Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

Prüfbericht / *Test Report*

Nr. / *No.*: M-112.99.644.00

Einheitliche Bedingungen für die Genehmigung der Motoren mit Selbstzündung, der mit Erdgas betriebenen und der mit Flüssiggas betriebenen Motoren mit Fremdzündung sowie der mit einem Motor mit Selbstzündung, einem mit Erdgas betriebenen oder einem mit Flüssiggas betriebenen Motor mit Fremdzündung ausgestatteten Fahrzeuge hinsichtlich der Emissionen von Schadstoffen aus dem Motor

Uniform provisions concerning the measures to be taken against the emission of gaseous and particulate pollutants from compression-ignition engines for use in vehicles, and the emission of gaseous pollutants from positive-ignition engines fuelled with natural gas or liquefied petroleum gas for use in vehicles

ECE-Regelung Nr. 49
Ergänzung 10 der Änderungsserie 05 vom 29. Dezember 2018

ECE-Regulation No. 49
Supplement 10 of 05 series of amendments dated 29th of December, 2018

zur Typgenehmigung auf Grundlage der Grenzwerte der Tabellen in Absatz 5.2.1., Zeile B2
for type approval according to limit values of the tables in paragraph 5.2.1, row B2

Genehmigungsstand *Approval status*	
ECE / *ECE*	Genehmigungsnummer *Number of approval*
	nennt Genehmigungsbehörde / *named by type approval authority*

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

I. Allgemeines / *General*

0.1	Fabrikmarke (Firmenname des Herstellers) *Make (name of company)*:	Detroit Diesel Corporation
0.2	Typ / *Type*:	R49-DD13V
0.3	Fahrzeugklasse / *Vehicle class*:	entfällt / *not applicable*
0.4	Motorklasse / *Category of engine*:	Diesel
0.5	Name und Anschrift des Herstellers / *Name and address of manufacturer*:	Detroit Diesel Corporation 13400 Outer Drive, West Detroit, Michigan 48239-4001 USA
0.6	Lage und Anbringung des ECE-Typgenehmigungszeichens / *Location and affixing method of ECE approval mark*:	siehe Beschreibungsbogen Nr. / *see information document No.*: 0.7
0.7	Anschriften der Fertigungsstätten / *Address of assembly plant*:	Detroit Diesel Corporation 13400 Outer Drive West Detroit, Michigan 48239-4001 USA
0.8	Beschreibungsbogen-Nr. / *Information document No.*:	R49-DD13V
	Ausstellungsdatum / *Date of issue*:	15.12.2020
	Änderungsdatum / *Amendment*:	entfällt / *not applicable*

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

II. Prüfprotokoll / *Test record*

1. Angaben zum Prüfobjekt / *Information about the test object*

Motor / *Engine*

- Marke / *Make*:	Detroit Diesel
- Typ / *Type*:	DD13 (OM471LA. V)
- Ausführung / *Version*:	DD13_MLE8
- Motornummer / *Engine number:*	471AE3178
- Hersteller / *Manufacturer*:	Detroit Diesel Corporation 13400 Outer Drive West Detroit, Michigan 48239-4001 USA

2. Prüfbedingungen / *Test conditions*

2.1 Drücke bei Nenndrehzahl / *Pressures at rated speed*:

- Ansaugunterdruck / *Air intake depression*:	2,4	kPa
- Abgasgegendruck / *Exhaust back pressure*:	17,5	kPa
- Ladeluftdruck / *Charge air pressure*:		
(vor Ladeluftkühler / *upstream intercooler*)	253,4	kPa
(nach Ladeluftkühler / *downstream intercooler*)	243,5	kPa

2.2 Prüfdrehzahlen / *Test speeds*

- Leerlauf / *Idling*:	600	min^{-1}
- Nenndrehzahl / *Rated speed*:	1600	min^{-1}
- Drehzahl A (ESC) / *Speed A (ESC)*:	1140	min^{-1}
- Drehzahl B (ESC) / *Speed B (ESC)*:	1460	min^{-1}
- Drehzahl C (ESC) / *Speed C (ESC)*:	1780	min^{-1}
- Bezugsdrehzahl (ETC) / *Reference speed (ETC)*:	2034	min^{-1}

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

3. Prüfergebnisse / *Test results*

3.1 Prüfung / *Test* (ECE-R.49)

3.1.1 Prüfeinrichtungen und Prüfbedingungen entsprechen dem Anhang 4A der Richtlinie ECE-R.49/05 /
Test equipment and test conditions are in accordance with the annex 4A of the directive ECE-R.49/05

3.2 Emissionswerte **ESC**-Prüfung / *Emission values **ESC**-Test*

(Ermittelt mit einem Teilstrom-Entnahmesystem /
Determined by a partial-flow-dilution system)

3.2.1 Messwerte / *Measured values*

	Messwerte [1] / *Measured values* [1] [g/kWh]
CO	0,531
HC	0,005
NO_x	0,509
PT	0,015

[1] ~~Mit periodisch regenerierendem DPF-System~~; ~~(Mittelwert aus Beladungs-und Regenerationsphase)~~/ ~~Mit kontinuierlich regenerierendem DPF-System~~ /
~~*With periodically regenerating PMRS; (mean value of sampling-and regeneration)* /~~
~~*With continuously regenerating PMRS*~~

3.2.2 Mit Verschlechterungsfaktoren / *With deterioration factors*

	Verschlechterungs-faktor [2] / *Deterioration factor* [2]	Ergebnisse / *Results* [g/kWh]	Grenzwerte [3] / *Limits* [3] [g/kWh]
CO	1,10	0,584	1,5
HC	1,05	0,005	0,46
NO_x	1,05	0,534	2,0
PT	1,10	0,017	0,02

[2] Ausgewiesen in Anhang 7, Abschnitt 3.6 der ECE-R.49/05
Listed in annex 7, section 3.6 of directive ECE-R.49/05

[3] Grenzwerte nach Zeile B2, Tabelle 2, 5.2.1 /
Limits of line B2, table 2, 5.2.1

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

3.3 Emissionswerte **ETC**-Prüfung / *Emission values **ETC**-Test*

(Ermittelt mit einem Teilstrom-Entnahmesystem /
Determined by a partial-flow-dilution system)

3.3.1 Messwerte / *Measured values*

	Messwerte / *Measured values* [g/kWh]	Regenerierungs-faktor / *Regeneration factor*	Messwerte (gewichtet) [4] / *Measured values (weighted)* [4] [g/kWh]
CO	0,852	-	-
NMHC[5]	0,013	-	-
CH_4	-	-	-
NO_X	1,202	-	-
PT	0,021	-	-

[4] ~~Mit periodisch regenerierendem DPF-System; (Mittelwert aus Beladungs-und Regenerationsphase)/ Mit kontinuierlich regenerierendem DPF-System~~ /
~~*With periodically regenerating PMRS; (mean value of sampling and regeneration) / With continuously regenerating PMRS*~~

[5] ausgedrückt als THC-Messwert nach 5.2.2.1 /
indicated as THC-value according to 5.2.2.1

3.3.2

	Verschlechterungs-faktor [6] / *Deterioration factor* [6]	Ergebnisse / *Results* [g/kWh]	Grenzwerte [7] / *Limits* [7] [g/kWh]
CO	1,10	0,937	4,0
NMHC [8]	1,05	0,014	0,55
CH_4	-	-	-
NO_X	1,05	1,262	2,0
PT	1,10	0,023	0,03

[6] Ausgewiesen in Anhang 7, Abschnitt 3.6 der ECE-R.49/05
Listed in annex 7, section 3.6 of directive ECE-R.49.5

[7] Grenzwerte nach Zeile B2, Tabelle 2, 5.2.1 /
Limits of line B2, table 2, 5.2.1

[8] ausgedrückt als THC-Messwert nach 5.2.2.1 /
indicated as THC-value according to 5.2.2.1

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

3.4 Emissionswerte **ELR**-Prüfung / *Emission values **ELR**-Test*

3.4.1 Trübungsmessgerät / *Opacimeter*:

- Marke / *Make*: AVL

- Typ / *Type*: 439

3.4.2

	Ergebnis / *Result* [m^{-1}]	Grenzwert / *Limit* [9)] [m^{-1}]
Rauchtrübung / *Smoke*	0,07	0,5

9) Grenzwerte nach Zeile B2, Tabelle 2, 5.2.1 /
Limits of line B2, table 2, 5.2.1

4. Datum und Ort der Prüfung /
Date and place of test: Detroit, USA
17.11.-23.11.2020

5. OBD und NO_x-Control /
OBD und NO_x-Control:

5.1 Bezeichnung der OBD-Familie /
Code of the OBD-family: HDEP, Engine Types 400,
OBD Stage 2, NOx Monitoring
(DD13, DD16)

5.2 Nummer des OBD-Testprotokolls /
Number of the OBD-testprotocol: M-131.99.643.00

6. Bemerkungen / *Remarks*:

Die Dokumentation gemäß 5.1.7.1 a) der ECE-R.49/05 liegt vor (siehe 0.8).
Die Unterlagen gemäß 5.1.7.1 b) haben dem Technischen Dienst vorgelegen und sind geprüft worden. Die verwendeten Zusatzsteuereinrichtungen entsprechen den Forderungen von 5.1 der ECE-R.49/05. /
The information according 5.1.7.1 a) of ECE-R.49/05 have been submitted.
The information according 5.1.7.1 b) were presented to the Technical Service.
The auxiliary control device used are according 5.1 of ECE-R.49/05.

Das geprüfte Motorsystem entspricht den Anforderungen der OBD Stufe 2 /
The tested engine system complies with the requirements of OBD stage 2.

Das geprüfte Motorsystem erfüllt die Forderungen zur Überwachung der Einrichtungen zur Begrenzung der NO_x-Emissionen. /
The tested engine system complies with the requirements regarding control of NO_x -emissions.

Typprüftests ohne Anwesenheit des Technischen Dienstes vor Ort (Remote Prüfung).
KBA Aktenzeichen: **400-21.03/007#015-001**/
Type approval testing without presence of Technical Service on-site (remote testing).
*KBA reference number: **400-21.03/007#015-001***

III. Anlagen / *Attachments*

1. Beschreibungsbogen /
Information document: siehe Nr. / *see no.* I. 0.8

IV. Änderungen / *Changes*

es wird geändert / *to be changed*: -

es wird hinzugefügt / *to be added*: -

es entfällt / *to be deleted*: -

es wird korrigiert / *to be corrected*: -

Hersteller / *Manufacturer* : Detroit Diesel Corporation, Detroit, Michigan 48239-4001
Motortyp / *Engine type* : R49-DD13V

V. Schlussbescheinigung / *Final confirmation*

Der Beschreibungsbogen (siehe Nr. I. 0.8) und der darin beschriebene Typ entsprechen den genannten Prüfgrundlagen mit den Grenzwerten in den Zeilen B2 der Tabellen 1 und 2, 5.2.1 [ECE-R.49/05]. Das geprüfte Motorensystem entspricht den Anforderungen der Richtlinie ECE-R.49/05 gemäß **13.2.1, Buchstabe G**.
The information document (see No. I. 0.8) and therein described types comply with the specified test basis with the limits in lines B2 of tables 1 and 2 , 5.2.1 [ECE-R.49/05]. The tested engine system fulfils the requirements of directive ECE-R.49/05 according to **13.2.1, Character G**

Eine auszugsweise Vervielfältigung und Veröffentlichung des Prüfberichtes ist ohne schriftliche Genehmigung des Prüflaboratoriums nicht zulässig.
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Dieser Prüfbericht umfasst die Seiten
This Test Report comprises pages 1 bis / *to* 9

TÜV NORD Mobilität GmbH & Co. KG
IFM - Institut für Fahrzeugtechnik und Mobilität
Adlerstr. 7, 45307 Essen, Germany

Prüflaboratorium akkreditiert von der DAkkS Deutsche Akkreditierungsstelle GmbH:
D-PL-11109-01-00 nach DIN EN ISO/IEC 17020:2012 | 17025:2018
Benannt als Technischer Dienst für die oben benannten Prüfungen durch das KBA, Kraftfahrt Bundesamt;
Akkreditierungsnummer: KBA – P 00004-96 /

Test laboratory accredited by DAkkS Deutsche Akkreditierungsstelle GmbH:
D-PL-11109-01-00 according DIN EN ISO/IEC 17020:2012 | 17025:2018
Designated as Technical Service for the above mentioned tests by the KBA, Kraftfahrt Bundesamt;
Accreditation Number: KBA – P 00004-96

Geschäftsstelle / *Office*: Essen
Datum / *Date*: 21.12.2020

IFM TÜV NORD Mobilität KBA-P00004-96 DIN EN ISO/IEC 17025, 17020

erstellt
created

Digital unterschrieben von Nentwig Stephan
Datum: 2021.01.06 16:03:52 +01'00'

Dipl.-Ing. Stephan Nentwig

freigegeben
approved

Digital unterschrieben von Ueding Jonas
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Auftrag / *Order*: 811.873.8107
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Telefon / *Phone*: +49 201 825-4170

Ende des Prüfberichtes / *End of Test Report*

Version	Motor engine	Beschreibung description	Leistung Power	Drehmoment Torque
A1*	DD13_MLE8	EURO V, 2500Nm / 1100 1/min	375 kW / 1600 1/min	2500 Nm
A3	DD13_ML31	EURO V, 2300Nm / 1100 1/min	350 kW / 1600 1/min	2300 Nm
A5	DD13_MLE2	EURO V, 2200Nm / 1100 1/min	330 kW / 1600 1/min	2200 Nm
A7	DD13_MLE1	EURO V, 2100Nm / 1100 1/min	310 kW / 1600 1/min	2100 Nm

* Stamm-Motor
* Parent engine

Beschreibungsbogen Nr. R49-DD13V
Information Document No. R49-DD13V

Motortyp: R49-DD13V
Engine type: R49-DD13V

Regelung Nr. 49 der Wirtschaftskommission für Europa der Vereinten Nationen (UN/ECE) einschließlich Ergänzung 10 zur Änderungsserie 05 vom 29.12.2018

Regulation No. 49 of the Economic Commission for Europe of the United Nations (UN/ECE) including supplement 10 to 05 series of amendments of 29.12.2018

zur Typgenehmigung auf Grundlage der Grenzwerte der Tabellen in Absatz 5.2.1., Zeile B2
for type approval according to limit values of the tables in paragraph 5.2.1, row B2

Für den Verkauf oder die Ausfuhr in Länder, welche die obengenannten Änderungsserie und Grenzwerte in ihren nationalen Rechtsvorschriften anwenden.
Intended for sale or export to countries, which apply the abovementioned series of amendments and limit values in their national legislation.

0.
ALLGEMEINES
GENERAL

0.1.
Fabrikmarke (Firmenname des Herstellers):
Make (trade name of manufacturer):
Detroit Diesel Corporation

0.2.
Typ und allgemeine Handelsbezeichnung(en):
Type and commercial description(s):
R49-DD13V

0.3.
Merkmale zur Typidentifizierung, sofern am Fahrzeug vorhanden (b), und Anbringungsstelle:
Means of identification of type, if marked on the vehicle (b), and location:
siehe 0.7.
see 0.7.

0.4.
Fahrzeugklasse (c):
Category of vehicle (c):
entfällt / not applicable

0.5.
Motorklasse: Diesel-/NG-/LPG-/Ethanol-betrieben
Category of engine: Diesel/NG/LPG/Ethanol fuelled
Diesel

0.6.
Name und Anschrift des Herstellers:
Name and address of manufacturer:
Detroit Diesel Corporation
13400 Outer Drive, West
Detroit, Michigan 48239-4001

0.7.
Lage und Anbringungsart der vorgeschriebenen Schilder und Aufschriften
Location of statutory plates and inscriptions and method of affixing

Lage:
location:
auf dem Kurbelgehäuse ww. auf dem Ventildeckel
on the crankcase opt. on the valve cover

Anbringungsart:
method of affixing:
Nadelprägung, ww. geprägt, ww. robuster Aufkleber, ww. graviert
dot peen marking, opt. embossed, opt. robust label, opt. engraving

0.8.
Bei Bauteilen und selbständigen technischen Einheiten Lage und Anbringungsart des Typgenehmigungszeichens:
In the case of components and separate technical units, location and method of affixing of the approval mark:
siehe 0.7.
see 0.7.

0.9.
Anschrift(en) der Fertigungsstätte(n)
Address(es) of assembly plant(s):
Detroit Diesel Corporation
13400 Outer Drive, West
Detroit, Michigan 48239-4001

Anlage 1
Appendix 1

Ausführung version	A1

Wesentliche Merkmale des (Stamm-)/Motors und Angaben zur Durchführung der Prüfung

Essential characteristics of the (parent) engine and information concerning the conduct of Test

1.
Beschreibung des Motors (q) (Bei Fahrzeugen, die sowohl mit Otto- oder Dieselkraftstoff als auch mit gasförmigem Kraftstoff betrieben werden können, sind die Punkte für jede Betriebsart separat anzuführen.) (+)
Description of Engine (q) (In the case of a vehicle that can run either on petrol, diesel, etc., or also in combination with another fuel, items shall be repeated (+)
Foto Motor
Photographs engine
Siehe Anlage, see attachment: T0553

1.1.
Hersteller des Motors:
Manufacturer of the engine:
Detroit Diesel Corporation

1.2.
Baumusterbezeichnung des Herstellers:
Manufacturer's engine code:
DD13_MLE8 EURO V, 2500Nm / 1100 1/min

1.3.
Arbeitsverfahren: Viertakt/Zweitakt
Cycle: four stroke/two stroke
Viertakt
four stroke

1.4.
Anzahl und Anordnung der Zylinder:
Number and arrangement of cylinders:
6, in Reihe
6, in line

1.4.1.
Bohrung (r): [mm]
Bore (r): [mm]
132,0

1.4.2.
Hub (r): [mm]
Stroke (r): [mm]
156,0

1.4.3.
Zündfolge:
Firing order:
1 - 5 - 3 - 6 - 2 - 4

1.5.
Hubvolumen (m): [cm³]
Engine capacity (m): [cm³]
12809

1.6.
Volumetrisches Verdichtungsverhältnis:
Volumetric compression ratio
18,3 ± 0,5

1.7.
Zeichnung(en) des Brennraums und des Kolbenbodens:
Drawing(s) of combustion chamber and piston crown:
Siehe Anlage, see attachment: T0552
Siehe Anlage, see attachment: T0738

1.8.
Mindestquerschnittsfläche der Einlass- und Auslasskanäle (3): [mm²]
Minimum cross-section area of inlet and outlet ports (3): [mm²]

Einlasskanäle Inlet ports	Auslasskanäle Outlet ports
1558	1162

1.9.
Leerlaufdrehzahl: [min-1]
Idling speed: [min-1]
600 + 100 / - 50

1.10.
Nennleistung (n): [kW] bei [min -1] (nach Angabe des Herstellers)
Maximum net power (n): [kW] at [min -1] (manufacturer's declared value)
375 / 1600

1.11.
Höchstzulässige Drehzahl: [min -1] (nach Angabe des Herstellers)
Maximum permitted engine speed: [min -1] (manufacturer's declared value)
2200 +/- 60

1.12.
Nenndrehmoment: [Nm bei min -1] (nach Angabe des Herstellers)
Maximum net torque (t): [Nm at min -1] (manufacturer's declared value)
2500/1100

1.13.
Verbrennungssystem: Selbstzündung/Fremdzündung
Combustion system: compression ignition/positive ignition
Selbstzündung
compression ignition

1.14.
Kraftstoff:
Diesel/LPG/NG-H/NG-L/NG-HL/Ethanol
Fuel:
diesel/LPG/NG-H/NG-L/NG-HL/ethanol
Diesel
Diesel oil

1.15.
Kühlsystem
Cooling system

1.15.1.
Flüssigkeitskühlung
Liquid

1.15.1.1.
Art der Flüssigkeit:
Nature of liquid:
Wasser-Frostschutzgemisch
Water-defreezing mixture

1.15.1.2.
Kühlmittelpumpe(n): ja/nein
Circulating pump(s): yes/no
ja
yes

1.15.1.3.
Kenndaten oder Marke(n) und Typ(en) (falls zutreffend):
Characteristics or make(s) and type(s) (if applicable):
Zentrifugalpumpe
centrifugal pump
Mahle-Behr, ww./opt. Nidec-GPM, Mercedes-Benz

1.15.1.4.
Übersetzungsverhältnis(se) (falls zutreffend):
Drive ratio(s) (if applicable):
1:2,05 ww. 1:2,16 bei geregelter Wasserpumpe, 1:2,22 ungeregelte Wasserpumpe
1:2,05 opt. 1:2,16 with controlled water pump, 1:2,22 uncontrolled water pump

1.15.2.
Luftkühlung
Air
nein
no

1.16.
Vom Hersteller zugelassene Temperatur
Temperature permitted by the manufacturer

1.16.1.
Flüssigkeitskühlung: Höchsttemperatur am Austritt: [K]
Liquid cooling: maximum temperature at outlet: [K]
383

1.16.2.
Luftkühlung: Bezugspunkt:
Air cooling: reference point:
entfällt
not applicable

1.16.3.
Höchste Luftaustrittstemperatur am Ansaug-Zwischenkühler (falls zutreffend): [K]
Maximum temperature of the air at the outlet of the intake intercooler (if applicable): [K]

A1	322,9*

*+2

1.16.4.
Höchste Abgastemperatur an der Anschlußstelle zwischen Auspuffsammelrohr(en) und Abgaskrümmer(n) bzw. Turbolader: [K]
Maximum exhaust temperature at the point in the exhaust pipe(s) adjacent to the outer flange(s) of the exhaust manifold(s) or turbocharger(s): [K]
993

1.16.5
Kraftstofftemperatur
Mindesttemperatur / Höchsttemperatur [K]
bei Dieselmotoren am Einlass der Einspritzpumpe, bei mit Gas betriebenen Motoren an der Druckregler-Endstufe
Fuel temperature
minimum / maxmimum [K]
for diesel engines at injection pump inlet, for gas-fuelled engines at pressure regulator final stage
248 / 363

1.16.6.
Kraftstoffdruck [kPa] mindestens/höchstens an der Druckregler-Endstufe, nur bei NG-betriebenen Gasmotoren:
Fuel pressure [kPa] minimum/maximum at pressure regulator final stage, NG fuelled gas engines only:
entfällt
not applicable

1.16.7.
Schmiermitteltemperatur - Mindesttemperatur / Höchsttemperatur: [K]
Lubricant temperature - minimum / maximum: [K]
233 / 403

1.17.
Lader: ja/nein
Pressure charger: yes/no
ja
yes

1.17.1.
Marke(n):
Make(s):
siehe 1.17.2.
see 1.17.2.

1.17.2.
Typ(en):
Type(s):

Version version	Typ(en): Type(s):	siehe Fußnote see footnote	Marke(n): Make(s):
A1	A4710904580	[1]	Mercedes-Benz ww./opt. DXC

[1] starr / fix
[2] Abblasventil / waste gate
[3] Variable Turbinen Geometrie (VTG) / variable turbine geometry (VTG)
[4] Turbobremse / turbobrake
[5] Sonstige / other

1.17.3.
Beschreibung des Systems (z. B. maximaler Ladedruck [kPa], Druckablassventil (wastegate), falls zutreffend):
Description of the system (e.g. maximum charge pressure [kPa], wastegate, if applicable):

Version version	maximaler Ladedruck / bei Drehzahl max. charge pressure / at engine speed	Beschreibung Description
A1	246,0 / 1600 [1]	starr fixed

[1] nach Ladeluftkühler
[1] after intercooler

1.17.4.
Ladeluftkühler: ja/nein (1)
Intercooler: yes/no (1)
ja
yes

1.18.
Ansaugsystem
Höchstzulässiger Ansaugunterdruck bei Motornenndrehzahl und Volllast gemäß den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03:
Intake system
Maximum allowable intake depression at rated engine speed and at 100 per cent load as specified in and under the operating conditions of Regulation No. 24, 03 series of amendments:

A1	2,4 kPa*

*+ 0,1 kPa

1.19.
Höchstzulässiger Abgasgegendruck bei Motornenndrehzahl und Volllast gemäß den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03:
Maximum allowable exhaust back pressure at rated engine speed and at 100 per cent load as specified in and under the operating conditions of Regulation No. 24, 03 series of amendments:

A1	17.5*

*+ 1,0 kPa

Volumen der Auspuffanlage
Exhaust system volume

Version version	Katalysator catalytic converter	Volumen Abgasnachbehandlung [dm³] Volume Aftertreatment [dm³]	Volumen Verrohrung (Min-Max) [dm³] Volume piping (min-max) [dm³]	Gesamtvolumen (Min-Max) [dm³] Total volume (min-max) [dm³]
A1	SC 2100	240 *	25 - 33 *	245 - 273 *

* ±10%

1.20.
Elektronisches Motorsteuergerät (EECU) (alle Motortypen):
Engine Electronic Control Unit (EECU) (all engine types):

1.20.1.
Marke:
Make:
Temic / Continental / Daimler

1.20.2.
Typ:
Type:

Version version	Typ type	Software-Kalibrierungsnummer software calibration number
A1	DD13_MLE8	siehe/see 9.1.

Bei Mehrfachnennungen: wahlweise
multiple entry: optional

1.20.3.
Kennnummer(n) der Softwarekalibrierung:
Software calibration number(s):
siehe 1.20.2.
see 1.20.2.

2.
Maßnahmen gegen Luftverunreinigung
Measures taken against air pollution

2.1.
Einrichtung zur Rückführung der Kurbelgehäusegase (Beschreibung und Zeichnungen):
Device for recycling crankcase gases (description and drawings):
ja, Rückführung in Ansaugleitung
yes, recycling at inlet pipes
Siehe Anlage, see attachment: T0685

2.2.
Zusätzliche Einrichtungen zur Abgasreinigung (falls vorhanden und nicht in einem anderen Abschnitt aufgeführt):
Additional polution control devices (if any, and if not covered by another heading):
Siehe Anlage, see attachment: T0568
Siehe Anlage, see attachment: T0760

2.2.1
Katalysator: ja/nein
Catalytic converter: yes/no
ja
yes

Version version	Nennleistung [kW] power [kW]	Katalysator catalytic converter	Anlage attachment
A1	375	SC 2100	Siehe Anlage, see attachment: T0759

2.2.1.1.
Marke(n)
Make(s)
siehe 2.2.1.
see 2.2.1.

2.2.1.2.
Typ(en)
Type(s)
siehe 2.2.1.
see 2.2.1.

2.2.1.3.
Anzahl der Katalysatoren und Monolithen:
Number of catalytic converters and elements:
siehe 2.2.1.
see 2.2.1.

2.2.1.4.
Abmessungen, Form und Volumen des Katalysators (der Katalysatoren):
Dimensions, shape and volume of the catalytic converter(s):
siehe 2.2.1.
see 2.2.1.

2.2.1.5.
Art der katalytischen Reaktion:
Type of catalytic action:
Reduktions-Katalysator (SCR)
Selective catalytic reduction catalyst (SCR)

2.2.1.6.
Gesamtbeschichtung mit Edelmetall:
Total charge of precious metals:
siehe 2.2.1.
see 2.2.1.

2.2.1.7.
Konzentrationsverhältnis der Edelmetalle:
Relative concentration:
siehe 2.2.1.
see 2.2.1.

2.2.1.8.
Trägerkörper (Aufbau und Werkstoff):
Substrate (structure and material):
siehe 2.2.1.
see 2.2.1.

2.2.1.9.
Zellendichte: [1/cm²]
Cell density: [1/cm²]
siehe 2.2.1.
see 2.2.1.

2.2.1.10.
Art des Katalysatorgehäuses:
Type of casing for the catalytic converter(s):
siehe 2.2.1.
see 2.2.1.

2.2.1.11.
Lage des (der) Katalysators(en) (Ort und Referenzentfernung innerhalb des Auspuffstrangs):
Location of the catalytic converter(s) (place and reference distance in the exhaust line):

A1	Siehe Anlage, see attachment: T0565 Siehe Anlage, see attachment: T0574 Siehe Anlage, see attachment: T0683 Siehe Anlage, see attachment: T0691

2.2.1.12.
Temperaturbereich Normalbetrieb: [K]
Normal operating temperature range: [K]

min.	max.
423	823

2.2.1.13.
Verbrauchsreagenzen (wo zutreffend):
Consumable reagents (where appropiate):

2.2.1.13.1
Typ und Konzentration der Reagenz, die für die katalytische Reaktion benötigt wird:
Type and concentration of reagent needed for catalytic action:
AdBlue - (NH2)2CO
32,5 % wässrige Harnstofflösung
32,5 % aqueous urea solution

2.2.1.13.2
Normaler Arbeitstemperaturbereich der Reagenz: [K]
Normal operational temperature range of reagent [K]

min.	max.
262	333

2.2.1.13.3
Internationaler Standard (wo zutreffend):
International standard (where appropriate):
DIN 70070 ww./opt. ISO / WD 22241

2.2.1.13.4
Häufigkeit des Nachfüllens der Reagenz (kontinuierlich/bei Wartung):
Frequency of reagent refill (continuous/maintenance):
kontinuierlich, abhängig von Tankanzeige AdBlue in der Instrumententafel
continuous, depends on the reagent display AdBlue in the dashboard

2.2.2.
Sauerstoffsonde: ja/nein
Oxygen sensor: yes/no
nein
no

2.2.2.1.
Marke(n)
Make(s)
entfällt
not applicable

2.2.2.2.
Typ:
Type:
entfällt
not applicable

2.2.2.3.
Lage:
Location:
entfällt
not applicable

2.2.3.
Lufteinblasung: ja/nein
Air injection: yes/no
nein
no

2.2.3.1.
Art (Selbstansaugung, Luftpumpe usw.):
Type (pulse air, air pump, etc.):
entfällt
not applicable

2.2.4.
Abgasrückführung: ja/nein
Exhaust gas recirculation: yes/no
ja
yes

2.2.4.1.
Kennwerte (Marke, Typ, Durchflussmenge usw.):
Characteristics (make, type, flow rate, etc.):
AGR-Kühler: AK 2001
AGR-Steller: AG 2000
AGR-Ventil: AR 2011
EGR-radiator: AK 2001
EGR-actuator: AG 2000
EGR-valve: AR 2011
Bei Mehrfachnennungen: wahlweise
multiple entry: optional
Siehe Anlage, see attachment: T0559
Siehe Anlage, see attachment: T0561
Siehe Anlage, see attachment: T0577
Siehe Anlage, see attachment: T0739

2.2.5.
Partikelfilter: ja/nein
Particulate trap: yes, no
nein
no

2.2.5.1.
Abmessungen, Form und Volumen des Partikelfilters:
Dimensions, shape and capacity of the particulate trap:
entfällt
not applicable

2.2.5.2.
Aufbau des Partikelfilters:
Design of the particulate trap:
entfällt
not applicable

2.2.5.3.
Lage (Bezugsentfernung innerhalb des Auspuffstranges):
Location (reference distance in the exhaust line):
entfällt
not applicable

2.2.5.4.
Verfahren oder Einrichtung zur Regenerierung, Beschreibung und/oder Zeichnung:
Method or system of regeneration, description and/or drawing:
entfällt
not applicable

2.2.5.5.
Normaler Betriebstemperaturbereich und Betriebsdruckbereich:
Normal operating temperature and pressure range:
entfällt
not applicable

2.2.5.6.
Im Fall periodischer Regeneration:
- Anzahl der ETC Tests zwischen zwei Regenerationen (n1)
- Anzahl der ETC Tests während der Regeneration (n2)
In case of periodic regeneration:
- Number of ETC test cycles between 2 regenerations
- Number of ETC test cycles during regeneration
entfällt
not applicable

2.2.6.
Andere Einrichtungen (ja/nein):
Other systems (yes/no):
ja
yes

2.2.6.1.
Beschreibung und Wirkungsweise:
Description and operation:

Version version	Name name	Typ type	Anlage attachment
A1	AdBlue Dosiereinheit Dosing Unit AdBlue	A0001405539	Siehe Anlage, see attachment: T0557
A1	Versorgungse Inheit AdBlue Supply Unit AdBlue	entfällt not applicable	Siehe Anlage, see attachment: T0744

Funktionsschema Abgasnachbahndlung:
functional diagram aftertreatment:
Siehe Anlage, see attachment: T0568
Siehe Anlage, see attachment: T0760

3.
Kraftstoffsystem
Fuel feed

3.1.
Dieselmotoren:
Diesel engines:

3.1.1.
Kraftstoffpumpe, Druck oder Kennlinie
Feed pump, pressure or characteristic diagram
max. 850 kPa

3.1.2.
Einspritzaggregat:
Injection system:

3.1.2.1.
Einspritzpumpe
Injection pump

3.1.2.1.1.
Marke(n):
Make(s):

Version version	Fabrikmarke make	Typ type	Anlage Attachment
A1	Bosch	PH2003	Siehe Anlage, see attachment: T0737

3.1.2.1.2.
Typ(en):
Type(s):
siehe 3.1.2.1.1.
see 3.1.2.1.1.

3.1.2.1.3.
Einspritzmenge [mm³] je Hub bzw. Takt bei einer Motordrehzahl von [1/min] bei vollständiger Einspritzung oder Kennlinie:
Delivery [mm³] per stroke at engine speed of [rpm] at full injection, or characteristic diagram:

A1	295,7 / 1600*

*+/- 3%

Angabe des angewandten Verfahrens (am Motor/auf dem Pumpenprüfstand)
Mention the method used (on engine/on pump bench)
am Motor
on engine

Wird eine Ladedruckregelung verwendet, so sind die charakteristische Kraftstoffzufuhr und der Ladedruck bezogen auf die jeweilige Motordrehzahl anzugeben
If boost control is supplied, state the characteristic fuel delivery and boost pressure versus engine speed

3.1.2.1.4.
Einspritzzeitpunkt:
Injection advance:

3.1.2.1.4.1.
Verstellkurve des Spritzverstellers:
Injection advance curve:
Verstellung in Abhängigkeit von Leistung und Drehzahl, integriert und gesteuert
siehe 1.20.
Timing variation of injection depending on motor power and number of revolutions, integrated and controlled
see 1.20.

3.1.2.1.4.2.
Statischer Einspritzzeitpunkt:
Static injection timing:

Version version	Einspritzzeitpunkt Haupteinspritzung Injection timing main injection
A1	11,0 ± 1,0° KW v OT 11,0 ± 1,0° ca b TDC

bei Maximalleistungsdrehzahl und 100% Last
at maximum power speed and 100% load

3.1.2.2.
Einspritzleitungen
Injection piping

3.1.2.2.1.
Länge: [mm]
Length: [mm]
3 x 277,1 ± 0,5 ww. 3 x 276,3 ± 0,5 ww. 6 x 278,5mm Rail-Injektor, 427,9 ± 0,5 Pumpe-Rail
3 x 277,1 ± 0,5 opt. 3 x 276,3 ± 0,5 opt. 6 x 278,5mm rail-Injector, 427,9 ± 0,5 pump-rail

3.1.2.2.2.
Innendurchmesser: [mm]
Internal diameter: [mm]
5,0 ± 0,05

3.1.2.2.3.
Hochdruckspeicher (common rail), Marke und Typ:
Common rail, make and type:

Version version	Marke make	Typ type	Anlage attachment
A1	Bosch	CA2006	Siehe Anlage, see attachment: T0736

3.1.2.3.
Einspritzdüse(n)
Injector(s)

3.1.2.3.1.
Marke(n):
Make(s):

Marke Make	Typ(en) Type(s)
Bosch	A4710700887

3.1.2.3.2.
Typ(en):
Type(s):
siehe 3.1.2.3.1.
see 3.1.2.3.1.

3.1.2.3.3.
Öffnungsdruck: kPa oder Kennlinie:
Opening pressure: kPa or characteristic diagram:
max. 250.000

3.1.2.4.
Regler
Governor

3.1.2.4.1.
Marke(n):
Make(s):
Temic / Continental / Daimler

3.1.2.4.2.
Typ:
Type:
ohne, integriert im Steuergerät
without, integrated in control unit

3.1.2.4.3.
Abregeldrehzahl bei Volllast: [min-1]
Cut-off point under full load: [min-1]
2100 ± 30

3.1.2.4.4.
Abregeldrehzahl bei Nulllast: [min-1] oder
Cut-off point without load: [min-1] or
2200 ± 60

3.1.2.4.5.
Leerlaufdrehzahl
Idling Speed
siehe 1.9.
see 1.9.

3.1.3.
Kaltstarteinrichtung
Cold start system

3.1.3.1.
Marke(n):
Make(s):
Temic / Continental / Daimler

3.1.3.2.
Typ(en):
Type(s):
ohne, in Steuergerät integriert
without, integrated in control unit

3.1.3.3.
Beschreibung:
Description:
Bei Erreichen der Leerlaufdrehzahl wird die Startmenge automatisch ausgeregelt.
By reaching idle speed the delivery for starting is controlled automatically.

