.4.1.1.Engine start via PLD-MR

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

An engine start via the ignition lock (terminal 50) is demanded via the inputs terminal 50 of the ADM2 and the terminal 50 of the PLD-MR engine management. The „terminal 50“ inputs of the ADM2 and the PLD-MR must be wired in parallel, because the redundancy of both wires is monitored.

The starting process is monitored by the PLD-MR

- 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 ADM2:

- Starter lockout, if the transmission is not in neutral position;
it can be activated via parameter 2/05 „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
- 13/04 Transmission neutral position, input NE

Output value
- Engine start demand to PLD-MR via CAN connection

7.4.1.2.Engine start directly via terminal 50

In the case of DaimlerChrysler engines with starter type KB, the starter is directly connected with the wire terminal 50 of the ignition lock. ADM2 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 ADM2. A cutoff relay - which deactivates the starter in reliance on the ADM2 internal protection mechanisms - is controlled via the output Pin 15/12.

The ADM2 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 ADM2:

- Starter lockout, if the transmission is not in neutral position;
it can be activated via parameter 2/05 „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
- 13/04 Transmission neutral position, 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 ADM2 and PLD-MR. .

If the ADM2 detects a deactivation of terminal 15, then the ADM2 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 ADM2 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-MR (transmitting zero torque quantity via engine CAN)

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

7.4.2.2.Engine stop via the external stop button of the ADM2

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 ADM2 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-MR (transmitting zero torque quantity via engine CAN)

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

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.
ADM2 demands an engine stop via CAN as long as the signal „engine stop“ is pesent.
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. Dadurch wird durch eine kurzzeitige Anforderung Motorstop über1939 Motor nicht abgestellt.

Input value:

CAN SAE J1939 input, engine stop with PGN 61184

Output value:

- Engine stop demand on PLD-MR (transmitting zero torque quantity via engine CAN)

Compare with chapter 8.2 binary values No. 7/2 zero torque quantity 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-MR 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 ADM2, 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 personel or after consultation with the engine manufacturer. It is not normally necessary to change these parameters

ADM2 supports 2 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.
The control of the engine brake takes place in a single stage or in a multi stage.
Refer for parameter settings to parameter 10/12, stage engine brake.

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

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

Parameter

- 02/13 Configuration engine brake MBR
- 10/01 Minimum engine speed MBR
- 10/04 Minimum road speed for engine brake operation
- 10/11 Type engine brake
- 10/12 Stage engine brake

Inputs

- Pin 18/08 MBR_L
- Pin 18/09 MBR_H

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.

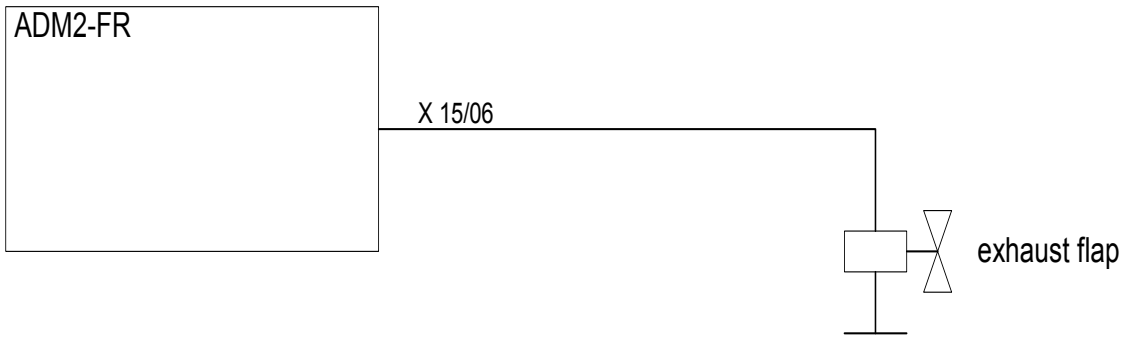
During the brief deadlock of the piston in the top dead center, the major part of the compressed air escapes through the decompression valve into the exhaust port. That means, the major part of the performed compression work is lost to the system.

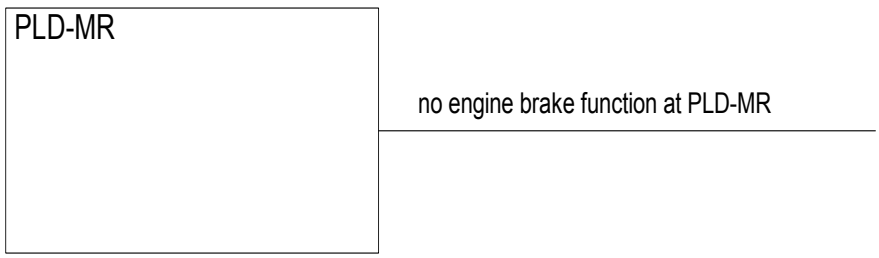
7.5.3. Engine brake configuration

7.5.3.1.Exhaust flap only, driven by ADM2

Configuration ADM2:
Configuration Vehicle Parameters/ Configuration Engine Brake, **02/13**
Parameter value =2 exhaust flap at ADM2

Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 0: disabled

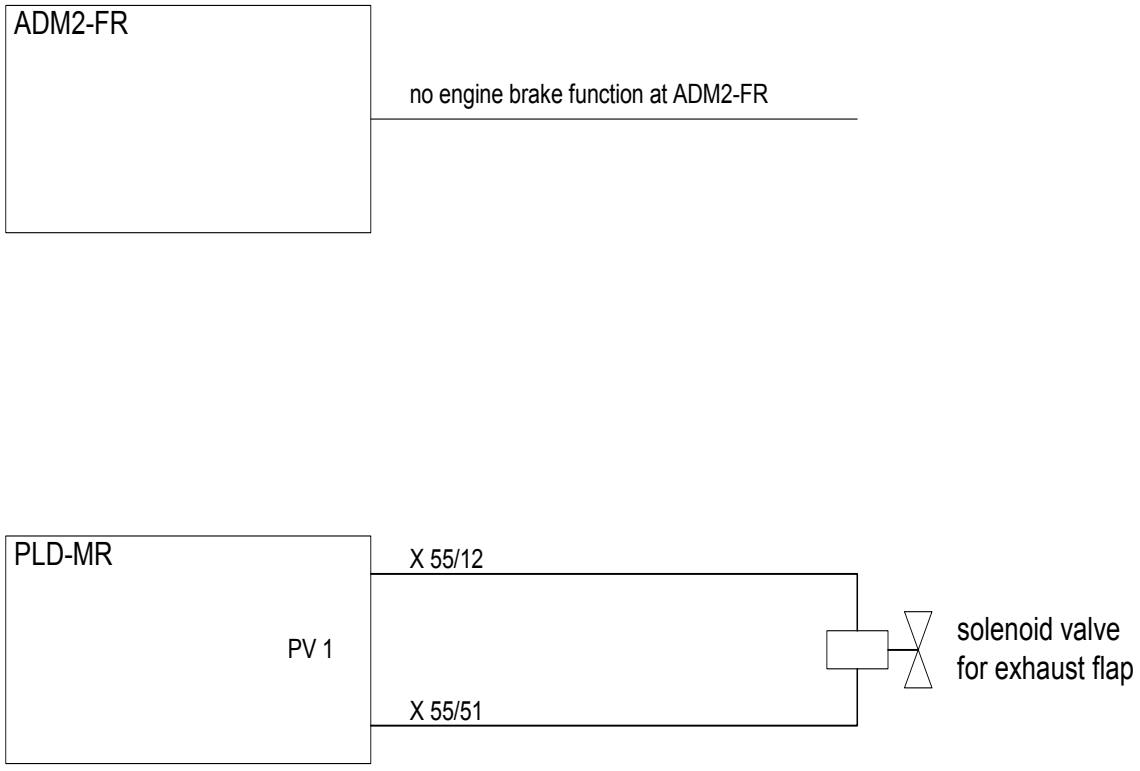




7.5.3.2. Exhaust flap only, Exhaust flap at PLD

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
Parameterwert = 0 disabled

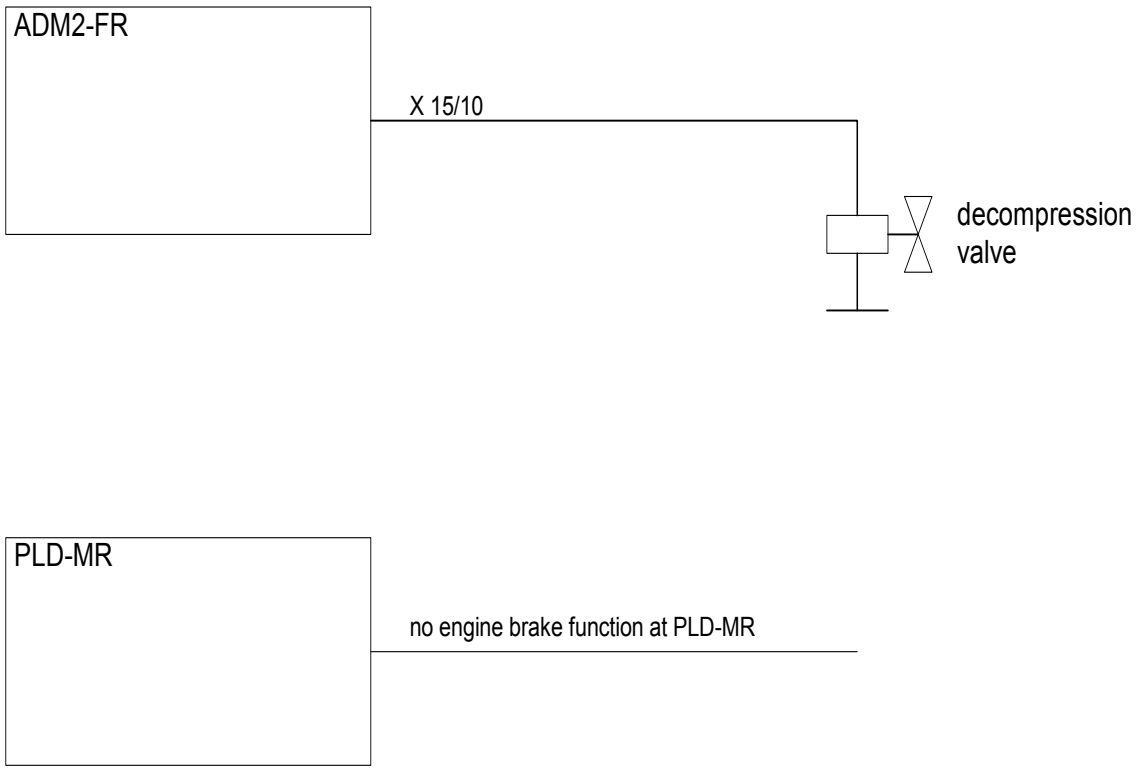
Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 3: exhaust flap at analog valve 1
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 0: disabled



7.5.3.3. Decompression valve only, decompression valve at ADM2

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
parameter value =3 decompression valve at ADM2

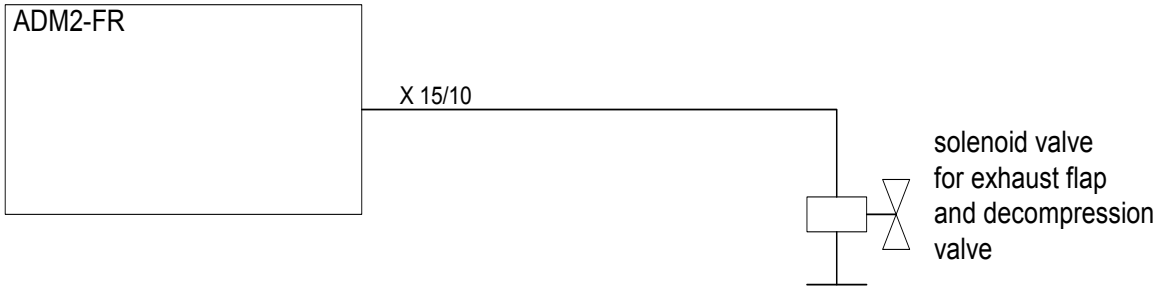
Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 0: disabled

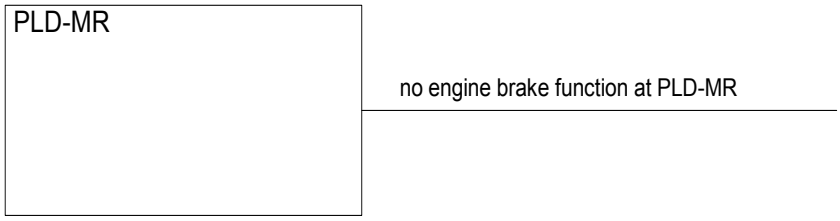


7.5.3.4. Exhaust flap and decompression valve at one valve

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
parameter value =1 exhaust flap and decompression valve at one valve

Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 0: disabled



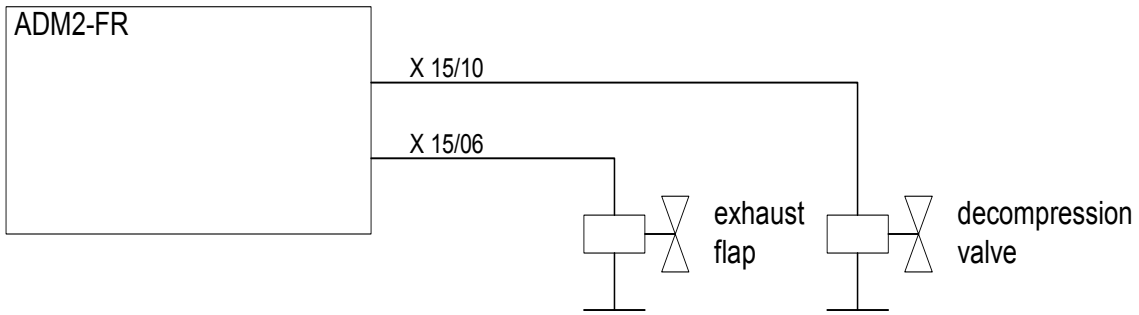


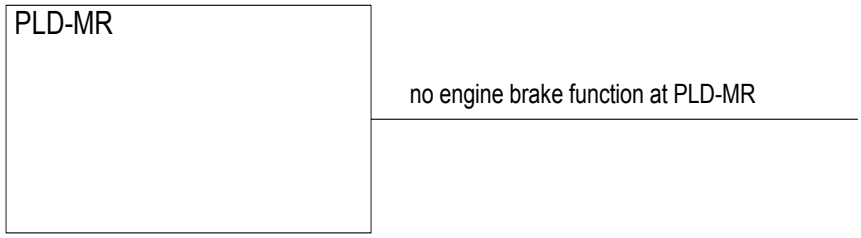
7.5.3.5. Exhaust flap und decompression valve at two separate valves

7.5.3.5.1.Exhaust flap und decompression valve at ADM2

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
parameter value =4 exhaust flap and decompression valve at ADM2

Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 0: disabled

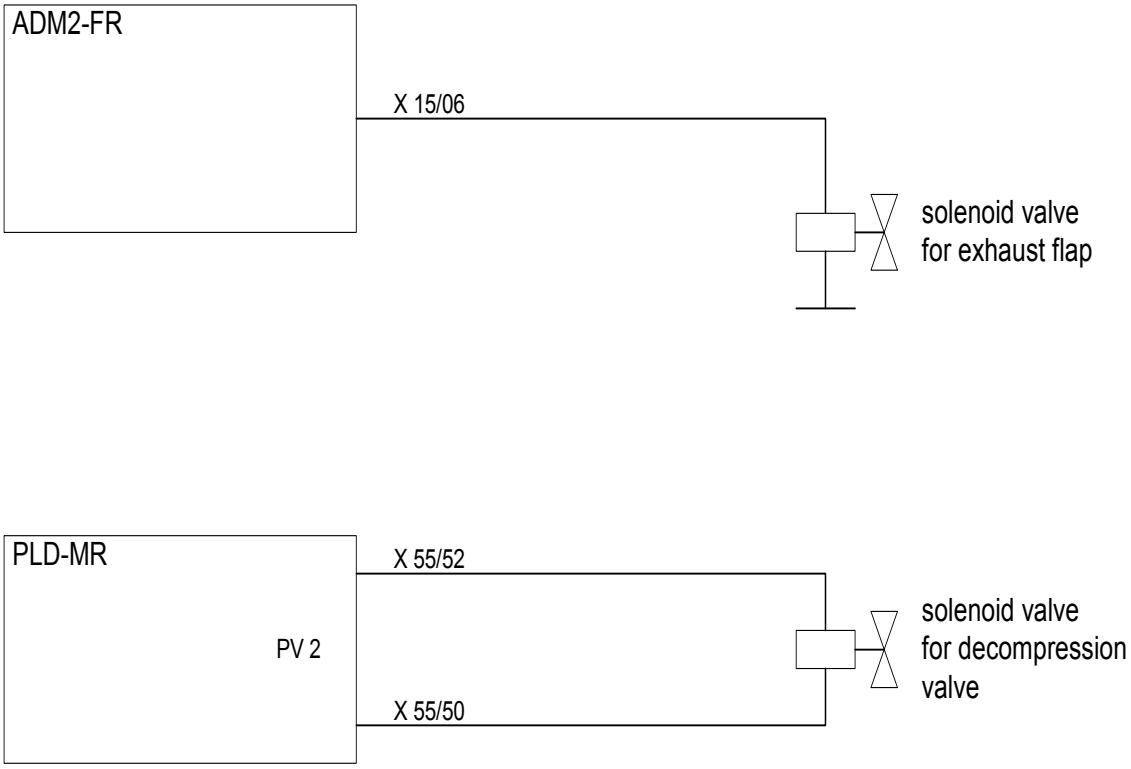




7.5.3.5.2. Exhaust flap at ADM2 and decompression valve at PLD

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
parameter value =2 exhaust flap at ADM2

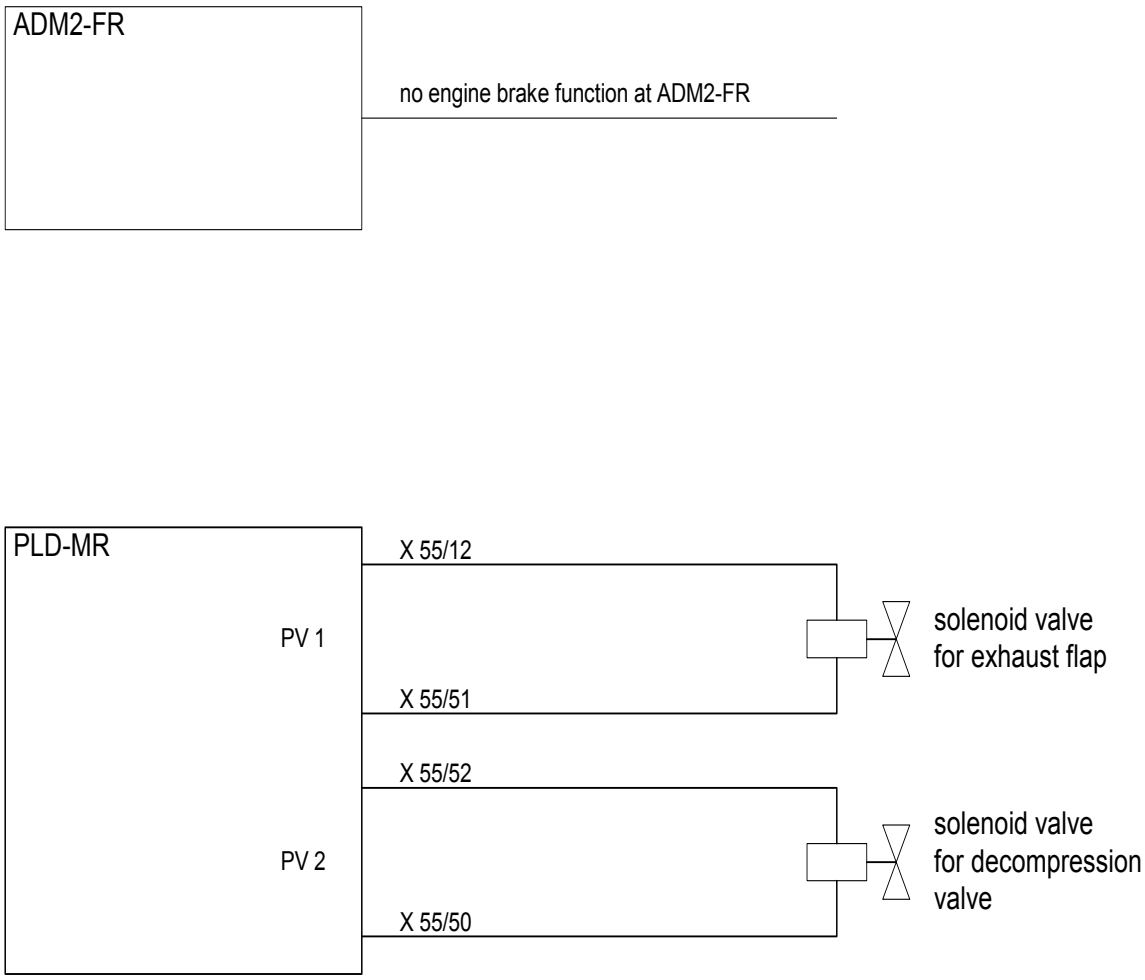
Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 0: disabled
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 3: decompression valve at PLD



7.5.3.5.3. Exhaust flap und decompression valve at PLD

Configuration ADM2:
Configuration Vehicle Parameters / Configuration Engine Brake , **02/13**
parameter value = 0 no engine brake at ADM2

Configuration PLD (DiagV. 3..5):
vehicle parameter set1/ analog valve 1, **06/01**
parameter value = 3: exhaust flap at PLD
vehicle parameter set1/ analog valve 2, **06/02**
parameter value = 3: decompression valve at PLD



7.5.4. Activation engine brake systems (Version 202, 203)

- Engine brake activation via MBR_L and MBR_H switches at ADM2
  (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

- automatically activation on road speed limite
  Refer to chapter 7.1.1.3

- automatically 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.
  The activated engine brake outputs are the same like an activation via MBR_H switche.

- 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

7.6. Instruments / Displays

7.6.1.Rev counter

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

Input values

-Engine speed information from PLD via CAN connection

Parameter

- 9/04 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 via CAN connection

Parameter

-9/04 Coolant temperatur 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 connectin up a conventional analogue indicator instrument.

Input values

-Oil pressure information from PLD via CAN connection

Parameter

-9/03 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

Parameter

- 9/04 Coolant temperatur 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

Parameter

- 9/03 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.

Input value

– CAN information "Oil level too low" from PLD

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 temperatur display (Output T_MOT)
- 14/01 Configuration (IWK3) Actual Value Comperator 3
- 14/11 Configuration (IWK4) Actual Value Comperator 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

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 recognised by the control unit due to the permanent monitorin 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 en ine 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 or CAN data implausible
- Active faults in PLD engine management fault memory, fault priority medium or high
- Active faults in ADM-FR fault memory, fault priority medium or high

Input values

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

Parameter

- 17/01 Enable idle shutdown
- 17/06 Warning period check engine light
- 18/01 Engine temperatur
- 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 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 temperatur are connected to the PLD.

Instruction "Buzzer"from ADM2 in the event of:

- Coolant level impermissibly low

The sensor for Coolant level is connected to the ADM2.

Parameter

- 17/01 Enable idle shutdown
- 17/07 Warning period stop engine light
- 18/01 Engine temperatur
- 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

Parameter	Description		
09/01 Actual value output	Programmable values:		
	Value	**Meaning**	**Remark**
	0	no output	
	1	Throttle torque (10 % ...90 %)	Indication of accelerator pedal position idle - full throttle to 10 % ...90 % pulse duty factor.
	2	Differential torque (limit load signal)	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
	3	Throttle torque inverted (90 % ...10 %)	Indication of accelerator pedal position idle - full throttle to 90 % ...10 % pulse duty factor.
	4	Actual torque	Indication of the actual engine torque 0 ... M max to 10 % ...90 % pulse duty factor.
	5	Load signal	Load signal for coupling an automatic transmission with PWM interface. Output value is the minimum of the active torque and a set torque, which is calculated on the basis of a maximum value generation of the accelerator pedal demand and the cruise control demand.

09/01 Actual value output	6	Road speed	Formation of a C3 signal for other electronics. v_{FZG} [km/h] = 0,45 * 1000/ t [ms] t = periodic time of signal (with T = 2 ms = constant = pulse period)
	7	Nominal speed	Indication of the currently active nominal speed during PTO mode to 10%...90% pulse duty factor.
	##valid from the diagnosis version 204: 8	Tipptastenfahren	Special function for vehicles with hydraulic drive. 10%...90% pulse duty factor.

7.8. Speed Signal

For the realisation 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 08/01, speed sensor.
For applications without speed signal, the ADM-FR speed measurement function must be deactivated by appropriate parameter programming, parameter 08/01.

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

Parameter

- 08/01 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/03 Maximum road speed KLIMA

Output value

- Maximum Speed via required torque to PLD 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.

Input

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

Parameter

- 08/01 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/03 Maximum road speed KLIMA

Output value

- Maximum Speed via required torque to PLD 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. Therefor the parameter group 22 has to be applied.

Input

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

Parameter

- 08/01 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/03 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 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. Therefor the parameter group 22 has to be applied.

Input value

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

Input

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

Parameter

- 08/01 Speed Sensor
- 03/03 Maximum road speed (legal)
- 05/03 Maximum road speed LIM0
- 05/07 Maximum road speed LIM1
- 06/03 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 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.

Parameter

- 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 roadsweepers 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.

Input

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

Parameter

- 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

- 06/01 Minimum engine speed KLIMA
- 06/02 Maximum engine speed KLIMA
- 06/03 Maximum road speed KLIMA
- 06/04 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
- CAN information "Oil pressure too low " from PLD
- CAN information "Oil level too low " from PLD
- "Coolant level impermissibly low " from ADM2

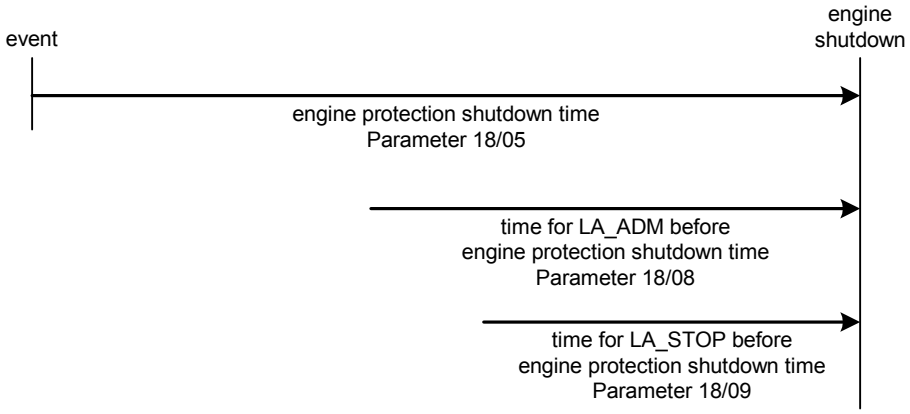
The limits for the values listed above are stored in the engine data records.
The sensors for Oil level, Oil pressure and Coolant temperatur are connected to the PLD.
"Coolant level impermissibly low" is realized in ADM2. The sensor for Coolant level is connected to the ADM2.