3.1.3.4.
Zusätzliche Starthilfe
Auxiliary starting aid
Flammanlage (mit Kraftstoff) ww. Heizflansch (elektrisch) ww. Vorwärmgerät (elektrisch)
flame starting system (with fuel) opt. heating flange (electrical) opt. Blockheater (electrical)

3.1.3.4.1.
Marke(n):
Make(s):
Temic / Continental

3.1.3.4.2.
Typ(en):
Type(s):
ohne
without

3.2.
Mit Gas betriebene Motoren
(Bei in anderer Weise ausgelegten Systemen ensprechende Angaben vorlegen, siehe Abs. 3.2)
Gas-fuelled engines
(In the case of systems laid-out in a different manner, supply equivalent information for paragraph 3.2)
entfällt
not applicable

4.
Ventileinstellung
Valve timing

4.1.
Maximaler Ventilhub, Öffnungs- und Schließwinkel bezogen auf die Totpunkte (Nennwerte):
Maximum lift of valves and angles of opening and closing in relation to dead centres (nominal values):

Ventilhub, spielfrei valve lift, without rage		Einlass inlet valve		Auslass outlet valve	
Einlass inlet	Auslass outlet	öffnet opens	schließt closes	öffnet opens	schließt closes
14,00 mm	14,00 mm	22,5°KW v OT 22,5°ca b TDC	211,5°KW n OT 211,5°ca a TDC	232,0°KW v OT 232,0°ca b TDC	12,0°KW n OT 12,0°ca a TDC

bei 2,0 mm Ventilhub
at 2,0 mm valve lift

4.2.
Bezugsgrößen- und/oder Einstellbereiche (1):
Reference and/or setting ranges (1):
Einlass 0,4 mm +0,13/-0,07, Auslass 0,6 mm +0,08/-0,10
Inlet 0,4 mm +0,13/-0,07, outlet 0,6 mm +0,08/-0,10

5.
Zündung (nur Fremdzündungsmotoren)
Ignition system (spark ignition engines only)
entfällt
not applicable

6.
Vom Motor angetriebene Hilfseinrichtungen:
Engine-driven auxiliary equipment:
Der Motor ist zur Prüfung zusammen mit den Hilfseinrichtungen vorzuführen, die gemäß den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03, Anhang 10, Absatz 5.1.1, für den Betrieb des Motors notwendig sind (Lüfter, Wasserpumpe usw.).
The engine shall be submitted for testing with the auxiliaries needed for operating the engine (e.g. fan, water pump etc.), as specified in and under the operating conditions of Regulation No. 24, 03 series of amendments, Annex 10, paragraph 5.1.1.

6.1.
Hilfseinrichtungen, die für die Prüfung angebracht werden
Auxiliaries to be fitted for the test
Ist es nicht möglich oder nicht zweckmäßig, die Hilfseinrichtungen auf dem Prüfstand anzubringen, muß die von ihnen aufgenommene Leistungen ermittelt und von der im gesamten Betriebsbereich des Prüfzyklusses (der Prüfzyklen) gemessenen Motorleistung abgezogen werden.
If it is impossible or inappropriate to install the auxiliaries on the test bench, the power absorbed by them shall be determined and subtracted from the measured engine power over the whole operating area of the test cycle(s).

6.2.
Hilfseinrichtungen, die für die Prüfung entfernt werden
Auxiliaries to be removed for the test
Hilfseinrichtungen, die nur für den Betrieb des Fahrzeugs notwendig sind (z.B. Luftverdichter, Klimaanlage), sind für die Prüfung zu entfernen. Ist es nicht möglich, die Hilfseinrichtungen zu entfernen, kann die von ihnen aufgenommene Leistung ermittelt und zu der im gesamten Betriebsbereich des Prüfzyklusses (der Prüfzyklen) gemessenen Motorleistung hinzugerechnet werden.

Auxiliaries needed only for the operation of the vehicles (e.g. air compressor, air-conditioning system (etc.)) shall be removed for the test. Where the auxiliaries cannot be removed, the power absorbed by them may be determined and added to the measured engine power over the whole operating area of the test cycle(s).

7.
Zusätzliche Angaben zu den Prüfbedingungen:
Additional information on test conditions:

7.1.
Verwendetes Schmiermittel:
Lubricant used:

7.1.1.
Marke:
Make:
vom Hersteller freigegebene Markenöle
recommended brands by manufacturer

7.1.2.
Typ:
Type:
siehe Technischer Bericht
see test report

7.2.
Vom Motor angetriebene Einrichtungen (falls vorhanden)
Engine-driven equipment (if applicable)
Die durch die Hilfseinrichtungen aufgenommene Leistung ist nur zu ermitteln, wenn:
- für den Betrieb des Motors notwendige Hilfseinrichtungen nicht am Motor angebracht sind und/oder
- für den Betrieb des Motors nicht notwendige Hilfseinrichtungen am Motor angebracht sind.

The power absorbed by the auxiliaries needs only to be determined:
- if auxiliaries needed for operating the engine are not fitted to the engine and/or
- if auxiliaries not needed for operating the engine are fitted to the engine

7.2.1.
Aufzählung und Einzelheiten:
Enumeration and identifying details:

7.2.2.
Bei den angegebenen Motordrehzahlen aufgenommene Leistungen:
Power absorbed at various indicated engine speeds:

P(a)
Für den Betrieb des Motors notwendige Hilfseinrichtungen (von der gemessenen Motorleistung abzuziehen), siehe Nummer 6.1
Auxiliaries needed for operating the engine (to be subtracted from measured engine power), see Section 6.1

Version	Bei verschiedenen Motordrehzahlen aufgenommene Leistung (kW) Power absorbed (kW) at various engine speeds						
	Leerlauf Idle	Niedrige Drehzahl Low speed	Hohe Drehzahl High speed	Drehzahl A(1) Speed A(1)	Drehzahl B(1) Speed B(1)	Drehzahl C(1) Speed C(1)	Bezugsdrehzahl(2) Ref. speed(2)
A1	0,00	0,13	0,43	0,19	0,26	0,34	0,41

P(b)
Für den Betrieb des Motors nicht notwendige Hilfseinrichtungen (zu der gemessenen Motorleistung hinzuzurechnen), siehe Nummer 6.2
Auxiliaries not needed for operating the engine (to be added to measured engine power), see Section 6.2

Version	Bei verschiedenen Motordrehzahlen aufgenommene Leistung (kW) Power absorbed (kW) at various engine speeds						
	Leerlauf Idle	Niedrige Drehzahl Low speed	Hohe Drehzahl High speed	Drehzahl A(1) Speed A(1)	Drehzahl B(1) Speed B(1)	Drehzahl C(1) Speed C(1)	Bezugsdrehzahl(2) Ref. speed(2)
A1	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable

(1) ESC-Prüfung
(1) ESC test
(2) ETC-Prüfung
(2) ETC test

8.
Motorleistung
Engine Performance

8.1.
Motordrehzahlen
Engine Speeds
(Bitte Toleranz angeben; muss im Bereich von +/- 3% der vom Hersteller angegebenen Werte liegen)
(Specify the tolerance; to be within +-3% of the values declared by the manufacturer)

	Niedrige Drehzahl (n_{lo}) Low speed (n_{lo})	Hohe Drehzahl (n_{hi}) High speed (n_{hi})
A1	820	2100

für ESC- und ELR-Zyklen:
for ESC and ELR cycles:

	Leerlauf Idle speed	Drehzahl A Speed A	Drehzahl B Speed B	Drehzahl C Speed C
A1	600	1140 ± 3%	1460± 3%	1781 ± 3%

für ETC-Zyklus:
for ETC cycles:

	Bezugsdrehzahl Reference speed
A1	2036

8.2.
Motorleistung (gemessen nach den Bestimmungen der Regelung Nr. 24/03), in kW
Engine power (measured in accordance with the provisions of Regulation No. 24, 03 series of amendments) in kW

P(m)
Auf dem Prüfstand gemessene Leistung
Power measured on test bed

	Motordrehzahl Engine speed					
Version	Steuergerät Control unit	Leerlauf Idle	Drehzahl A[(1)] Speed A[(1)]	Drehzahl B[(1)] Speed B[(1)]	Drehzahl C[(1)] Speed C[(1)]	Bezugsdrehzahl[(2)] Ref. speed[(2)]
A1	DD13_MLE8	0,00	297,80	370,27	352.65	293,62

P(a) - Bei verschiedenen Motordrehzahlen aufgenommene Leistung (kW) P(a) - Power absorbed (kW) at various engine speeds					
Version	Leerlauf Idle	Drehzahl A[(1)] Speed A[(1)]	Drehzahl B[(1)] Speed B[(1)]	Drehzahl C[(1)] Speed C[(1)]	Bezugsdrehzahl[(2)] Ref. speed[(2)]
A1	0,00	0,19	0,26	0,34	0,41

P(b) - Bei verschiedenen Motordrehzahlen aufgenommene Leistung (kW) P(b) - Power absorbed (kW) at various engine speeds					
Version	Leerlauf Idle	Drehzahl A[(1)] Speed A[(1)]	Drehzahl B[(1)] Speed B[(1)]	Drehzahl C[(1)] Speed C[(1)]	Bezugsdrehzahl[(2)] Ref. speed[(2)]
A1	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable	entfällt not applicable

P(n)
Motor-Nutzleistung
Net engine Power
= P(m) - P(a) + P(b)

	Motordrehzahl Engine speed					
Version	Steuergerät Control unit	Leerlauf Idle	Drehzahl A(1) Speed A(1)	Drehzahl B(1) Speed B(1)	Drehzahl C(1) Speed C(1)	Bezugsdrehzahl(2) Ref. speed(2)
A1	DD13_ MLE8	0	297,61	370,01	352,31	293,21

(2) nur ETC-Prüfung
(2) ETC test only
(1) ESC-Prüfung
(1) ESC test

8.3.
Einstellung des Leistungsprüfstandes (kW)
Dynamometer settings (kW)
Die Einstellungen des Leistungsprüfstands für die ESC- und ELR-Prüfungen sind auf der Grundlage der Nutzleistung des Motors P(n) von Nummer 8.2 vorzunehmen. Es wird empfohlen, den Motor im Nettozustand auf dem Prüfstand aufzubauen. Dabei stimmen P(m) und P(n) überein. Ist ein Betrieb des Motors im Nettozustand nicht möglich oder zweckmäßig, sind die Einstellungen des Leistungsprüfstands entsprechend der vorstehend angegebenen Formel so zu ändern, dass der Nettozustand hergestellt wird.
The dynamometer settings for the ESC and ELR tests and for the reference cycle of the ETC test shall be based upon the net engine power P(n) of section 8.2. It is recommended to install the engine on the test bed in the net condition. In this case, P(m) and P(n) are identical. If it is impossible or inappropriate to operate the engine under net conditions, the dynamometer settings shall be corrected to net conditions using above formula.

8.3.1.
ESC- und ELR-Prüfungen
ESC and ELR tests
Die Einstellungen des Leistungsprüfstands sind anhand der Formel in Anhang II, Anlage 1, Nummer 1.2 zu berechnen.
the dynamometer settings shall be calculated according to the formula in AnnexII, Appendix 1, Section 1.2.

			Motordrehzahl Engine speed					
Teillastverhältnis Per cent load	Version	Steuergerät Control unit	Leerlauf 1) Idle 1)	Drehzahl A Speed A		Drehzahl B Speed B		Drehzahl C Speed C	
25	A1	DD13_MLE8	---	74,26	7)	92,31	9)	87.82	11)
50	A1	DD13_MLE8	---	148,71	5)	184,88	3)	175,83	13)
75	A1	DD13_MLE8	---	223,16	6)	277,44	4)	264,15	12)
100	A1	DD13_MLE8	---	297,61	2)	370,01	8)	352,31	10)

8.3.2.
ETC-Prüfung
ETC test
Erfolgt keine Prüfung des Motors im Nettozustand, so ist durch den Hersteller die Korrekturformel zur Umrechnung der gemessenen Leistung bzw. gemessenen Zyklusarbeit gemäß Anhang III, Anlage 2, Nummer 2 in Nutzleistung bzw. Netto-Zyklusarbeit für den gesamten Betriebsbereich des Zyklusses vorzulegen und durch den Technischen Dienst zu genehmigen.
If the engine is not tested under net conditions, the correction formula for converting the measured power or measured cycle work, as determined according to Annex III, Appendix 2, Section 2, to net power or net cycle work shall be submitted by the engine manufacturer for the whole operating area of the cycle, and approved by the Technical Service.

9.
On-Board-Diagnosesystem (OBD-System)
On-Board diagnostic (OBD) system:

9.1.
Schriftliche und/oder bildliche Darstellung des Störungsmelders (*):
Written description and/or drawing of the MI (*):
Siehe Anlage, see attachment: LE16-75069

9.2.
Liste aller vom OBD-System überwachten Bauteile und ihrer Funktionen:
List and purpose of all components monitored by the OBD system:
siehe 9.1.
see 9.1.

9.3.
Schriftliche Darstellung (Arbeitsprinzipien) des OBD-Systems für:
Written description (general OBD working principles) for:

9.3.1.
Selbstzündungs-/Gasmotoren (*):
Diesel/gas engines (*):
Dieselmotoren
Diesel engines

9.3.1.1.
Überwachung des Katalysators (*):
Catalyst monitoring (*):
siehe 9.1.
see 9.1.

9.3.1.2.
Überwachung des DeNOx-Systems (*):
deNOx system monitoring (*):
siehe 9.1.
see 9.1.

9.3.1.3.
Überwachung des Diesel-Partikelfilters (*):
Diesel particulate filter monitoring (*):
siehe 9.1.
see 9.1.

9.3.1.4.
Überwachung des elektronischen Kraftstoffsystems (*):
Electronic fuelling system monitoring (*):
siehe 9.1.
see 9.1.

9.3.1.5.
Sonstige vom OBD-System überwachte Bauteile (*):
Other components monitored by the OBD system (*):
siehe 9.1.
see 9.1.

9.4.
Kriterien für die Aktivierung des Störungsmelders (feste Anzahl von Fahrzyklen oder statistische Methode):
Criteria for MI activation (fixed number of driving cycles or statistical method):
siehe 9.1.
see 9.1.

9.5.
Liste aller vom OBD-System verwendeten Ausgabecodes und -formate (jeweils mit Erläuterung)
List of all OBD output codes and formats used (with explanation of each):
siehe 9.1.
see 9.1.

10.
Drehmomentbegrenzer
Torque limiter

10.1.
Voraussetzungen für die Aktivierung des Drehmomentbegrenzers
Description of the torque limiter activation
siehe 9.1.
see 9.1.

10.2.
Verlauf der Volllastkurve bei aktivem Drehmomentbegrenzer
Description of the full load curve limitation
Siehe Anlage, see attachment: LE16-75070

Anlage 2
Appendix 2

Wesentliche Merkmale der Motorfamilie
Essential characteristics of the engine family

1.
Gemeinsame Kenndaten
Common parameters

1.1.
Arbeitsweise:
Combustion cycle:
Viertakt
four stroke

1.2.
Kühlmittel:
Cooling medium:
Wasser-Frostschutzgemisch
Water-defreezing mixture

1.3.
Anzahl der Zylinder:
Number of cylinders:
6

1.4.
Hubraum des einzelnen Zylinders:
Individual cylinder displacement:
2134,8 cm³

1.5.
Art der Luftansaugung:
Method of air aspiration:
Abgasturboaufladung
pressure charger

1.6.
Typ/Beschaffenheit des Brennraums:
Combustion chamber type/design:
Siehe Anlage, see attachment: T0552

1.7.
Ventile und Kanalanordnung, Größe [mm] und Anzahl:
Valve and porting - configuration, size [mm] and number:

Einlass Inlet		Auslass Outlet	
Größe size	Anzahl number	Größe size	Anzahl number
45,0	2	43,0	2

1.8.
Kraftstoffanlage:
Fuel system:
Common-Rail

1.9.
Zündsystem (Gasmotoren):
Ignition system (gas engines):
entfällt
not applicable

1.10.
Sonstige Merkmale:
Miscellaneous features:
Ladeluftkühlung: ja
Charge cooling system: yes

Abgasrückführung: ja
Exhaust gas recirculation: yes

Wassereinspritzung/Emulsion: nein
Water injection/emulsion: no

Lufteinblasung: nein
Air injection: no

1.11.
Abgas-Nachbehandlung:
Exhaust after-treatment:
Reduktions-Katalysator (SCR)
Selective catalytic reduction catalyst (SCR)

Nachweis des gleichen (oder beim Stamm-Motor des niedrigsten) Verhältnisses: Systemkapazität/Kraftstoff-Fördermenge je Hub gemäß Schaubild Nr.:
Proof of identical (or lowest for the parent engine) ratio: systemcapacity/fuel delivery per stroke, pursuant to diagram number(s):

Version version	Verhältnis Systemkapazität / Kraftstoffördermenge je Hub bei Nenndrehzahl und Vollast (cm^3/mm^3) Ratio catalyst capacity / fuel delivery per stroke at rated speed under full load (cm^3/mm^3)
A1	75,5
A3	80,8
A5	85,8
A7	91,4

2.
Aufstellung der Motorfamilie
Engine family listing

2.1.
Bezeichnung der Dieselmotorenfamilie
Name of diesel engine family
R49-DD13V

2.1.1.
Spezifikation von Motoren dieser Familie
Specification of engines within this family

Version	Motor engine
A1*	DD13_MLE8
A3	DD13_ML31
A5	DD13_MLE2
A7	DD13_MLE1

*) Stamm-Motor
*) Parent engine

	Version	Wert Value
Anzahl der Zylinder Number of cylinders	A1 A3 A5 A7	6
Nenndrehzahl (1/min) Rated speed (rpm)	A1 A3 A5 A7	1600
Kraftstoffördermenge je Hub (mm^3) pro Zylinder Fuel delivery per stroke (mm^3) per cylinder	A1	295,7
	A3	276,2
	A5	260,1
	A7	244,1
Nennutzleistung (kW) Rated net power (kW)	A1	375
	A3	350
	A5	330
	A7	310
Drehzahl bei maximalem Drehmoment (1/min) Maximum torque speed (rpm)	A1 A3 A5 A7	1100

	Version	Wert Value
Maximales Drehmoment (Nm) Maximum torque (Nm)	A1	2500
	A3	2300
	A5	2200
	A7	2100
Niedrige Leerlaufdrehzahl (1/min) Low idle speed (rpm)	A1 A3 A5 A7	600 + 100 / - 50
Zylinderhubraum % des Stamm-Motors Cylinder displacement (in % of parent engine)	A1 A3 A5 A7	100

2.2.
Bezeichnung der Gasmotorenfamilie
Name of gas engine family
entfällt
not applicable

Anlage 3
Appendix 3

Hauptmerkmale des Motorentyps innerhalb der Motorenfamilie
(Für jeden Motor der Familie einzureichen)
Essential characteristics of the engine type within the family
(To be submitted for each engine of the family)

1.
Beschreibung des Motors
Description of engine

1.1.
Hersteller Manufacturer
Detroit Diesel Corporation

1.2.
Baumusterbezeichnung des Herstellers:
Manufacturer's engine code:

A3	DD13_MLE8	EURO V, 2300Nm / 1100 1/min
A5	DD13_MLE2	EURO V, 2200Nm / 1100 1/min
A7	DD13_MLE1	EURO V, 2100Nm / 1100 1/min

1.3.
Arbeitsverfahren: Viertakt/Zweitakt
Cycle: four stroke/two stroke
Viertakt
four stroke

1.4.
Anzahl und Anordnung der Zylinder:
Number and arrangement of cylinders:
6, in Reihe
6, in line

1.4.1.
Bohrung:
Bore:
132,0 mm

1.4.2.
Hub:
Stroke:
156,0 mm

1.4.3.
Zündfolge:
Firing order:
1 - 5 - 3 - 6 - 2 - 4

1.5.
Hubvolumen (m): [cm³]
Engine capacity (m): [cm³]
12809

1.6.
Volumetrisches Verdichtungsverhältnis (2):
Volumetric compression ratio (2):
18,3 ± 0,5

1.7.
Zeichnung(en) des Brennraums und des Kolbenbodens:
Drawing(s) of combustion chamber and piston crown:
Siehe Anlage, see attachment: T0552
Siehe Anlage, see attachment: T0738

1.8.
Mindestquerschnittsfläche der Einlass- und Auslasskanäle (3): [mm²]
Minimum cross-section area of inlet and outlet ports (3): [mm²]

Einlasskanäle Inlet ports	Auslasskanäle Outlet ports
1558	1162

1.9.
Leerlaufdrehzahl: [min-1]
Idling speed: [min-1]
600 + 100 / - 50 1/min

1.10.
Höchste Nutzleistung:
Maximum net power:

A3	350 kW / 1600 1/min
A5	330 kW / 1600 1/min
A7	310 kW / 1600 1/min

1.11.
Höchste zulässige Motordrehzahl:
Maximum permitted engine speed:
2200 +/- 60 1/min

1.12.
Maximales Nettodrehmoment:
Maximum net torque:

A3	2300 Nm / 1100 1/min
A5	2200 Nm / 1100 1/min
A7	2100 Nm / 1100 1/min

1.13.
Verbrennungssystem: Selbstzündung/Fremdzündung
Combustion system: compression ignition/positive ignition
Selbstzündung
compression ignition

1.14.
Kraftstoff:
Kraftstoffarten: Diesel/LPG/NG-H/NG-L/NG-HL/Ethanol
Fuel:
diesel/LPG/NG-H/NG-L/NG-HL/ethanol
Diesel
Diesel oil

1.15.
Kühlsystem
Cooling system

1.15.1.
Flüssigkeitskühlung
Liquid

1.15.1.1.
Art der Flüssigkeit:
Nature of liquid:
Wasser-Frostschutzgemisch
Water-defreezing mixture

1.15.1.2.
Kühlmittelpumpe(n): ja/nein
Circulating pump(s): yes/no
ja
yes

1.15.1.3.
Kenndaten oder Marke(n) und Typ(en) (falls zutreffend):
Characteristics or make(s) and type(s) (if applicable):
Zentrifugalpumpe
centrifugal pump
Mahle-Behr, ww./opt. Nidec-GPM, Mercedes-Benz

1.15.1.4.
Übersetzungsverhältnis(se) (falls zutreffend):
Drive ratio(s) (if applicable):
1:2,05 ww. 1:2,16 bei geregelter Wasserpumpe, 1:2,22 ungeregelte Wasserpumpe
1:2,05 opt. 1:2,16 with controlled water pump, 1:2,22 uncontrolled water pump

1.15.2.
Luftkühlung
Air
nein
no

1.16.
Vom Hersteller zugelassene Temperatur
Temperature permitted by the manufacturer

1.16.1.
Flüssigkeitskühlung: Höchsttemperatur am Austritt: [K]
Liquid cooling: maximum temperature at outlet: [K]
383

1.16.2.
Luftkühlung: Bezugspunkt: höchste Temperatur am Bezugspunkt:
Air cooling: reference point: maximum temperature at reference point:
entfällt
not applicable

1.16.3.
Höchste Luftaustrittstemperatur am Ansaug-Zwischenkühler (falls zutreffend): [K]
Maximum temperature of the air at the outlet of the intake intercooler (if applicable): [K]

A3	327,1*
A5	322,6*
A7	323,5*

*+ 2

1.16.4.
Höchste Abgastemperatur an der Anschlußstelle zwischen Auspuffsammelrohr(en) und Abgaskrümmer(n) bzw. Turbolader: [K]
Maximum exhaust temperature at the point in the exhaust pipe(s) adjacent to the outer flange(s) of the exhaust manifold(s) or turbocharger(s): [K]
993

1.16.5
Kraftstofftemperatur
Mindesttemperatur / Höchsttemperatur [K]
bei Dieselmotoren am Einlass der Einspritzpumpe, bei mit Gas betriebenen Motoren an der Druckregler-Endstufe
Fuel temperature
minimum / maxmimum [K]
for diesel engines at injection pump inlet, for gas-fuelled engines at pressure regulator final stage
248 / 363

1.16.6
Kraftstoffdruck [kPa] mindestens/höchstens an der Druckregler-Endstufe, nur bei NG-betriebenen Gasmotoren:
Fuel pressure [kPa] minimum/maximum at pressure regulator final stage, NG fuelled gas engines only:
entfällt
not applicable

1.16.7.
Schmiermitteltemperatur - Mindesttemperatur / Höchsttemperatur: [K]
Lubricant temperature - minimum / maximum: [K]
233 / 403

1.17.
Auflader: ja/nein (1)
Pressure charger: yes/no (1)
ja
yes

1.17.1.
Marke(n):
Make(s):
siehe 1.17.2.
see 1.17.2.

1.17.2.
Typ(en):
Type(s):

Version version	Typ(en): Type(s):	siehe Fußnote see footnote	Marke(n): Make(s):
A3 A5 A7	A4710904580	[1]	Mercedes-Benz ww./opt. DXC

[1] starr / fix
[2] Abblasventil / waste gate
[3] Variable Turbinen Geometrie (VTG) / variable turbine geometry (VTG)
[4] Turbobremse / turbobrake
[5] Sonstige / other

1.17.3.
Beschreibung des Systems (z. B. maximaler Ladedruck [kPa], Druckablassventil (wastegate), falls zutreffend):
Description of the system (e.g. maximum charge pressure [kPa], wastegate, if applicable):

Version version	maximaler Ladedruck / bei Drehzahl max. charge pressure / at engine speed	Beschreibung Description
A3	227,6 / 1600 [1]	starr fixed
A5	213,1 / 1600 [1]	starr fixed

Version version	maximaler Ladedruck / bei Drehzahl max. charge pressure / at engine speed	Beschreibung Description
A7	199,0 / 1600 [1]	starr fixed

[1] nach Ladeluftkühler
[1] after intercooler

1.17.4.
Zwischenkühler: ja/nein
Intercooler: yes/no
ja
yes

1.18.
Ansaugsystem
Höchstzulässiger Ansaugunterdruck bei Motornenndrehzahl und Volllast gemäß den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03:
Intake system
Maximum allowable intake depression at rated engine speed and at 100 per cent load as specified in and under the operating conditions of Regulation No. 24, 03 series of amendments:

	max
A3	2,3 kPa*
A5	2,2 kPa*
A7	2,1 kPa*

*+ 0,1 kPa

1.19.
Höchstzulässiger Abgasgegendruck bei Motornenndrehzahl und Volllast gemäß den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03:
Maximum allowable exhaust back pressure at rated engine speed and at 100 per cent load as specified in and under the operating conditions of Regulation No. 24, 03 series of amendments:

A3	16,2 kPa*
A5	14,6 kPa*
A7	13,3 kPa*

*+ 1,0 kPa

Volumen der Auspuffanlage
Exhaust system volume

Version version	Katalysator catalytic converter	Volumen Abgasnachbehandlung [dm³] Volume Aftertreatment [dm³]	Volumen Verrohrung (Min-Max) [dm³] Volume piping (min-max) [dm³]	Gesamtvolumen (Min-Max) [dm³] Total volume (min-max) [dm³]
A3 A5 A7	SC 2100	240 *	25 - 33 *	245 - 273 *

*+- 10%

1.20.
Elektronisches Motorsteuergerät (EECU) (alle Motortypen):
Engine Electronic Control Unit (EECU) (all engine types):

1.20.1.
Marke:
Make:
Temic / Continental / Daimler

1.20.2.
Typ:
Type:

Version version	Typ type	Software-Kalibrierungsnummer software calibration number
A3	DD13_ML31	siehe/see 9.1.
A5	DD13_MLE2	siehe/see 9.1.
A7	DD13_MLE1	siehe/see 9.1.

Bei Mehrfachnennungen: wahlweise
multiple entry: optional

1.20.3.
Kennnummer(n) der Softwarekalibrierung:
Software calibration number(s):
siehe 1.20.2.
see 1.20.2.

2.
Maßnahmen gegen Luftverunreinigung
Measures taken against air pollution

2.1.
Einrichtung zur Rückführung der Kurbelgehäusegase (Beschreibung und Zeichnungen):
Device for recycling crankcase gases (description and drawings):
ja, Rückführung in Ansaugleitung
yes, recycling at inlet pipes
Siehe Anlage, see attachment: T0685

2.2.
Zusätzliche Einrichtungen zur Abgasreinigung (falls vorhanden und nicht in einem anderen Abschnitt aufgeführt):
Additional polution control devices (if any, and if not covered by another heading):
Siehe Anlage, see attachment: T0568
Siehe Anlage, see attachment: T0760

2.2.1
Katalysator: ja/nein (1)
Catalytic converter: yes/no (1)

A3, A5, A7	ja yes

Version version	Nennleistung [kW] power [kW]	Katalysator catalytic converter	Anlage attachment
A3	350	SC 2100	Siehe Anlage, see attachment: T0759
A5	330	SC 2100	Siehe Anlage, see attachment: T0759
A7	310	SC 2100	Siehe Anlage, see attachment: T0759

2.2.1.1.
Marke(n)
Make(s)
siehe 2.2.1.
see 2.2.1.

2.2.1.2.
Typ(en)
Type(s)
siehe 2.2.1.
see 2.2.1.

2.2.1.3.
Anzahl der Katalysatoren und Monolithen:
Number of catalytic converters and elements:
siehe 2.2.1.
see 2.2.1.

2.2.1.4.
Abmessungen, Form und Volumen des Katalysators (der Katalysatoren):
Dimensions, shape and volume of the catalytic converter(s):
siehe 2.2.1.
see 2.2.1.

2.2.1.5.
Art der katalytischen Reaktion:
Type of catalytic action:
Reduktions-Katalysator (SCR)
Selective catalytic reduction catalyst (SCR)

2.2.1.6.
Gesamtbeschichtung mit Edelmetall:
Total charge of precious metals:
siehe 2.2.1.
see 2.2.1.

2.2.1.7.
Konzentrationsverhältnis der Edelmetalle:
Relative concentration:
siehe 2.2.1.
see 2.2.1.

2.2.1.8.
Trägerkörper (Aufbau und Werkstoff):
Substrate (structure and material):
siehe 2.2.1.
see 2.2.1.

2.2.1.9.
Zellendichte: [1/cm²]
Cell density: [1/cm²]
siehe 2.2.1.
see 2.2.1.

2.2.1.10.
Art des Katalysatorgehäuses:
Type of casing for the catalytic converter(s):
siehe 2.2.1.
see 2.2.1.

2.2.1.11.
Lage desKatalysators (der Katalysatoren) (Ort und Bezugsentfernung innerhalb der Abgasleitung):
Location of the catalytic converter(s) (place and reference distance in the exhaust line):

A3	Siehe Anlage, see attachment: T0565
A5	Siehe Anlage, see attachment: T0574
A7	Siehe Anlage, see attachment: T0683
	Siehe Anlage, see attachment: T0691

2.2.1.12.
Temperaturbereich Normalbetrieb: [K]
Normal operating temperature range: [K]
423 - 823

2.2.1.13.
Verbrauchsreagenzen (wo zutreffend):
Consumable reagents (where appropiate):

2.2.1.13.1
Typ und Konzentration der Reagenz, die für die katalytische Reaktion benötigt wird:
Type and concentration of reagent needed for catalytic action:
AdBlue - (NH2)2CO
32,5 % wässrige Harnstofflösung
32,5 % aqueous urea solution

2.2.1.13.2
Normaler Arbeitstemperaturbereich der Reagenz: [K]
Normal operational temperature range of reagent [K]

min.	max.
262	333

2.2.1.13.3
Internationaler Standard (wo zutreffend):
International standard (where appropriate):
DIN 70070 ww./opt. ISO / WD 22241

2.2.1.13.4
Häufigkeit des Nachfüllens der Reagenz (kontinuierlich/bei Wartung):
Frequency of reagent refill (continuous/maintenance):
kontinuierlich, abhängig von Tankanzeige AdBlue in der Instrumententafel
continuous, depends on the reagent display AdBlue in the dashboard

2.2.2.
Sauerstoffsonde: ja/nein
Oxygen sensor: yes/no
nein
no

2.2.2.1.
Marke:
Make:
entfällt
not applicable

2.2.2.2.
Typ:
Type:
entfällt
not applicable

2.2.2.3.
Lage:
Location:
entfällt
not applicable

2.2.3.
Lufteinblasung: ja/nein
Air injection: yes/no
nein
no

2.2.3.1.
Art (Selbstansaugung, Luftpumpe usw.):
Type (pulse air, air pump, etc.):
entfällt
not applicable

2.2.4.
Abgasrückführung: ja/nein
Exhaust gas recirculation: yes/no
ja
yes

2.2.4.1
Kennwerte (Marke, Typ, Durchflussmenge usw.)
Characteristics (make, type, flow rate etc.)
AGR-Kühler: AK 2001
AGR-Steller: AG 2000
AGR-Ventil: AR 2011
EGR-radiator: AK 2001
EGR-actuator: AG 2000
EGR-valve: AR 2011
Bei Mehrfachnennungen: wahlweise
multiple entry: optional
Siehe Anlage, see attachment: T0559
Siehe Anlage, see attachment: T0561
Siehe Anlage, see attachment: T0577
Siehe Anlage, see attachment: T0739

2.2.5.
Partikelfilter: ja/nein
Particulate trap: yes/no
nein
no

2.2.5.1.
Abmessungen, Form und Volumen des Partikelfilters:
Dimensions, shape and capacity of the particulate trap:
entfällt
not applicable

2.2.5.2.
Aufbau des Partikelfilters:
Design of the particulate trap:
entfällt
not applicable

2.2.5.3.
Lage (Bezugsentfernung innerhalb des Auspuffstranges):
Location (reference distance in the exhaust line):
entfällt
not applicable

2.2.5.4.
Verfahren oder Einrichtung zur Regenerierung, Beschreibung und/oder Zeichnung:
Method or system of regeneration, description and/or drawing:
entfällt
not applicable

2.2.5.5.
Normaler Betriebstemperaturbereich und Betriebsdruckbereich:
Normal operating temperature and pressure range:
entfällt
not applicable

2.2.5.6.
Im Fall periodischer Regeneration:
- Anzahl der ETC Tests zwischen zwei Regenerationen (n1)
- Anzahl der ETC Tests während der Regeneration (n2)
In case of periodic regeneration:
- Number of ETC test cycles between 2 regenerations
- Number of ETC test cycles during regeneration

entfällt
not applicable

2.2.6.
Andere Einrichtungen (ja/nein):
Other systems (yes/no):
ja
yes

2.2.6.1.
Beschreibung und Wirkungsweise:
Description and operation:

Version version	Name name	Typ type	Anlage attachment
A3 A5 A7	AdBlue Dosiereinheit Dosing Unit AdBlue	A0001405539	Siehe Anlage, see attachment: T0557
A3 A5 A7	Versorgungse Inheit AdBlue Supply Unit AdBlue	entfällt not applicable	Siehe Anlage, see attachment: T0744

Funktionsschema Abgasnachbahndlung:
functional diagram aftertreatment:
Siehe Anlage, see attachment: T0568
Siehe Anlage, see attachment: T0760

3.
Kraftstoffsystem
Fuel feed

3.1.
Dieselmotoren:
Diesel engines:

3.1.1.
Kraftstoffpumpe, Druck oder Kennlinie
Feed pump, pressure or characteristic diagram
max. 850 kPa

3.1.2.
Einspritzaggregat:
Injection system:

3.1.2.1.
Einspritzpumpe
Injection pump

3.1.2.1.1.
Marke(n):
Make(s):

Version version	Fabrikmarke make	Typ type	Anlage Attachment
A3 A5 A7	Bosch	PH2003	Siehe Anlage, see attachment: T0737

3.1.2.1.2.
Typ(en):
Type(s):
siehe 3.1.2.1.1.
see 3.1.2.1.1.

3.1.2.1.3.
Einspritzmenge [mm³] je Hub bzw. Takt bei einer Motordrehzahl von [1/min] bei vollständiger Einspritzung oder Kennlinie:
Delivery [mm³] per stroke at engine speed of [rpm] at full injection, or characteristic diagram:

A3	276,2 / 1600*
A5	260,1 / 1600*
A7	244,1 / 1600*

*+/- 3%

Angabe des angewandten Verfahrens (am Motor/auf dem Pumpenprüfstand)
Mention the method used (on engine/on pump bench)

am Motor
on engine

Wird eine Ladedruckregelung verwendet, so sind die charakteristische Kraftstoffzufuhr und der Ladedruck bezogen auf die jeweilige Motordrehzahl anzugeben
If boost control is supplied, state the characteristic fuel delivery and boost pressure versus engine speed

3.1.2.1.4.
Einspritzzeitpunkt:
Injection advance:

3.1.2.1.4.1.
Verstellkurve des Spritzverstellers:
Injection advance curve:
Verstellung in Abhängigkeit von Leistung und Drehzahl, integriert und gesteuert
siehe 1.20.
Timing variation of injection depending on motor power and number of revolutions, integrated and controlled
see 1.20.

3.1.2.1.4.2.
Statischer Einspritzzeitpunkt:
Static injection timing:

Version version	Einspritzzeitpunkt Haupteinspritzung Injection timing main injection
A3	11,8 ± 1,0° KW v OT 11,8 ± 1,0° ca b TDC
A5	12,8 ± 1,0° KW v OT 12,8 ± 1,0° ca b TDC
A7	13,1 ± 1,0° KW v OT 13,1 ± 1,0° ca b TDC

bei Maximalleistungsdrehzahl und 100% Last
at maximum power speed and 100% load

3.1.2.2.
Einspritzleitungen
Injection piping

3.1.2.2.1.
Länge: [mm]
Length: [mm]
3 x 277,1 ± 0,5 ww. 3 x 276,3 ± 0,5 ww. 6 x 278,5mm Rail-Injektor, 427,9 ± 0,5 Pumpe-Rail
3 x 277,1 ± 0,5 opt. 3 x 276,3 ± 0,5 opt. 6 x 278,5mm rail-Injector, 427,9 ± 0,5 pump-rail

3.1.2.2.2.
Innendurchmesser: [mm]
Internal diameter: [mm]
5,0 ± 0,05

3.1.2.2.3.
Hochdruckspeicher (common rail), Marke und Typ:
Common rail, make and type:

Version version	Marke make	Typ type	Anlage attachment
A3 A5 A7	Bosch	CA2006	Siehe Anlage, see attachment: T0736

3.1.2.3.
Einspritzdüse(n)
Injector(s)

3.1.2.3.1.
Marke(n):
Make(s):

Marke Make	Typ(en) Type(s)
Bosch	A4710700887

3.1.2.3.2.
Typ(en):
Type(s):
siehe 3.1.2.3.1.
see 3.1.2.3.1.

3.1.2.3.3.
Öffnungsdruck (2): kPa oder Kennlinie (2):
Opening pressure (2): kPa or characteristic diagram (2):
max. 250.000

3.1.2.4.
Regler
Governor

3.1.2.4.1.
Marke(n):
Make(s):
Temic / Continental / Daimler

3.1.2.4.2.
Typ:
Type:
ohne, integriert im Steuergerät
without, integrated in control unit

3.1.2.4.3.
Abregeldrehzahl bei Volllast: [min-1]
Cut-off point under full load: [min-1]
2100 ± 30

3.1.2.4.4.
Abregeldrehzahl bei Nulllast: [min-1] oder
Cut-off point without load: [min-1] or
2200 ± 60

3.1.2.4.5.
Leerlaufdrehzahl: [min-1]
Idling speed: [min-1]
siehe 1.9.
see 1.9.

3.1.3.
Kaltstarteinrichtung
Cold start system

3.1.3.1.
Marke(n):
Make(s):
Temic / Continental / Daimler

3.1.3.2.
Typ(en):
Type(s):
ohne, in Steuergerät integriert
without, integrated in control unit

3.1.3.3.
Beschreibung:
Description:
Bei Erreichen der Leerlaufdrehzahl wird die Startmenge automatisch ausgeregelt.
By reaching idle speed the delivery for starting is controlled automatically.