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

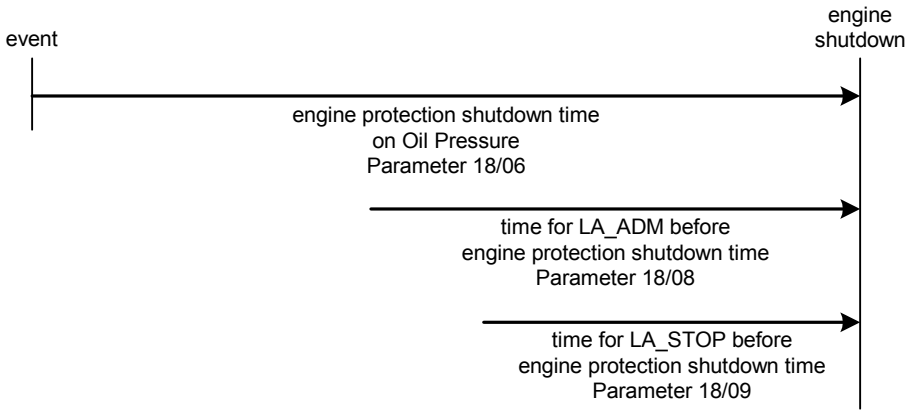
If an engine protection shutdown is performed, the engine protection shutdown time is running down. After this time, the engine will be shutdown. There are two different engine protection shutdown times.

- 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, pleas refer to chapter 7.6.10 and 7.6.11.



Engine protection shutdown time.



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 value

– CAN information "Coolant temperature too high " from PLD
– CAN information "Oil pressure too low " from PLD
– CAN information "Oil level too low " from PLD
– "Coolant level impermissibly low " from ADM2

Parameter

- 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-MR, 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-MR response to a CAN failure can be set in parameter 02/09.

Parameter

- 02/09 Response PLD-MR if engine CAN failure

7.11. Cold start with grid heater

The ADM2 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.

Parameter

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 ADM2 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.

Status	Explanation (continued)
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. 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 13/06 or 13/07, 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

- 13/06 Configuration variable input DSF0
- 13/07 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-MR This setting only has a useful purpose on units on which the fan is controlled via the engine control PLD-MR.

A retarder intervention is deactivating an active Curies 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 19/06 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 19/07 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.

Input

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

Parameter

- 13/06 Configuration variable input DSF0
- 13/07 Configuration variable input DSF1
- 19/06 DSF0 Fan
- 19/07 DSF1 Fan
- 19/08 Hold time Fan
- 19/09 Ramp Fan
- 15/07 Automatic Cruise Resume

Output value

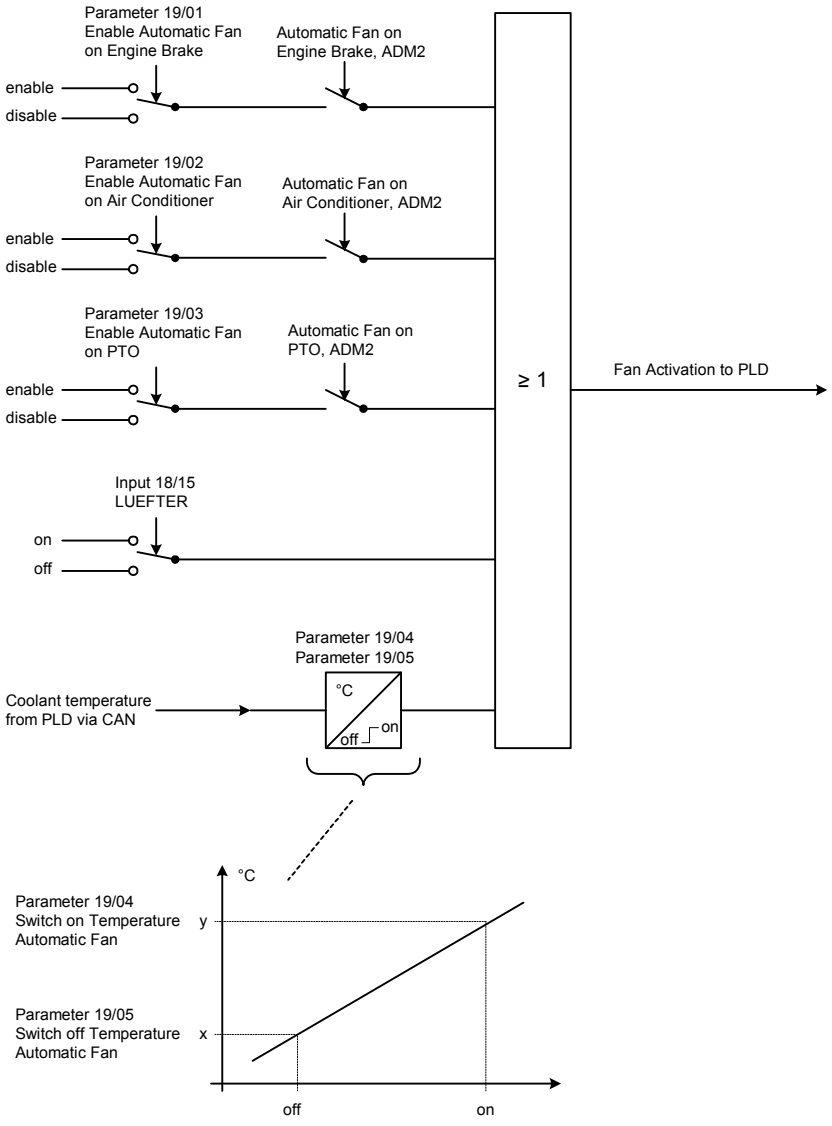
- Information "Retarder intervention" transmitting to the engine control PLD-MR via CAN

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.
Because the functionality of Automatic Fan differs between Diagnosis Version 202 and 203, the following decryption is divided into two parts.

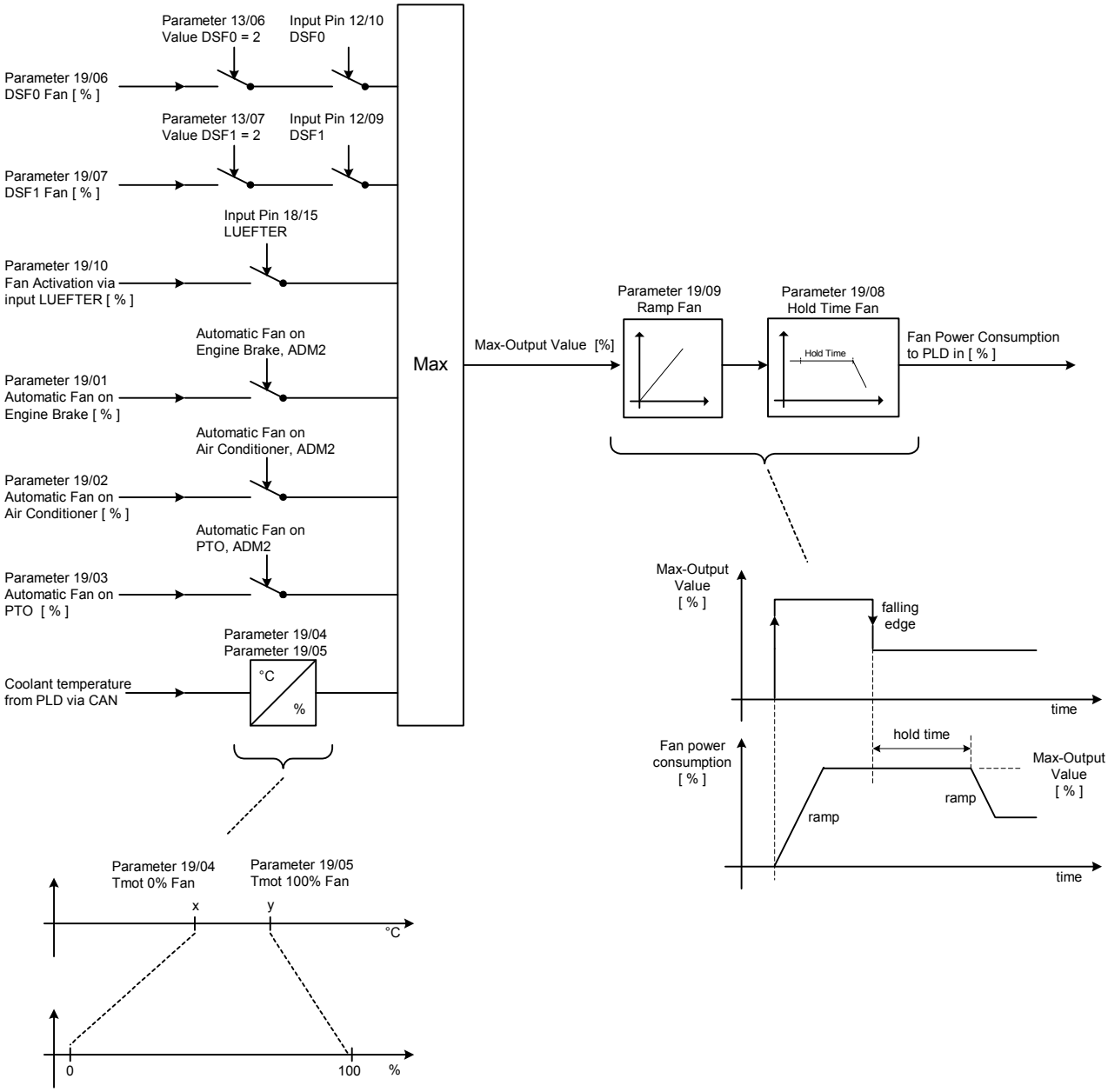
Version 202

In this version it is possible to activate the van on engine brake, air conditioner, PTO, input LUEFTER and on CAN information coolant temperature. The ADM2 is transmitting the Information "Fan activation" to the engine control PLD-MR via CAN. The value of the supplied "Fan power consumption" is stored in the PLD-MR data record. The PLD-MR is controlling the Fan.