3.1.3.4.
Zusätzliche Starthilfe
Auxiliary starting aid
Flammanlage (mit Kraftstoff) ww. Heizflansch (elektrisch) ww. Vorwärmgerät (elektrisch)
flame starting system (with fuel) opt. heating flange (electrical) opt. Blockheater (electrical)

3.1.3.4.1.
Marke(n):
Make(s):
Temic / Continental

3.1.3.4.2.
Typ(en):
Type(s):
ohne
without

3.2.
Mit Gas betriebene Motoren
(Bei in anderer Weise ausgelegten Systemen entsprechende Angaben vorlegen, siehe Abs. 3.2)
Gas-fuelled engines
(In the case of systems laid-out in a different manner, supply equivalent information for paragraph 3.2)
entfällt
not applicable

4.
Ventileinstellung
Valve timing

4.1.
Maximaler Ventilhub, Öffnungs- und Schließwinkel bezogen auf die Totpunkte (Nennwerte):
Maximum lift of valves and angles of opening and closing in relation to dead centres (nominal values):

Ventilhub, spielfrei valve lift, without rage		Einlass inlet valve		Auslass outlet valve	
Einlass inlet	Auslass outlet	öffnet opens	schließt closes	öffnet opens	schließt closes
14,00 mm	14,00 mm	22,5°KW v OT 22,5°ca b TDC	211,5°KW n OT 211,5°ca a TDC	232,0°KW v OT 232,0°ca b TDC	12,0°KW n OT 12,0°ca a TDC

bei 2,0 mm Ventilhub
at 2,0 mm valve lift

4.2.
Bezugsgrößen- und/oder Einstellbereiche (1):
Reference and/or setting ranges (1):
Einlass 0,4 mm +0,13/-0,07, Auslass 0,6 mm +0,08/-0,10
Inlet 0,4 mm +0,13/-0,07, outlet 0,6 mm +0,08/-0,10

5.
Zündung (nur Fremdzündungsmotoren)
Ignition system (spark ignition engines only)
entfällt
not applicable

6.
On-Board-Diagnosesystem (OBD-System)
On-Board diagnostic (OBD) system:

6.1.
Schriftliche und/oder bildliche Darstellung des Störungsmelders (*):
Written description and/or drawing of the MI (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.2.
Liste aller vom OBD-System überwachten Bauteile und ihrer Funktionen:
List and purpose of all components monitored by the OBD system:
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.3.
Schriftliche Darstellung (Arbeitsprinzipien) des OBD-Systems für:
Written description (general OBD working principles) for:

6.3.1.
Selbstzündungs-/Gasmotoren (*):
Diesel/gas engines (*):
Dieselmotoren
Diesel engines

6.3.1.1.
Überwachung des Katalysators (*):
Catalyst monitoring (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.3.1.2.
Überwachung des DeNOx-Systems (*):
deNOx system monitoring (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.3.1.3.
Überwachung des Diesel-Partikelfilters (*):
Diesel particulate filter monitoring (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.3.1.4.
Überwachung des elektronischen Kraftstoffsystems (*):
Electronic fuelling system monitoring (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.3.1.5.
Sonstige vom OBD-System überwachte Bauteile (*):
Other components monitored by the OBD system (*):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.4.
Kriterien für die Aktivierung des Störungsmelders (feste Anzahl von Fahrzyklen oder statistische Methode):
Criteria for MI activation (fixed number of driving cycles or statistical method):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

6.5.
Liste aller vom OBD-System verwendeten Ausgabecodes und -formate (jeweils mit Erläuterung)
List of all OBD output codes and formats used (with explanation of each):
siehe Anlage 1, Nr. 9.1.
See appendix 1, No. 9.1.

7.
Drehmomentbegrenzer
Torque limiter

7.1.
Voraussetzungen für die Aktivierung des Drehmomentbegrenzers
Description of the torque limiter activation
siehe 9.1.
see 9.1.

7.2.
Verlauf der Volllastkurve bei aktivem Drehmomentbegrenzer
Description of the full load curve limitation

A3	Siehe Anlage, see attachment: LE16-75072
A5	Siehe Anlage, see attachment: LE16-75074
A7	Siehe Anlage, see attachment: LE16-75076

Anlage 4
Appendix 4

Merkmale der mit dem Motor verbundenen Fahrzeugteile
Characteristics of the engine-related vehicle parts

1.	Ansaugunterdruck bei Motornenndrehzahl und bei Volllast: [kPa] Intake system depression at rated engine speed and at 100% load:	Siehe Anl. 1, Nr. 1.18 See annex 1, item 1.18
2.	Abgasgegendruck bei Motornenndrehzahl und bei Vollast: [kPa] Exhaust system back pressure at rated engine speed and at 100% load:	Siehe Anl. 1, Nr. 1.19 See annex 1, item 1.19
3.	Volumen des Auspuffanlage: [cm³] Volume of exhaust system:	Siehe Anl. 1, Nr. 1.19 See annex 1, item 1.19
4.	Leistungsaufnahme der Hilfseinrichtungen, die nach den Beschreibungen und Betriebsbedingungen der Regelung Nr. 24, Änderungsserie 03, Anhang 10, Absatz 5.1.1 für den Betrieb des Motors notwendig sind Power absorbed by the engine-driven auxiliaries as specified in and under the operation conditions of Regulation No. 24, 03 series of amendments, Annex 10, paragraph 5.1.1.	Siehe Anl. 1, Nr. 7.2.2. See annex 1, item 7.2.2.

Anlagen:

Attachments:

Nr. No.	Benennung Designation	Datum Date
LE16-75069	HDEP EuroIV-V DG OBD-Beschreibung OBD-description	02.10.2019
LE16-75070	EuroIV-V DD13-375kW torque limiter	02.05.2016
LE16-75072	EuroIV-V DD13-350kW torque limiter	02.05.2016
LE16-75074	EuroIV-V DD13-330kW torque limiter	02.05.2016
LE16-75076	EuroIV-V DD13-310kW torque limiter	02.05.2016
T0552	Brennraumquerschnitt DD1x Section combustion chamber	14.02.2011
T0553	Motor DD13 Engine DD13	11.02.2011
T0557	Dosiereinheit AdBlue DE 2001 Dosing Unit AdBlue	17.04.2019
T0559	Stellmotor 12V-24V AG 2000 Servomotor	08.03.2012
T0561	Abgaskühler AK 2001 Exhaust gas cooler	21.02.2011
T0565	Abgasdrucksensor Differenzdruck SD 2000 Pressure Sensor Differential pressure	16.03.2016
T0568	NOx-Sensor NOx-Sensor	23.05.2018
T0574	Rep AGA EURO 6 mit SCR Katalysator 334 Liter Presentable exhaust system with scr-katalytic converter	05.09.2018
T0577	AGR-Beschreibung DD1x FE0 EURO VI EGR-Description	10.04.2018
T0683	Spezifikation Abgasrohrverlängerung RA2015 Specification of extension of exhaust gas pipe	27.11.2014
T0685	Kurbelgehaeuseentlueftung geschlossen DD1x Crankcase ventilation closed DD1x	04.04.2019
T0691	Spezifikation Abgasrohrverlängerung RA2002 Specification of extension of exhaust gas pipe	17.04.2018
T0736	Common Rail CA 2006 common rail	28.10.2014
T0737	Hochdruck-Förderpumpe PH 2003 High pressure fuel pump	30.09.2014
T0738	Kolbenmulde DD13 Piston crown DD13	22.10.2014

T0739	Abgaskrümmer mehrteilig Mittelteil mit AGR AR 2011 Exhaust gas manifold multi-piece center with EGR	11.11.2014
T0744	Versorgungseinheit Adblue FLO Supply unit Adblue FLO	26.04.2018
T0759	Repräsentativer SCR-Katalysator 250ltr SC2100 Presentable SCR-Catalyst	23.10.2019
T0760	Funktionsschema Abgasemission DD1x EuroV DG FLO Function diagram exhaust emission DD1x EuroV DG FLO	02.11.2015

The OBD-family consists of the types following:

OBD-Family HDEP	Engine Type
	DD13
	DD16

All vehicles are equipped with an engine control module (MCM) and an emission control module (ACM).

The OBD- functions may be deactivated during the following conditions (acc. to 2005/78/EC, Annex IV, 3.5.1, defined in 2005/55/EC, Annex I, 6.1.5.4):

- Engine coolant Temperature: < 70°C and > 100°C
- Ambient temperature: < 2°C and > 30°C
- Elevations: > 1000 m bove sea level
- Fuel Level: < 20% nominal capacity

The NOx-emission control monitoring system shall be operational during the following conditions (acc. to 2006/51/EC, Annex I, 6.5.6.1):

- Engine coolant Temperature: >70°C
- Ambient temperature: ≥ -7°C and ≤ 35°C
- Elevations: < 1600 m above sea level

9.	**On-Board-Diagnostic (OBD) System**	
9.1.	Written description and/or drawing of the MI:	Yellow malfunction indicator located in the instrument panel, symbol in conformity with ISO 2575
9.2.	List and purpose of all components monitored by the OBD system:	See following pages
9.3.	Written description (general working principles) for:	
9.3.1.	Diesel Engines:	
9.3.1.1.	Catalyst monitoring:	See following pages
9.3.1.2.	deNOx system monitoring:	See following pages
9.3.1.3.	Diesel particulate trap monitoring:	for SCTR systems only
9.3.1.4.	Electronic fuelling system monitoring:	See following pages
9.3.1.5.	Other components monitored by the OBD system:	See following pages
9.4.	Criteria for MI activation (fixed number of driving cycles or statistical method):	See following pages
9.5.	List of all OBD output codes and formats used (with explanation of each):	See following pages
10.	**Torque Limiter**	See following pages
10.1.	Description of the torque limiter activation:	According to 2006/51/EC
	Torque Limitation: no (for armed-, rescue- and fire-services etc.) or 75% or 60%	
10.2.	Description of the full load curve limitation:	See following pages
	Declaration by the manufacturer	
3.4.1.6.	Describe provisions taken to prevent tampering with and modification of the emission control computer:	
	a) The Emission Control Computer is non-removable integrated in the Engine Control Unit.	applicable
	b)The software is protected against misuse by code and checksum detection or encrypted access.	applicable
	c)There is no provision to switch off the emission control computer.	applicable

Annex IV, 3.7.2.:

The hours run by the engine while the MI is activated: applicable

Annex IV, 6.6.:

The software calibration identification number (CAL-ID) of the engine is available through the standardized OBD data link connector:
The CAL-ID is a 16 digit number, please refer to the schematic below.
Software calibration identification number:

1 - 2	3 - 4	5 - 6	7 - 8	9 - 10	11 - 12	13 - 16
Engine Type	Emission Stand.	Engine Version	OBD Stage	Data Set end no	Torque Limiter	Free

Annex IV, 6.7.:

The vehicle identification number (VIN) is available through the serial port of the standardised diagnostic connector: applicable

Annex II, 1.20.:
Appendix 1

The certification number of the engine control unit is available through the standardized OBD data link connector via scan tool applicable

Mercedes-Benz

OBD-Regulations according to ECE-R49: EURO IV and V
OBD-System: Common Rail (CR), Emission Control System: SCR + EGR
OBD Engine Family: HDEP, Engine Types 400
OBD Stage 2, NOx Monitoring

Attachment: LE16 - 75069
Date of issue: 02.05.2016
Status: 02.10.2019

OBD-Description: MCM (Motor Control Module)

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
0	Engine Coolant Inlet Temperature Sensor	P0117	Engine Coolant Temperature Sensor 1 Circuit Low	SRL	Engine Coolant Inlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	
1	Engine Coolant Inlet Temperature Sensor	P0118	Engine Coolant Temperature Sensor 1 Circuit High	SRH	Engine Coolant Inlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	
2	Battery Voltage	P0562	System Voltage Low	SRL	Engine Operating On State = Engine Start		OR	Always Enabled			s	4 DC	-	-	x	
					Intake Air Heater Actuator Active											
					Battery Voltage <	V										
					Otherwise											
					Battery Voltage <	V										
3	Battery Voltage	P0563	System Voltage High	SRH	Battery Voltage >	V		Always Enabled			s	4 DC	-	-	x	
6	Barometric Pressure Sensor	P2228	Barometric Pressure Sensor "A" Circuit Low	SRL	Barometric Pressure Sensor Voltage <	V		Always Enabled			s	4 DC	-	x	-	
7	Barometric Pressure Sensor	P2229	Barometric Pressure Sensor "A" Circuit High	SRH	Barometric Pressure Sensor Voltage >	V		Always Enabled			s	4 DC	-	x	-	
10	Fuel Temperature Sensor	P0182	Fuel Temperature Sensor "A" Circuit Low	SRL	Fuel Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	
11	Fuel Temperature Sensor	P0183	Fuel Temperature Sensor "A" Circuit High	SRH	Fuel Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	
14	Engine Oil Temperature Sensor	P0197	Engine Oil Temperature Sensor "A" Circuit Low	SRL	Engine Oil Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	-	
15	Engine Oil Temperature Sensor	P0198	Engine Oil Temperature Sensor "A" Circuit High	SRH	Engine Oil Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	-	
16	Intake Manifold Temperature Sensor	P0112	Intake Air Temperature Sensor 1 Circuit Low Bank 1	SRL	Intake Manifold Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	
17	Intake Manifold Temperature Sensor	P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1	SRH	Intake Manifold Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	
18	MCM Power Supply	P0658	Actuator Supply Voltage "A" Circuit Low	SRL	MCM Power Supply Voltage* <	V		Engine Operating On State = Engine Start		OR	s	4 DC	-	-	x	
					*First Order Low Pass Filter With Filter Factor	-		Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
19	MCM Power Supply	P0659	Actuator Supply Voltage "A" Circuit High	SRH	MCM Power Supply Voltage* >	V		Engine Operating On State = Engine Start		OR	s	4 DC	-	-	x	
					*First Order Low Pass Filter With Filter Factor	-		Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
24	Charge Air Cooler Outlet Temperature Sensor	P007C	Charge Air Cooler Temperature Sensor Circuit Low Bank 1	SRL	Charge Air Cooler Outlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	
25	Charge Air Cooler Outlet Temperature Sensor	P007D	Charge Air Cooler Temperature Sensor Circuit High Bank 1	SRH	Charge Air Cooler Outlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
32	Engine Coolant Outlet Temperature Sensor	P2184	Engine Coolant Temperature Sensor 2 Circuit Low	SRL	Engine Coolant Outlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	
33	Engine Coolant Outlet Temperature Sensor	P2185	Engine Coolant Temperature Sensor 2 Circuit High	SRH	Engine Coolant Outlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	
81	Engine Brake Driver Circuit	P1D12	Jake Brake Stage 2 Circuit Failed Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Battery Voltage >	V		E	4 DC	-	x	-	
109	Cylinder 1 Misfire	P0301	Cylinder 1 Misfire Detected	Detection Of Injector 1 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1		All Cylinders Available(No Cylinder Is Cut Off)			E	4 DC	-	x	-	
					All Cylinders Available			Stationary Conditions:								
								The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1							
								The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm							
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature <=	°C							
								Engine Fuel Temperature >=	°C							
								Thermo Management In Normal Operation Mode								
								Desired Fuel Mass >	kg/s							
								Calculated Fuel Volume >	mm^3/st							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous								
								2. Engine Speed Is Equal Or Less	min-1							
								3. Engine Speed Is Equal Or Greater Than	min-1							
								All Misfire Conditions Above Must Be True For More Than [Cycle]								
110	Cylinder 2 Misfire	P0302	Cylinder 2 Misfire Detected	Detection Of Injector 2 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1		All Cylinders Available(No Cylinder Is Cut Off)			E	4 DC	-	x	-	
					All Cylinders Available			Stationary Conditions:								
								The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1							
								The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm							
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature <=	°C							
								Engine Fuel Temperature >=	°C							
								Thermo Management In Normal Operation Mode								
								Desired Fuel Mass >	kg/s							
								Calculated Fuel Volume >	mm^3/st							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous								
								2. Engine Speed Is Equal Or Less	min-1							
								3. Engine Speed Is Equal Or Greater Than	min-1							
								All Misfire Conditions Above Must Be True For More Than [Cycle]								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info		Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info		Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit			description	unit			unit	cycles	-	-	-	-
113	CAN Communication With CPC	PC400	Invalid Data Received	Detect Abnormal CAN Data	CPC System ID Is Not Defined		OR		Always Enabled				s	4 DC	-	-	-	
					Received Engine Torque Request >	Nm												
					Engine State From CPC Is Not Available													
114	CAN Communication With CPC	P1E35	No Data Received from Engine CAN Link	Detect Absence Of CAN Data	Timeout Of CAN Message 1 CPC				CAN 1 Online Status				s	4 DC	-	-	x	
									Ignition On									
									Engine Operating On State = Engine Start		OR							
									Intake Air Heater Actuator Active									
									Battery Voltage >=	V								
									Otherwise									
									Battery Voltage >=	V								
									Battery Voltage <=	V								
									Above Conditions True For More Than	s								
115	Cylinder 3 Misfire	P0303	Cylinder 3 Misfire Detected	Detection Of Injector 3 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1			All Cylinders Available(No Cylinder Is Cut Off)				E	4 DC	-	x	-	
					All Cylinders Available				Stationary Conditions:									
									The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1								
									The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm								
									Engine Coolant Outlet Temperature <=	°C								
									Engine Coolant Outlet Temperature >=	°C								
									Engine Fuel Temperature <=	°C								
									Engine Fuel Temperature >=	°C								
									Thermo Management In Normal Operation Mode									
									Desired Fuel Mass >	kg/s								
									Calculated Fuel Volume >	mm^3/st								
									Engine Speed <=	min-1								
									Engine Speed >=	min-1								
									Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous									
									2. Engine Speed Is Equal Or Less	min-1								
									3. Engine Speed Is Equal Or Greater Than	min-1								
									All Misfire Conditions Above Must Be True For More Than [Cycle]									
116	Cylinder 4 Misfire	P0304	Cylinder 4 Misfire Detected	Detection Of Injector 4 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1			All Cylinders Available(No Cylinder Is Cut Off)				E	4 DC	-	x	-	
					All Cylinders Available				Stationary Conditions:									
									The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1								
									The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm								
									Engine Coolant Outlet Temperature <=	°C								
									Engine Coolant Outlet Temperature >=	°C								
									Engine Fuel Temperature <=	°C								
									Engine Fuel Temperature >=	°C								
									Thermo Management In Normal Operation Mode									
									Desired Fuel Mass >	kg/s								
									Calculated Fuel Volume >	mm^3/st								
									Engine Speed <=	min-1								
									Engine Speed >=	min-1								
									Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous									
									2. Engine Speed Is Equal Or Less	min-1								
									3. Engine Speed Is Equal Or Greater Than	min-1								
									All Misfire Conditions Above Must Be True For More Than [Cycle]									

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
117	Cylinder 5 Misfire	P0305	Cylinder 5 Misfire Detected	Detection Of Injector 5 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1		All Cylinders Available(No Cylinder Is Cut Off)			E	4 DC	-	x	-	
					All Cylinders Available			Stationary Conditions:								
								The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1							
								The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm							
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature <=	°C							
								Engine Fuel Temperature >=	°C							
								Thermo Management In Normal Operation Mode								
								Desired Fuel Mass >	kg/s							
								Calculated Fuel Volume >	mm^3/st							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous								
								2. Engine Speed Is Equal Or Less	min-1							
								3. Engine Speed Is Equal Or Greater Than	min-1							
								All Misfire Conditions Above Must Be True For More Than [Cycle]								
154	Proportional Valve Bank 2	P1E80	Proportional Valve Bank 2 Circuit Low	Output Driver Internal Diagnostic	Driver Status Short Circuit Low			Battery Voltage >	V		E	4 DC	-	x	-	
176	Turbocharger Compressor Inlet Temperature Sensor	P1D70	Turbo Charger Compressor Inlet Temperature Circuit Failed Low	SRL	Turbocharger Compressor Inlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	-	
177	Turbocharger Compressor Inlet Temperature Sensor	P1D71	Turbo Charger Compressor Inlet Temperature Circuit Failed High	SRH	Turbocharger Compressor Inlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	-	
190	Proportional Valve Bank 2	P1E7F	Proportional Valve Bank 2 Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit High			Battery Voltage >	V		E	4 DC	-	x	-	
191	Fuel Rail Pressure Sensor	P0192	Fuel Rail Pressure Sensor "A" Circuit Low	SRL	Fuel Rail Pressure Sensor Voltage <	V		Always Enabled			s	4 DC	-	x	-	
192	Fuel Rail Pressure Sensor	P0193	Fuel Rail Pressure Sensor "A" Circuit High	SRH	Fuel Rail Pressure Sensor Voltage >	V		Always Enabled			s	4 DC	-	x	-	
206	Rail Pressure Governor : Quantity Control Valve	P1D96	Fuel Metering Unit Error Current Too Low	Detect If Measured Current Of Fuel Metering Unit Is Smaller Than A Threshold	Measured Current Of Fuel Metering Unit <	mA		Desired Current Of Fuel Metering Unit >	mA		s	4 DC	-	x	-	
								Battery Voltage >	V							
								Enable If Fuel Rail Pressure >	bar	AND						
								Disable If Fuel Rail Pressure <=	bar							
								Diagnostic Of Fuel Metering Unit Active								
								Leakage Fault Detection Active								
								Engine Shutdown Request Active		AND						
								Engine Speed >	min-1							
								MU Number 944 - MCM2: Backwards Running Engine Detected Active Failure								
								Fuel Metering Unit Pulse Counter Is Active To Prepare Fuel Metering Unit For Activation		AND						
								Engine Speed =								
								Fuel Metering Unit Not Active								
								Fuel Metering Unit Pulse Counter <	-							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit				unit	cycles	-	-	-	-
207	Rail Pressure Governor	P0087	Fuel Rail/System Pressure - Too Low	Detect If The Actual Rail Pressure Is Too Low.	Detect If The Difference Between Desired And Actual Rail Pressure Exceeds A Maximum Threshold. Rail Pressure Deviation > Threshold	See Table 2		Fuel Rail Pressure Governor Operating On State = Closed Loop		AND	OR		s	4 DC	-	x	-	
								Rail Pressure Limiting Valve Is Closed										
								Engine Operating On State > Engine Start										
								Engine Operating On State > Engine Start		AND								
								Rail Pressure Limiting Valve Active Failure										
								Fuel Metering Unit Active										
								Blank Shot Strategy Active			OR							
								Blank Shot Strategy Not Active		AND								
								Fuel Mass Total Actual >=	mm^3/st									
210	Rail Pressure Governor: Quantity Control Valve	P0629	Fuel Pump "A" Control Circuit High	Short Cut To Battery Low-Side: Low Level Detection	Quantity Control Valve (Low Side) Open Load			Always Enabled					E	4 DC	-	x	-	
220	Crankshaft Position Sensor	P0337	Crankshaft Position Sensor "A" Circuit Low	Circuit Continuity Out Of Range Low	At Synchronised Crankshaft The Average Voltage Of The Crankshaft Sensor (Internal Signal) Is Longer Than 1.2s Below An Internal Threshold			Always Enabled					s	4 DC	-	-	x	
221	Crankshaft Position Sensor	P0335	Crankshaft Position Sensor "A" Circuit	Circuit Continuity Out Of Range High	At Not Synchronised Camshaft The Average Voltage Of The Crankshaft Sensor (Internal Signal) Is Longer Than 1.2s Above An Internal Threshold			Always Enabled					s	4 DC	-	-	x	
223	Crankshaft Position Sensor	P0339	Crankshaft Position Sensor "A" Circuit Intermittent	Missing Crankshaft Signal When Camshaft Signal Is Present	Engine Speed >	min-1		Always Enabled					s	4 DC	-	-	x	
					Duration Between Two Cogs Of The Crankshaft Gear > Engine Speed Depended Duration Duration = 8 * Time Between The Two Latest Valid Events													
228	Camshaft Position Sensor	P0344	Camshaft Position Sensor "A" Circuit Intermittent Bank 1 or Single Sensor	Missing Camshaft Signal When Crankshaft Signal Is Present	Engine Speed >	min-1		Always Enabled					s	4 DC	-	-	x	
					Duration Between Two Cogs Of The Camshaft Gear > Engine Speed Depended Duration Duration = 4 * Time Between The Two Latest Valid Events													
230	Camshaft And Crankshaft Position Sensor	P0016	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Verify Normal Tooth Count Ratio	If Extra Camshaft Tooth Is More Than +/- 6 Crank Degrees Out Of Phase With Missing Crankshaft Reference Tooth Over 4 Crankshaft Revolutions, Then An Error Bit Is Set. If Error Bit Is Set The Fault Condition Is True		OR	Always Enabled					s	4 DC	-	-	-	
					If Missing Crankshaft Reference Tooth Is More Than +/- 6 Crank Degrees Out Of Phase With Extra Camshaft Tooth Over 3 Camshaft Revolutions, Then An Error Bit Is Set. If Error Bit Is Set The Fault Condition Is True													
231	Rail Pressure Governor	P1DA2	Pressure Limiting Valve Failed to Close	Detect If Fuel Rail Pressure Recovers To Controlled Level	Fuel Rail Pressure Deviation (Desired - Current) <	bar		Engine Speed >	min-1				s	4 DC	-	x	-	
					Fuel Rail Pressure Deviation >=	bar		Fuel Rail Pressure Governor Operating On State = Closed Loop										
					Fuel Rail Pressure Governor Operating On State = Closed Loop													
					Upper Fuel Rail Pressure Limit <= Threshold + *Fuel Rail Pressure Offset													
					Lower Fuel Rail Pressure Limit >= Threshold - *Fuel Rail Pressure Offset													
					Threshold	See Table 3												
					*Fuel Rail Pressure Offset	bar												
					Fuel Supply Pressure Voltage >=	V												
					Fuel Supply Pressure Voltage <=	V												
					5V Sensor Supply Bank 1 Voltage >=	V												
					5V Sensor Supply Bank 1 Voltage <=	V												
					Low Fuel Pressure <=	bar												
					Low Fuel Pressure >=	bar												
					All Conditions Above For More Than	s												

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit		unit	cycles	-	-	-	-
					Reset Conditions If Pressure Limiting Valve Open Detection Was Activated		AND	OR										
					Fuel Rail Pressure Deviation (Desired - Current) >=	bar												
					For More Than	s												
					Engine Speed ==	min-1												
233	Rail Pressure Governor	P1DA1	Leakage in High Pressure Fuel System Too High	Detect Leakage In High Pressure Fuel Circuit Beyond Or Equal A Limit During Engine Shut Down	Leakage Error Counter >=					Before Activation Of Leakage Test The Engine Must Be On For More Than >	min		E	4 DC	-	-	-	
					Increment Leakage Error Counter If The Quotient Between The Calculated Leakage Pressure And Current Rail Pressure >					Before Activation Of Leakage Test The Engine Must Be Working On Idle For A Time Smaller Than <	min							
					Decrement Leakage Error Counter If The Difference Between The Calculated Leakage Pressure And Current Rail Pressure <=					Ignition Switched From On To Off								
										For More Than	s							
										Filtered *Fuel Rail Pressure>	bar							
										Filtered *Fuel Rail Pressure<	bar							
										* First Order Low Pass Filter With Filter Factor And Initial Value Is Start Value	-							
										Minimum Allowed Coolant Temperature For Activation Of Leakage Test Engine Coolant Outlet Temperature >=	°C							
										Maximum Allowed Coolant Temperature For Activation Of Leakage Test Engine Coolant Outlet Temperature <	°C							
										Service Routine: Minimum Allowed Fuel Temperature For Activation Of Leakage Test Engine Fuel Temperature >=	°C							
										Minimum Allowed Fuel Temperature For Activation Of Leakage Test Engine Fuel Temperature >=	°C							
										Maximum Allowed Fuel Temperature For Activation Of Leakage Test Engine Fuel Temperature <	°C							
										Blank Shot Strategy Not Active								
										Parameters Used To Get Active Status Of Blank Shot Strategy								
										If No Failure Active For Fuel Rail Pressure Sensor								
										2D Table Depends On - Fuel Rail Pressure	See Table 4							
										Otherwise Use Default Maximum Active Duration Of Bss Strategy After Leakage Test At RPG Sensor Error	s							
										Increment Rail Pressure Governor Leakage Detection Timer While All Conditions Above Active								
										Fuel Rail Pressure Governor Leakage Detection Timer >=	s							
234	Fuel Rail Pressure Sensor	P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	Detects A Drift Of The Signal Voltage Of The Rail Pressure Sensor (Too High)	Fuel Rail Pressure Sensor Voltage >=	V				Classic Immobilizer Key Slip Not Active			E	4 DC	-	x	-	
					For More Than (Up/Down Counter)	s				Engine Off Time >=	min							
					...					Engine Off Time Plausibility Check								
					The Following Conditions Must Be True To Activate Up/Down Counter					Ignition Enabled For Time >	s							
					Fuel Rail Pressure Sensor Voltage >	V				Ignition Enabled For Time <=	s							
					Fuel Rail Pressure Sensor Voltage <	V				Crankshaft And Camshaft Not Moving								
					Fuel Rail Pressure Sensor Voltage >	V	OR			For Less Or Equal Than	s							
					Fuel Rail Pressure Sensor Voltage <	V				Low Fuel Pressure <	bar							
					Crankshaft And Camshaft Not Moving					Value Of 2D Table Depends On Signal Voltage Of Low Pressure Fuel Sensor	See Table 5							
					Engine Start Timer Counter <=	s				Low Fuel Pressure Sporadic Defect Not Active								
					Battery Voltage >	V				Fuel Supply Pressure Voltage >=	V							
					Engine Was On In Last Driving Cycle					Fuel Supply Pressure Voltage <=	V							
					5V Sensor Supply Bank 1 Voltage >=	V				5V Sensor Supply Bank 1 Voltage >=	V							
					5V Sensor Supply Bank 1 Voltage <=	V				5V Sensor Supply Bank 1 Voltage <=	V							
					If Up/Down Counter Is Not Active Counter Will Hold Last Value					Up/Down Counter Active								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Fuel Rail Pressure Sensor Voltage >	V						
								Fuel Rail Pressure Sensor Voltage <	V						
								Fuel Rail Pressure Sensor Voltage >	V	OR					
								Fuel Rail Pressure Sensor Voltage <	V						
								Crankshaft And Camshaft Not Moving							
								Engine Start Time Counter <=	s						
								Battery Voltage >	V						
								Engine Was On In Last Driving Cycle							
235	Fuel Rail Pressure Sensor	P0190	Fuel Rail Pressure Sensor "A" Circuit	Calculate Difference Between Maximum And Minimum Rail Pressure To Determine If There Is An Open Circuit At The Fuel Rail Pressure Sensor	Filtered* Fuel Rail Pressure Sensor Voltage <	V		Fuel Rail Pressure Sensor Voltage <	V		s	4 DC	-	x	-	
					Filtered* Fuel Rail Pressure Sensor Voltage >	V		Fuel Rail Pressure Sensor Voltage >	V							
					Fuel Rail Pressure Sensor Voltage <	V										
					Fuel Rail Pressure Sensor Voltage >	V										
					Difference Between Calculated Maximum And Minimum Filtered* Fuel Rail Pressure Sensor Voltage <	V										
					*First Order Low Pass Filter With Filter Factor	-										
240	Intake Manifold Pressure Sensor	P0237	Turbocharger/Supercharger Boost Sensor "A" Circuit Low	SRL	Intake Manifold Pressure Sensor Voltage <	V		Always Enabled			s	4 DC	-	x	-	
241	Intake Manifold Pressure Sensor	P0238	Turbocharger/Supercharger Boost Sensor "A" Circuit High	SRH	Intake Manifold Pressure Sensor Voltage >	V		Always Enabled			s	4 DC	-	x	-	
244	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1DB0	Exhaust Gas Recirculation Delta Pressure Sensor Circuit Low	SRL	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	x
245	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1DB1	Exhaust Gas Recirculation Delta Pressure Sensor Circuit High	SRH	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	x
258	Intake Manifold Presssure Sensor / Barometric Pressure Sensor	P0106	Manifold Absolute Pressure/Barometric Pressure Sensor Circuit Range/Performance	Determine If In Specified Speed And Load Range The Absolute Value Of Difference Between Intake Manifold Pressure And Barometric Pressure Exceeds A Threshold.	Absolute Value Of Difference Between Intake Manifold Pressure And Barometric Pressure >	mbar		Engine Speed <=	min-1		s	4 DC	-	x	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Barometric Pressure Sensor Voltage >=	V							
								Barometric Pressure Sensor Voltage <=	V							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
263	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1DAB	Exhaust Gas Recirculation Differential Pressure Range/Performance High	Detects If EGR Differential Pressure Is Higher Than A Threshold In A Specified Speed And Load Range And Nearly Closed EGR Valve.	EGR Differential Pressure >	See Table 6		Desired EGR Valve Position <	%		s	4 DC	-	-	-	x
								EGR System No Failure								
								Engine Running For Time >	s							
								Engine Operating On State > Engine Start								
								Engine Coolant Outlet Temperature >	°C							
								For More Than	s							
								Engine Oil Temperature >	°C							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								For More Than	s							
								If Engine Coolant Outlet Temperature And Engine Oil Temperature Have A Fault The Monitor Is Inhibited								
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Weighting Factor For Engine Transient Mode <=								
								Weighting Factor For Engine Smoke Mode <=								
								Intake Manifold Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
264	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1DAB	Exhaust Gas Recirculation Differential Pressure Range/Performance Low	Detects If EGR Differential Pressure Is Lower Than A Threshold In A Specified Speed And Load Range And Open EGR Valve.	EGR Differential Pressure <	See Table 7		EGR System No Failure			s	4 DC	-	-	-	x
								Engine Running For Time >	s							
								Engine Operating On State > Engine Start								
								Engine Coolant Outlet Temperature >	°C							
								For More Than	s							
								If Engine Coolant Outlet Temperature Has A Fault Engine Oil Temperature Is Used								
								Engine Oil Temperature >	°C							
								For More Than	s							
								If Engine Coolant Outlet Temperature And Engine Oil Temperature Have A Fault The Monitor Is Inhibited								
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Weighting Factor For Engine Transient Mode <=								
								Weighting Factor For Engine Smoke Mode <=								
								Intake Manifold Temperature >=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
272	Turocharger Shaft Speed Sensor	P2579	Turbocharger/Supercharger Speed Sensor "A" Circuit Range/Performance	Turocharger Shaft Speed Is Below Threshold In Specified Speed And Load Range When No Regeneration Is Active	Turbocharger Shaft Speed <	rpm		Engine Speed <=	min-1		s	4 DC	-	x	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Monitoring Conditions Active For More Than	s							
284	Exhaust Gas Recirculation (EGR) Mass Flow	P04D9	Closed Loop EGR Control At Limit - Flow Too Low	EGR Error Ratio Is Less Than Threshold, While EGR Mass Flow Is Above Calibrated Value	If Transient Weighting Factor Is < 0.5			Desired EGR Mass Flow >•	kg/s		s	4 DC	-	x	-	
					(EGR Mass Flow - Desired EGR Mass Flow)* / Desired EGR Mass Flow <			Modelled EGR Mass Flow >•	kg/s							
					...			Weighting Factor For Engine Smoke Mode <=								
					If Transient Weighting Factor Is >= 0.5			EGR Valve Position >=	%							
					(EGR Mass Flow - Desired EGR Mass Flow)* / Desired EGR Mass Flow <			Engine Speed <=	min-1							
					* First Order Low Pass Filtered With Filter Factor	-		Engine Speed >=	min-1							
					(NOx Raw - NOx Model)* >			Engine Torque <=	Nm							
					* First Order Low Pass Filtered With Filter Factor	-		Engine Torque >=	Nm							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
					Filtered Boost Ratio >	-		Engine On Time >=	min							
					EGR Valve Correction Factor >	-		Charge Air Cooler Outlet Temperature >	°C							
								Engine Speed Gradient* <	min-1/s							
								Engine Speed Gradient* >	min-1/s							
								Desired Fuel Mass Gradient** <	(mg/st) / s							
								Desired Fuel Mass Gradient** >	(mg/st) / s							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
								*First Order Low Pass Filtered With Filter Factor For Engine Speed Gradient	-							
								**First Order Low Pass Filtered With Filter Factor For Fuel Mass Gradient	-							
								•If Applicable								
285	Exhaust Gas Recirculation (EGR) Mass Flow	P04DA	Closed Loop EGR Control At Limit - Flow Too High	When Desired EGR Mass Flow > Threshold, Detect If EGR Error Ratio> Threshold. When Desired EGR Mass Flow < Threshold, Detect If Desired EGR Mass Flow - EGR Mass Flow > Threshold	If Transient Weighting Factor Is < 0.5			Desired EGR Mass Flow >•	kg/s		s	4 DC	-	x	-	
					(EGR Mass Flow - Desired EGR Mass Flow)* / Desired EGR Mass Flow >	See Table 11		Modelled EGR Mass Flow >•	kg/s							
					If Transient Weighting Factor Is >= 0.5			Engine Speed <=	min-1							
					(EGR Mass Flow - Desired EGR Mass Flow)* / Desired EGR Mass Flow >	See Table 12		Engine Speed >=	min-1							
					* First Order Low Pass Filtered With Filter Factor	-		Engine Torque <=	Nm							
					(NOx Raw - NOx Model)* <	See Table 13		Engine Torque >=	Nm							
					* First Order Low Pass Filtered With Filter Factor	-		Engine On Time >=	min							
					EGR Valve Correction Factor <	-		Charge Air Cooler Outlet Temperature >	°C							
					Filtered Boost Ratio <	-		Engine Speed Gradient* <	min-1/s							
								Engine Speed Gradient* >	min-1/s							
								Desired Fuel Mass Gradient** <	(mg/st) / s							
								Desired Fuel Mass Gradient** >	(mg/st) / s							
								*First Order Low Pass Filtered With Filter Factor For Engine Speed Gradient	-							
								**First Order Low Pass Filtered With Filter Factor For Fuel Mass Gradient	-							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
								•If Applicable								
297	Charge Air Cooler Outlet Temperature Sensor	P007B	Charge Air Cooler Temperature Sensor Circuit Range/Performance Bank 1	Detect If The Absolute Value Of Charge Air Cooler Outlet Temperature Is Higher Than A Calibratable Threshold Under Conditions Of Low Engine Speed And Engine Torque.	Difference Between Charge Air Cooler Outlet Temperature And Minimum Of Turbocharger Compressor Inlet Temperature And Ambient Air Temperature >	°C		Engine Speed <=	min-1		s	4 DC	-	-	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Engine On Time >	hr							
								Vehicle Speed >	km/h							
								Weighting Factor For Engine Transient Mode ==								
								Weighting Factor For Engine Smoke Mode ==								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
298	Charge Air Cooler Outlet Temperature Sensor	P007B	Charge Air Cooler Temperature Sensor Circuit Range/Performance Bank 1	Detect If The Absolute Value Of Charge Air Cooler Outlet Temperature Is Lower Than A Calibratable Threshold Under Conditions Of High Engine Speed And Engine Torque.	Difference Between Charge Air Cooler Outlet Temperature And Minimum Of Turbocharger Compressor Inlet Temperature And Ambient Air Temperature <=	°C		Engine Speed <=	min-1		s	4 DC	-	-	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Engine On Time >	hr							
								Vehicle Speed >	km/h							
								Weighting Factor For Engine Transient Mode ==								
								Weighting Factor For Engine Smoke Mode ==								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
299	Intake Manifold Temperature Sensor	P00CE	Intake Air Temperature Measurement System - Multiple Sensor Correlation	Detect If The Difference Between Intake Manifold Temperature And Ambient Air Temperature Is Higher Than A Calibratable Threshold Under Conditions Of Low Engine Speed And Engine Torque. No EGR Mass Flow.	Difference Between Intake Manifold Temperature And Minimum Of Turbocharger Compressor Inlet Temperature And Ambient Air Temperature >	°C		Engine Speed <=	min-1		s	4 DC	-	-	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								EGR Mass Flow <=	kg/s							
								Weighting Factor For Engine Transient Mode ==								
								Weighting Factor For Engine Smoke Mode ==								
								Engine On Time >	hr							
								Vehicle Speed >	km/h							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
300	Intake Manifold Temperature Sensor	P00CE	Intake Air Temperature Measurement System - Multiple Sensor Correlation	Detect If The Difference Between Intake Manifold Temperature And Ambient Air Temperature Is Lower Than Or Equal To A Calibratable Threshold Under Conditions Of High Engine Speed And Engine Torque. EGR Mass Flow Requested.	Difference Between Intake Manifold Temperature And Minimum Of Turbocharger Compressor Inlet Temperature And Ambient Air Temperature <=	°C		Engine Speed <=	min-1		s	4 DC	-	-	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								EGR Mass Flow >	kg/s							
								Engine On Time >	hr							
								Vehicle Speed >	km/h							
								Weighting Factor For Engine Transient Mode ==								
								Weighting Factor For Engine Smoke Mode ==								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
301	Turbocharger Compressor Inlet Temperature Sensor	P1F92	Coolant Temperature / Compressor Inlet Temperature Plausibility Error	Detect If Absolute Value Of Difference Between Ambient Air Temperature And Turbocharger Compressor Inlet Temperature Exceeds A Calibratable Threshold Under Conditions Of High Engine Speed And Engine Torque.	Absolute Value Of Difference Between Ambient Air Temperature And Turbocharger Compressor Inlet Temperature >	°C		Engine Speed <=	min-1		s	4 DC	-	-	-	
								Engine Speed >=	min-1							
								Desired Injection Fuel Mass<=	mg/st							
								Desired Injection Fuel Mass>=	mg/st							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
364	Exhaust Gas Recirculation (EGR) Actuator	P1DC1	EGR Valve Actuator, Position Deviation Error	The Logic Detects If The EGR Valve Actuator Is Not Able To Reach The Mechanical Or Electrical Failsafe Position And The Current Position Is Unknown.	Hardware Detected Position Deviation Of The EGR Actuator >	°		Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
365	Exhaust Gas Recirculation (EGR) Actuator	P1DC2	EGR Valve Actuator, Learn Cycle Too Large	The Logic Detects If The EGR Valve Actuator Has A Position Deviation Or Does Not Receive Any Signal From Engine Control Unit. The EGR Valve Actuator Is In The Electrical Failsafe Position.	Hardware Detected EGR Error State = (difference between learn-span and calibration-span > 9,03) (error_code = 4)			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
366	Exhaust Gas Recirculation (EGR) Actuator	P1DC3	EGR Valve Actuator, Failsafe Mode, Motor Off	The Logic Detects If The EGR Actuator Responses To The Demand Slower Than Expected. Evaluation Of EGR Valve Actuator Self-Diagnosis Plus Additional Conditions For Better Fault Separation	Hardware Detected Error At The Drive Of The EGR Actuator.			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
368	Exhaust Gas Recirculation (EGR) Actuator	P1DC5	EGR Valve Actuator, Communication Error	The Logic Detects If The CAN Messages Are Consecutively Not Received	Hardware Detected Error That No Valid CAN Command Received (And Previously Received) For A Term Of >=	ms		Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
369	Exhaust Gas Recirculation (EGR) Actuator	P1DC6	EGR Valve Actuator, Error	The Logic Detects If The Learned Spot Span Is Too Large.	Hardware Detected Error That The First Learned(Reference) Spot Span <	°	OR	Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
					Hardware Detected Error That The First Learned(Reference) Spot Span >	°		For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
383	Rail Pressure Governor : Quantity Control Valve	P1F4B	Fuel Metering Unit Performance	Detect If The Absolute Value Of Difference Between Desired And Measured Current Is HigherThan A Threshold	Absolute Value Of Difference Between Measured Current Of Fuel Metering Unit And Desired Current Of Fuel Metering Unit >	mA		Measured Current Of Fuel Metering Unit >=	mA		s	4 DC	-	x	-	
								Desired Current Of Fuel Metering Unit >	mA							
								Battery Voltage >	V							
								Enable If Fuel Rail Pressure >	bar	AND / OR						
								Disable If Fuel Rail Pressure <=	bar							
								Diagnostic Of Fuel Metering Unit Active								
								Leakage Fault Detection Active								
								Engine Shutdown Request Active		AND / OR						
								Engine Speed >	min-1							
								MU Number 944 - MCM2: Backwards Running Engine Detected Active Failure		OR						
								Fuel Metering Unit Pulse Counter Is Active To Prepare Fuel Metering Unit For Activation		AND / OR						
								Engine Speed =	min-1	AND / OR						
								Fuel Metering Unit Measuring Current Not Active		AND / OR						
								Fuel Metering Unit Pulse Counter <	-	AND / OR						
386	Turocharger Shaft Speed Sensor	P2580	Turbocharger/Supercharger Speed Sensor "A" Circuit Low	SRL	Turocharger Shaft Speed Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	x	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
387	Turocharger Shaft Speed Sensor	P2581	Turbocharger/Supercharger Speed Sensor "A" Circuit High	SRH	Turocharger Shaft Speed Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	x	
394	Fuel Injector Needle Amplifier Cylinder 1	P0262	Cylinder 1 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
395	Fuel Injector Needle Amplifier Cylinder 2	P0265	Cylinder 2 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
396	Fuel Injector Needle Amplifier Cylinder 3	P0268	Cylinder 3 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
397	Fuel Injector Needle Amplifier Cylinder 4	P0271	Cylinder 4 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
398	Fuel Injector Needle Amplifier Cylinder 5	P0274	Cylinder 5 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
399	Fuel Injector Needle Amplifier Cylinder 6	P0277	Cylinder 6 Injector "A" Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
402	Fuel Injector Amplifier Actuator Cylinder 1	P1D30	Injector Cylinder #1 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
403	Fuel Injector Amplifier Actuator Cylinder 2	P1D31	Injector Cylinder #2 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
404	Fuel Injector Amplifier Actuator Cylinder 3	P1D32	Injector Cylinder #3 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
405	Fuel Injector Amplifier Actuator Cylinder 4	P1D33	Injector Cylinder #4 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
406	Fuel Injector Amplifier Actuator Cylinder 5	P1D34	Injector Cylinder #5 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
407	Fuel Injector Amplifier Actuator Cylinder 6	P1D35	Injector Cylinder #6 Spill Control Valve ("Amplifier"), Valve Shorted Circuit	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
410	Fuel Injector Needle Amplifier Group 1	P2147	Fuel Injector Group "A" Supply Voltage Circuit Low	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
411	Fuel Injector Needle Amplifier Group 2	P2150	Fuel Injector Group "B" Supply Voltage Circuit Low	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
412	Fuel Injector Amplifier Actuator Group 3	P1F4C	Injector Amplifier Control Valve Cylinder #1, #2, #3, Shorted to Ground	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
413	Fuel Injector Amplifier Actuator Group 4	P1D36	Injector Amplifier Control Valve Cylinder #4, #5, #6, Shorted to Ground	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
416	Fuel Injector Needle Amplifier Group 1	P2148	Fuel Injector Group "A" Supply Voltage Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
417	Fuel Injector Needle Amplifier Group 2	P2151	Fuel Injector Group "B" Supply Voltage Circuit High	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
418	Fuel Injector Amplifier Actuator Group 3	P1F4D	Injector Amplifier Control Valve Cylinder #1, #2, #3, Shorted to Battery	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
419	Fuel Injector Amplifier Actuator Group 4	P1D39	Injector Amplifier Control Valve Cylinder #4, #5, #6, Shorted to Battery	Hardware Detected	Driver Status Short Circuit			Always Enabled			E	4 DC	-	x	-	
422	Fuel Temperature	P0168	Fuel Temperature Too High	Detect Fuel Temperature Above A Limit	A Calculated Time After System Start Must Be Reached			Engine Speed >			s	4 DC	-	-	-	
					Fuel Temperature >	°C										
					For More Than	min										
					Engine Speed >	rpm										
423	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1F4E	Exhaust Gas Recirculation Delta Pressure Sensor Out Of Calibration Low	EGR Differential Pressure Sensor Compensation Logic Checks For Offset While ECU Post-Run. If Offset Is Less Than Low Limit Then Sensor Drift Exceeds Compensation Range. Fault Stays Active To Next Cycle.	EGR Differential Pressure <	mbar		Ignition Off For More Than	s		E	4 DC	-	-	x	x