Version 203

In this version it is possible to activate the van on engine brake, air conditioner, PTO, input LUEFTER, input DSF0, input DSF1 and on CAN information coolant temperature. The ADM2 is transmitting the Information " Fan power consumption in percent " to the engine control PLD-MR via CAN. The value of the supplied "Fan power consumption" has to be set in the appropriate parameter. The PLD-MR is controlling the Fan.



Input value

- fan activation on engine brake from ADM2
- fan activation on air conditioner from ADM2
- fan activation on PTO from ADM2
- CAN information Coolant temperature

Input

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

Parameter

Version 202

- 19/01 Enable automatic fan activation on engine brake
- 19/02 Enable automatic fan activation on air conditioner
- 19/03 Enable automatic fan activation on PTO
- 19/04 Switch on temperature automatic fan
- 19/05 Switch off temperature automatic fan

Version 203

- 19/01 Enable automatic fan activation on engine brake
- 19/02 Enable automatic fan activation on air conditioner
- 19/03 Enable automatic fan activation on PTO
- 19/04 Tmot 0% fan
- 19/05 Tmot 100% fan
- 19/06 DSF0 fan
- 19/07 DSF1 fan
- 19/08 Hold time fan
- 19/09 Ramp fan
- 19/10 Fan activation via input LUEFTER
- 13/06 Configuration Variable Input DSF0
- 13/07 Configuration Variable Input DSF1

Output value

Version 202

- Information "Fan activation" transmitting to the engine control PLD-MR via CAN

Version 203

- Information "Fan power consumption in percent" transmitting to the engine control PLD-MR 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.

Parameter

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 ADM2 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.

Status	Explanation (continued)
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!

7.13. Diagnosis

The ADM-FR and PLD 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 ADM-FR and PLD using DaimlerChrysler diagnosis tools (e.g. minidiag2) at the diagnosis connector.

Input/output

– Pin 12/02 K-DIAG

8. Actual Values

8.1. Analog Values

Nr.	Description	Range Min	Range Max	Dimen-sion	Pin
1	Analog Accelerator Pedal (AFPS)	0	100	%	21/11
2	**Supply Analog Acc. Pedal (AFP+)**	4,500	5,500	V	21/09
3	Analog Remote Pedal (HFGS)	0	100	%	18/18
4	Supply Analog Remote Pedal (HFG+)	5,000	6,000	V	18/17
5	Selected Pedal Value	0	100	%	-
6	Calculated Pedal Torque Value	-5000	5000	Nm	-
7	Actual Engine Speed	0	3000	1/min	-
8	Actual Torque	-5000	5000	Nm	-
9	Friction Torque	-5000	0	Nm	-
10	**Governor Type**	0	15	-	-
11	Demand Engine Speed	0	3000	1/min	-
12	Demand Engine Torque	-5000	5000	Nm	-
13	Minimum Engine Speed	0	3000	1/min	-
14	Maximum Engine Speed	0	3000	1/min	-
15	Road Speed	0	150	km/h	-
16	Set Speed Cruise Control	0	150	km/h	-
17	Voltage Coolant Level Sensor	0	5,000	V	-
18	Status Coolant level 0= Value not valid 1= Level warning, below under limit 2= Refill range 3= Coolant level O.K.	0	3	-	-
19	Voltage Air Filter Sensor	0	5,000	V	-
20	Pressure Air Filter Sensor	0	5000	mbar	-
21	Coolant Temperature	-40	150	°C	
22	Oil Pressure	0	5000	mbar	-

Nr.	Description	Range Min	Range Max	Dimen-sion	Pin
23	Oil Temperature	-40	150	°C	-
24	Voltage Terminal 15 (ignition)	0	30,000	V	21/02
25	Voltage Terminal 30	0	30,000	V	21/01
26	**C3-Signal Frequency**	0	10000	Hz	15/03
27	C3 diagnosis threshold	0	5,000	V	-
28	SAE J1939 Current Active TSC1 Sender	0	255	-	-
29	SAE J1939 Demand Engine Speed	0	3000	1/min	-
30	SAE J1939 Demand Torque	-125	125	%	-
31	SAE J1939 Maximum Engine Speed	0	3000	1/min	-
32	SAE J1939 Maximum Torque	-125	125	%	-
33	PWM Pedal Signal GAS1 Idle: 10% ... 30% o.k Max. Load: 40% ... 90% o.k	0	100	%	21/12
34	PWM Pedal Signal GAS2 Idle: 10% ... 30% o.k Max. Load: 40% ... 90% o.k	0	100	%	21/13
35	Status Grid Heater 0= Disabled 1= Preheating phase 2= Ready for starting 3= Starting 4= Postheating phase 5= Cooling off phase 6= End	0	6	-	-
36	Boost Temperature	-50	200	°C	-
37	*Software Version	-	-	-	-
	**IWA output	0	100	%	12/05
38	**Software Version	-	-	-	-

*** Diagnosis Version 202**
**** Diagnosis Version 203**

8.2. BinaryValues

Nr.	Description	Status 00/01	Pin	
1/1	Terminal 15 (Ignition)	Off/On	21/02	
1/2	Service Brake	Off/On	21/15	-
1/3	Park Brake	Off/On	21/16	-
1/4	Clutch	Closed/ Open	18/02	-
2/1	Cruise Control Switch CC-	Off/On	18/04	On = Set and Deccelerate
2/2	Cruise Control Switch CC+	Off/On	18/05	On = Resume and accelerate
2/3	Cruise Control Switch CC_EIN	Off/On	18/06	On = Enable Cruise Control
2/4	Throttle Select Switch FG_WAHL	Off/On	18/07	Off: accelerator pedal On: remote pedal
3/1	Engine Brake Low MBR_L	Off/On	18/08	-
3/2	Engine Brake High MBR_H	Off/On	18/09	-
3/3	PTO Control Set Switch	Off/On	18/10	
3/4	Limiter0 Set Switch	Off/On	18/11	-
4/1	Limiter1 Set Switch	Off/On	18/12	-
4/2	Shutdown Override MABSCH_SP	Off/On	18/13	-
4/3	Limiter 2 Set Switch (KLIMA)	Off/On	18/14	-
4/4	Fan	Off/On	18/15	-
5/1	Acceleretor Pedal Lockout	No/Yes	18/16	On active input acc. pedal and remote pedal are disabled.
5/2	Transmission Neutral NE	Off/On	15/01	-
5/3	Rear Axle HA	Off/On	15/02	-
5/4	ABS	Off/On	-	SAE J1939, preliminary
6/1	GAS2 (analog throttle)	Off/On	21/13	Idle validation switch 1, if analog throttle
6/2	GAS1 (analog throttle)	Off/On	21/12	Idle validation switch 2, if analog throttle
6/3	engine brake(s) off	No/Yes	-	lockout demand via SAE J1939

Nr.	Description	Status 00/01	Pin	
6/4	Kickdown	No/Yes	-	status accelerator pedal
7/1	engine stop demand (ADM2 to MR)	No/Yes	-	
7/2	engine stop demand (via SAE J1939)	No/Yes	-	
7/3	starter signal (Term. 50)	Off/On	12/01	starter signal (Ignition key)
7/4	configurable input DSF0	Off/On	12/10	
8/1	configurable input DSF1	Off/On	12/09	
8/2	**exhaust brake valve MBR-BK	Off/On	15/06	
8/3	**decompression valve MBR-KD	Off/On	15/10	
8/4	**relay 1	Off/On	15/12	
9/1	**relay 2	Off/On	15/09	
9/2	**relay 3	Off/On	15/11	
9/3	**relay 4	Off/On	18/01	
9/4	##engine-hood switch	Off/On	12/08	

**** valid from diagnosis version 203**
##valid from diagnosis version 204

9. Fault codes

9.1 Fault codes diagnosis version 203

ADM2 fault codes (J1939) SPN/FMI	ADM2 fault codes (k-line)	Description		Remedial action	Pin
54/3	10003	decom-pression valve MBR_KD	open circuit	- check wiring - check solenoid valve	15/10
54/4	10004	decom-pression valve MBR_KD	shorted to ground	- check wiring - check solenoid valve	15/10
84/3	10103	vehicle speed signal C3	open circuit	- check wiring - check parameter 08/01	15/03
84/4	10104	vehicle speed signal C3	shorted to ground	- check wiring	15/03
84/14	10114	vehicle speed signal C3	value not plausible	- check parameter 08/01	15/03
91/0	10200	analog accelerator pedal	accelerator pedal 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
91/2	10202	analog accelerator pedal	voltage not plausible	- Pedal unit exchange, if defective - check wiring - Limit value idle operation position: 5,0 V - Limit value kickdown position: 4,9 V	21/11
91/3	10203	analog accelerator pedal	voltage too high or shorted to battery voltage	- 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	analog accelerator pedal AFPS	voltage too low or shorted to ground	- Pedal unit exchange, if defective - check wiring - Limit value idle operation position: 5,0 V - Limit value kickdown position: 4,9 V	21/11
98/0	10400	oil level	oil level to high	- Oil discharge with to strong overstocking. - remark: This problem can occur also if in PLD-MR the false type of oil pan were programmed.	PLD-MR