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
					The Fault Stays Active Until The Next Driving Cycle			Engine Must Have Been Run In Current Driving Cycle								
								MU Number 520 - MCM2: Sensor Reference Voltage "A" Circuit Low No Active Failure								
								MU Number 521 - MCM2: Sensor Reference Voltage "A" Circuit High No Active Failure								
								Engine Speed ==	1/min							
								Engine Regular Shut Down (First Ignition Off And Than Engine Speed = 0)								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
424	Exhaust Gas Recirculation (EGR) Differential Pressure Sensor	P1F4F	Exhaust Gas Recirculation Delta Pressure Sensor Out Of Calibration High	EGR Differential Pressure Sensor Compensation Logic Checks For Offset While ECU Post-Run. If Offset Is Above Limit Then Sensor Drift Exceeds Compensation Range. Fault Stays Active To Next Cycle.	EGR Differential Pressure >	mbar		Ignition Off For More Than	s		E	4 DC	-	-	x	x
					The Fault Stays Active Until The Next Driving Cycle			Engine Must Have Been Run In Current Driving Cycle								
								MU Number 520 - MCM2: Sensor Reference Voltage "A" Circuit Low No Active Failure								
								MU Number 521 - MCM2: Sensor Reference Voltage "A" Circuit High No Active Failure								
								Engine Speed ==	1/min							
								Engine Regular Shut Down (First Ignition Off And Than Engine Speed = 0)								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
455	Cylinder 6 Misfire	P0306	Cylinder 6 Misfire Detected	Detection Of Injector 6 Malfunction And Cylinder Power. The Detection Works With A Frequency-Dependence Analysis.	Misfire Comparing Amplitude >	See Table 1		All Cylinders Available(No Cylinder Is Cut Off)			E	4 DC	-	x	-	
					All Cylinders Available			Stationary Conditions:								
								The Absolute Value Of Difference Between The Actual Engine Speed And The Engine Speed From The Last Firing Cycle <=	min-1							
								The Absolute Value Of Difference Between The Actual Torque And The Torque From The Last Firing Cycle <=	Nm							
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature <=	°C							
								Engine Fuel Temperature >=	°C							
								Thermo Management In Normal Operation Mode								
								Desired Fuel Mass >	kg/s							
								Calculated Fuel Volume >	mm^3/st							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Speed Analysis Is Enable If: 1. Crankshaft And Camshaft Run Synchronous								
								2. Engine Speed Is Equal Or Less	min-1							
								3. Engine Speed Is Equal Or Greater Than	min-1							
								All Misfire Conditions Above Must Be True For More Than [Cycle]								
476	CAN Communication	P1DE0	CAN3 Communication Error	Physical Link Failure Of CAN-3 Detected	MCM Doesn't Receive CAN Messages From Pneumatic Boost System (PBS) But From Smart Remote Actuator (SRA)			Bank_1 Condition If Engine Off And Over Temperature Is Inactive		OR	s	4 DC	-	x	-	
								Bank_2 Condition If Engine Off And Over Temperature Is Inactive								
								Ignition On								
								Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
								For More Than	s							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
477	Rail Pressure Governor	P016D	Excessive Time To Enter Closed Loop Fuel Pressure Control	Check If Current Rail Pressure Is Smaller Or Equal Than A Threshold	Fuel Rail Pressure <=	bar		Engine Operating On State > Engine Start			s	4 DC	-	x	-	
					Fuel Rail Pressure Governor Operating On State = Open Loop			Desired Fuel Rail Pressure >	bar							
					Fuel Rail Pressure Governor Was Operating On State = Closed Loop			MU Number 944 - MCM2: Backwards Running Engine Detected No Active Failure								
					Engine Speed >	min-1										
					Ignition On											
517	3V Sensor Supply Bank 1 Voltage	P06B2	Sensor Power Supply "A" Circuit High	Detect Voltage Beyond Limit	3V Sensor Supply Bank 1 Voltage >	V		Always Enabled			s	4 DC	-	-	x	
518	3V Sensor Supply Bank 2 Voltage	P06B4	Sensor Power Supply "B" Circuit Low	Detect Voltage Below Limit	3V Sensor Supply Bank 2 Voltage <	V		Always Enabled			s	4 DC	-	-	x	
519	3V Sensor Supply Bank 2 Voltage	P06B5	Sensor Power Supply "B" Circuit High	Detect Voltage Beyond Limit	3V Sensor Supply Bank 2 Voltage >	V		Always Enabled			s	4 DC	-	-	x	
520	5V Sensor Supply Bank 1 Voltage	P0642	Sensor Reference Voltage "A" Circuit Low	Detect Voltage Below Limit	5V Sensor Supply Bank 1 Voltage <	V		Always Enabled			s	4 DC	-	x	-	
521	5V Sensor Supply Bank 1 Voltage	P0643	Sensor Reference Voltage "A" Circuit High	Detect Voltage Beyond Limit	5V Sensor Supply Bank 1 Voltage >	V		Always Enabled			s	4 DC	-	x	-	
522	5V Sensor Supply Bank 2 Voltage	P0652	Sensor Reference Voltage "B" Circuit Low	Detect Voltage Belowlimit	5V Sensor Supply Bank 2 Voltage <	V		Always Enabled			s	4 DC	-	-	If Applicable	
523	5V Sensor Supply Bank 2 Voltage	P0653	Sensor Reference Voltage "B" Circuit High	Detect Voltage Beyond Limit	5V Sensor Supply Bank 2 Voltage >	V		Always Enabled			s	4 DC	-	-	If Applicable	
526	Coolant System	P1CD0	Coolant Level Low (CAN)	Coolant Level Signal Via CAN Indicates A Faulty Coolant Level	Detects If The Coolant Level Via CAN Is Defect			Coolant Level Signal Via CAN Has To Be Available			s	4 DC	-	x	-	
534	Charge Air Cooler Outlet Pressure	P1E89	Unacceptable Long Time In Smoke Mode	Check If The Engine Is Operated For An Unacceptable Long Time When Very Low Air Is Supplied (Smoke Mode).	Weighting Factor For Engine Smoke Mode >		AND	Engine Operating On State = Engine On			s	4 DC	-	x	-	
					Engine Operating On State = Engine On		OR	Monitoring Conditions Active For More Than	See Table 14							
					Both Fault Conditions Active For More Than	See Table 14		Engine Speed >=	min-1	OR						
					Failure Will Be Latched If Occurred For More Than X Times	-		Vehicle Speed >=	km/h							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=•	°C							
								Barometric Pressure >=•	mbar							
								•If Applicable								
535	3V Sensor Supply Bank 1 Voltage	P06B1	Sensor Power Supply "A" Circuit Low	Detect Voltage Below Limit	3V Sensor Supply Bank 1 Voltage <	V		Always Enabled			s	4 DC	-	-	x	
538	Engine Coolant Pump Actuator	P1F57	Electronically Controlled Water Pump Mechanical Defect Detected	Comparison Between Outlet Coolant Temperature And Inlet Coolant Temperature.	Calcualted Water Pump Speed >	min-1	AND	No Fault Active For Alternator Speed *		OR	s	4 DC	-	x	-	
					For Less Than	s		Current Water Pump Speed >	rpm							
					Maximum Allowed Drive Before Fault Detection True	min-1		Above Condition For More Than	s							
					Maximum Allowed Slip Before Fault Detection True	See Table 15		...								
					Pulse Width Modulation Signal Of Engine Coolant Pump Actuator <=		OR	Engine Coolant Pump Actuator Must Be Available								
					Last Conditions For More Than	s		Engine Operating On State > Engine Start								
					Calculated Water Pump Speed <=	min-1		For More Than	s							
					For More Than	s	AND	* Alternator Speed Fault Is Active Under Following Conditions:								
					Difference Between Engine Coolant Outlet Temperature And Engine Coolant Inlet Temperature >=	°C		Quotient Of Generator Speed And Engine Speed <	See Table 16							
					Last Conditions For More Than	s		Alternator Speed Valid								
549	Reagent Tank Heater	P202B	Reductant Tank Heater Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Battery Voltage >	V		E	4 DC	-	x	-	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
571	Fuel Rail Pressure Sensor	P0194	Fuel Rail Pressure Sensor "A" Circuit Intermittent/Erratic	Sporadic Loose Of Contact From Sensor Signal	Absolute Of Change Of Fuel Rail Pressure Sensor Voltage In 10 Milliseconds >	V/10ms		Time Under Stationary Conditions >	s		E	4 DC	-	x	-	
					Sensor Loose Contact: Max. Number Of Sensor Loose Contact Per Time (Samples)			Stationary Conditions:								
								Maximum Engine Speed Change <=	min-1							
								Maximum Change Of Flow In Rail <=	l/h							
								Maximum Desired Rail Pressure Change <=	bar							
								Rail Pressure Sensor Signal Voltage <	V							
								Rail Pressure Sensor Signal Voltage >	V							
								Engine Speed <	min-1							
								Engine Speed >=	min-1							
572	Rail Pressure Governor	P0088	Fuel Rail/System Pressure - Too High	Detect If The Actual Rail Pressure Is Too High.	Detect If The Difference Between Desired And Actual Rail Pressure Is Smaller Than A Minimum Threshold. Rail Pressure Deviation < Threshold	See Table 17		Fuel Rail Pressure Governor Operating On State = Closed Loop		AND / OR	s	4 DC	-	x	-	
								Rail Pressure Limiting Valve Is Closed								
								Engine Operating On State > Engine Start		OR						
								Engine Operating On State > Engine Start		AND						
								Rail Pressure Limiting Valve OPEN Active Failure								
								Fuel Metering Unit Active								
								Blank Shot Strategy Active		OR						
								Blank Shot Strategy Not Active								
								Fuel Mass Total Actual >=	mm^3/st	AND						
573	Engine Coolant System	P00B7	Engine Coolant Flow Low/Performance	The Logic Detects If There Is No Coolant Water Flow In The Engine	Hysteresis* Of Engine Coolant Outlet Temperature			Engine Speed >	min-1		s	4 DC	-	x	-	
					*On Condition Of Hysteresis = Off Condition = On Condition - 1 °C	°C		For More Than	s							
					Engine Speed >	min-1										
					For More Than	s										
					(Engine Coolant Outlet Temperature - Engine Coolant Inlet Temperature)>	°C										
578	Exhaust Gas Recirculation (EGR) Cooler	P2457	EGR Cooler "A" Efficiency Below Threshold	The EGR Cooler Performance Is Monitored By Checking If The Difference Between Intake Manifold Temperature And Charge Air Cooler Outlet Temperature Exceeds A Calibrtatable Threshold.	Intake Manifold Temperature - Charge Air Cooler Outlet Temperature > 2D Table Depending On Charge Air Cooler Out Temperature	See Table 18		Engine Speed <=	min-1		s	4 DC	-	x	-	
								Engine Speed >=	min-1							
								Engine Torque <=	Nm							
								Engine Torque >=	Nm							
								Weighting Factor For Engine Smoke Mode <=								
								Weighting Factor For Engine Transient Mode <=								
								Intake Manifold Temperature <=	°C							
								Ambient Air Temperature <=	°C							
								Charge Air Cooler Out Temperature >=	°C							
								EGR Mass Flow >=	kg/s							
								Engine Runtime >	s							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
618	Engine Coolant Inlet Temperature Sensor	P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	Comparison Of Engine Coolant Outlet Temperature To Engine Coolant Inlet Temperature And Comparison Of Engine Coolant Inlet Temperature To Engine Oil Temperature	Difference Between Engine Coolant Outlet Temperature And Engine Coolant Inlet Temperature >	°C	OR / AND	Engine Speed <=	min-1		s	4 DC	-	-	-	
					Difference Between Engine Coolant Outlet Temperature And Engine Coolant Inlet Temperature <	°C		Engine Speed >=	min-1							
					Absolute Value Of Difference Between Engine Oil Temperature And Engine Coolant Inlet Temperature >	°C		Engine Coolant Outlet Temperature >	°C	OR						