ADM2 fault codes (J1939) SPN/FMI	ADM2 fault codes (k-line)	Description		Remedial action	Pin
98/1	10401	oil level	low oil level	- refill oil	PLD-MR
98/14	10414	oil level	oil level too low	- refill oil - remark: This problem can occur also if in PLD-MR the false type of oil pan were programmed.	PLD-MR
100/1	10501	oil pressure sensor	low oil pressure	- check oil pump and oil circuit	PLD-MR
100/14	10514	oil pressure sensor	oil pressure too low	- check oil pump and oil circuit.	PLD-MR
107/0	10800	air filter sensor	air pressure too high	- check wiring.	15/08
107/3	10803	air filter sensor	open circuit	- check wiring.	15/08
107/4	10804	air filter sensor	shorted to ground	- check wiring.	15/08
110/0	10900	coolant temperature	high coolant temperature	- cooling-water level and cooling circuit check.	PLD-MR
110/14	10914	coolant temperature	coolant temperature too high	- cooling-water level and cooling circuit check.	PLD-MR
111/1	11001	coolant level	low coolant level	- refill coolant - check wiring	15/07
111/3	11003	coolant level	open circuit	- check wiring - Voltage must be larger than 2,0 V.	15/07
111/4	11004	coolant level	shorted to ground	- check wiring.	15/07
158/0	11100	terminal 15 (ignition)	over voltage	- check battery voltage - check parameter 2/08 (24V/12V selection)	21/02
158/1	11101	terminal 15 (ignition)	under voltage	- check battery voltage - check parameter 2/08 (24V/12V selection)	21/02

ADM2 fault codes (J1939) SPN/FMI	ADM2 fault codes (k-line)	Description		Remedial action	Pin
558/5	11705	idle switch (analog pedal)	both switches open circuit (GAS2 + GAS1 open)	- check wiring - Pedal unit exchange, if defective	21/12 and 21/13
558/12	11712	idle switch (analog pedal)	both switches closed (GAS2 + GAS1 closed)	- check wiring - Pedal unit exchange, if defective	21/12 and 21/13
599/12	11812	cruise control switch CC+ and CC-	both switches closed	- check wiring - check cruise control switch	18/04 and 18/05
601/12	11912	cruise control switch CC+ and CC-	both switches closed	- check wiring - check cruise control switch	18/04 and 18/05
620/3	12103	power supply analog pedal (AFP+)	voltage too high	- supply voltage > 5,2 V.	21/09
620/4	12104	power supply analog pedal (AFP+)	voltage too low	- supply voltage < 4,8 V.	21/09
625/2	12202	CAN link ADM2 - MR	no com-munication with MR	- check wiring (engine CAN) - check configuration: MR parameter (../..) and ADM2 parameter 1/01 to be set to equal functionality (0ne wire capability)	-
625/14	12214	CAN link ADM2 - MR	one wire mode	- check wiring (engine CAN) - check configuration: MR parameter (../..) and ADM2 parameter 1/01 to be set to equal functionality (0ne wire capability)	-
629/12	12312	ADM2	internal error	-	-
677/5	13305	output relay 1	open circuit	- check wiring - check relay 1	15/12
677/6	13306	output relay 1	shorted to ground	- check wiring - check relay 1	15/12

ADM2 fault codes (J1939) SPN/FMI	ADM2 fault codes (k-line)	Description		Remedial action	Pin
730/0	13900	output relay 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	grid heater: relay permanently closed	- check wiring - check relay 2	15/09
730/2	13902	output relay 2	grid heater: relay permanently closed	- check wiring - check relay 2	15/09
730/3	13903	output relay 2	voltage too high or shorted to battery voltage	- check wiring	15/09
730/4	13904	output relay 2	voltage too low or shorted to ground	- check wiring - check relay 2	15/09
974/2	14202	remote pedal HFG	supply voltage out of range	- 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 pedal HFG	voltage too high or shorted to battery voltage	- check wiring - check remote pedal	18/18
974/4	14204	remote pedal HFG	voltage too low or shorted to ground	- check wiring - check remote pedal	18/18
1004/3	14403	output relay 4	open circuit	- check wiring - check relay 4	18/01
1004/4	14404	output relay 4	shorted to ground	- check wiring - check relay 4	18/01

ADM2 fault codes (J1939) SPN/FMI	ADM2 fault codes (k-line)	Description		Remedial action	Pin
1005/3	14503	output PWM pedal supply or transmission	open circuit	- check wiring.	15/05
1005/4	14504	output PWM pedal supply or transmission	shorted to ground	- check wiring.	15/05
1006/3	14603	exhaust brake valve MBR_BK	open circuit	- check wiring - check exhaust brake valve	15/06
1006/4	14604	exhaust brake valve MBR_BK	shorted to ground	- check wiring - check exxhaust brake valve	15/06
639/2	14902	J1939 CAN-interface	CAN identifiers ETC#1 or ACC#1 missing	- PGN ETC1 was received only once and did not disappear.	
1015/1	15001	PWM accelerator pedal	no supply voltage	- check wiring	15/05
1015/2	15002	PWM accelerator pedal	both signals missing (GAS1 and GAS2)	- check wiring - Pins 21/13, 21/12, 15/05 , 21/14.	
1015/3	15003	PWM accelerator pedal	signal GAS2, not available	- check wiring - Pins 21/13, 15/05 , 21/14.	
1015/4	15004	PWM accelerator pedal	signal GAS1, not available	- check wiring - Pins 21/12, 15/05 , 21/14.	
1015/5	15005	PWM accelerator pedal	accelerator pedal not adjusted	- restart accelerator pedal adjustment routine	-
1015/6	15006	PWM accelerator pedal	idle position out of adjusted range	- restart accelerator pedal adjustment routine	-
1015/7	15007	PWM accelerator pedal	accelerator pedal out of adjusted range	- restart accelerator pedal adjustment routine	-

10. Routines for ADM2

10.1. Routines for ADM2, Diagnosis version 202 and 203

No.	Routine Name	Abbreviation	Description	Pin
1	if initial start-up, ecu or acc. pedal change	acc.pedal adjust.	With an initial start up of ADM2 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	Set all parameters back to default value.	-
3 *)	activate oil level lamp	oil level lamp	ADM2 output test. Refer to chapter 7.6.	21/04
4 *)	activate engine stop lamp	engine stop lamp		21/05
5 *)	activate fault lamp	fault lamp		21/06
6 *)	activate grid heater lamp	grid heater lamp		21/07
7 *)	activate air filter lamp	air filter lamp		21/08
8 *)	activate relay 1	relay 1	ADM2 output test. Refer to chapter 4.2.	15/12
9 *)	activate relay 2	relay 2	ADM2 output test. Refer to chapter 4.2.	15/09
10 *)	activate relay 3	relay 3	ADM2 output test. Refer to chapter 4.2.	15/11
11 *)	activate relay 4	relay 4	ADM2 output test. Refer to chapter 4.2.	18/01
12 *)	activate MBR_BK	MBR_BK	ADM2 output test. Refer to chapter 7.5.	15/06
13 *)	activate MBR_KD	MBR_KD		15/10
14 *)	activate IWA output	IWA output	ADM2 output test. Refer to chapter 7.7.	12/05
15 *)	activate engine speed gauge	engine speed gauge	ADM2 output test. Refer to chapter 7.6.	12/06
16 *)	activate cool.temp.gauge/lamp	cool.temp.gauge	ADM2 output test. Refer to chapter 7.6.	12/04
17 *)	activate oil pressure gauge/ lamp	oil pressure gauge	ADM2 output test. Refer to chapter 7.6.	12/03

*) valid till diagnosis version 203

11. CAN Messages according to SAE J1939

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
TSC1_ENG	0C 00 00 00	10ms				Torque/Speed Control to Engine	5.3.1		
	PGN=0			1	8, 7	Not defined	---	2 bits	11b
			√		6, 5	Override Control Mode Priority	5.2.3.3	2 bits	00b...11b
			√		4, 3	Requested Speed Control conditions	5.2.3.2	2 bits	00b...11b
			√		2, 1	Override Control Mode	5.2.3.1	2 bits	00b...11b
			√	2, 3		Requested Speed / Speed Limit	5.2.1.19	0.125 rpm	0 to 8031.875 rpm
			√	4		Requested Torque / Torque Limit	5.2.1.15	1%	0 to 125%
				5..8		Not defined	---	4 Bytes	FF.FF.FF.FFh
TSC1_ER	0C 00 0F 0F	50ms				Torque/Speed Controlto Engine Retarder	5.3.1		
	PGN=0			1	8, 7	Not defined	---	2 bits	11b
			√		6, 5	Override control mode priority	5.2.3.3	2 bits	00b...11b
			√		4, 3	Requested speed control conditions	5.2.3.2	2 bits	00b...11b
			√		2, 1	Override control modes	5.2.3.1	2 bits	00b...11b
				2, 3		Requested Speed / Speed Limit	5.2.1.19	0.125 rpm	0 to 8031.875 rpm
			√	4		Requested Torque / Torque Limit	5.2.1.15	1%	-125 to 0%
				5..8		Not defined	---	4 Bytes	FF.FF.FF.FFh
ESS	0C EF 00 00	50ms				Engine Start/Stop			
	PGN=61184			1	8..7	Not defined	---	2 bits	11b
			√		6, 5	Inhibit engine start	---	2 bits	00b...01b
			√		4, 3	##Engine start	---	2 bits	00b...01b
			√		2, 1	##Inhibit fuel injection	---	2 bits	00b...01b
				2..8		Not defined	---	7 Bytes	FF.FF.FF.FF.FF.FF.FFh
						##valid from diagnosis version 204			