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Engine Coolant Inlet Temperature >	°C							
								Battery Voltage >=	V							
								Engine Operating On State >= Low Idle								
								All Conditions Above For More Than	s							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
619	Engine Coolant System	P2183	Engine Coolant Temperature Sensor 2 Circuit Range/Performance	Comparison Of Engine Coolant Outlet Temperature To Engine Coolant Inlet Temperature And Comparison Of Engine Coolant Outlet Temperature To Engine Oil Temperature	Difference Between Engine Coolant Outlet Temperature And Engine Coolant Inlet Temperature >	°C	OR / AND	Engine Speed <=	min-1		s	4 DC	-	-	-	
					Difference Between Engine Coolant Outlet Temperature And Engine Coolant Inlet Temperature <	°C		Engine Speed >=	min-1							
					Absolute Value Of Difference Between Engine Oil Temperature And Engine Coolant Outlet Temperature >=	°C		Engine Coolant Outlet Temperature >	°C	OR						
								Engine Coolant Inlet Temperature >	°C							
								Battery Voltage >=	V							
								Engine Operating On State >= Low Idle								
								For More Than	s							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
633	Fuel Injector Needle Amplifier Cylinder 1	P02EE	Cylinder 1 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
634	Fuel Injector Needle Amplifier Cylinder 2	P02EF	Cylinder 2 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
635	Fuel Injector Needle Amplifier Cylinder 3	P02F0	Cylinder 3 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
636	Fuel Injector Needle Amplifier Cylinder 4	P02F1	Cylinder 4 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
637	Fuel Injector Needle Amplifier Cylinder 5	P02F2	Cylinder 5 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
638	Fuel Injector Needle Amplifier Cylinder 6	P02F3	Cylinder 6 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
639	Fuel Injector Amplifier Actuator Cylinder 1	P1D3C	Injector Cylinder #1 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
640	Fuel Injector Amplifier Actuator Cylinder 2	P1D3D	Injector Cylinder #2 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
641	Fuel Injector Amplifier Actuator Cylinder 3	P1D3E	Injector Cylinder #3 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
642	Fuel Injector Amplifier Actuator Cylinder 4	P1D3F	Injector Cylinder #4 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
643	Fuel Injector Amplifier Actuator Cylinder 5	P1D40	Injector Cylinder #5 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
644	Fuel Injector Amplifier Actuator Cylinder 6	P1D41	Injector Cylinder #6 Spill Control Valve ("Amplifier"), Abnormal Operation (MIN)	Needle Solenoid Current Response Time Does Not Meet Requirement.(Time Too Small)	Push Time <	msec		Minimum Energization Time Of Injector > 1.5 X	msec		E	4 DC	-	x	-	
								…								
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
653	Fuel Quantity	P026D	Total Injected Fuel Mass too High	Detect An Injection Quantity Drift High	Current Deviation Of Fuel Mass(Actual Fuel Mass/Demanded Fuel Mass) > 3D Table Depends On - Engine Speed & Torque	See Table 19		Engine Speed Stationary Condition Check Absolute Engine Speed Gradient <=	min-1		E	4 DC	-	x	-	xx
								Torque Stationary Condition Check Absolute Engine Percent Load Gradient <=	%							
								Current Lambda Stationary Condition Check Absolute Measured O2s Gradient <=	-							
								Calculated Lambda Stationary Condition Check Absolute Calculated O2s Gradient <=	-							
								Fuel Stationary Condition Check Absolute Fuel Mass Gradient <=	mg/st							
								All Stationary Conditions For More Than	s							
								Torque Limitation Not Active								
								Fuel Mass Limitation Not Active								
								Weighting Factor For Engine Transient Mode <=	-							
								Weighting Factor For Engine Cold Mode <=	-							
								Weighting Factor For Engine Smoke Mode <=	-							
								Weighting Factor For Engine Altitude Mode <=	-							
								Weighting Factor For Engine Altitude2 Mode <=	-							
								Normal Thermo Management Mode Active								
								Asymmetric Injection Not Active								
								Injection Type Parameter =="Only Main" Or "Main And Pilot1"								
								Number Of Available Cylinders ==	-							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature >=	°C							
								Engine Fuel Temperature<=	°C							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Percent Load >=	Nm							
								Engine Percent Load <=	Nm							
								SCR Inlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	sec							
654	Fuel Quantity	P026C	Total Injected Fuel Mass too Low	Detect An Injection Quantity Drift Low	Current Deviation Of Fuel Mass(Actual Fuel Mass*/Demanded Fuel Mass) > 3D Table Depends On - Engine Speed & Torque	See Table 23		Engine Speed Stationary Condition Check Absolute Engine Speed Gradient <=	min-1		E	4 DC	-	-	-	xx
								Torque Stationary Condition Check Absolute Engine Percent Load Gradient <=	%							
								Current Lambda Stationary Condition Check Absolute Measured O2s Gradient <=	-							
								Calculated Lambda Stationary Condition Check Absolute Calculated O2s Gradient <=	-							
								Fuel Stationary Condition Check Absolute Fuel Mass Gradient <=	mg/st							
								All Stationary Conditions For More Than	s							
								Torque Limitation Not Active								
								Fuel Mass Limitation Not Active								
								Weighting Factor For Engine Transient Mode <=	-							
								Weighting Factor For Engine Cold Mode <=	-							
								Weighting Factor For Engine Smoke Mode <=	-							
								Weighting Factor For Engine Altitude Mode <=	-							
								Weighting Factor For Engine Altitude2 Mode <=	-							
								Normal Thermo Management Mode Active								
								Asymmetric Injection Not Active								
								Injection Type Parameter =="Only Main" Or "Main And Pilot1"								
								Number Of Available Cylinders ==	-							
								Engine Coolant Outlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Engine Fuel Temperature >=	°C							
								Engine Fuel Temperature<=	°C							
								Engine Speed <=	min-1							
								Engine Speed >=	min-1							
								Engine Percent Load >=	Nm							
								Engine Percent Load <=	Nm							
								SCR Inlet Temperature <=	°C							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	sec							
672	Fuel Injector Needle Amplifier Cylinder 1	P02EE	Cylinder 1 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
673	Fuel Injector Needle Amplifier Cylinder 2	P02EF	Cylinder 2 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
674	Fuel Injector Needle Amplifier Cylinder 3	P02F0	Cylinder 3 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
675	Fuel Injector Needle Amplifier Cylinder 4	P02F1	Cylinder 4 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
676	Fuel Injector Needle Amplifier Cylinder 5	P02F2	Cylinder 5 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
677	Fuel Injector Needle Amplifier Cylinder 6	P02F3	Cylinder 6 Injector Circuit Range/Performance	Needle Solenoid Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
678	Fuel Injector Amplifier Actuator Cylinder 1	P1DF9	Injector Cylinder #1 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
679	Fuel Injector Amplifier Actuator Cylinder 2	P1DFA	Injector Cylinder #2 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
680	Fuel Injector Amplifier Actuator Cylinder 3	P1DFB	Injector Cylinder #3 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
681	Fuel Injector Amplifier Actuator Cylinder 4	P1DFC	Injector Cylinder #4 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
682	Fuel Injector Amplifier Actuator Cylinder 5	P1DFD	Injector Cylinder #5 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
683	Fuel Injector Amplifier Actuator Cylinder 6	P1DFE	Injector Cylinder #6 Spill Control Valve Abnormal Operation (MAX)	Injector Amplifier Current Response Time Does Not Meet Requirement	Push Time >	msec		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
								Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
718	Fuel Supply Pressure	P1F60	Low Side Fuel Pressure Sensor Circuit Low	SRL	Fuel Supply Pressure Voltage <	V		Always Enabled			s	4 DC	-	-	x	
719	Fuel Supply Pressure	P2542	Low Pressure Fuel System Sensor Circuit High	SRH	Fuel Supply Pressure Voltage >	V		Always Enabled			s	4 DC	-	-	x	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
720	Fuel Supply Pressure	P2540	Low Pressure Fuel System Sensor Circuit Range/Performance	Detect If Fuel Supply Pressure Is Not In A Defined Range.	Fuel Supply Pressure <	bar	OR	Engine Is Operating On State >= Low Idle			s	4 DC	-	-	x	
					Fuel Supply Pressure >	bar		Fuel Tank Level Error Active Failure		OR						
					Engine Is Operating On State >= Low Idle			Fuel Tank Level >=								
								Fuel Temperature Error Active Failure		OR						
								Fuel Temperature >=	°C							
753	Intake Manifold Pressure Sensor	P0234	Turbocharger/Supercharger "A" Overboost Condition	Check If Current Intake Manifold Pressure Is Too High In Comparison To The Desired Intake Manifold Pressure.	Difference Between Current Intake Manifold Pressure* And Desired Intake Manifold Pressure** >	See Table 19		Engine Speed >=	min-1		s	4 DC	-	x	-	
					Adaption Of Threshold Depends On Ambient Air Pressure And Charge Air Cooler Outlet Temperature	See Table 20		Engine Speed <=	min-1							
					* First Order Low Pass Filtered With Filter Factor	-		Engine Torque >=	Nm							
					** First Order Low Pass Filtered With Filter Factor	-		Engine Torque <=	Nm							
								Diagnosis Routine For EGR Close Not Active								
								Desired Charge Air Pressure**>=	mbar							
								Desired Charge Air Pressure**<=	mbar							
								** First Order Low Pass Filtered With Filter Factor	-							
								And Initial Value == Value At Start								
								Thermal mode control --SCR Heat-Up Acitvation								
								Thermal Mode Control --Adaptive Nox Control Active And SCR High Efficiency								
								Thermal mode control --adaptive Nox Control Active and SCR Low Efficiency								
								Thermal Mode Stable								
								Speed Gradient<=								
								Speed Gradient>=								
								Fuel Mass Gradient<=								
								Fuel Mass Gradient>=								
								Transient Weighted Factor>=								
								Cold Weighted Factor>=								
								Smoke Weighted Factor>=								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >•	s							
								Monitoring Conditions Above Should Be Active For More Than•	sec							
								This Stabilization Time Is Extended Under Conditions When The Charge Air Pressure Closed Loop Control Is Inactive And Engine Speed Is <•	min-1							
								By The Time Of •	sec							
								• If Applicable								
754	Intake Manifold Pressure Sensor	P0299	Turbocharger/Supercharger "A" Underboost Condition	Check If Current Intake Manifold Pressure Is Too Low In Comparison To The Desired Intake Manifold Pressure.	Difference Between Current Intake Manifold Pressure* And Desired Intake Manifold Pressure** <	See Table 21		Engine Speed >=	min-1		s	4 DC	-	-	-	
					Adaption Of Threshold Depends On Ambient Air Pressure And Charge Air Cooler Outlet Temperature	See Table 22		Engine Speed <=	min-1							
					...			Engine Torque >=	Nm							
					* First Order Low Pass Filtered With Filter Factor	-		Engine Torque <=	Nm							
					** First Order Low Pass Filtered With Filter Factor	-		EGR Close Not Active								
								Desired Charge Air Pressure**>=	mbar							
								Desired Charge Air Pressure**<=	mbar							
								** First Order Low Pass Filtered With Filter Factor	-							
								And Initial Value == Value At Start								
								Thermal mode control --SCR Heat-Up Acitvation								
								Thermal Mode Control --Adaptive Nox Control Active And SCR High Efficiency								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Thermal mode control --adaptive Nox Control Active and SCR Low Efficiency								
								Thermal Mode Stable								
								Speed Gradient<=								
								Speed Gradient>=								
								Fuel Mass Gradient<=								
								Fuel Mass Gradient>=								
								Transient Weighted Factor>=								
								Cold Weighted Factor>=								
								Smoke Weighted Factor>=								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >•	s							
								Monitoring Conditions Above Should Be Active For More Than	sec							
								This Stabilization Time Is Extended Under Conditions When The Charge Air Pressure Closed Loop Control Is Inactive And Engine Speed Is <•	min-1							
								By The Time Of •	sec							
								Charge Air Controller Mode Not Active								
								•If Applicable								
763	CAN Communication From ACM	P1D76	ACM Message Not Received	Detect Absence Of CAN Data	Timeout Of Critical Control Messages On Proprietary Data Link From ACM			No CAN Channel 1 BusOff			s	4 DC	x	-	-	
								CAN 1 Online Request Acitve								
								No disable request from UDS for ACM communication								
								CAN Channel 1 Active Monitoring Time* >	s							
								*Active Monitoring Condition timer will be ON if following Conditions are Satisfied								
								Ignition ON								
								Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
								For more than	s							
764	Camshaft Position Sensor	P0341	Camshaft Position Sensor "A" Circuit Range/Performance Bank 1 or Single Sensor	Looking For Proper Number Of Camshaft Teeth Per Revolution	Error Bit Is Set If Over 1 Camshaft Revolution 12 +1 Teeth Are Not Detected.			Engine Operating On State > Engine Start			s	4 DC	-	-	-	
769	Crankshaft Position	P0339	Crankshaft Position Sensor "A" Circuit Intermittent	Detects If The Driver Status Of The Component Has A Fault	Driver Status For Active Crankshaft Fault			Engine Operating On State > Engine On			E	4 DC	-	-	-	
					For More Than	count		Engine Speed >	min-1							
					Without Being Inactive For More Than	sek										
					Without Loosing Monitoring Conditions											
776	Crankshaft Position Sensor	P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	Looking For Proper Number Of Crankshaft Teeth Per Revolution	Error Bit Is Set If Over 1 Crankshaft Revolution 60-2 Teeth Are Not Detected.			Engine Operating On State > Engine Start			s	4 DC	-	-	-	
777	Camshaft Position Sensor	P0344	Camshaft Position Sensor "A" Circuit Intermittent Bank 1 or Single Sensor	Detects If The Driver Status Of The Component Has A Fault	Driver Status For Active Camshaft Fault			Engine Operating On State > Engine On			E	4 DC	-	-	-	
					For More Than	count		Engine Speed >	min-1							
					Without Being Inactive For More Than	sek										
					Without Loosing Monitoring Conditions											
778	CAN Communication From ACM	P1E3E	No ACM2 Communication - Pre Warning	Check Whether MU Number 161 - MCM2: Current Data Link Abnormal Update Rate Is Active Since 8h	ACM CAN Message Timeout			Ignition On			s	4 DC	-	x	-	
					Timer >=	s		Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								CAN 1 BUS Online								
								For More Than	s							
779	CAN Communication From ACM	P1E3F	No ACM2 Communication - Warning	Check Whether MU Number 161 - MCM2: Current Data Link Abnormal Update Rate Is Active Since 16h	ACM CAN Message Timeout			Ignition On			s	4 DC	-	x	-	
					Timer >=	s		Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
								CAN 1 BUS Online								
								For More Than	s							
789	Fuel Rail Pressure Sensor	P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	Detects A Drift Of The Signal Voltage Of The Rail Pressure Sensor (Too Low)	Fuel Rail Pressure Sensor Voltage <=	V		Classic Immobilizer Key Slip Not Active			E	4 DC	-	x	-	
					For More Than (Up/Down Counter)	s		Engine Off Time >=	min							
					The Following Conditions Must Be True To Activate Up/Down Counter			Engine Off Time Plausibility Check								
					Fuel Rail Pressure Sensor Voltage >	V		Ignition Enabled For Time >	s							
					Fuel Rail Pressure Sensor Voltage <	V		Ignition Enabled For Time <=	s							
					Fuel Rail Pressure Sensor Voltage >	V	OR	Crankshaft And Camshaft Not Moving								
					Fuel Rail Pressure Sensor Voltage <	V		For Less Or Equal Than	s							
					Crankshaft And Camshaft Not Moving			Low Fuel Pressure <	bar							
					Engine Start Timer Counter <=	s		Fuel Supply Pressure Voltage >=	V							
					Battery Voltage >	V		Fuel Supply Pressure Voltage <=	V							
					Engine Was On In Last Driving Cycle			5V Sensor Supply Bank 1 Voltage >=	V							
					5V Sensor Supply Bank 1 Voltage >=	V		5V Sensor Supply Bank 1 Voltage <=	V							
					5V Sensor Supply Bank 1 Voltage <=	V		Up/Down Counter Active								
								Fuel Rail Pressure Sensor Voltage >	V							
								Fuel Rail Pressure Sensor Voltage <	V							
								Fuel Rail Pressure Sensor Voltage >	V	OR						
								Fuel Rail Pressure Sensor Voltage <	V							
								Crankshaft And Camshaft Not Moving								
								Engine Start Time Counter <=	s							
								Battery Voltage >	V							
								Engine Was On In Last Driving Cycle								
845	Rail Pressure Governor: Quantity Control Valve	P1E3A	Fuel Metering Unit High Side Circuit High	Short Cut To Battery High-Side: Low Level Detection	Quantity Control Valve (High Side) Short Circuit To Battery			Always Enabled			E	4 DC	-	x	-	
846	Rail Pressure Governor: Quantity Control Valve	P1E3B	Fuel Metering Unit Low Side Circuit Low	Short Cut To Ground Low-Side	Quantity Control Valve (High Side) Error (Driver Status) Active Failure			Leakage Detection Error No Active Failure			E	4 DC	-	x	-	
					Maximum Fuel Metering Unit Voltage < Battery Voltage X *Factor			Enable If Fuel Rail Pressure >	bar	AND						
					*Factor			Disable If Fuel Rail Pressure <=	bar							
								Diagnostic Of Fuel Metering Unit Active								
								Leakage Fault Detection Active		OR						
								Engine Shutdown Request Active								
								Engine Speed >	min-1	AND						
								MU Number 944 - MCM2: Backwards Running Engine Detected Active Failure								
								Fuel Metering Unit Pulse Counter Is Active To Prepare Fuel Metering Unit For Activation		OR						
								Engine Speed =								
								Fuel Metering Unit Not Active								
								Fuel Metering Unit Pulse Counter <	-							
								...								
								Time After Ignition On >=	sec							
								Desired Current Of Fuel Metering Unit >	mA							
								Battery Voltage >=	V							
								...								
								Absolute Value Of Fuel Rail Pressure Flow Demanded Gradient >	l/h							
								Absolute Value Of Engine Torque Per Load Gradient >	%							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Absolute Value Of Current Fuel Injection Amount Gradient >	mm^3/st	OR						
								Absolute Value Of Difference Between Measured Current Of Fuel Metering Unit And Desired Current Of Fuel Metering Unit <	mA							
								Upper Four Condition Not Enabled For More Than	s							
849	Rail Pressure Governor: Quantity Control Valve	P0628	Fuel Pump "A" Control Circuit Low	Short Cut To Ground High-Side: Low Level Detection	Quantity Control Valve (High Side) Short Circuit To Ground			Always Enabled			E	4 DC	-	x	-	
854	Vehicle Speed Sensor	P0501	Vehicle Speed Sensor "A" Circuit Range/Performance	Vehicle Speed Sensor "A" Range/Performance	True If Vehicle Speed Input Frequency Received From CPC Via DM1			Always Enabled			E	4 DC	-	-	-	
855	Vehicle Speed Sensor	P0503	Vehicle Speed Sensor "A" Intermittent/Erratic/High	Vehicle Speed Sensor "A" Intermittent/Erratic/High	True If vehicle speed input short circuit to battery (or open circuit) Received From CPC Via DM1			Always Enabled			E	4 DC	-	-	-	
856	Vehicle Speed Sensor	P0502	Vehicle Speed Sensor "A" Circuit Low	Vehicle Speed Sensor "A" Circuit Low	True If vehicle speed input short circuit to ground Received From CPC Via DM1			Always Enabled			E	4 DC	-	-	-	
906	Battery Voltage	P1FA3	Overvoltage of UB12_24 detection	The MCM2 Has An Internal Overvoltage Shutdown. Due To Tolerances The Shutdown Is Done At 40V In A Worst Case Scenario. This Should Be Reduced To 35V By Software In Order To Safe The Sensors And Actuators Which Are Designed For A High Voltage Of 35V.	Battery Voltage >=	V		Always Enabled			s	4 DC	-	x	-	
					Longer Than	ms										
910	Fuel Injector Needle Amplifier Cylinder 1	P1FA4	Injector Cylinder #1, Needle Control Valve Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
911	Fuel Injector Needle Amplifier Cylinder 2	P1FA5	Injector Cylinder #2 Needle Control Valve, Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
912	Fuel Injector Needle Amplifier Cylinder 3	P1FA6	Injector Cylinder #3 Needle Control Valve, Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
913	Fuel Injector Needle Amplifier Cylinder 4	P1FA7	Injector Cylinder #4 Needle Control Valve, Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
914	Fuel Injector Needle Amplifier Cylinder 5	P1FA8	Injector Cylinder #5 Needle Control Valve, Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
915	Fuel Injector Needle Amplifier Cylinder 6	P1FA9	Injector Cylinder #6 Needle Control Valve, Circuit Open	Needle Solenoid Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
916	Fuel Injector Amplifier Actuator Cylinder 1	P1FAA	Injector Cylinder #1 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
917	Fuel Injector Amplifier Actuator Cylinder 2	P1FAB	Injector Cylinder #2 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
918	Fuel Injector Amplifier Actuator Cylinder 3	P1FAC	Injector Cylinder #3 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
919	Fuel Injector Amplifier Actuator Cylinder 4	P1FAD	Injector Cylinder #4 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
920	Fuel Injector Amplifier Actuator Cylinder 5	P1FAE	Injector Cylinder #5 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
921	Fuel Injector Amplifier Actuator Cylinder 6	P1FAF	Injector Cylinder #6 Spill Control Valve ("Amplifier"), Circuit Open	Amplifier Current During Injector Duration Does Not Meet Requirement	Injector Current <	A		Minimum Energization Time Of Injector > 0.1msec +	msec		E	4 DC	-	x	-	
					During Push Time Of The Injector =	msec		Blank Shot Strategy Disabled								
								Drop Mode Disabled								
								Double Firing Mode Disabled								
944	Cam Shaft Position Sensor	P1EB1	Backwards Running Engine Detected	Logic detects reverse rotation of CAM and plausibility check with angular information for injections is based on only Crank sensor	CAM Shaft Rotating in Reverse Direction			Engine In State <= LOW IDLE			s	4 DC	-	-	-	
					CAM Shaft reverse rotation detected newly in current driving cycle			Battery Voltage >	V							
					Injection Angular information only based on Crank Sensor			Engine Speed >								
					...											
					No errors with Engine Oil Pressure Sensor											
					Engine Oil Pressure Sensor <=	bar										
987	Engine Out NOx Sensor	P2201	NOx Sensor Circuit Range/Performance Bank 1 Sensor 1	Compare Measured NOx To Calculated NOx	Difference Of Average Of Measured NOx* And Average Of Calculated NOx** Divided By Average Of Calculated NOx** In Percent <	See Table 23		Engine Speed >=	min-1		s	4 DC	-	-	-	xx
					*First Order Low Pass Filter With Filter Factor	-		Engine Speed <	min-1							
					**First Order Low Pass Filter With Filter Factor	-		Engine Torque >=	Nm							
								Engine Torque <	Nm							
								Engine Is Operating On State > Engine Start								
								Engine Brake Not Engaged								
								Thermal Management Control = No Request								
								NOx Stable								
								EGR Valve Position Gradient >=	%/ts40							
								EGR Valve Position Gradient <	%/ts40							
								Battery Voltage >=	V							
								Engine Torque Gradient >	Nm/ts40							
								Engine Torque Gradient <=	Nm/ts40							
								EGR Mass Flow >=	kg/s							
								EGR Valve Position >=	%							
								EGR Valve Position <	%							
								Thermal Mode Control --SCR Heat-Up Acitvation								
								Thermal Mode Control --Adaptive Nox Control Active And SCR High Efficiency								
								Thermal Mode Control --Adaptive Nox Control Active And SCR Low Efficiency								
								Thermal Mode Stable								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Speed Gradient<=								
								Speed Gradient>=								
								Fuel Mass Gradient<=								
								Fuel Mass Gradient>=								
								Transient Weighted Factor>=								
								Cold Weighted Factor>=								
								Smoke Weighted Factor>=								
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
								Weighting Factor For Engine Smoke Mode <=	-							
								Weighting Factor For Engine Altitude Mode <=	-							
								Weighting Factor For Engine Smoke Altitude Mode <=	-							
								Weighting Factor For Engine Altitude2 Mode <=	-							
								Weighting Factor For Engine Cold Mode <=	-							
								All Conditions Above For More Than	ts40							
								All Conditions Above For Less Than	ts40							
988	Engine Out NOx Sensor	P2201	NOx Sensor Circuit Range/Performance Bank 1 Sensor 1	Compare Measured NOx To Calculated NOx	Difference Of Average Of Measured NOx* And Average Of Calculated NOx** Divided By Average Of Calculated NOx** In Percent >=	See Table 24		Engine Speed >=	min-1		s	4 DC	-	-	-	
					*First Order Low Pass Filter With Filter Factor	-		Engine Speed <=	min-1							
					**First Order Low Pass Filter With Filter Factor	-		Engine Torque >=	Nm							
								Engine Torque <=	Nm							
								Engine Is Operating On State > Engine Start								
								Engine Brake Not Engaged								
								Thermal Management Control = No Request								
								NOx Stable								
								EGR Valve Position Gradient >=	%/ts40							
								EGR Valve Position Gradient <	%/ts40							
								Battery Voltage >=	V							
								Engine Torque Gradient >	Nm/ts40							
								Engine Torque Gradient <=	Nm/ts40							
								EGR Mass Flow >=	kg/s							
								EGR Valve Position >=	%							
								Thermal Mode Control --SCR Heat-Up Acitvation								
								Thermal Mode Control --Adaptive Nox Control Active And SCR High Efficiency								
								Thermal Mode Control --Adaptive Nox Control Active And SCR Low Efficiency								
								Thermal Mode Stable								
								Speed Gradient<=								
								Speed Gradient>=								
								Fuel Mass Gradient<=								
								Fuel Mass Gradient>=								
								Transient Weighted Factor>=								
								Cold Weighted Factor>=								
								Smoke Weighted Factor>=								
								EGR Valve Position <	%							
								Engine Coolant Outlet Temperature >=	°C							
								Ambient Air Temperature >=	°C							
								Barometric Pressure >=	mbar							
								Stabilization Time >	s							
								Weighting Factor For Engine Smoke Mode <=	-							
								Weighting Factor For Engine Altitude Mode <=	-							
								Weighting Factor For Engine Smoke Altitude Mode <=	-							
								Weighting Factor For Engine Altitude2 Mode <=	-							
								Weighting Factor For Engine Cold Mode <=	-							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								All Conditions Above For More Than	ts40							
								All Conditions Above For Less Than	ts40							
1001	Exhaust Gas Recirculation (EGR) Actuator	P1EBD	EGR Valve Actuator, Learn Cycle Too Small	The Logic Detects If The EGR Valve Actuator Has A Position Deviation Or Does Not Receive Any Signal From Engine Control Unit. The EGR Valve Actuator Is In The Electrical Failsafe Position.	Learned End Positions Not Plausible Compared To Reference			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State* Not Active								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1002	Exhaust Gas Recirculation (EGR) Actuator	PC10A	Lost Communication With Exhaust Gas Recirculation Control Module "A"	The Logic Detects If The CAN Message Has Never Been Received Since Power On	Hardware Detected EGR Error State = (CAN message has never been received since power on) (error code = 11)			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
					Exhaust Gas Recirculation Actuator Received No Signal Via CAN From ECU Since Powering Up For A Fixed Time.			For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1011	Exhaust Gas Recirculation (EGR) Actuator	P1EBE	EGR Valve Actuator, Low Supply Voltage	Ignition Voltage Low	Hardware Detected EGR Error State = [Actuator supply voltage (> 34V and < 40V)] (error code = 15)			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active								
								Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1012	Exhaust Gas Recirculation (EGR) Actuator	P1EBF	EGR Valve Actuator, Wrong Failsafe Calibration	Wrong Failsafe Direction	Hardware Detected EGR Error State = [cmd 0x13 or 0x14 has been send for failsafe direction and now the opposite is used] (error code = 12)			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
					Wrong Failsafe Direction Has Been Received Or Reference Has Been			For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1013	Exhaust Gas Recirculation (EGR) Actuator	P1EC6	EGR Valve Actuator, Common Failure	Referenz Not Found	Hardware Detected EGR Error State = [if code 4, 9, 10 or 12 is active code 23 is also sended or temperature is >=135°C] (error code = 23)			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
					Reference Not Detected During Learn Due To Mechanical System Binding Or Internal Condition			For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1014	Exhaust Gas Recirculation (EGR) Actuator	PC40B	Invalid Data Received From Exhaust Gas Recirculation Control Module "A"	The Logic Detects If The Received Singal Is Valid.	No Valid Signal Received			Engine Operating On State >= Low Idle			s	4 DC	-	x	-	
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								
1015	Exhaust Gas Recirculation (EGR) Actuator	P240F	EGR Slow Response	The Logic Detects If The Absolute Difference Between Desired And Measured Position Of The EGR Exceeds A Threshold.	Absolute Difference Between Actual And Desired Exhaust Gas Recirculation Actuator Position >			Current Exhaust Gas Recirculation Actuator Position <			s	4 DC	-	x	-	
								Engine Operating On State >= Low Idle								
								For More Than	sec							
								Proportional Valve Bank 2 Active								
								Battery Voltage >=	V							
								For More Than	s							
								EGR Frozen State Not Active*								
								*Under The Following Conditions The EGR Frozen State Is Not Active:								
								EGR Temperature >	°C							
								MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large No Active Failure								
								MU Number 369 - MCM2: EGR Valve Actuator, Error No Active Failure								
								MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small No Active Failure								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info		Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info		Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit			description	unit			unit	cycles	-	-	-	-
1016	Exhaust Gas Recirculation (EGR) Actuator	P1EC7	EGR Valve Actuator, Frozen	The Logic Detects If The EGR Is Frozen.	Under The Following Conditions The EGR Frozen State Is Active:				Engine Operating On State >= Low Idle				s	4 DC	-	x	-	
					EGR Temperature <	°C			For More Than	sec								
					MU Number 365 - MCM2: EGR Valve Actuator, Learn Cycle Too Large Active Failure		OR		Proportional Valve Bank 2 Active									
					MU Number 369 - MCM2: EGR Valve Actuator, Error Active Failure				Battery Voltage >=	V								
					MU Number 1001 - MCM2: EGR Valve Actuator, Learn Cycle Too Small Active Failure				For More Than	s								
1075	Reagent Tank Heater	P1173	DEF Tank Heater Valve, Short-Circuit to Battery or Open Load and DEF Tank Temperature Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery		OR		Battery Voltage >	V			s	4 DC	x	-	-	
					Driver Status Open Load				Reductant Tank Heater Control Circuit High Tested		OR							
					Urea Tank Temperature <=	°C			Reductant Tank Heater Control Circuit/Open Tested									
1106	Engine Coolant Inlet Temperature Sensor	P0119	Engine Coolant Temperature Sensor 1 Circuit Intermittent	Detects If The Positve Or Negative Gradient Of The Engine Coolant Inlet Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Engine Coolant Inlet Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	x	
					Negative Gradient Of Engine Coolant Inlet Temperature Sensor <=	K/s												
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s												
1107	Fuel Temperature Sensor	P0184	Fuel Temperature Sensor "A" Circuit Intermittent	Detects If The Positve Or Negative Gradient Of The Fuel Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Fuel Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	x	
					Negative Gradient Of Fuel Temperature Sensor <=	K/s												
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s												
1108	Engine Oil Temperature Sensor	P0199	Engine Oil Temperature Sensor "A" Circuit Intermittent/Erratic	Detects If The Positve Or Negative Gradient Of The Engine Oil Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Engine Oil Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	-	
					Negative Gradient Of Engine Oil Temperature Sensor <=	K/s												
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s												
1109	Charge Air Cooler Outlet Temperature Sensor	P007E	Charge Air Cooler Temperature Sensor Circuit Intermittent/Erratic Bank 1	Detects If The Positve Or Negative Gradient Of The Charge Air Cooler Outlet Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Charge Air Cooler Outlet Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	x	
					Negative Gradient Of Charge Air Cooler Outlet Temperature Sensor <=	K/s												
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s												
1111	Turbocharger Compressor Inlet Temperature Sensor	P1178	MU_ISP_T_COMP_IN_GRAD	Detects If The Positve Or Negative Gradient Of The Turbocharger Compressor Inlet Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Turbocharger Compressor Inlet Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	-	
					Negative Gradient Of Turbocharger Compressor Inlet Temperature Sensor <=	K/s												
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s												
1112	Engine Coolant Outlet Temperature Sensor	P2186	Engine Coolant Temperature Sensor 2 Circuit Intermittent/Erratic	Detects If The Positve Or Negative Gradient Of The Engine Coolant Outlet Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Engine Coolant Outlet Temperature Sensor >=	K/s	OR		Always Enabled				s	4 DC	-	-	x	
					Negative Gradient Of Engine Coolant Outlet Temperature Sensor <=	K/s												

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info		Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit			description	unit		unit	cycles	-	-	-	-
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For An Addition Time =	s											
1115	Intake Manifold Temperature Sensor	P0114	Intake Air Temperature Sensor 1 Circuit Intermittent Bank 1	Detects If The Positve Or Negative Gradient Of The Intake Temperature Sensor Signal Is Above Or Below A Threshold	Positive Gradient Of Intake Temperature Sensor >=	K/s	OR		Always Enabled			s	4 DC	-	-	x	
					Negative Gradient Of Intake Temperature Sensor <=	K/s											
					After The Sensor Signal Is Again In The Allowed Gradient Range The Active Fault State Is Hold For A Addition Time =	s											
1126	Malfunction Indicator Lamp	P163B	MiL actuatioin not possible	MI Control Monitoring: ICUC Is Monitoring The Proper Function Of MI (Malfunction Indicator). In Case Of Failure ICUC Is Broadcasting This Failure In A DM1 Message To MCM. MCM Is Processing The DM1 Content Of ICUC And Logging A Fault If The ICUC DM1 Contains A Failure Indicating An MI Issue.	DM1 From CPC Contains MI Circuit Failed				Ignition On For More Than >	ms		s	4 DC	-	-	-	
1132	Intake Manifold Presssure Sensor / Barometric Pressure Sensor	P1107	Barometric Pressure and Intake Manifold Pressure Rationality Error	The Logic Checks Wheter The Difference Between Intake And Ambient Pressure Is Possible	Absolute Difference Between Intake Pressure And Ambient Pressure >	mbar			Battery Voltage >	V		s	4 DC	-	x	-	
									Engine Off Time >	min							
									Engine Speed <	min-1							
									Barometric Pressure Sensor Voltage >=	V							
									Barometric Pressure Sensor Voltage <=	V							
									Engine Is Operating On State = Engine Stoped								
									Ignition On								
									Stabilization Time >	s							
1334	Instrument Cluster Malfunction Indicator	P163C	ICUC presence check	CAN Timeout for ICUC CAN Frame	CAN Message Timeout For ICUC				Always Enabled			s	1 DC	-	-	-	xx
1350	Charge Air Boost Pressure	P1257	Fault Reaction Manager - Intake Manifold Pressure too Low	Checking And Confirming Of Boost System Low Deviation Errors When EGR And Fuel Injection System Are Tested For Proper Functioning	Defect Active For "Turbocharger/Supercharger "A" Underboost Condition"				Always Enabled•			s	4 DC	-	x	-	
									Defect Active For "Turbocharger/Supercharger "A" Underboost Condition"•								
									•If Applicable								
1351	Engine Fuel Temperature Sensor	P0181	Fuel Temperature Sensor "A" Circuit Range/Performance	Diffence Between Engine Fuel Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Engine Fuel Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR	Engine Operating In State <= LOW IDLE			E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****				Battery Voltage >=	V							
					Absolute Difference Of Average Sampled Engine Fuel Temperature* And Average Of Group 2 Temperature** > Sensor Threshold Group 2***		AND		Engine OFF time >=	min							
					Absolute Difference Of Average Min And Max Group 2 Temperatures Except The Suspect Temperature <= Range Threshold Group 2****				Plausibility Check Of Engine OFF by confirming Engine Speed =0								
					*Average Sampled Engine Fuel Temperature=sum Of Sampled Temperatue/No. Of Samples				Maximum Engine ON time in current driving cycle <	s							
					Samples Collected Once MC Active Time >				Time Since Ignition On <	s							
					...				Block Heater Presence Confirmed•								
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples				Ignition ON								
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID				Stabilization Time >	s							
					Normal Mode Temperature Grouping				All Above Conditions Are Active For Max Time Of								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info		Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info		Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit			description	unit			unit	cycles	-	-	-	-
					Engine Oil Temperature				Max Time = Time Sample * Run Time									
					Engine Coolant Out Temperature				Time Sample									
					Engine Coolant In Temperature				Run Time									
					Fuel Temperature				…									
					Turbo Charger Compressor In Temperature				All Enabled Temperature Sensors Have No Electric Faults									
					Charge Air Cooler Out Temperature				Time Since Ignition On <	s								
					Intake Manifold Temperature				All Above Conditions Are Active For Max Time Of									
					Ambient Temperature				Max Time = Time Sample * Run Time									
					…				Time Sample									
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection				Run Time									
					Engine Oil Temperature				…									
					Fuel Temperature				Engine OFF For Max Time Of	s								
					Turbo Charger Compressor In Temperature				…									
					Charge Air Cooler Out Temperature				Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•									
					Ambient Temperature				*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C								
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic				Select Group 1 Temperature Sensors For Hot Ambient Check:•									
					Difference Of Selected Temperature 1 and 2 >	°C			Engine Oil Temperature Sensor•									
					Difference Of Selected Temperature 3 and 4 >	°C	AND		Engine Coolant Out Temperature Sensor•									
					Difference Of Selected Temperature 5 and 6 >	°C			Engine Coolant In Temperature Sensor•									
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C			Engine Fuel Temperature Sensor•									
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C	AND		Compressor In Temperature Sensor•									
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C			Charge Air Cooler Temperature Sensor•									
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND	OR	Intake Manifold Temperature Sensor•									
					Ignition On Timer <	s			Ambient Temperature Sensor•									
					Engine OFF For Max Time Of	s			No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR						
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C			Temperature Sensor Group 1 Select Enabled* (=1)									
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off		AND		No. Of Temperatures Sensors Failed In Group 2 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND							
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C			Temperature Sensor Group 2 Select Enabled*(=2)									
					Engine OFF For Max Time Of	s			•If Applicable									
					Cold Condition Temperature* Is•													
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature•													
					…													
					***Sensor Threshold Group 1	See Table 25												
					***Sensor Threshold Group 2	See Table 26												
					****Range Threshold Group 1	See Table 27												
					****Range Threshold Group 2	See Table 28												
					•If Applicable													

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit		unit	cycles	-	-	-	-
1352	Engine Oil Temperature Sensor	P0196	Engine Oil Temperature Sensor "A" Range/Performance	Diffence Between Engine Oil Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Engine Oil Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR		Engine Operating In State <= LOW IDLE			E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****					Battery Voltage >=	V							
					Absolute Difference Of Average Sampled Engine Oil Temperature* And Average Of Group 2 Temperature** > Sensor Threshold Group 2***		AND			Engine OFF time >=	min							
					Absolute Difference Of Average Min And Max Group 2 Temperatures Except The Suspect Temperature <= Range Threshold Group 2****					Plausibility Check Of Engine OFF by confirming Engine Speed =0								
					*Average Sampled Engine Oil Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s							
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s							
					…					Block Heater Presence Confirmed•								
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON								
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID					Stabilization Time >	s							
					Normal Mode Temperature Grouping					All Above Conditions Are Active For Max Time Of								
					Engine Oil Temperature					Max Time = Time Sample * Run Time								
					Engine Coolant Out Temperature					Time Sample								
					Engine Coolant In Temperature					Run Time								
					Fuel Temperature					…								
					Turbo Charger Compressor In Temperature					All Enabled Temperature Sensors Have No Electric Faults								
					Charge Air Cooler Out Temperature					Time Since Ignition On <	s							
					Intake Manifold Temperature					All Above Conditions Are Active For Max Time Of								
					Ambient Temperature					Max Time = Time Sample * Run Time								
					…					Time Sample								
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection					Run Time								
					Engine Oil Temperature					…								
					Fuel Temperature					Engine OFF For Max Time Of	s							
					Turbo Charger Compressor In Temperature					…								
					Charge Air Cooler Out Temperature					Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•								
					Ambient Temperature					*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C							
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic					Select Group 1 Temperature Sensors For Hot Ambient Check:•								
					Difference Of Selected Temperature 1 and 2 >	°C	AND	OR		Engine Oil Temperature Sensor•								
					Difference Of Selected Temperature 3 and 4 >	°C				Engine Coolant Out Temperature Sensor•								
					Difference Of Selected Temperature 5 and 6 >	°C				Engine Coolant In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND			Engine Fuel Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C				Compressor In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND			Charge Air Cooler Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C				Intake Manifold Temperature Sensor•								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit				unit	cycles	-	-	-	-
					Ignition On Timer <	s	AND			Ambient Temperature Sensor•										
					Engine OFF For Max Time Of	s				No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR							
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 1 Select Enabled* (=1)										
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off					No. Of Temperatures Sensors Failed In Group 2 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND								
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 2 Select Enabled*(=2)										
					Engine OFF For Max Time Of	s				•If Applicable										
					…															
					***Sensor Threshold Group 1	See Table 25														
					***Sensor Threshold Group 2	See Table 26														
					****Range Threshold Group 1	See Table 27														
					****Range Threshold Group 2	See Table 28														
					•If Applicable															
1353	Engine Coolant Outlet Temperature Sensor	P2183	Engine Coolant Temperature Sensor 2 Circuit Range/Performance	Difference Between Engine Coolant Outlet Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Engine Coolant Outlet Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR		Engine Operating In State <= LOW IDLE					E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****					Battery Voltage >=	V									
					Absolute Difference Of Average Sampled Engine Coolant Outlet Temperature* And Average Of Group 3 Temperature** > Sensor Threshold Group 3***		AND			Engine OFF time >=	min									
					Absolute Difference Of Average Min And Max Group 3 Temperatures Except The Suspect Temperature <= Range Threshold Group 3****					Plausibility Check Of Engine OFF by confirming Engine Speed =0										
					*Average Sampled Engine Coolant Outlet Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s									
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s									
					…					Block Heater Presence Confirmed•										
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON										
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID					Stabilization Time >	s									
					Normal Mode Temperature Grouping					All Above Conditions Are Active For Max Time Of										
					Engine Oil Temperature					Max Time = Time Sample * Run Time										
					Engine Coolant Out Temperature					Time Sample										
					Engine Coolant In Temperature					Run Time										
					Fuel Temperature					…										
					Turbo Charger Compressor In Temperature					All Enabled Temperature Sensors Have No Electric Faults										
					Charge Air Cooler Out Temperature					Time Since Ignition On <	s									
					Intake Manifold Temperature					All Above Conditions Are Active For Max Time Of										
					Ambient Temperature					Max Time = Time Sample * Run Time										
					…					Time Sample										
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection					Run Time										
					Engine Coolant Out Temperature					…										
					Engine Coolant In Temperature					Engine OFF For Max Time Of	s									
					Intake Manifold Temperature					…										
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic					Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•										
					Difference Of Selected Temperature 1 and 2 >	°C	AND			*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C									
					Difference Of Selected Temperature 3 and 4 >	°C				Select Group 1 Temperature Sensors For Hot Ambient Check:•										

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit				unit	cycles	-	-	-	-
					Difference Of Selected Temperature 5 and 6 >	°C				Engine Oil Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND			Engine Coolant Out Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C				Engine Coolant In Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND			Engine Fuel Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C		OR		Compressor In Temperature Sensor•										
					Ignition On Timer <	s				Charge Air Cooler Temperature Sensor•										
					Engine OFF For Max Time Of	s				Intake Manifold Temperature Sensor•										
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C				Ambient Temperature Sensor•										
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off		AND			No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR							
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 1 Select Enabled* (=1)										
					Engine OFF For Max Time Of	s				No. Of Temperatures Sensors Failed In Group 3 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND								
					Cold Condition Temperature* Is					Temperature Sensor Group 3 Select Enabled*(=3)										
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature					•If Applicable										
					…															
					***Sensor Threshold Group 1	See Table 25														
					***Sensor Threshold Group 3	See Table 29														
					****Range Threshold Group 1	See Table 27														
					****Range Threshold Group 3	See Table 30														
					•If Applicable															
1354	Engine Coolant Inlet Temperature Sensor	P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	Diffence Between Engine Coolant Inlet Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Engine Coolant Inlet Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***					Engine Operating In State <= LOW IDLE					E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****		AND			Battery Voltage >=	V									
					Absolute Difference Of Average Sampled Engine Coolant Inlet Temperature* And Average Of Group 3 Temperature** > Sensor Threshold Group 3***			OR		Engine OFF time >=	min									
					Absolute Difference Of Average Min And Max Group 3 Temperatures Except The Suspect Temperature <= Range Threshold Group 3****		AND			Plausibility Check Of Engine OFF by confirming Engine Speed =0										
					*Average Sampled Engine Coolant Outlet Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s									
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s									
					…					Block Heater Presence Confirmed•										
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON										
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID					Stabilization Time >	s									
					Normal Mode Temperature Grouping					All Above Conditions Are Active For Max Time Of										
					Engine Oil Temperature					Max Time = Time Sample * Run Time										
					Engine Coolant Out Temperature					Time Sample										
					Engine Coolant In Temperature					Run Time										
					Fuel Temperature					…										
					Turbo Charger Compressor In Temperature					All Enabled Temperature Sensors Have No Electric Faults										

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit				unit	cycles	-	-	-	-
					Charge Air Cooler Out Temperature					Time Since Ignition On <	s									
					Intake Manifold Temperature					All Above Conditions Are Active For Max Time Of										
					Ambient Temperature					Max Time = Time Sample * Run Time										
					…					Time Sample										
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection					Run Time										
					Engine Coolant Out Temperature					…										
					Engine Coolant In Temperature					Engine OFF For Max Time Of	s									
					Intake Manifold Temperature					…										
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic					Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•										
					Difference Of Selected Temperature 1 and 2 >	°C				*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C									
					Difference Of Selected Temperature 3 and 4 >	°C	AND			Select Group 1 Temperature Sensors For Hot Ambient Check:•										
					Difference Of Selected Temperature 5 and 6 >	°C				Engine Oil Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND			Engine Coolant Out Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C				Engine Coolant In Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND			Engine Fuel Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C		OR		Compressor In Temperature Sensor•										
					Ignition On Timer <	s				Charge Air Cooler Temperature Sensor•										
					Engine OFF For Max Time Of	s				Intake Manifold Temperature Sensor•										
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C				Ambient Temperature Sensor•										
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off		AND			No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR							
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 1 Select Enabled* (=1)										
					Engine OFF For Max Time Of	s				No. Of Temperatures Sensors Failed In Group 3 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND								
					Cold Condition Temperature* Is					Temperature Sensor Group 3 Select Enabled*(=3)										
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature					•If Applicable										
					…															
					***Sensor Threshold Group 1	See Table 25														
					***Sensor Threshold Group 3	See Table 29														
					****Range Threshold Group 1	See Table 27														
					****Range Threshold Group 3	See Table 30														
					•If Applicable															
1355	Turbocharger Compressor Inlet Temperature Sensor	P1150	Compressor Inlet Temperature Sensor Signal Not Plausible	Diffence Between Turbo Charger Compressor In Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Engine Compressor Inlet Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND			Engine Operating In State <= LOW IDLE					E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****					Battery Voltage >=	V									
					Absolute Difference Of Average Sampled Engine Compressor Inlet Temperature* And Average Of Group 2 Temperature** > Sensor Threshold Group 2***		AND	OR		Engine OFF time >=	min									
					Absolute Difference Of Average Min And Max Group 2 Temperatures Except The Suspect Temperature <= Range Threshold Group 2****					Plausibility Check Of Engine OFF by confirming Engine Speed =0										

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
					*Average Sampled Engine Coolant Outlet Temperature=sum Of Sampled Temperatue/No. Of Samples			Maximum Engine ON time in current driving cycle <	s							
					Samples Collected Once MC Active Time >			Time Since Ignition On <	s							
					…			Block Heater Presence Confirmed•								
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples			Ignition ON								
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID			Stabilization Time >	s							
					Normal Mode Temperature Grouping			All Above Conditions Are Active For Max Time Of								
					Engine Oil Temperature			Max Time = Time Sample * Run Time								
					Engine Coolant Out Temperature			Time Sample								
					Engine Coolant In Temperature			Run Time								
					Fuel Temperature			…								
					Turbo Charger Compressor In Temperature			All Enabled Temperature Sensors Have No Electric Faults								
					Charge Air Cooler Out Temperature			Time Since Ignition On <	s							
					Intake Manifold Temperature			All Above Conditions Are Active For Max Time Of								
					Ambient Temperature			Max Time = Time Sample * Run Time								
					…			Time Sample								
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection			Run Time								
					Engine Oil Temperature			…								
					Fuel Temperature			Engine OFF For Max Time Of	s							
					Turbo Charger Compressor In Temperature			…								
					Charge Air Cooler Out Temperature			Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•								
					Ambient Temperature			*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C							
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic			Select Group 1 Temperature Sensors For Hot Ambient Check:•								
					Difference Of Selected Temperature 1 and 2 >	°C		Engine Oil Temperature Sensor•								
					Difference Of Selected Temperature 3 and 4 >	°C	AND	Engine Coolant Out Temperature Sensor•								
					Difference Of Selected Temperature 5 and 6 >	°C		Engine Coolant In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND	Engine Fuel Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C		Compressor In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND	Charge Air Cooler Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C		Intake Manifold Temperature Sensor•								
					Ignition On Timer <	s	OR	Ambient Temperature Sensor•								
					Engine OFF For Max Time Of	s		No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND						
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C	AND	Temperature Sensor Group 1 Select Enabled* (=1)								
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off			No. Of Temperatures Sensors Failed In Group 2 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR					
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C		Temperature Sensor Group 2 Select Enabled*(=2)								
					Engine OFF For Max Time Of	s		•If Applicable								
					Cold Condition Temperature* Is											

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit		unit	cycles	-	-	-	-
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature													
					…													
					***Sensor Threshold Group 1	See Table 25												
					***Sensor Threshold Group 2	See Table 26												
					****Range Threshold Group 1	See Table 27												
					****Range Threshold Group 2	See Table 28												
					•If Applicable													
1356	Charge Air Cooler Outlet Temperature Sensor	P1151	Charge Air Cooler Outlet Temperature Sensor Signal Not Plausible	Diffence Between Charge Cooler Out Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Charge Cooler Out Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR		Engine Operating In State <= LOW IDLE			E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****				AND	Battery Voltage >=	V							
					Absolute Difference Of Average Sampled Charge Cooler Out Temperature* And Average Of Group 2 Temperature** > Sensor Threshold Group 2***		AND			Engine OFF time >=	min							
					Absolute Difference Of Average Min And Max Group 2 Temperatures Except The Suspect Temperature <= Range Threshold Group 2****					Plausibility Check Of Engine OFF by confirming Engine Speed =0								
					*Average Sampled Charge Cooler Out Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s							
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s							
					…					Block Heater Presence Confirmed•								
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON								
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID					Stabilization Time >	s							
					Normal Mode Temperature Grouping					All Above Conditions Are Active For Max Time Of								
					Engine Oil Temperature					Max Time = Time Sample * Run Time								
					Engine Coolant Out Temperature					Time Sample								
					Engine Coolant In Temperature					Run Time								
					Fuel Temperature					…								
					Turbo Charger Compressor In Temperature					All Enabled Temperature Sensors Have No Electric Faults								
					Charge Air Cooler Out Temperature					Time Since Ignition On <	s							
					Intake Manifold Temperature					All Above Conditions Are Active For Max Time Of								
					Ambient Temperature					Max Time = Time Sample * Run Time								
					…					Time Sample								
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection					Run Time								
					Engine Oil Temperature					…								
					Fuel Temperature					Engine OFF For Max Time Of	s							
					Turbo Charger Compressor In Temperature					…								
					Charge Air Cooler Out Temperature					Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•								
					Ambient Temperature					*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C							
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic					Select Group 1 Temperature Sensors For Hot Ambient Check:•								
					Difference Of Selected Temperature 1 and 2 >	°C	AND			Engine Oil Temperature Sensor•								
					Difference Of Selected Temperature 3 and 4 >	°C				Engine Coolant Out Temperature Sensor•								
					Difference Of Selected Temperature 5 and 6 >	°C				Engine Coolant In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND			Engine Fuel Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C				Compressor In Temperature Sensor•								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info				Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit					unit	cycles	-	-	-	-
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND	OR		Charge Air Cooler Temperature Sensor•											
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C				Intake Manifold Temperature Sensor•											
					Ignition On Timer <	s	AND			Ambient Temperature Sensor•											
					Engine OFF For Max Time Of	s				No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR								
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 1 Select Enabled* (=1)											
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off					No. Of Temperatures Sensors Failed In Group 2 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND									
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C				Temperature Sensor Group 2 Select Enabled*(=2)											
					Engine OFF For Max Time Of	s				•If Applicable											
					Cold Condition Temperature* Is																
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature																
					…																
					***Sensor Threshold Group 1	See Table 25															
					***Sensor Threshold Group 2	See Table 26															
					****Range Threshold Group 1	See Table 27															
					****Range Threshold Group 2	See Table 28															
					•If Applicable																
1357	Intake Manifold Temperature Sensor	P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance Bank 1	Diffence Between Intake Manifold Temperature And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Intake Manifold Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR		Engine Operating In State <= LOW IDLE						E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****					Battery Voltage >=	V										
					Absolute Difference Of Average Sampled Intake Manifold Temperature* And Average Of Group 3 Temperature** > Sensor Threshold Group 3***		AND			Engine OFF time >=	min										
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 3****					Plausibility Check Of Engine OFF by confirming Engine Speed =0											
					*Average Sampled Intake Manifold Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s										
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s										
					…					Block Heater Presence Confirmed•											
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON											
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID					Stabilization Time >	s										
					Normal Mode Temperature Grouping					All Above Conditions Are Active For Max Time Of											
					Engine Oil Temperature					Max Time = Time Sample * Run Time											
					Engine Coolant Out Temperature					Time Sample											
					Engine Coolant In Temperature					Run Time											
					Fuel Temperature					…											
					Turbo Charger Compressor In Temperature					All Enabled Temperature Sensors Have No Electric Faults											
					Charge Air Cooler Out Temperature					Time Since Ignition On <	s										
					Intake Manifold Temperature					All Above Conditions Are Active For Max Time Of											
					Ambient Temperature					Max Time = Time Sample * Run Time											
					…					Time Sample											
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection					Run Time											
					Engine Coolant Out Temperature					…											

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info			Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit				description	unit				unit	cycles	-	-	-	-
					Engine Coolant In Temperature					Engine OFF For Max Time Of	s									
					Intake Manifold Temperature					...										
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic					Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•										
					Difference Of Selected Temperature 1 and 2 >	°C				*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C									
					Difference Of Selected Temperature 3 and 4 >	°C	AND			Select Group 1 Temperature Sensors For Hot Ambient Check:•										
					Difference Of Selected Temperature 5 and 6 >	°C				Engine Oil Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C				Engine Coolant Out Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C	AND			Engine Coolant In Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C				Engine Fuel Temperature Sensor•										
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND	OR		Compressor In Temperature Sensor•										
					Ignition On Timer <	s				Charge Air Cooler Temperature Sensor•										
					Engine OFF For Max Time Of	s				Intake Manifold Temperature Sensor•										
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C				Ambient Temperature Sensor•										
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off					No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND	OR							
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C	AND			Temperature Sensor Group 1 Select Enabled* (=1)										
					Engine OFF For Max Time Of	s				No. Of Temperatures Sensors Failed In Group 3 Range Pass Check ~=no. Of Temperature Sensors Used For Samples Collection		AND								
					Cold Condition Temperature* Is					Temperature Sensor Group 3 Select Enabled*(=3)										
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature					•If Applicable										
					...															
					***Sensor Threshold Group 1	See Table 25														
					***Sensor Threshold Group 3	See Table 29														
					****Range Threshold Group 1	See Table 27														
					****Range Threshold Group 3	See Table 30														
					•If Applicable															
1359	Ambient Air Temperature Sensor	P0071	Ambient Air Temperature Sensor Circuit "A" Range/Performance	Diffence Between Ambient And Group Mean Temperature Is Above Threshold	Absolute Difference Of Average Sampled Ambient Temperature* And Average Of Group 1 Temperature** > Sensor Threshold Group 1***		AND	OR		Engine Operating In State <= LOW IDLE					E	4 DC	-	-	-	
					Absolute Difference Of Average Min And Max Group 1 Temperatures Except The Suspect Temperature <= Range Threshold Group 1****					Battery Voltage >=	V									
					Absolute Difference Of Average Sampled Ambient Temperature* And Average Of Group 2 Temperature** > Sensor Threshold Group 2***		AND			Engine OFF time >=	min									
					Absolute Difference Of Average Min And Max Group 2 Temperatures Except The Suspect Temperature <= Range Threshold Group 2****					Plausibility Check Of Engine OFF by confirming Engine Speed =0										
					*Average Sampled Ambient Temperature=sum Of Sampled Temperatue/No. Of Samples					Maximum Engine ON time in current driving cycle <	s									
					Samples Collected Once MC Active Time >					Time Since Ignition On <	s									
					...					Block Heater Presence Confirmed•										
					**Average Of Group Temperature = Sum Of Sampled Below Group Temperatures/ No. Of Samples					Ignition ON										

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
					It Will Be Calculated On Below Temperature Sensors If Corresponding Group ID Is Matching To Suspect Temperature Group ID			Stabilization Time >	s							
					Normal Mode Temperature Grouping			All Above Conditions Are Active For Max Time Of								
					Engine Oil Temperature			Max Time = Time Sample * Run Time								
					Engine Coolant Out Temperature			Time Sample								
					Engine Coolant In Temperature			Run Time								
					Fuel Temperature			…								
					Turbo Charger Compressor In Temperature			All Enabled Temperature Sensors Have No Electric Faults								
					Charge Air Cooler Out Temperature			Time Since Ignition On <	s							
					Intake Manifold Temperature			All Above Conditions Are Active For Max Time Of								
					Ambient Temperature			Max Time = Time Sample * Run Time								
					…			Time Sample								
					*****Special Mode Temperature Grouping, During Preheater (Auxiliary Power Unit) or Blockheater Detection			Run Time								
					Engine Oil Temperature			…								
					Fuel Temperature			Engine OFF For Max Time Of	s							
					Turbo Charger Compressor In Temperature			…								
					Charge Air Cooler Out Temperature			Total Number Of Group 1 Temperature Sensors Satisfying Mean Check For Hot Ambient Condition* <•								
					Ambient Temperature			*Mean Of Each Group 1 Temperature For Hot Ambient Check Sensor >=•	°C							
					*****Special Mode Temperature Grouping, During Preheater or Blockheater Detection logic			Select Group 1 Temperature Sensors For Hot Ambient Check:•								
					Difference Of Selected Temperature 1 and 2 >	°C	AND	Engine Oil Temperature Sensor•								
					Difference Of Selected Temperature 3 and 4 >	°C		Engine Coolant Out Temperature Sensor•								
					Difference Of Selected Temperature 5 and 6 >	°C		Engine Coolant In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C	AND	Engine Fuel Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Intake Temperature >•	°C		Compressor In Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Engine Oil Temperature >•	°C	AND	Charge Air Cooler Temperature Sensor•								
					Absolute Difference Between Cold Condition Temperature* And Coolant Outlet Temperature >•	°C		Intake Manifold Temperature Sensor•								
					Ignition On Timer <	s	AND	Ambient Temperature Sensor•								
					Engine OFF For Max Time Of	s		No. Of Temperatures Sensors Failed In Group 1 Range Pass Check ~=no. Of Temperatures Sensors Used For Samples Collection		AND						
					Difference Of Coolant Out Temperature And Ambinet Air Temperature When Engine Off >=	°C		Temperature Sensor Group 1 Select Enabled* (=1)								
					Coolant Out Temperature > Maximum Of Intake Temperature And Ambient Air Temperature When Engine Off			No. Of Temperatures Sensors Failed In Group 2 Range Pass Check ~=no. Of Temperatures Sensors Used For Samples Collection		AND	OR					
					Difference Of Intake Temperature And Ambinet Air Temperature When Engine Off >=	°C		Temperature Sensor Group 2 Select Enabled*(=2)								
					Engine OFF For Max Time Of	s										
					Cold Condition Temperature* Is											
					Average Of InterCooler Out Temerature, Ambient Air Temperature And Exhaust Gas Temperature											
					…											
					***Sensor Threshold Group 1	See Table 25										
					***Sensor Threshold Group 2	See Table 26										
					****Range Threshold Group 1	See Table 27										
					****Range Threshold Group 2	See Table 28										
					• If Applicable											

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
1376	CAN Communication With CPC	PC12A	Lost Communication With Chassis Control Module "A"	CAN Monitoring CPC MCM	CAN Timeout For CPC CAN Frames			No BusOff for CAN1 Channel in MCM			s	4 DC	-	-	x	
								CAN channel 1 Active monitoring time>	s							
								Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
								For More Than	s							
1381	CAN Communication With SRA3	PC10A	Lost Communication With Exhaust Gas Recirculation Control Module "A"	CAN Monitoring SRA3 MCM	CAN Timeout For SRA3 CAN Frames			CAN Channel 3 Active Monitoring Time*>	s		s	4 DC	-	x	-	
								No BusOff for CAN3 Channel in MCM								
								Proportional Valve Power Stage BANK 2 Active								
								*Active Monitoring Condition Timer Will Be ON If Following Conditions Are Satisfied								
								Ignition ON								
								Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
1383	Ambient Air Temperature Sensor	P0072	Ambient Air Temperature Sensor Circuit "A" Low	Detect sensor voltage beyond limit	If Received True From CPC Via DM1			Always Enabled			E	4 DC	-	-	x	xxx
1384	Ambient Air Temperature Sensor	P0073	Ambient Air Temperature Sensor Circuit "A" High	Detect sensor voltage beyond limit	If Received True From CPC Via DM1			Battery Sensor Initialization Filter Adaptation Is Done			E	4 DC	-	-	x	xxx
1436	Fault Memory Manager Communication	P16DE	Freeze frame data exchange not possible	Check if positve response for synchronization data request is received	No Positive Response Received From Aftertreatment Control Module			Always Enabled			E	1 DC	-	-	x	
1449	Vehicle Speed Sensor	P0501	Vehicle Speed Sensor "A" Circuit Range/Performance	Received CAN Vehicle Speed Out Of Range	Can Vehicle Speed From CPC >			Engine Running			s	4 DC	-	-	-	xxx
					Can Vehicle Speed From CPC <=			For More Than	s							
								No CPC Message Timeout								
								No CAN Channel1 Busoff								
								CAN1 Channel Active Monitoring Time* >	s							
								...								
								*CAN1 Channel Active Monitoring Time Will Be Incremented Under Following Conditions:								
								CAN1 Bus Online Request Active								
								Ignition On								
								Engine Operating On State = Engine Start		OR						
								Intake Air Heater Actuator Active								
								Battery Voltage >=	V							
								Otherwise								
								Battery Voltage >=	V							
								Battery Voltage <=	V							
								For More Than	s							
1450	CPC	P16E7	Vehicle speed over PTCAN SNA	Vehicle Speed From CPC Not Available	Can Vehicle Speed From CPC >			Engine Running			s	4 DC	-	-	-	xxx
								For More Than	s							
								No CPC Message Timeout								
								No CAN Channel1 Busoff								
								CAN1 Channel Active Monitoring Time* >	s							
								...								
								*CAN1 Channel Active Monitoring Time Will Be Incremented Under Following Conditions:								
								CAN1 Bus Online Request Active								
								Ignition On								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info		Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit			unit	cycles	-	-	-	-
								Engine Operating On State = Engine Start		OR							
								Intake Air Heater Actuator Active									
								Battery Voltage >=	V								
								Otherwise									
								Battery Voltage >=	V								
								Battery Voltage <=	V								
								For More Than	s								
1536	CAN Communication From ACM	P0100	HO2S Heater Resistance Bank 1 Sensor 1	No Response From ACM For UDS Request From MCM	UDS Read Request Defect Counter* >			Ignition On				E	4 DC	-	-	x	
					* Counter Will Be Incremented If There Is No Positive Response From ACM To MCM For UDS Read Requests.												
1629	Proportional Valve Bank	P1745	EGR "A" Flow Excessive Detected	Bank Adc Current Beyond Limit	*Filtered Bank 2 ADC Current >	-		Always Enabled				s	4 DC	-	x	-	
					*First Order Low Pass Filter With Filter Factor	-											
1645	Ambient Air Temperature Sensor	P009A	Intake Air Temperature/Ambient Air Temperature Correlation	Ambient Air Temperature From CAN CPC Is Valid or Not	CAN Measured Ambient Air Temperature ==			Ignition On				s	4 DC	-	-	x	xxx
								Engine Operating On State = Engine Start		OR							
								Intake Air Heater Actuator Active									
								Battery Voltage >=	V								
								Otherwise									
								Battery Voltage >=	V								
								Battery Voltage <=	V								
								CAN 1 BUS Online									
								For More Than	s								
1646	Ambient Air Temperature Sensor	P0070	Ambient Air Temperature Sensor Circuit "A"	Ambient Air Temperature From CAN CPC Is having Error	CAN Measured Ambient Air Temperature ==			Ignition On				s	4 DC	-	-	x	xxx
								Engine Operating On State = Engine Start		OR							
								Intake Air Heater Actuator Active									
								Battery Voltage >=	V								
								Otherwise									
								Battery Voltage >=	V								
								Battery Voltage <=	V								
								CAN 1 BUS Online									
								For More Than	s								
1796	Vehicle Speed Sensor	P0501	Vehicle Speed Sensor "A" Circuit Range/Performance	Current Vehicle Speed Below Threshold	True If Received Vehicle Speed Input Open Circuit From CPC Via DM1			Always Enabled				E	4 DC	-	-	-	xxx

If Applicable:
x: Applicable if engine is equipped with corresponding component
xx: Applicable depending on calibration e.g. inhibitmatrix
xxx: Applicable depending on EE architecture
END

Mercedes-Benz

OBD-Regulations according to ECE-R49: EURO IV and V
OBD-System: Common Rail (CR), Emission Control System: SCR + EGR
OBD Engine Family: HDEP, Engine Types 400
OBD Stage 2, NOx Monitoring

Attachment: LE16 -75069
Date of issue: 02.05.2016
Status: 02.10.2019

OBD-Description: ACM (Aftertreatment Control Module)

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
0	Reagent Dosing Actuator	P2048	Reductant Injection Valve Circuit Low Bank 1 Unit 1	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Always Enabled			E	4 DC	x	-	-	
1	Reagent Dosing Actuator	P2049	Reductant Injection Valve Circuit High Bank 1 Unit 1	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Always Enabled			E	4 DC	x	-	-	
2	Reagent Dosing Actuator	P2047	Reductant Injection Valve Circuit/Open Bank 1 Unit 1	Output Driver Self Diagnostic	Driver Status Open Load			Always Enabled			E	4 DC	x	-	-	
3	Reagent Pump Actuator	P208C	Reductant Pump "A" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Always Enabled			E	4 DC	x	-	-	
4	Reagent Pump Actuator	P208D	Reductant Pump "A" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Always Enabled			E	4 DC	x	-	-	
5	Reagent Pump Actuator	P208A	Reductant Pump "A" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Always Enabled			E	4 DC	x	-	-	
12	Reagent Line Heater Actuator 1	P1E00	Reductant Heater "E" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
13	Reagent Line Heater Actuator 1	P1E01	Reductant Heater "E" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
14	Reagent Line Heater Actuator 1	P1E02	Reductant Heater "E" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
15	Reagent Diffuser Heater Actuator	P1E0C	Dosing Unit Heater Circuit Failed Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
16	Reagent Diffuser Heater Actuator	P1E0D	Dosing Unit Heater Circuit Failed High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
17	Reagent Diffuser Heater Actuator	P1E0E	Dosing Unit Heater Open Circuit	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
21	Reagent Line Heater Actuator 2	P1E5C	Reductant Heater "F" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
22	Reagent Line Heater Actuator 2	P1E5D	Reductant Heater "F" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
23	Reagent Line Heater Actuator 2	P1E5E	Reductant Heater "F" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
24	Reagent Line Heater Actuator 3	P20BF	Reductant Heater "B" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
25	Reagent Line Heater Actuator 3	P20C0	Reductant Heater "B" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
26	Reagent Line Heater Actuator 3	P20BD	Reductant Heater "B" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
27	Reagent Line Heater Actuator 4	P20C3	Reductant Heater "C" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
28	Reagent Line Heater Actuator 4	P20C4	Reductant Heater "C" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
29	Reagent Line Heater Actuator 4	P20C1	Reductant Heater "C" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
30	Reagent Line Heater Actuator 5	P20C7	Reductant Heater "D" Control Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Not Active			E	4 DC	-	-	-	
31	Reagent Line Heater Actuator 5	P20C8	Reductant Heater "D" Control Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active			E	4 DC	-	-	-	
32	Reagent Line Heater Actuator 5	P20C5	Reductant Heater "D" Control Circuit/Open	Output Driver Self Diagnostic	Driver Status Open Load			Output Is Not Active			E	4 DC	-	-	-	
90	Tailpipe Outlet NOx And Oxygen Sensor	P229F	NOx Sensor Circuit Range/Performance Bank 1 Sensor 2	Tailpipe Out Lambda Threshold Exceeded	Removal Of Sensor Detected:			Tailpipe Out NOx Sensor Lambda Value Enabled			s	1 DC	-	-	x	
					Tailpipe Out Lambda >			Tailpipe Out NOx Sensor Concentration Value Enabled								
					For More Than [0.1s, Cumulative Counter]			Tailpipe Out NOx Sensor Dew Point Enabled								
					While Monitoring Condition True And Tailpipe Out Lambda Never Below			Engine Speed >=	min-1							
								Engine Torque >=	%							
								For More Than	s							
								...								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info			Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit				unit	cycles	-	-	-	-
								Tailpipe Out Lambda >		AND	OR							
								For More Than [0.1s, Cumulative Counter]										
								While Monitoring Condition True And Tailpipe Out Lambda Never Below										
								…										
								Tailpipe Out Lambda <=		AND								
								For More Than [0.1s, Cumulative Counter]										
								While Monitoring Condition True And Tailpipe Out Lambda Never Above										
91	Engine Outlet NOx And Oxygen Sensor	P2201	NOx Sensor Circuit Range/Performance Bank 1 Sensor 1	Engine Out Lambda Threshold Exceeded	Removal Of Sensor Detected:			Engine Out NOx Sensor Lambda Value Enabled					s	1 DC	-	-	x	
					Engine Out Lambda >			Engine Out NOx Sensor Concentration Value Enabled										
					For More Than [0.1s, Cumulative Counter]			Engine Out NOx Sensor Dew Point Enabled										
					While Monitoring Condition True And Engine Out Lambda Never Below			Engine Speed >=	min-1									
								Engine Torque >=	%									
								For More Than	s									
								…										
								Engine Out Lambda >		AND	OR							
								For More Than [0.1s, Cumulative Counter]										
								While Monitoring Condition True And Engine Out Lambda Never Below										
								…										
								Engine Out Lambda <=		AND								
								For More Than [0.1s, Cumulative Counter]										
								While Monitoring Condition True And Engine Out Lambda Never Above										
93	High Side Driver Proportional Valve Bank 1	P1E20	High Side Digital Output 1 Circuit Failed Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Active					E	4 DC	x	-	-	
94	High Side Driver Proportional Valve Bank 1	P1E21	High Side Digital Output 1 Circuit Failed High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			During ECU Initialization					E	4 DC	-	-	-	
97	High Side Driver Proportional Valve Bank 3	P1E22	High Side Digital Output 3 Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Active					E	4 DC	-	-	-	
98	High Side Driver Proportional Valve Bank 3	P1E23	High Side Digital Output 3 Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			During ECU Initialization					E	4 DC	-	-	-	
99	High Side Driver Proportional Valve Bank 4	P1E24	Coolant Valve Supply Voltage Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Active					E	4 DC	-	-	-	
100	High Side Driver Proportional Valve Bank 4	P1E25	Coolant Valve Supply Voltage Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			During ECU Initialization					E	4 DC	-	-	-	
101	High Side Driver Proportional Valve Bank 5	P1E97	High Side Digital Output 5 Circuit Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Active					E	4 DC	-	-	-	
102	High Side Driver Proportional Valve Bank 5	P1E98	High Side Digital Output 5 Circuit High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			During ECU Initialization					E	4 DC	-	-	-	
108	Sensor Supply Bank Voltage	P1CE6	ACM Sensor Supply 2 Short to Ground	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Output Is Active					s	4 DC	x	-	-	
109	Sensor Supply Bank Voltage	P1CE7	ACM Sensor Supply 2 Short to Battery	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Output Is Active					s	4 DC	x	-	-	
128	Battery Voltage	P0562	System Voltage Low	Signal Range Low	Battery Voltage <	V		Engine Not In Operation Mode: Start					s	4 DC	x	-	-	
129	Battery Voltage	P0563	System Voltage High	Signal Range High	Battery Voltage >	V		Always Enabled					s	4 DC	x	-	-	
130	CAN Communication / Control Module	P1CEE	Actual Torque Signal Not Available Via CAN	Value Not Valid (CAN)	CAN Engine Torque Signal >			Ignition On					s	4 DC	x	-	-	
								No Sporadic Defect In The Battery										
								Battery Voltage >=	V									
								CAN1 Bus Online Request										
								For More Than	s									
								CAN1 Bus Online										
								No MCM Message Timeout										

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
131	CAN Communication / Control Module	P1CEF	Engine Speed Signal Not Available Via CAN	Value Not Valid (CAN)	CAN Engine Speed Signal >			Ignition On			s	4 DC	x	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								CAN1 Bus Online								
								No MCM Message Timeout								
132	Reagent Pressure Sensor	P204C	Reductant Pressure Sensor Circuit Low	Signal Range Low	Reagent Pressure Sensor Voltage <	V		Always Enabled			s	4 DC	x	-	-	
133	Reagent Pressure Sensor	P204D	Reductant Pressure Sensor Circuit High	Signal Range High	Reagent Pressure Sensor Voltage >	V		Always Enabled			s	4 DC	x	-	-	
136	CAN Communication / Control Module	P1CF3	Coolant Temperature Signal Not Available Via CAN	Value Not Valid (CAN)	CAN Engine Coolant Temperature Signal >			Ignition On			s	4 DC	-	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								CAN1 Bus Online								
								No MCM Message Timeout								
137	CAN Communication / Control Module	P1D84	Ambient Air Pressure Signal Not Available Via CAN	Value Not Valid (CAN)	CAN Barometric Pressure Signal >			Ignition On			s	4 DC	-	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								CAN1 Bus Online								
								No MCM Message Timeout								
138	CAN Communication / Control Module	P1D85	Ambient Air Temperature Signal Not Available Via CAN	Value Not Valid (CAN)	CAN Ambient Air Temperature Signal From CPC >		OR	Ignition On			s	4 DC	-	-	-	
					CAN Ambient Air Temperature Signal From MCM >			No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								CAN1 Bus Online								
								No MCM Message Timeout								
								If CAN Ambient temperature Signal From MCM >								
								No CPC Message Timeout								
145	Reagent Tank Temperature Sensor	P205C	Reductant Tank Temperature Sensor Circuit Low	Signal Range Low	Reagent Tank Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	-	-	-	
146	Reagent Tank Temperature Sensor	P205D	Reductant Tank Temperature Sensor Circuit High	Signal Range High	Reagent Tank Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	-	-	-	
147	Reagent Tank Level Sensor	P203C	Reductant Level Sensor "A" Circuit Low	Signal Range Low	Reagent Tank Level Sensor Voltage <	V		Always Enabled			s	4 DC	x	-	-	
148	Reagent Tank Level Sensor	P203D	Reductant Level Sensor "A" Circuit High	Signal Range High	Reagent Tank Level Sensor Voltage >	V		Always Enabled			s	4 DC	x	-	-	
149	Selective Catalytic Reduction (SCR) Inlet Temperature Sensor	P0427	Catalyst Temperature Sensor Circuit Low Bank 1 Sensor 1	Signal Range Low	SCR Inlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	x	-	-	
150	Selective Catalytic Reduction (SCR) Inlet Temperature Sensor	P0428	Catalyst Temperature Sensor Circuit High Bank 1 Sensor 1	Signal Range High	SCR Inlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	x	-	-	
151	Selective Catalytic Reduction (SCR) Outlet Temperature Sensor	P042C	Catalyst Temperature Sensor Circuit Low Bank 1 Sensor 2	Signal Range Low	SCR Outlet Temperature Sensor Voltage <	V		Always Enabled			s	4 DC	x	-	-	

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
152	Selective Catalytic Reduction (SCR) Outlet Temperature Sensor	P042D	Catalyst Temperature Sensor Circuit High Bank 1 Sensor 2	Signal Range High	SCR Outlet Temperature Sensor Voltage >	V		Always Enabled			s	4 DC	x	-	-	
157	CAN Communication / Control Module	PC29E	Lost Communication With NOX Sensor "B"	Message Timeout (CAN)	Engine Out NOx Sensor CAN Message Timeout			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
158	Tailpipe Outlet NOx And Oxygen Sensor	P22A0	NOx Sensor Circuit Low Bank 1 Sensor 2	Sensor Self Diagnostic Short Circuit	NOx Sensor CAN Short Circuit Message			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
								No NOx Sensor Message Timeout								
159	Tailpipe Outlet NOx And Oxygen Sensor	P22A1	NOx Sensor Circuit High Bank 1 Sensor 2	Sensor Self Diagnostic Open Wire	NOx Sensor CAN Open Wire Message			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
								No NOx Sensor Message Timeout								
161	CAN Communication / Control Module	P1E4A	Exhaust Mass Signal Not Available via CAN	Value Not Valid (CAN)	CAN Exhaust Gas Mass Flow Signal >			Ignition On			s	4 DC	x	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								MCM CAN Message Out Of Calibration								
								No MCM Message Timeout								
162	CAN Communication / Control Module	P1E4B	NOx Mass Signal Not Available via CAN	Value Not Valid (CAN)	CAN Engine Out NOx Mass Signal >			Ignition On			s	4 DC	x	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								CAN1 Bus Online Request								
								For More Than	s							
								MCM CAN Message Out Of Calibration								
								No MCM Message Timeout								
180	CAN Communication / Control Module	PC29D	Lost Communication With NOX Sensor "A"	Message Timeout (CAN)	Engine Out NOx Sensor CAN Message Timeout			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
181	Engine Outlet NOx And Oxygen Sensor	P2202	NOx Sensor Circuit Low Bank 1 Sensor 1	Sensor Self Diagnostic Short Circuit	NOx Sensor CAN Short Circuit Message			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
								No NOx Sensor Message Timeout								
182	Engine Outlet NOx And Oxygen Sensor	P2203	NOx Sensor Circuit High Bank 1 Sensor 1	Sensor Self Diagnostic Open Wire	NOx Sensor CAN Open Wire Message			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								
								No NOx Sensor Message Timeout								
252	Selective Catalytic Reduction (SCR)	P1EEA	SCR NOX Conversion Efficiency Very Low	Detect Conversion Malfunction	Mid-Term Averaged* Tailpipe Out NOx' Multiplied By Mid-Term Averaged* NOx Correction Factor" > Threshold + Offset			Mid Term Average Ready			E	2 DC	x	-	-	
					Threshold	g/kwh		Mid Term Average Release Condition*								
					Offset =	g/kwh		NOx Monitoring Release Conditions**								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
					...			Mid-Term Average* Is Initialized With Number Of Samples	-							
					*Mid-Term Average Calculation Conditions:			Short-Term Average Sample Time:	s							
					Mid-Term Averaged Signals Calculated With Simple Moving Average With Input From Short Term Simple Moving Averages:			Short Term Average Is Input To Mid-Term Average. Both Short And Mid-Term Average Use Sample Time:	s							
					Short Term Average Ready			**NOx Monitoring Release Conditions								
					Short Term Average Is Calculated If NOx Monitoring Release Conditions True.			General Release Conditions:								
					With Sample Time	s		No Inhibitation Through Other Fault Codes								
					Dosed Reagent Mass Since Last Sample >=	g		Dosing System Components Enabled								
					NOx Conversion Ratio Steady In Range +-	-		Reagent Dosing Quantity Of Last Cycle >	g/h							
					Mid-Term Average Samples	-		Tailpipe Out NOx Concentration Sensor Enabled								
					Tailpipe Out NOx' Emission Calculation:			Tailpipe-Out NOx Sensor Enabled								
					NOx Emission =NOx Mass Flow Rate * (Molar Mass Ratio * Exhaust Gas Mass Flow Rate) / Engine Power			Delayed NOx Raw Emissions Signal Ready								
					Engine Power Calculated By Engine Speed Multiplied By Engine Torque Divided By 9550 [kW]			Absolute Value Of Gradient Of Filtered*** Engine Speed <=	rpm/period							
					...			Absolute Value Of Gradient Of Filtered**** Engine Torque <=	%/period							
					NOx" Correction Factor By	See Table 1		Filtered*** Engine Speed And Filtered**** Engine Torque In Operation Point Release Map	See Table 2							
								If Sensor Signal Available: Engine Coolant Temperature >=	°C							
								If Sensor Signal Available: Ambient Air Pressure >=	mbar							
								If Sensor Signal Available: Ambient Air Temperature >=	°C							
								If Sensor Signal Available: Ambient Air Temperature <=	°C							
								General Release Conditions True For	s							
								...								
								SCR Inlet Temperature>=	°C							
								SCR Inlet Temperature<=	°C							
								Filtered""" SCR Catalyst Temperature >=	°C							
								Filtered""" SCR Catalyst Temperature <=	°C							
								Pre-Debouncing Active: Monitoring Event Is Created If Good Or Bad Limit Counter Is Reached.								
								Good Limit Counter	-							
								Bad Limit Counter	-							
								Filtered*** With First Order Low Pass Filter With Filter Factor	-							
								Filtered**** With First Order Low Pass Filter With Filter Factor	-							
								Filtered""" With First Order Low Pass Filter With Filter Factor	-							
378	Engine Outlet NOx And Oxygen Sensor	P2201	NOx Sensor Circuit Range/Performance Bank 1 Sensor 1	NOx-Raw Sensor Too Often Not Ready After Dew Point Enable	NOx Sensor Has Not Reached Full Measurement Readiness After Dew Point Enable. Occurence Counter (Defect)>			Readiness Control Is Enabled If Sensor Dew Point Is Reached And Disabled After Sensor Readiness Has Been Checked			s	1 DC	-	-	-	
					NOx Sensor Has Been Reached Full Measurement Readiness After Dew Point Enable. Occurence Counter (Intact)<=			Engine Out NOx Sensor Dew Point Enable								
								Engine Out NOx Sensor State* <		OR						
								Engine Out NOx Sensor State* >								
								After Dew Point Is Enabled: Occurence Counter (Defect) Is Increased After Delay Time [100ms Samples] >=								
								Monitoring Event Is Generated If Occurence Counter (Defect) >=								
								Occurence Counter (Defect) Is Reset If NOx Sensor Has Been Ready After Dew Point Enable								
								Engine Out NOx Sensor Dew Point Enable								
								Engine Out NOx Sensor State* >=								
								Engine Out NOx Sensor State* <=								
								Engine State >= IDLE								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								After Dew Point Is Enabled: Occurence Counter (Intact) Is Increased After Delay Time [100ms Samples] >=								
								Monitoring Event Is Generated If Occurence Counter (Intact) >=								
								Engine Out NOx Sensor State*:								
								1: Preheating								
								2: Heating								
								3: Waiting For Valid Sensor Content Status								
								4: Tune In - Sensor Delivers Non Realistic Measurement Values								
								5: Measurement								
								6: NOx Status Short Interrupt								
								7: NOx Status Long Interrupt								
379	Tailpipe Outlet NOx And Oxygen Sensor	P229F	NOx Sensor Circuit Range/Performance Bank 1 Sensor 2	NOx-Out Sensor Too Often Not Ready After Dew Point Enable	NOx Sensor Has Not Reached Full Measurement Readiness After Dew Point Enable. Occurence Counter (Defect) >			Readiness Control Is Enabled If Sensor Dew Point Is Reached And Disabled After Sensor Readiness Has Been Checked			s	1 DC	-	-	-	
					NOx Sensor Has Been Reached Full Measurement Readiness After Dew Point Enable. Occurence Counter (Intact) <			Tailpipe Out NOx Sensor Dew Point Enable								
								Tailpipe Out NOx Sensor State* <		OR						
								Tailpipe Out NOx Sensor State* >								
								After Dew Point Is Enabled: Occurence Counter (Defect) Is Increased After Delay Time [100ms Samples] >=								
								Monitoring Event Is Generated If Occurence Counter (Defect) >=								
								Occurence Counter (Defect) Is Reset If NOx Sensor Has Been Ready After Dew Point Enable								
								Tailpipe Out NOx Sensor Dew Point Enable								
								Tailpipe Out NOx Sensor State* >=								
								Tailpipe Out NOx Sensor State* <=								
								Engine State >= IDLE								
								After Dew Point Is Enabled: Occurence Counter (Intact) Is Increased After Delay Time [100ms Samples] >=								
								Monitoring Event Is Generated If Occurence Counter (Intact) >=								
								Occurence Counter (Intact) Is Reset If NOx Sensor Has Not Been Ready After Dew Point Enable								
								Tailpipe Out NOx Sensor State*:								
								1: Preheating								
								2: Heating								
								3: Waiting For Valid Sensor Content Status								
								4: Tune In - Sensor Delivers Non Realistic Measurement Values								
								5: Measurement								
								6: NOx Status Short Interrupt								
								7: NOx Status Long Interrupt								
426	Selective Catalytic Reduction (SCR) Inlet Temperature Sensor	P0426	Catalyst Temperature Sensor Circuit Range/Performance Bank 1 Sensor 1	SCR Catalyst Inlet Temperature Does Not Exceed Threshold After Engine Warmup	SCR Catalyst Inlet Temperature <	°C		Average* Of Engine Speed <	min-1		s	4 DC	x	-	-	
								Average* Of Engine Speed >=	min-1							
								Average* Is Simple Moving Average Over	s							
								Average** Of Engine Torque <	%							
								Average** Of Engine Torque >=	%							
								Average** Is Simple Moving Average	s							
								All Conditions For More Than	s							
427	Selective Catalytic Reduction (SCR) Outlet Temperature Sensor	P042B	Catalyst Temperature Sensor Circuit Range/Performance Bank 1 Sensor 2	SCR Catalyst Outlet Temperature Does Not Exceed Threshold After Engine Warmup	SCR Catalyst Outlet Temperature <	°C		Average* Of Engine Speed <	min-1		s	4 DC	x	-	-	
								Average* Of Engine Speed >=	min-1							
								Average* Is Simple Moving Average Over	s							
								Average** Of Engine Torque <	%							
								Average** Of Engine Torque >=	%							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Average** Is Simple Moving Average	s							
								All Conditions For More Than	s							
445	Reagent Tank Level	P203F	Reductant Level Too Low	Reagent Tank Level Lower Than Threshold	Filtered* Reagent Tank Level <=	See Table 3		Ignition On			E	2 DC	-	x	-	
					For More Than	s										
					Reagent Tank Level Filtering* Condition											
					1)Reagent Tank Empty Signal Enabled And Reagent Tank Empty Active		OR									
					2) Vehicle In Motion For More Than	s										
					3) Power Take Off Mode Active For More Than	s										
					4) Reagent Tank Level Increase Restriction Inactive And Reagent Tank level >	%										
					Ignition On											
					Tank Level Model Based On Reagent Consumption Inactive											
					Model Based Tank Level Calculation is Deactivated If Reagent Tank Level<=	%										
					For More Than	s										
					CAN Message For Reagent Tank Level Invalid											
					Tank Level Model Based On Reagent Consumption Disabled											
					Filtered* With First Order Low Pass Filter With Filter Factor											
463	Reagent Dosing Valve Actuator	P1F7B	High Side Digital Output UV_DOS Circuit Failed Low	Output Driver Self Diagnostic	Driver Status Short Circuit To Ground			Always Enabled			E	4 DC	x	-	-	
464	Reagent Dosing Valve Actuator	P1F7C	High Side Digital Output Supply Voltage Circuit Failed High	Output Driver Self Diagnostic	Driver Status Short Circuit To Battery			Always Enabled			E	4 DC	-	-	-	
465	Reagent Pump Actuator	P1E76	pump speed signal over measurement range	Signal Range High	Pump Frequency >	s-1		High Side 1 Switch Closed			s	4 DC	x	-	-	
466	Reagent Pump Actuator	P1E77	pump speed signal below measurement range	Signal Range Low	Pump Frequency <	s-1		High Side 1 Switch Closed			s	4 DC	x	-	-	
467	Reagent Pump Actuator	P1FC7	Non DEF flow situation	Detect Pump Revolutions Too Low	Pump Revolutions Did Not Reach	min-1	OR	Pulse Width Modulation Of Reagent Pump Actuator >=	%		s	4 DC	x	-	-	
					Pump Revolutions <=	min-1		Pulse Width Modulation Of Reagent Pump Actuator <=	%							
								MU Number 473 - ACM: Over pressurized DEF system Not Failed		OR						
								MU Number 473 - ACM: Over pressurized DEF system Failed For More Than	s							
								Gradient (20ms) Of Pulse Width Modulation Of Reagent Pump Actuator <=	%	OR						
								Pulse Width Modulation Of Reagent Pump Actuator >=	%	AND						
								For More Than Pump Blocked Delay Time*								
								Pump Blocked Delay Time*:								
								If Filtered** Reagent Pressure >	mbar							
								Pump Blocked Delay Time =	s							
								Else								
								Pump Blocked Delay Time =	s							
								Fault Case: All Conditions For A Cumulated Time >=	s							
								Non-Fault Case: All Conditions For A Cumulated Time >=	s							
								Filtered** With First Order Low Pass Filter With Filter Factor								
								General Cold Level*** >=								
								General Cold Level***								
								Level 0: Ambient Air Temperature >=	°C							
								Level -1: Ambient Air Temperature Fall Below	°C							
								Level -1: Ambient Air Temperature Rise Above	°C							
								Level -2: Ambient Air Temperature Fall Below	°C							
								Level -2: Ambient Air Temperature Rise Above	°C							
								Level -3: Ambient Air Temperature Fall Below	°C							
								If Signal Limp Home Value: Set To Status								