Message				Message Definition					
Name	**Identifier [Hex]**	**Repetition-rate**	**State**	**Byte**	**Bit**	**Comment / Parameter**	**SAE J1939/71 Rev. 10/1998**	**Length or Resolution**	**Operating Data Range**
ERC1	18F000 0F	100ms				Electronic Retarder Controler #1	5.3.3		
				1	8, 7	Ret. Enable - shift assist switch	5.2.2.12	2 bits	00b, 01b
					6, 5	Ret. Enable - brake assist switch	5.2.2.11	2 bits	00b, 01b
	PGN=61440				4..1	Engine/retarder torque mode	5.2.2.1	4 bits	0000b...1110b
				2		Actual retarder - percent torque	5.2.1.17	1 %	-125 to 0 %
				3		Intended retarder percent torque	5.2.5.169	1 %	-125 to 0 %
				4	8..3	Not defined	---	6 bits	000000b...111111b
					2, 1	Engine coolant load increase	5.2.2.21	2 bits	00b, 11b
				5		Source address of controling device for retarder control	5.2.5.300	1 Byte	0 to 253d
				6					
			√	7		Retarder torque			
				8		Not defined	---	1 Byte	FFh
ETC1	0C F0 02 03	10ms				Electronic Transmision Controller #1	5.3.5		
	PGN=61442			1	8, 7	Not defined	---	2 bits	11b
					6, 5	Shift in process	5.2.2.14	2 bits	00b, 01b
			√		4, 3	Torque converter lockup engaged	5.2.2.13	2 bits	00b, 01b
					2, 1	Driveline engaged	5.2.2.6	2 bits	00b, 01b
			√	2, 3		Output shaft speed	5.2.1.14	0.125 rpm, upper byte resolution 32 rpm	0 to 8031.875 rpm
				4		Percent clutch slip	5.2.1.20	0,4%	0 to 100%
					8..5	Not defined	---	4 bits	1111b
					4, 3	Progressive shift disable	5.2.3.11	2 bits	00b, 11b
			√	5	2, 1	Momentary engine overspeed enable	5.2.3.12	2 bits	00b, 11b
				6, 7		Input shaft speed	5.2.5.55	0.125 rpm	0 to 8031.875 rpm
				8		Source address of controlling device for transmission control	5.2.5.301	1 Byte	0 to 253d

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
ETC2	18 F0 05 03	100ms				Electronic Transmision Controller #2			
				1		Selected gear	5.2.1.23	1 gear	-125 to +125
	PGN=61445			2, 3		Actual gear ratio	5.2.1.25	0.001	0 to 64.255
			√	4		##Current gear	5.2.1.22	1 gear	-125 to +125
				5, 6		Transmission requested range	5.2.5.108	ASCII	0 to 250
				7, 8		Transmission current range	5.2.5.109	ASCII	0 to 250
						##valid from diagnosis version 204			
					6, 5	Driver 1 card	5.2.6.80		
					4..1	Driver 1 timer related states	5.2.6.79		
				3	8, 7	Not defined	---		
					6, 5	Driver 2 card	5.2.6.80		
					4..1	Driver 2 timer related states	5.2.6.79		
				4	8, 7	Direction indicator	5.2.6.85		
					6, 5	Tachograph performance	5.2.6.84		
					4, 3	Handling information	5.2.6.83		
					2, 1	System event	5.2.6.82		
			√	5, 6		Tachograph output shaft speed	5.2.5.282	0.125 rpm	0 to 8031.875 rpm
			√	7, 8		Tachograph vehicle speed	5.2.5.283	1/256 km/h	0 to 250.996 km/h

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
EEC1	0C F0 04 00	10ms	⊠			Electronic Engine Controller #1	5.3.7		
				1	8..5	Not defined	---	4 bits	1111b
	PGN=61444		√		4..1	Engine / Retarder torque mode	5.2.2.1	4 bits	0000b...1110b
			√	2		Drivers demand engine - percent torque	5.2.1.4	1%	0 to 125%, (0= -125%, 125=0%, 250= +125%)
			√	3		Actual engine - percent torque	5.2.1.5	1%	0 to 125%
			√	4, 5		Engine Speed	5.2.1.9	0.125 rpm	0 to 8031.875 rpm
				6		Source address of controlling device for engine control	5.2.5.298	1 Byte	0 to 253d
				7, 8		Not defined	---	2 Bytes	FF.FFh
EEC2	0C F0 03 00	50ms	⊠			Electronic Engine Controller #2	5.3.6		
				1	8, 7	Not defined	---	2 bits	00b, 01b
	PGN=61443				6, 5	Road speed limit status	5.2.6.76	2 bits	00b, 01b
			√		4, 3	Accelerator pedal (AP) kickdown switch	5.2.2.5	2 bits	00b, 01b
			√		2, 1	Accelerator pedal (AP) low idle switch	5.2.2.4	2 bits	00b, 01b
			√	2		Accelerator pedal (AP) position	5.2.1.8	0.4%	0 to 100%
			√	3		Percent load at current speed	5.2.1.7	1%	0 to 125%
			(√)	4		Remote accelerator	5.2.1.59	0.4%	0 to 100%
				5..8		Not defined	---	4 Bytes	FF.FF.FF.FFh
EEC3	18 FE DF 00	250ms	⊠			Electronic Engine Controller	5.3.13		
			√	1		Nominal friction - percent torque	5.2.1.6	1%	0 to 125%
	PGN=65247		√	2, 3		Engine's desired operating speed	5.2.1.10	0.125 rpm	0 to 8031.875 rpm
			√	4		Engine's operating speed asymmetry adjustment	5.2.1.16	1Byte, ratio	0 to 250d
				5..8		Not defined	---	4 Bytes	FF.FF.FF.FFh

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
CCVS	18 FE F1 00	100ms	⊠			Cruise Control / Vehicle Speed	5.3.31		
				1	8..5	Not defined	---	4 bits	1111b
	PGN=65265		√		4, 3	Parking brake switch	5.2.6.8	2 bits	00b, 01b
			√		2, 1	Two speed axle switch	5.2.6.1	2 bits	00b, 01b
			√	2, 3		Wheel-based vehicle speed	5.2.1.12	1/256 km/h, upper byte resolution 1.0 km/h	0 to 250.996 km/h
			√	4	8, 7	Clutch switch	5.2.6.12	2 bits	00b, 01b
			√		6, 5	Brake switch	5.2.6.11	2 bits	00b, 01b
			√		4, 3	Cruise Control enable switch	5.2.6.10	2 bits	00b, 01b
			√		2, 1	Cruise Control active	5.2.6.9	2 bits	00b, 01b
			√	5	8, 7	Cruise Control accelerate switch	5.2.6.17	2 bits	00b, 01b
			√		6, 5	Cruise Control resume switch	5.2.6.16	2 bits	00b, 01b
			√		4, 3	Cruise Control coast switch	5.2.6.15	2 bits	00b, 01b
			√		2, 1	Cruise Control set switch	5.2.6.14	2 bits	00b, 01b
			√	6		Cruise Control set speed	5.2.5.47	1 km/h	0 to 250 km/h
			√	7	8..6	Cruise Control state	5.2.2.18	3 bits	000b...110b
			(√)		5..1	PTO state	5.2.2.19	5 bits	00000b...11110b
				8	8, 7	Engine shutdown override speed	5.2.6.102	2 bits	00b, 01b
					6, 5	Engine test mode switch	5.2.6.40	2 bits	00b, 01b
			√		4, 3	Idle decrement switch	5.2.6.41	2 bits	00b, 01b
			√		2, 1	Idle increment switch	5.2.6.42	2 bits	00b, 01b

Message				Message Definition					
Name	**Identifier [Hex]**	**Repetition-rate**	**State**	**Byte**	**Bit**	**Comment / Parameter**	**SAE J1939/71 Rev. 10/1998**	**Length or Resolution**	**Operating Data Range**
EET	18 FE EE 00	1s	✉			Electronic Engine Temperature	5.3.28		
			√	1		Engine coolant temperature	5.2.5.5	1°C	-40 to +210°C
	PGN=65262		(√)	2		Fuel temperature ##	5.2.5.14	1°C	-40 to +210°C
			√	3,4		Engine oil temperature	5.2.5.15	0.03125°C	-273 to +1735.0°C
				5,6		Turbo oil temperature	5.2.5.16	0.03125°C	-273 to +1735.0°C
				7		Engine intercooler temperature	5.2.5.6	1°C	-40 to +210°C
				8		Engine intercooler thermostat opening	5.2.5.242	0.4%	0 to 100%
EFL/P	18 FE EF 00	500ms	✉			Engine Fluid Level/Pressure	5.3.29		
				1		Fuel delivery pressure	5.2.5.27	4kPa	0 to 1000 kPa
	PGN=65263			2		Extended crankcase blow-by pressure	5.2.5.241	0.05 kPa	0 to 12.5 kPa
			√	3		Engine oil level	5.2.5.72	0.4%	0 to 100%
			√	4		Engine oil pressure	5.2.5.28	4 kPa	0 to 1000 kPa
				5,6		Crankcase pressure	5.2.5.40	1/128 kPa	-250 to +251.99 kPa
				7		Coolant pressure	5.2.5.38	2 kPa	0 to 500 kPa
				8		Coolant level	5.2.5.73	0.4%	0 to 100%