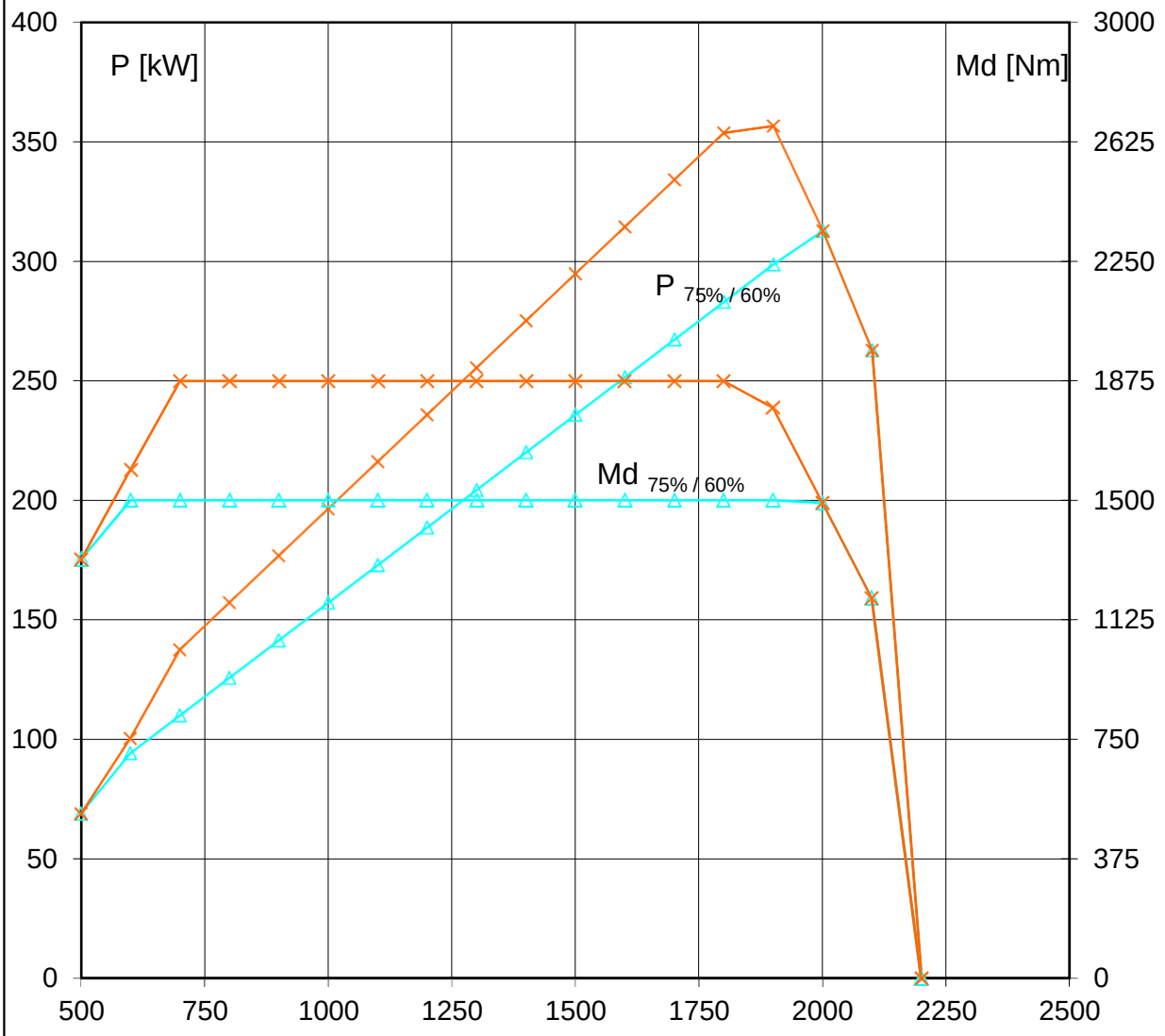
MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
468	Reagent Dosing Unit	P1D8C	DEF LO system Dosing Unit Defect	Detect And Summarize Electrical Faults In The Dosing Unit	Dosing Unit Open Load Detection Not Stored*			Always Enabled			s	4 DC	x	-	-	
					Number Of Active Electrical Faults >=											
					Active Electrical Faults Not Only:											
					MU Number 132 - ACM: Reductant Pressure Sensor Circuit Low											
					MU Number 17 - ACM: Dosing Unit Heater Open Circuit											
					MU Number 2 - ACM: Reductant Injection Valve Circuit/Open Bank 1 Unit 1											
					But Also:											
					MU Number 108 - ACM: ACM Sensor Supply 2 Short to Ground											
					MU Number 109 - ACM: ACM Sensor Supply 2 Short to Battery											
					MU Number 133 - ACM: Reductant Pressure Sensor Circuit High											
					MU Number 15 - ACM: Dosing Unit Heater Circuit Failed Low											
					MU Number 16 - ACM: Dosing Unit Heater Circuit Failed High											
					MU Number 0 - ACM: Reductant Injection Valve Circuit Low Bank 1 Unit 1											
					MU Number 1 - ACM: Reductant Injection Valve Circuit High Bank 1 Unit 1											
					MU Number 94 - ACM: High Side Digital Output 1 Circuit Failed High											
					MU Number 93 - ACM: High Side Digital Output 1 Circuit Failed Low											
					High Side Digital Output 2 Circuit Failed High											
					High Side Digital Output 2 Circuit Failed Low											
					...											
					Conditions For More Than	s										
					*Dosing Unit Open Load Detection Is Stored Only If The Following Electrical Open Load Faults Are Active Simultaneously:											
					MU Number 132 - ACM: Reductant Pressure Sensor Circuit Low											
					MU Number 17 - ACM: Dosing Unit Heater Open Circuit											
					MU Number 2 - ACM: Reductant Injection Valve Circuit/Open Bank 1 Unit 1											
472	Reagent Pump Actuator	P1F84	Under pressurized DEF system	Checks If The Relation Of Reagent Pressure To Pump Speed Is Within A Normal Range.	Reagent Pump Revolutions >	See Table 4		MU Number 473 - ACM: Over pressurized DEF system Tested And No Fault			s	4 DC	x	-	-	
								Reagent Dosing Pressure Sufficient For Dosing If Filtered* Reagent Pressure Exceeded	mbar	AND						
								And Has Not Been Below	mbar							
								For More Than	s							
								Reagent Pump Actuator Or On/Off-Cycle Enabled For More Than Maximal Pressure Build Up Time		AND	OR					
								Maximal Pressure Build Up Time While Pump Overspeed Is Not Active	s							
								Maximal Pressure Build Up Time While Pump Overspeed Is Active	s							
								While Reagent Pump Actuator Enabled								
								Requested Reagent Quantity <=	g/h							
								Target Pressure On/Off Cycle Intrusive Diagnostic Routine Not Active								
								Post-Run Not Active								
								...								
								Fault Case:								
								If General Cold Level* <=								
								All Conditions For A Cumulated Time >=	s							
								Else								
								All Conditions For A Cumulated Time >=	s							
								Non-Fault Case:								
								All Monitoring Conditions For A Cumulated Time >=	s							
								General Cold Level** >=								
								Filtered* With First Order Low Pass Filter With Filter Factor								
								General Cold Level**								
								Level 0: Ambient Air Temperature >=	°C							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Level -1: Ambient Air Temperature Fall Below	°C							
								Level -1: Ambient Air Temperature Rise Above	°C							
								Level -2: Ambient Air Temperature Fall Below	°C							
								Level -2: Ambient Air Temperature Rise Above	°C							
								Level -3: Ambient Air Temperature Fall Below	°C							
								If Signal Limp Home Value: Set To Status								
473	Reagent Pump Actuator	P1F85	Over pressurized DEF system	Checks If The Relation Of System Pressure To Pump Speed Is Within A Normal Range.	Reagent Pump Revolutions <	See Table 5		MU Number 472 - ACM: Under pressurized DEF system Tested And No Fault			s	4 DC	-	-	-	
								Reagent Dosing Pressure Sufficient For Dosing If Filtered* Reagent Pressure Exceeded	mbar	AND / OR						
								And Has Not Been Below	mbar							
								For More Than	s							
								Reagent Pump Actuator Or On/Off-Cycle Enabled For More Than Maximal Pressure Build Up Time		AND / OR						
								Maximal Pressure Build Up Time While Pump Overspeed Is Not Active	s	AND						
								Maximal Pressure Build Up Time While Pump Overspeed Is Active	s							
								While Reagent Pump Actuator Enabled								
								Requested Reagent Quantity <=	g/h							
								Post-Run Not Active								
								...								
								Fault Case:								
								If General Cold Level** <=								
								All Conditions For A Cumulated Time >=	s							
								Else								
								All Conditions For A Cumulated Time >=	s							
								Non-Fault Case:								
								All Monitoring Conditions For A Cumulated Time >=	s							
								General Cold Level** >=								
								Filtered* With First Order Low Pass Filter With Filter Factor								
								General Cold Level**								
								Level 0: Ambient Air Temperature >=	°C							
								Level -1: Ambient Air Temperature Fall Below	°C							
								Level -1: Ambient Air Temperature Rise Above	°C							
								Level -2: Ambient Air Temperature Fall Below	°C							
								Level -2: Ambient Air Temperature Rise Above	°C							
								Level -3: Ambient Air Temperature Fall Below	°C							
								If Signal Limp Home Value: Set To Status								
474	Reagent Pump Actuator	P1FC8	pump speed difference between high and low dosing amounts is to small	Detect Unplausible Relation Of Reagent Pump Revolutions To Dosed Reagent Quantity	Difference Of Pump Revolutions Depending On Lower And Upper Range Of Required Reagent Quantity <	min-1		Reagent Dosing Pressure Sufficient For Dosing If Filtered' Reagent Pressure Exceeded	mbar		s	4 DC	x	-	-	
								And Has Not Been Below	mbar							
								For More Than	s							
								Reagent Dosing Enabled								
								Reagent Dosing Pump Enabled								
								Reagent Dosing Valve Enabled								
								Pressure Speed Validation On-Off-Cycle Not Active								
								Evaluation Is Paused In Case Of High Dynamic Dosing Amounts. Following Conditions Need To Be True:								
								Absolute Gradient Of Requested Reagent Quantity <=	g/h	OR						
								Requested Reagent Quantity Does Not Fall Below	g/h	OR						
								Requested Reagent Quantity Does Not Rise Above	g/h	OR						
								For More Than	s							
								Pump Revolutions Average Is Calculated Every Dosing Cycle (1s)								

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								Pump Revolutions Average Value Is Used For Event Based Filter* Of Lower Range Average Values If Required Reagent Quantity In Lower Range								
								Pump Revolutions Average Value Is Used For Event Based Filter** Of Upper Range Average Values If Required Reagent Quantity In Upper Range								
								Requested Reagent Quantity In Lower Range If <=	g/h							
								Requested Reagent Quantity In Upper Range If >	g/h							
								While System Pressure Built-Up Test								
								Necessary Number Of Events For Lower Range Average Before Calculating The Pump Revolution Difference	-							
								Necessary Number Of Events For Upper Range Average Before Calculating The Pump Revolution Difference	-							
								Filtered* With First Order Low Pass Filter With Filter Factor								
								Filtered** With First Order Low Pass Filter With Filter Factor	-							
								Fault Case:								
								Fault Conditions* For More Than								
								If Fault Event Counter <								
								Fault Conditions* For More Than								
								If Fault Event Counter >=								
								Fault Conditions* For More Than								
								If Fault Event Counter >=								
								Fault Conditions* For More Than								
								If Fault Event Counter >=								
								Fault Conditions* For More Than								
								Non Fault Case:								
								All Conditions For More Than								
								Filtered' With First Order Low Pass Filter With Filter Factor								
480	Reagent Pump Actuator	P1FC6	DEF system is not being controlled as expected	Detect Pump Revolutions Out Of Expected Range	Reagent Pump Revolutions > Expected Maximum Revolutions		OR	Absolute Value Of Gradient (20ms) Of Filtered* Estimated** Pump Revolutions Signal <=	min-1	OR	s	4 DC	x	-	-	
					Reagent Pump Revolutions < Expected Minimum Revolutions			For More Than	s							
					Expected Maximum Revolutions Calculated By Filtered* Estimated** Revolutions + Offset (High)	min-1		Pulse Width Modulation Of Reagent Pump Actuator >=	%							
					Expected Minimum Revolutions Calculated By Filtered* Estimated** Revolutions - Offset (Low)	min-1		Pulse Width Modulation Of Reagent Pump Actuator <=	%							
					Estimated** Revolutions	See Table 6		Pump Revolutions Rise Above	min-1							
					Filtered* With First Order Low Pass Filter With Filter Factor	-		Pump Revolutions Did Not Fall Below	min-1							
								Fault Case: All Conditions For A Cumulated Time >=	s							
								Non-Fault Case: All Monitoring Conditions For A Cumulated Time >=	s							
								Filtered* With First Order Low Pass Filter With Filter Factor	-							
								Estimated** Pump Revolutions	See Table 6							
								General Cold Level** >=								
								General Cold Level**								
								Level 0: Ambient Air Temperature >=	°C							
								Level -1: Ambient Air Temperature Fall Below	°C							
								Level -1: Ambient Air Temperature Rise Above	°C							
								Level -2: Ambient Air Temperature Fall Below	°C							
								Level -2: Ambient Air Temperature Rise Above	°C							
								Level -3: Ambient Air Temperature Fall Below	°C							
								If Signal Limp Home Value: Set To Status								
585	CAN Communication / Control Module	P1560	Lost Communication With Engine CAN	CAN Not Available	CAN 1 Bus Off			Ignition On			s	4 DC	x	-	-	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							

MU Order	Component / System	SAE J2012	Malfunction Name SAE J2012	Monitor Strategy	Malfunction Criteria = Fault Condition		Fault Condition Additional Info	Secondary Parameters = Monitoring Condition		Monitoring Condition Additional Info	Time or Events Required (Debounce)		Warning Mode	Torque Limiter	Torque Limiter after 36h	If applicable*
No.	description	No.	description	description	description	unit		description	unit		unit	cycles	-	-	-	-
								CAN1 Online Request Active								
587	CAN Communication / Control Module	P1563	Lost Communication With NOx Sensor Bank 1 Sensor 2	CAN Not Available	CAN 4 Bus Off			Ignition On			s	4 DC	-	-	x	
								No Sporadic Defect In The Battery								
								Battery Voltage >=	V							
								For More Than	s							
664	SCR System Sensors	P1428	Aftertreatment 1 Diesel Exhaust Fluid Tank Level 2 Abnormal Rate Of Change	Sensor Self Diagnostic	Reagent Tank Not Frozen			Ignition On			s	4 DC	-	-	-	
					Reagent Tank Level [mm] CAN Signal Value >=			No Sporadic Defect In The Battery								
					Reagent Tank Level [mm] CAN Signal Value <=			Battery Voltage >=	V							
								For More Than	s							
								CAN4 Bus Online								

*Applicable if engine equipped with corresponding component
END

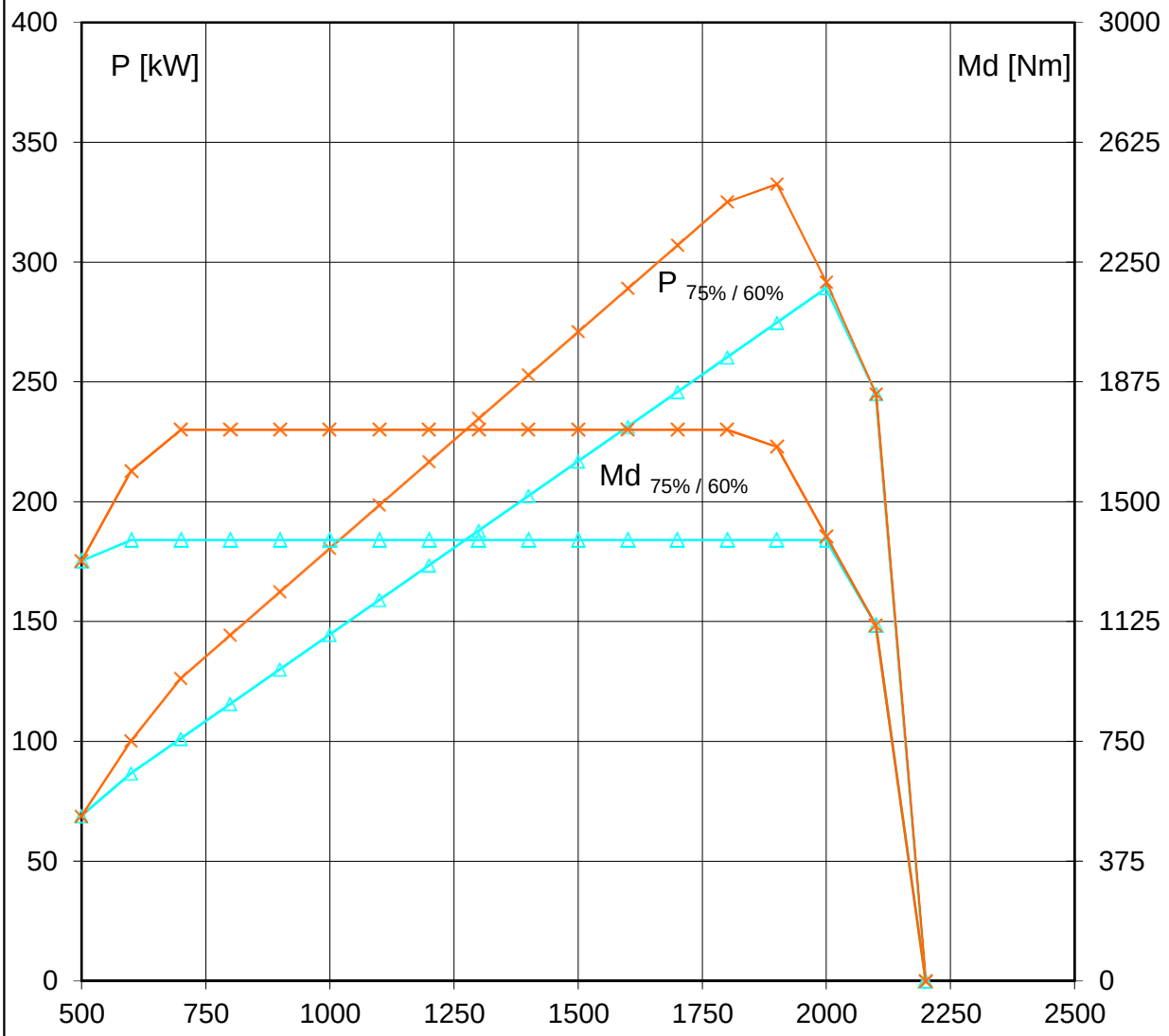


NOx-Control:
Drehmomentbegrenzer / Torque Limiter
Motortyp / Engine Type:
DD13

P_{nenn}: 375 kW / 1600 1/min
Md_{nenn}: 2500 Nm / 1100 1/min

Md_{max} 75%: 1875 Nm / 700 1/min
Md_{max} 60%: 1500 Nm / 600 1/min

Daimler AG	Diagramm Drehmomentbegrenzer Diagram Torque Limiter Richtlinie / Directive: ECE-R49	**LE 16-75070** 02.05.2016 TP/EVH TP/PFH

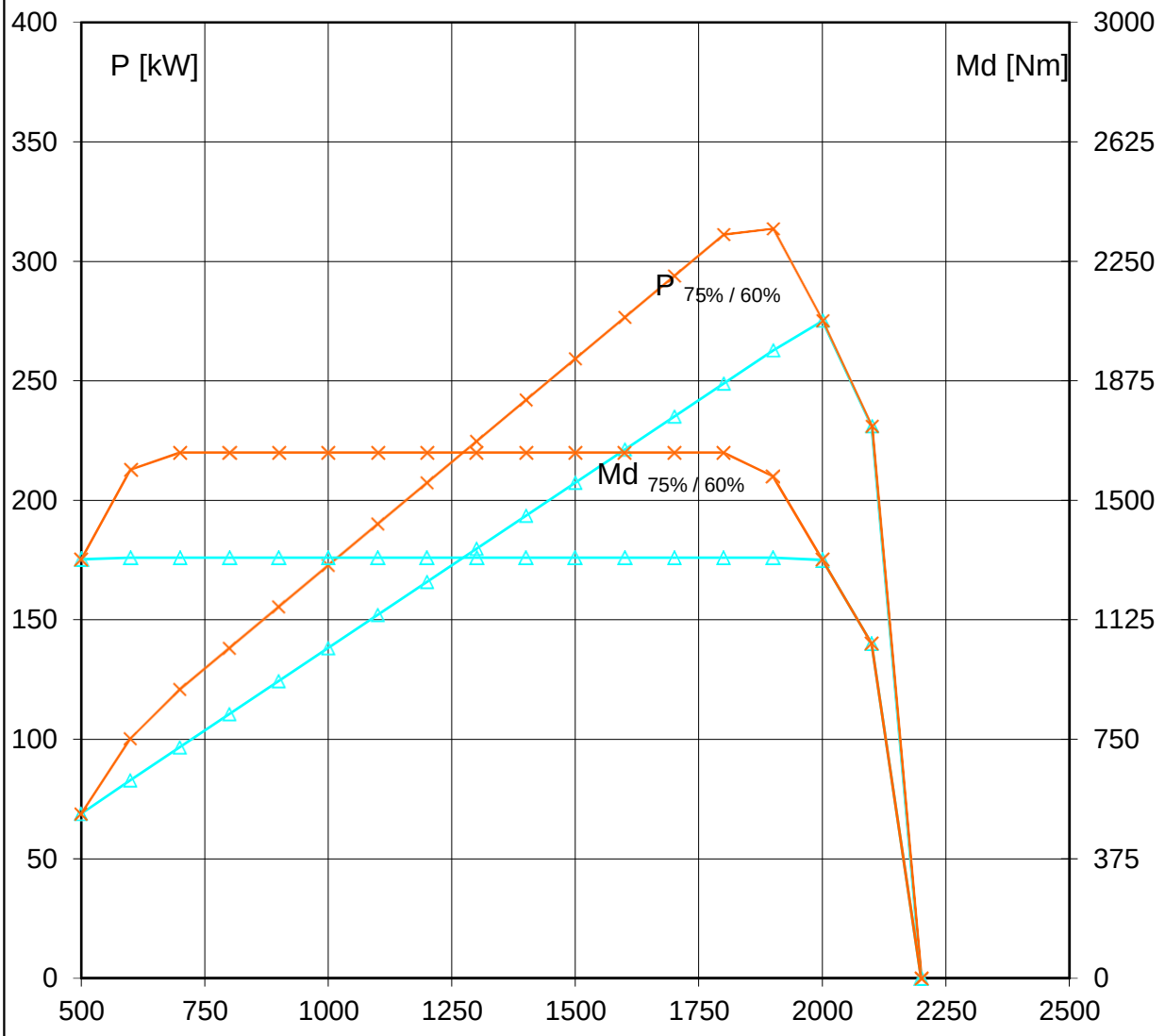


NOx-Control:
Drehmomentbegrenzer / Torque Limiter
Motortyp / Engine Type:
DD13

P_{nenn}: 350 kW / 1600 1/min
Md_{nenn}: 2300 Nm / 1100 1/min

Md_{max} 75%: 1725 Nm / 800 1/min
Md_{max} 60%: 1380 Nm / 600 1/min

Daimler AG	Diagramm Drehmomentbegrenzer Diagram Torque Limiter Richtlinie / Directive: ECE-R49	**LE16-75072** 02.05.2016 TP/EVH TP/PFH

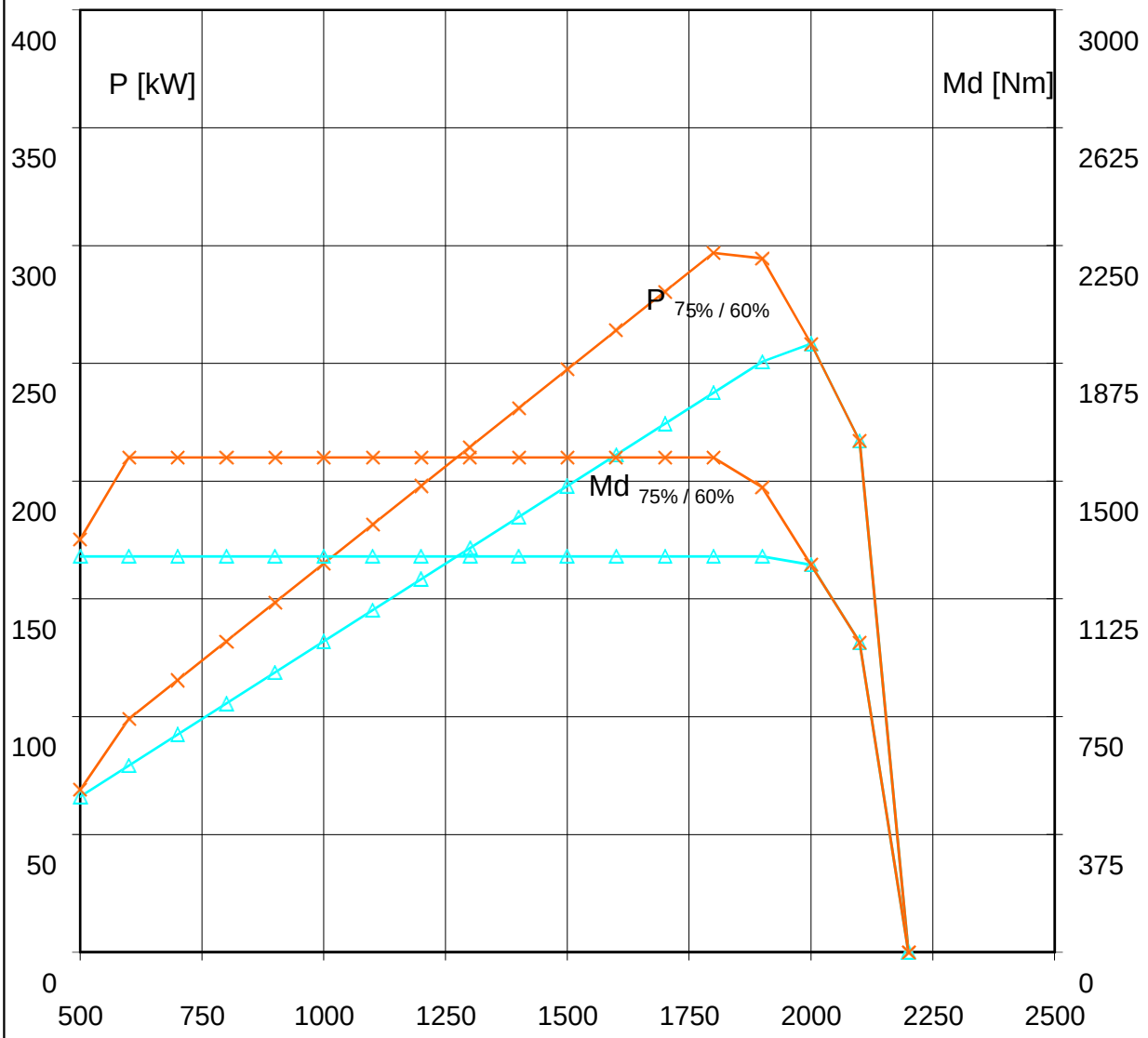


NOx-Control:
Drehmomentbegrenzer / Torque Limiter
Motortyp / Engine Type:
DD13

P_{nenn}: 330 kW / 1600 1/min
Md_{nenn}: 2200 Nm / 1100 1/min

Md_{max} 75%: 1650Nm / 700 1/min
Md_{max} 60%: 1320 Nm / 600 1/min

Daimler AG	Diagramm Drehmomentbegrenzer Diagram Torque Limiter Richtlinie / Directive: ECE-R49	**LE16-75074** 02.05.2016 TP/EVH TP/PFH

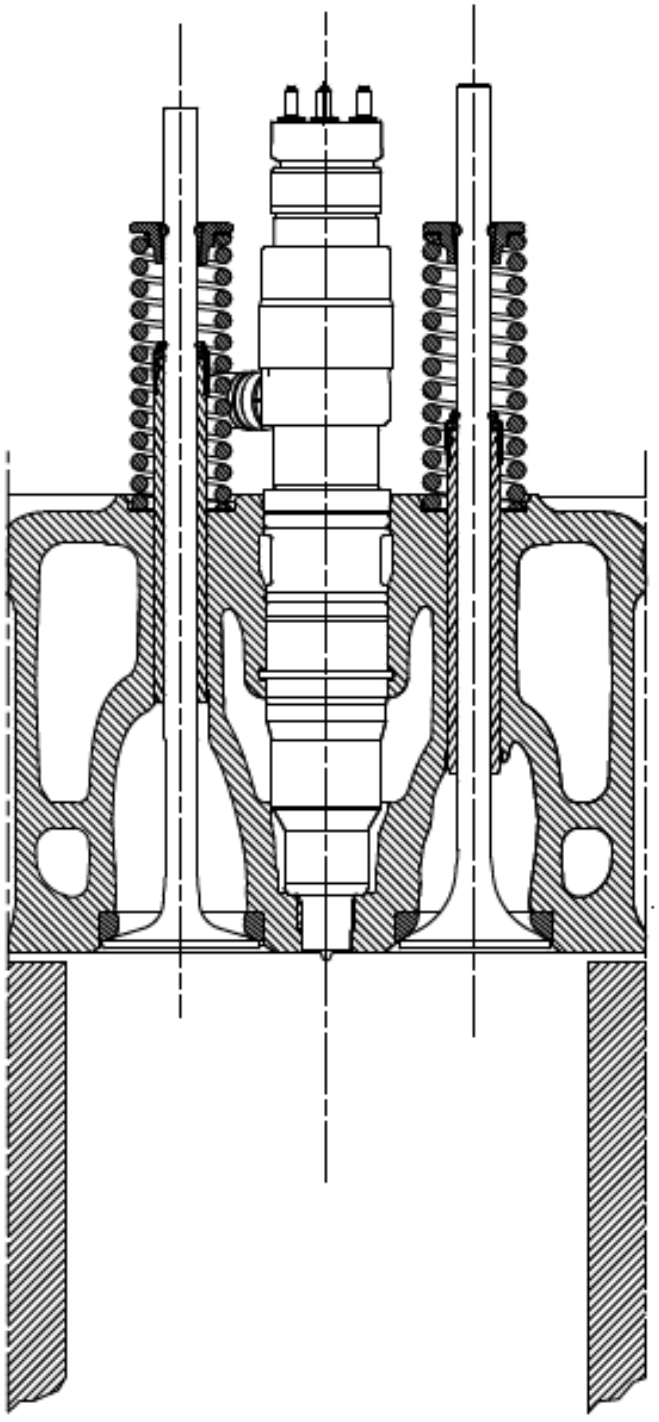


NOx-Control:
Drehmomentbegrenzer / Torque Limiter
Motortyp / Engine Type:
DD13
P_{nenn}: 310 kW / 1600 1/min
Md_{nenn}: 2100 Nm / 1100 1/min

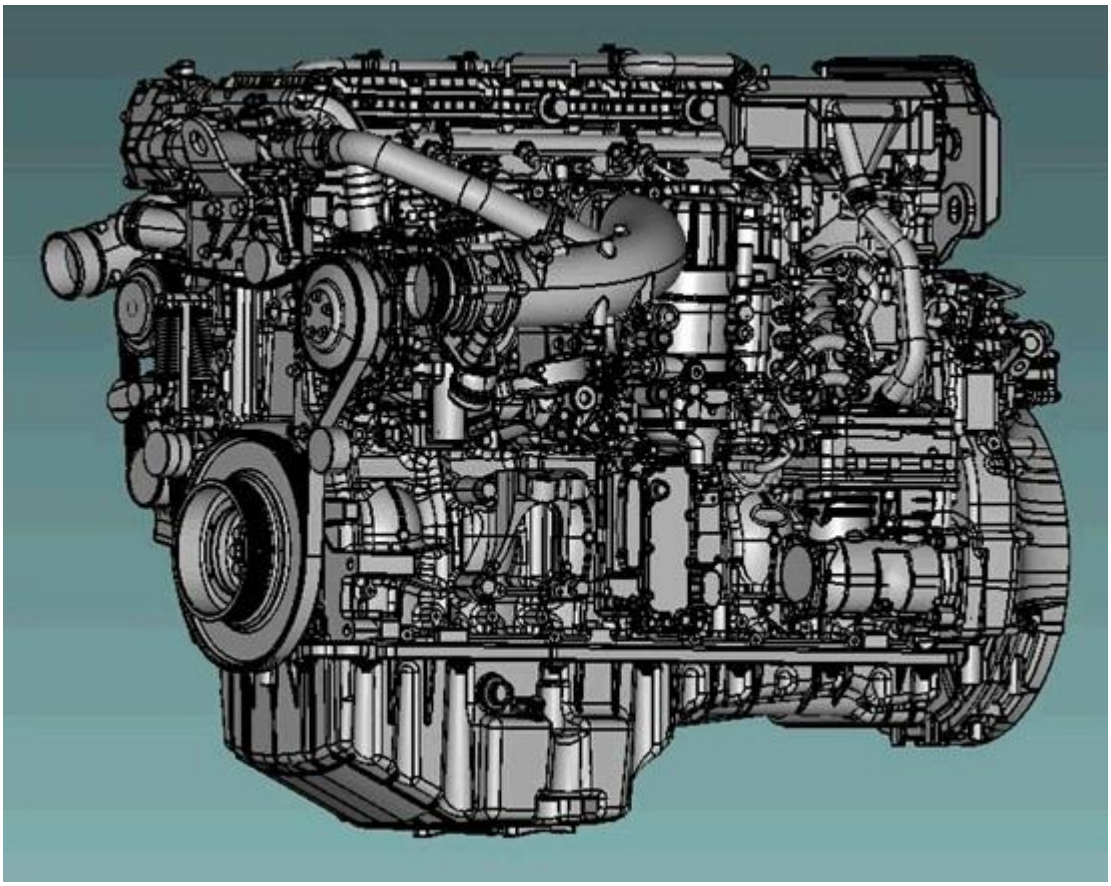
Md_{max} 75%: 1575Nm / 600 1/min
Md_{max} 60%: 1260 Nm / 500 1/min

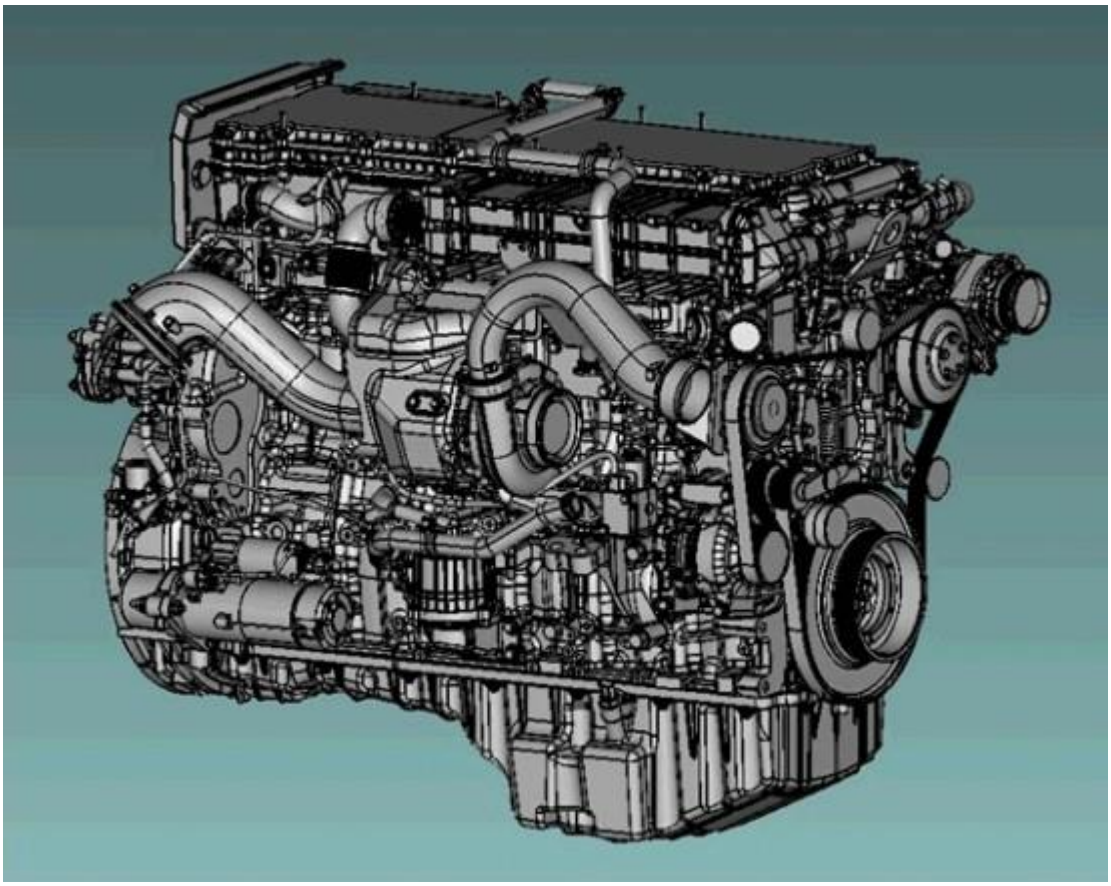
Daimler AG	Diagramm Drehmomentbegrenzer Diagram Torque Limiter Richtlinie / Directive: ECE-R49	**LE16-75076** 02.05.2016 TP/EVH TP/PFH