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
CFG_E	18 FE E3 00	every 5 s	☒			Engine Configuration	5.3.17		
			√	1, 2		Engine speed at idle, point 1	5.2.1.26	0.125 rpm	0 to 8031.875 rpm
	PGN=65251		√	3		Percent torque at idle, point 1	5.2.1.36	1%	0 to 125%
			√	4, 5		Engine speed at point 2	5.2.1.27	0.125 rpm	0 to 8031.875 rpm
			√	6		Percent torque at point 2	5.2.1.37	1%	0 to 125%
			√	7, 8		Engine speed at point 3	5.2.1.28	0.125 rpm	0 to 8031.875 rpm
			√	9		Percent torque at point 3	5.2.1.38	1%	0 to 125%
			√	10, 11		Engine speed at point 4	5.2.1.28	0.125 rpm	0 to 8031.875 rpm
			√	12		Percent torque at point 4	5.2.1.38	1%	0 to 125%
			√	13, 14		Engine speed at point 5	5.2.1.28	0.125 rpm	0 to 8031.875 rpm
			√	15		Percent torque at point 5	5.2.1.38	1%	0 to 125%
			√	16, 17		Engine speed at high idle, point 6	5.2.1.29	0.125 rpm	0 to 8031.875 rpm
				18, 19		Gain (KP) of endspeed governor	5.2.1.40	0.0007813 %/rpm	0 to 50.2 %/rpm
			√	20, 21		Reference engine torque	5.2.1.39	1 Nm	0 to 64255 Nm
			√	22, 23		Maximum momentary engine override speed, point 7	5.2.1.30	0.125 rpm	0 to 8031.875 rpm
			√	24		Maximum momentary engine override time limit	5.2.1.31	0.1 s	0 to 25 s, 0=no override of high idle allowed, 255=not applicable
				25		Requested speed control range lower limit	5.2.1.32	10 rpm	0 to 2500 rpm
				26		Requested speed control range upper limit	5.2.1.33	10 rpm	0 to 2500 rpm
				27		Requested torque control range lower limit	5.2.1.34	1%	0 to 125%
				28		Requested torque control range upper limit	5.2.1.35	1%	0 to 125%

Message				Message Definition					
Name	**Identifier [Hex]**	**Repetition-rate**	**State**	**Byte**	**Bit**	**Comment / Parameter**	**SAE J1939/71 Rev. 10/1998**	**Length or Resolution**	**Operating Data Range**
DM1	18 FE CA 00	1s	⊠			Active Diagnostic Trouble Codes	SAE J1939/73 Rev. 10/1998		
	PGN=65226		√	1	8, 7	Malfunction Indicator Lamp Status	5.7.1.1	2 bits	00b, 01b
			√		6, 5	Red Stop Lamp Status	5.7.1.2	2 bits	00b, 01b
			√		4, 3	Amber Warning Lamp Status	5.7.1.3	2 bits	00b, 01b
			√		2, 1	Protect Lamp Status	5.7.1.4	2 bits	00b, 01b
				2	8..1	Reserved for SAE assignment Lamp status	---	1 Byte	FFh
			√	3	8..1	SPN, 8 least significant bits of SPN	5.7.1.5	1 Byte	FFh
			√	4	8..1	SPN, second byte of SPN	5.7.1.5	1 Byte	FFh
			√	5	8..6	SPN, 3 most significant bits	5.7.1.5	3 bits	000b...111b
			√		5..1	FMI (most significant at bit 5)	5.7.1.6	5 bits	00000b...11111b
				6	8	SPN Conversion method	5.7.1.7	1 bit	1b
			√		7..1	Occurence Count	5.7.1.8	7 bits	0000000b..1111111b

Engine									
Message				**Message Definition**					
Name	**Identifier [Hex]**	**Repetition-rate**	**State**	**Byte**	**Bit**	**Comment / Parameter**	**SAE J1939/71 Rev. 10/1998**	**Length or Resolution**	**Operating Data Range**
CFG_ER	18 FE E1 0F	every 5 s	✉			Engine Retarder Configuration	5.3.15		
			√	1	8..5	Retarder location	5.2.2.3	4 bits	0000b...1110b
	PGN=65249		√		4..1	Retarder type	5.2.2.2	4 bits	0000b...1110b
			√	2		Retarder control method	5.2.1.50	1 Step	0 to 250d, 0=continuous control, 1=on/off control, 2 to 250=number of
			√	3, 4		Retarder speed at idle, point 1	5.2.1.41	0.125 rpm	0 to 8031.875 rpm
			√	5		Percent torque at idle, point 1	5.2.1.45	1 %	-125% to 0%
			√	6, 7		Maximum retarder speed, point 2	5.2.1.43	0.125 rpm	0 to 8031.875 rpm
			√	8		Percent torque at maximum speed, point 2	5.2.1.46	1 %	-125% to 0%
			√	9, 10		Retarder speed at point 3	5.2.1.44	0.125 rpm	0 to 8031.875 rpm
			√	11		Percent torque at point 3	5.2.1.47	1 %	-125% to 0%
			√	12, 13		Retarder speed at point 4	5.2.1.44	0.125 rpm	0 to 8031.875 rpm
			√	14		Percent torque at point 4	5.2.1.47	1 %	-125% to 0%
			√	15, 16		Retarder speed at peak torque, point 5	5.2.1.42	0.125 rpm	0 to 8031.875 rpm
			√	17, 18		Reference retarder torque	5.2.1.49	1 Nm	0 to 64255 Nm
			√	19		Percent torque at point 5	5.2.1.48	1 %	-125% to 0%

Message				Message Definition					
Name	**Identifier [Hex]**	**Repetition-rate**	**State**	**Byte**	**Bit**	**Comment / Parameter**	**SAE J1939/71 Rev. 10/1998**	**Length or Resolution**	**Operating Data Range**
ERC1_ER	18 F0 00 0F	100ms	✉			Electronic Retarder Controller Engine Retarder	5.3.3		
	PGN=61440		(√)	1	8, 7	Retarder enable - shift assist switch	5.2.2.12	2 bits	00b, 01b
			(√)		6, 5	Retarder enable - brake assist switch	5.2.2.11	2 bits	00b, 01b
			√		4..1	Engine / retarder torque mode	5.2.2.1	4 bits	0000b...1110b
			√	2		Actual retarder - percent torque	5.2.1.17	1 %	-125 to 0 %
				3		Intended retarder - percent torque	5.2.5.169	1 %	-125 to 0 %
				4	8..3	Not defined	---	6 bits	000000b...111111b
					2,1	Engine coolant load increase	5.2.2.21	2 bits	00b, 11b
				5		Source address of controlling device for retarder control	5.2.5.300	1 Byte	0 to 253d
				6		Not defined		1 Byte	FFh
				7		###Retarder switch percent torque		1 Byte	
				8		Not defined		1 Byte	FFh
						##valid from diagnosis version 204	---		
FE	18 FE F2 00	100ms	✉			Fuel Economy	5.3.32		
			√	1,2		Fuel Rate	5.2.5.63	0.05 l/h	0 to 3212.75 l/h
	PGN=65266		√	3,4		Instantaneous fuel economy	5.2.5.67	1/512 km/l	0 to 125.5 km/l
			√	5,6		average fuel economy	5.2.5.68	1/512 km/l	0 to 125.5 km/l
				7,8		Not defined	---		
IEC	18 FE F6 00	500ms	✉			Inlet / Exhaust Conditions	5.3.36		
				1		Particulate trap inlet pressure	5.2.5.41		
	PGN=65270		√	2		Boost pressure	5.2.5.36	2 kPa	0 to 500 kPa
			√	3		Intake manifold temperature	5.2.5.4	1°C	.-40 to 210 °C
				4		Air inlet pressure	5.2.5.37		
				5		Air filter differential pressure	5.2.5.46		
				6,7		Exhaust gas temperature	5.2.5.8		
				8		Coolant filter differential pressure	5.2.5.44		

Message				Message Definition					
Name	Identifier [Hex]	Repetition-rate	State	Byte	Bit	Comment / Parameter	SAE J1939/71 Rev. 10/1998	Length or Resolution	Operating Data Range
CI	18 FE EB 00	on request	🖂			Cmponent Identification	5.3.25		
			√	Field a		Make	5.2.5.90	ASCII	
	PGN=65259		√	Field b		Model	5.2.5.91	ASCII	
			√	Field c		Serial number	5.2.5.92	ASCII	
			√	Field d		Unit number	5.2.5.89	ASCII	
EHR	18 FE E5 00	on request	🖂			Engine Hours, Revolutions	5.3.19		
			√	1..4		Total engine hours	5.2.5.61		
	PGN=65253		√	5..8		Total engine revolutions	5.2.5.58		
FC	18 FE E9 00	on request	🖂			Fuel Consumption	5.3.23		
			√	1..4		Trip fuel	5.2.5.64	0.5l	0 to 2105540608l
	PGN=65257		√	5..8		Total fuel used	5.2.5.66	0.5l	0 to 2105540608l

🖂	Transmitter
🖅	Receiver
√	Data used in current application
(√)	Data received but not used in current application
⊗	data interests for future application