Brennraumschnitt Section Combustion Chamber	T 0 552

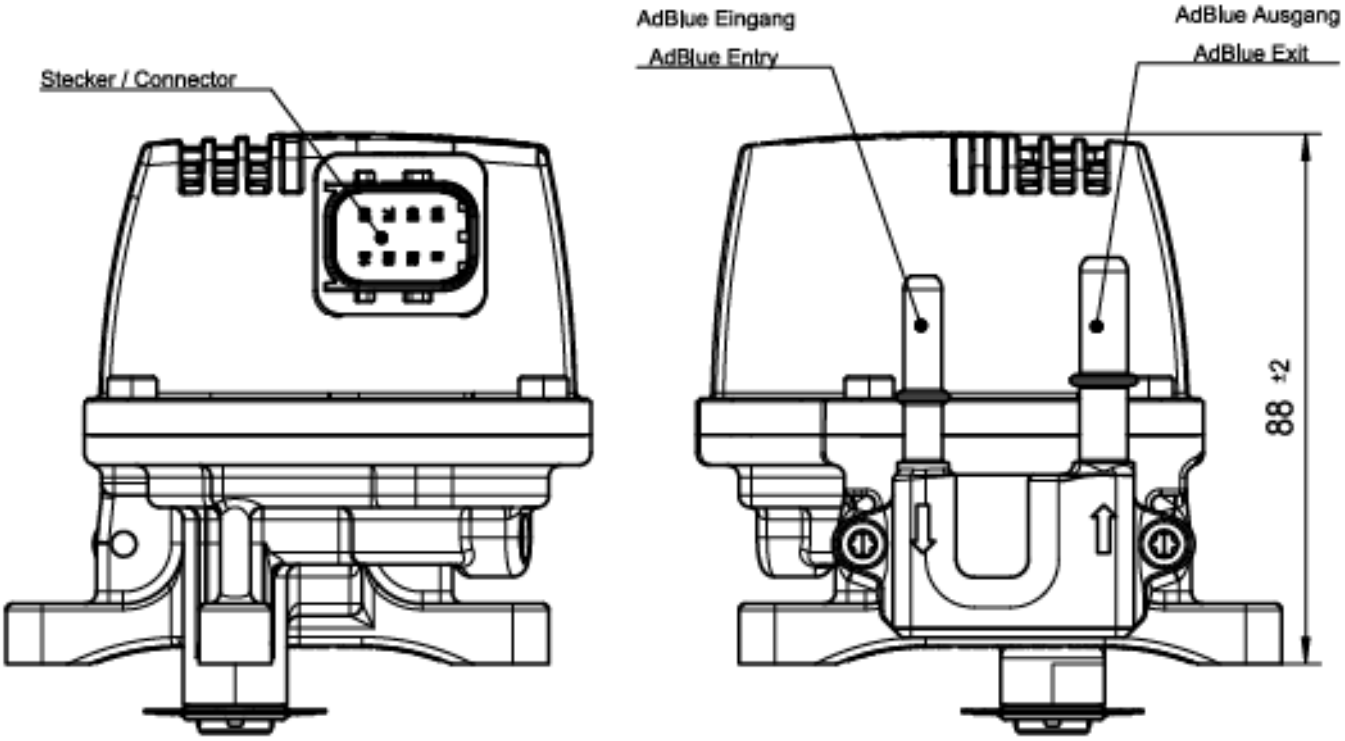


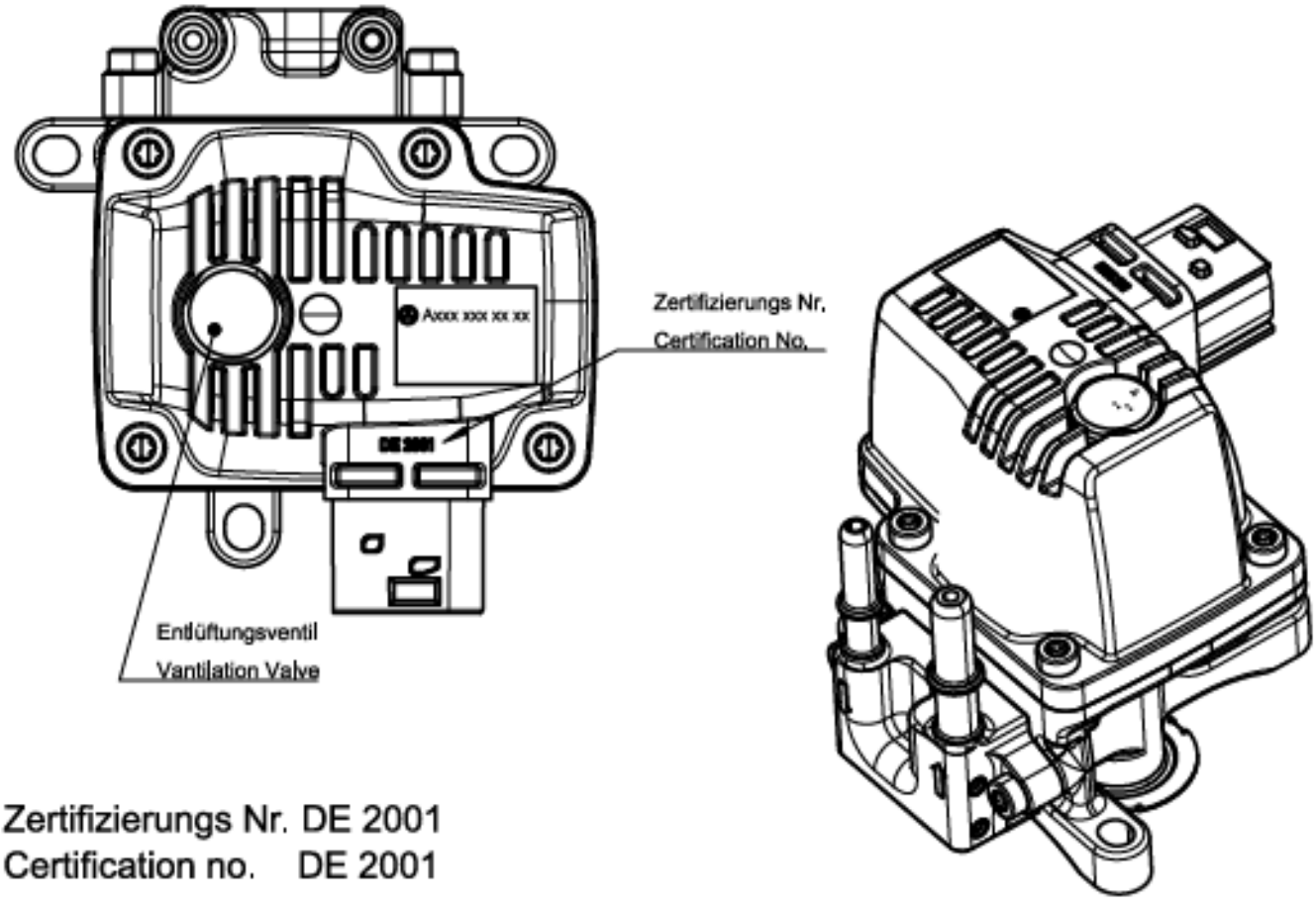
Daimler AG	Abteilung: TG/ECS	Ausg.-Datum: 14.02.2011 Stand: 14.02.2011





AdBlue Dosiereinheit EU 5/6, MCS, GATS 2.0 AdBlue Dosing Unit EU 5/6, MCS, GATS 2.0	T 0 557

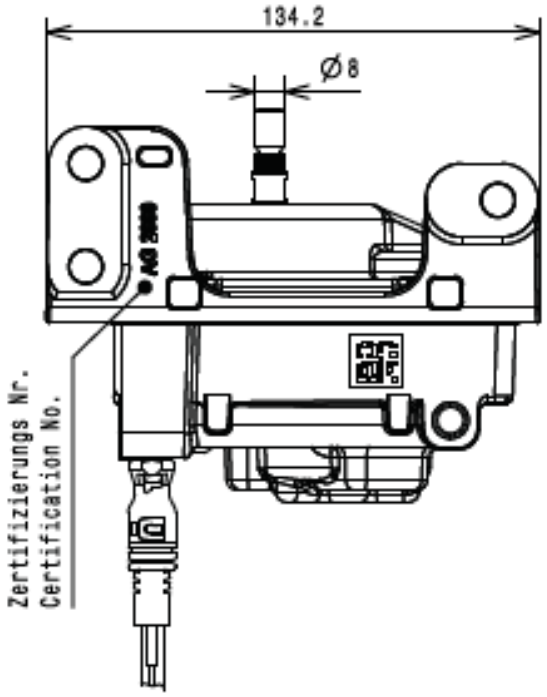


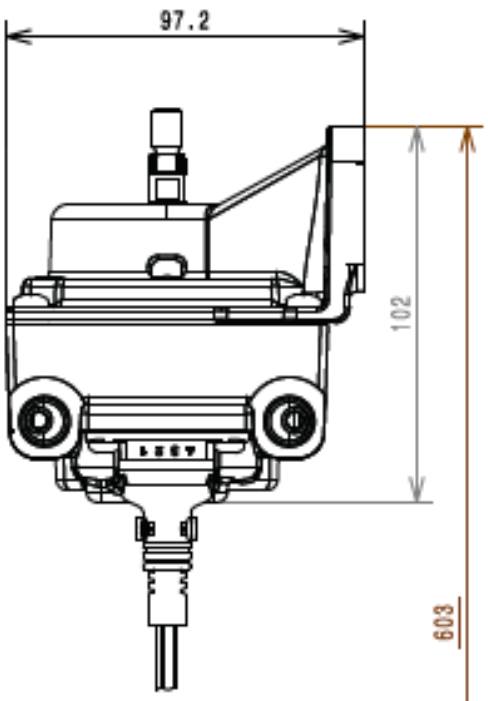


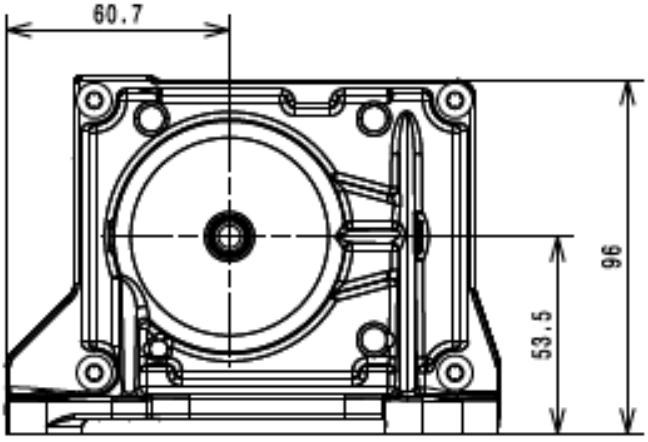
Zertifizierungs Nr. DE 2001
Certification no. DE 2001

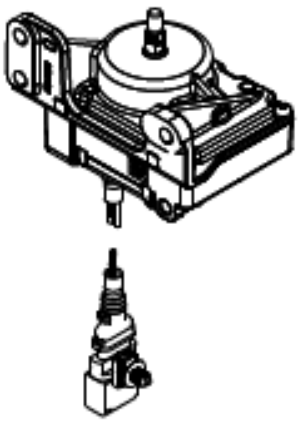
Daimler AG	Abteilung: TG / LPS	Ausg. -Datum: 17.02.2011 Stand: 17.04.2019

Stellmotor Servomotor	T 0 559





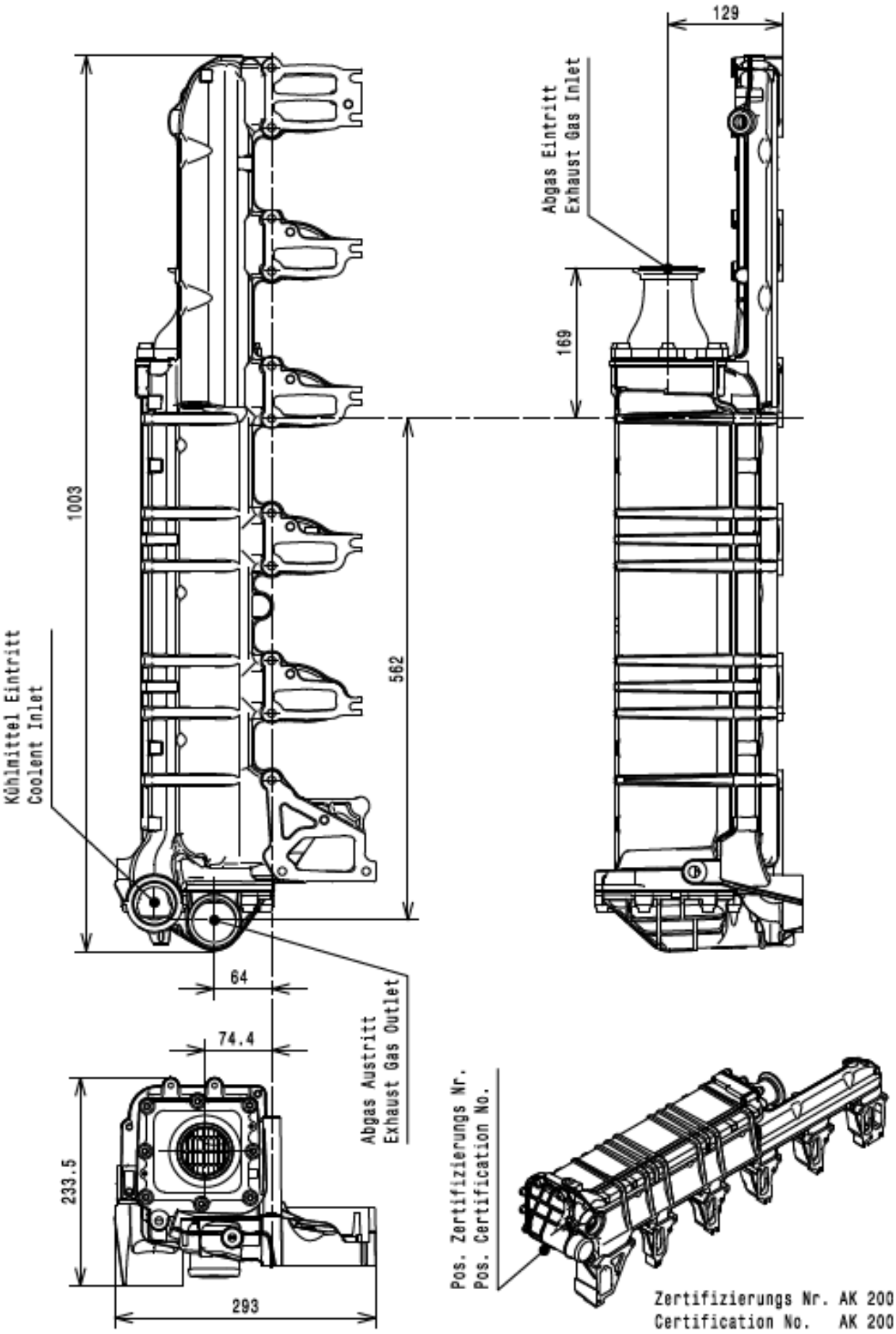




Daimler AG	Abteilung: TG/ECS	Ausg.-Datum: 21.02.2011 Stand: 08.03.2012

Abgaskühler
Exhaust Gas Cooler

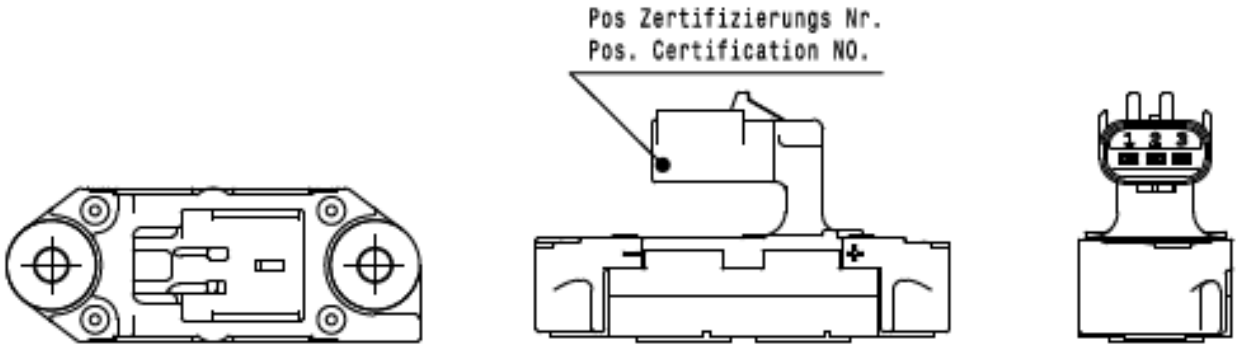
T 0 561



Daimler AG	Abteilung: TG/ECS	Ausg.-Datum: 21.02.2011 Stand: 21.02.2011

Abgasdrucksensor / Differenzdruck
Pressure Sensor / Differential Pressure

T 0 565



1) Druck Eingänge	
Differenzdruck Nenndruckbereich:	* -0.25 to +5 PSID (-1.724 kPa to +34.47 kPa)
Differenzdruck Überdruck:	* ±14.5 PSID (99.97 kPa)
Leitungsnenndruck:	* 87 PSIA Max (450 kPa max.)
2) Nennversorgungsspannung (Us):	* 5.0 VDS ±5% (4.75 VDC to 5.25 VDC)
3) Ausgangsfunktion bei 5VDC, siehe Bild 1:	* -0.25 PSID (-1.724 kPa) Output = 0.5V
	* 5.0 PSID (+34.47 kPa) Output = 4.5V
4) Ausgangsimpedanz:	* 180 Ohm Max.
5) Reaktionszeit t=63% auf einen Druckschritt:	* 80 ... 140ms
6) Einsatztemperaturbereich:	* -40°C ... 125°C

1) Pressure Inputs:	
Differential pressure range:	* -0.25 to +5 PSID (-1.724 kPa to +34.47 kPa)
Differential proof pressure:	* ±14.5 PSID (99.97 kPa)
Common mode operating pressure:	* 87 PSIA Max (450 kPa max.)
2) Operating Supply Voltage (Vs):	* 5.0 VDS ±5% (4.75 VDC to 5.25 VDC)
3) Output function at 5.0 VDC, See Figure 1:	* -0.25 PSID (-1.724 kPa) Output = 0.5V
	* 5.0 PSID (+34.47 kPa) Output = 4.5V
4) Output Impedance:	* 180 Ohm Max.
5) Response time t=63% for a pressure step:	* 80 ... 140ms
6) Operating Temperature range:	* -40°C ... 125°C

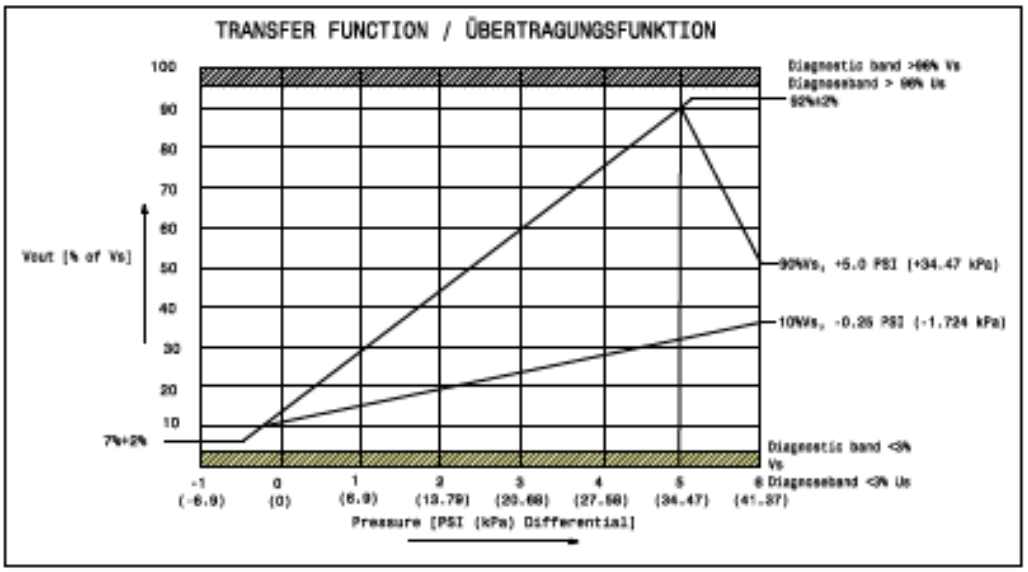
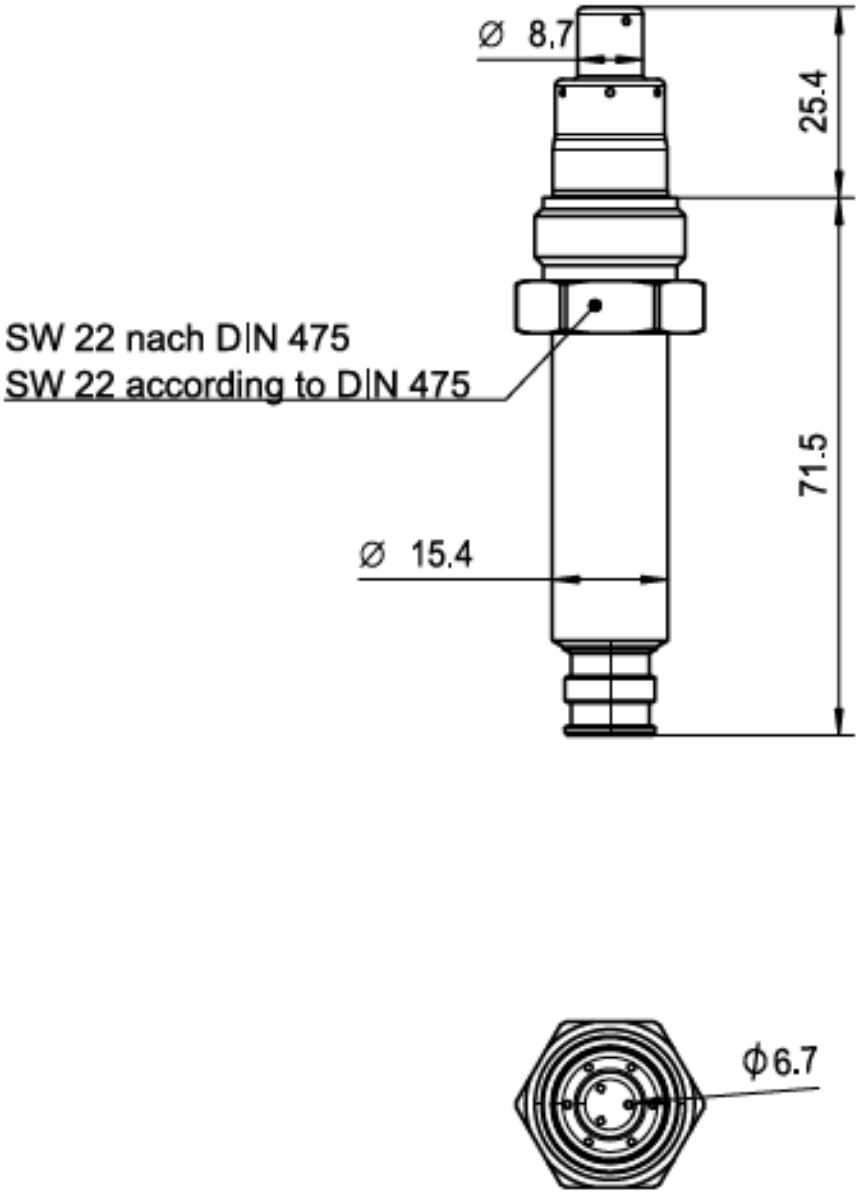


Figure 1 / Bild 1

Zertifizierungs Nr. SD 2000
Certification No. SD 2000

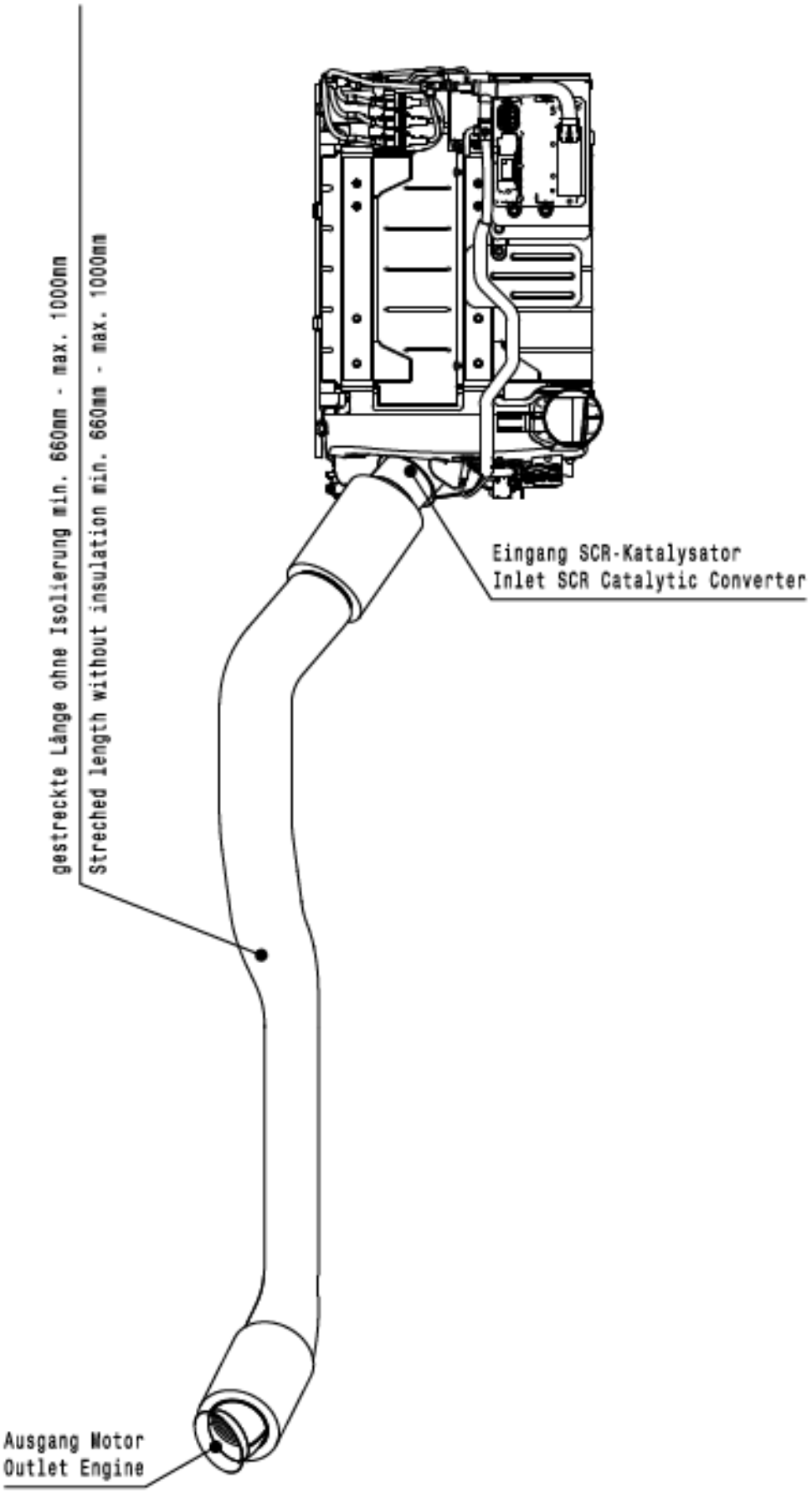
NOx-Sensor	T 0 568

Ansicht zeigt Sensorgehaeuse
View shows sensor housing



Daimler AG	Abteilung: TG / LPS	Ausg. - Datum: 24.02.2011 Stand: 23.05.2018

Repräsentative Abgasanlage mit SCR-Katalysator Presentable Exhaust System With SCR-Katalytic Converter	T 0 574



Daimler AG	Abteilung: TG/LPS	Ausg.-Datum: 28.07.2011 Stand: 05.09.2018

Beschreibung Abgasrückführung

Die AGR-Menge wird durch folgende Parameter gesteuert:
- Motorlast (Mengensignal aus Motorsteuergerät)
- Motordrehzahl (Drehzahlsignal aus Motorsteuergerät)
- Lufttemperatur nach Ladeluftkühler
- Lufttemperatur vor Einlasskanal
- Lufttemperatur vor Verdichter
- Ladedruck vor Einlasskanal
- Atmosphärendruck
- Differenzdruck am Venturi
- AGR-Klappe
- Wassertemperatur

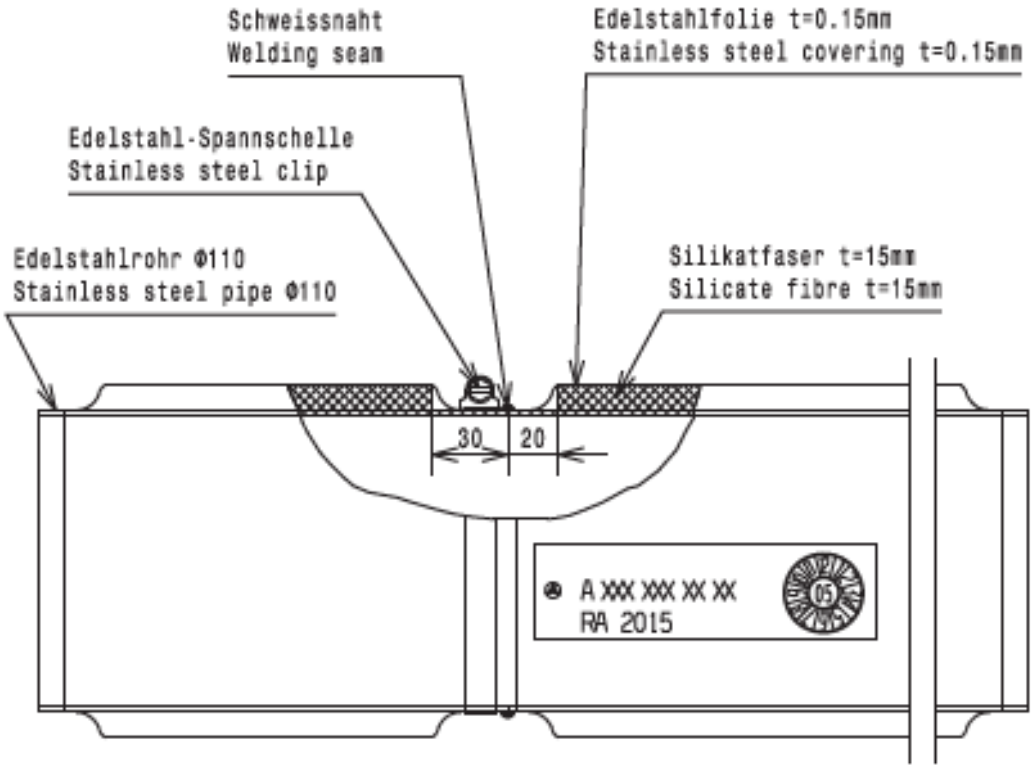
Description exhaust gases recirculation

EGR rate is controlled by following parameters:
- engine load (fuel mass signal from engine control unit)
- engine speed (engine speed signal from engine control unit)
- air temperatur after charge air cooler
- air temperatur before inlet port
- air temperatur before compressor
- charging pressure before inlet port
- atmospheric pressure
- pressure difference venturi
- EGR-flap
- water temperatur

Spezifikation Abgasrohrverlängerung
Specification of extension of exhaust gas pipe

T 0 683

Fixieren der Edelstahlfolie nach "Arbeits -und Montageanleitung für Abgasleitung isoliert" des Zulieferers.
Fixation of stainless steel covering according to "Operation instruction for isolated exhaust pipes" from the supplier.



Isoliermaterial mit Zertifizierungsnr: RA 2015
Insulating material certification Nr.: RA 2015

mindestens zu isolierende Länge: 80%
min. isolated length should be : 80%

max. zulässige Winkelsumme : 360°
allowable angularsum : 360°

*wahlweise Wärmedurchlasswiderstand Silikatfaser
*optional thermal resistance silicate fibre

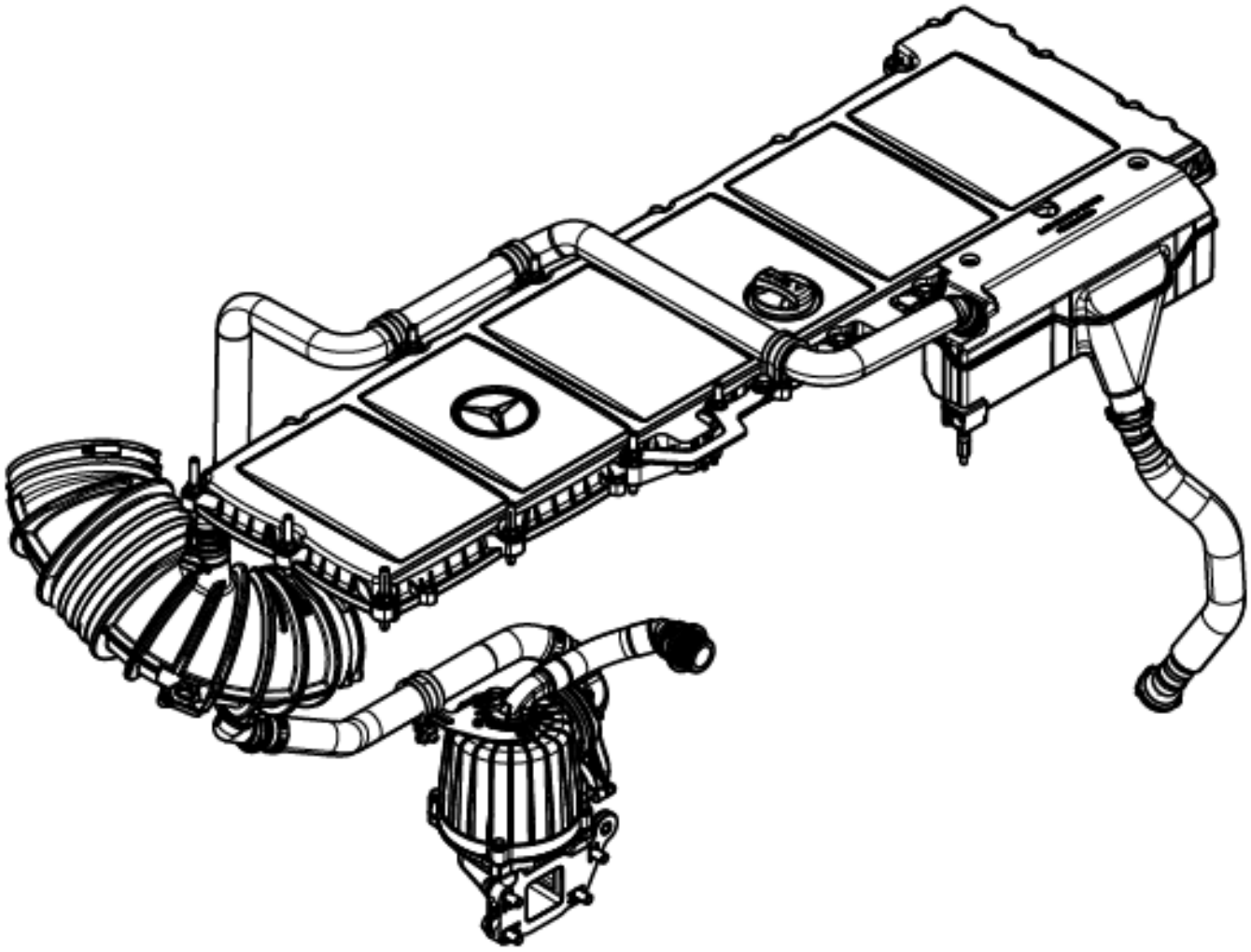
°C	100	200	300	400	500	600	700	800	900
m^2K/W	0,357**	0,288**	0,231**	0,183**	0,153**	0,126**	0,101**	0,086**	0,079**

**Werte entsprechen Mindestanforderungen
**Values are minimum requirements

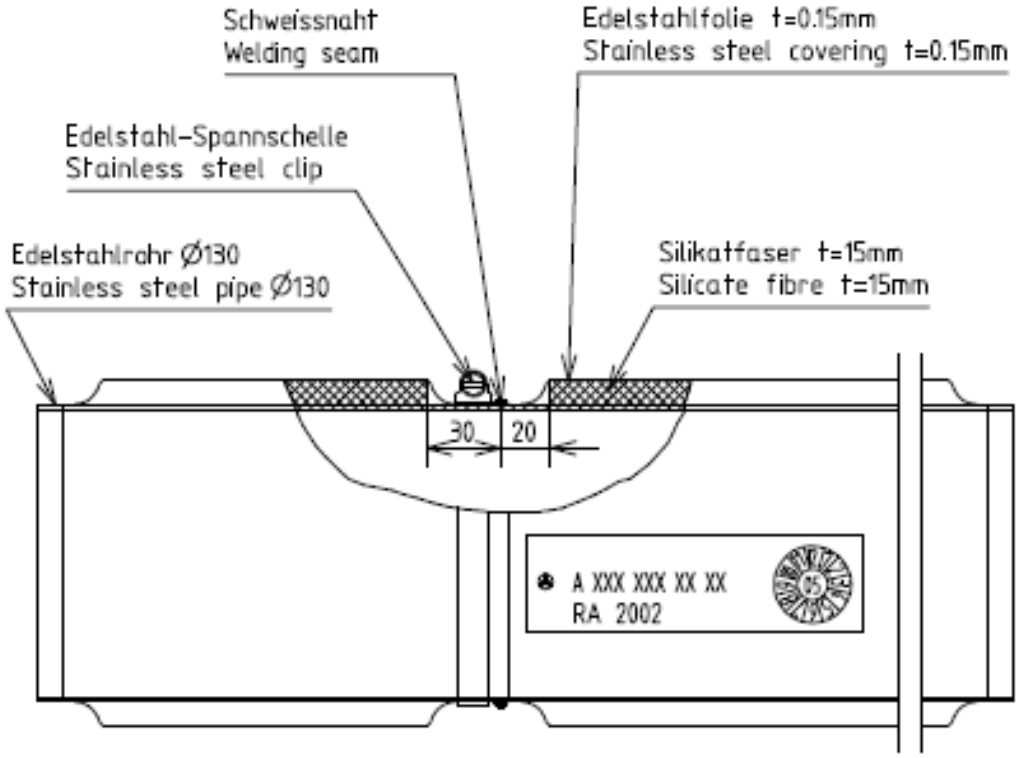
Kurbelgehäuseentlüftung geschlossen OM 47x Crankcase ventilation closed OM 47x	T 0 685

„Die Blowby-Verbrennungsgase und Kurbelgehäuseaerosole strömen durch den Vorabscheider in der Zylinderkopfhaube und den aktiven Ölabscheider am Kurbelgehäuse über einen Formschlauch zum Ansaugrohr vor dem Verdichter des Abgasturboladers. Von hier wird der Blowby der Ansaugluft beigemischt und gelangt über den Verdichter, Ladeluftkühler und Ladeluftkrümmer direkt in die Brennräume.

The engine blow-by gases and crankcase aerosols pass through the pre-separator in the cylinder head cover and the active driven oil separator on the crankcase via a vent-line to the compressor inlet. From here the blow-by gases are mixed into the intake air and are led via compressor, charge air cooler and charge air manifold into the combustion chambers."



Fixieren der Edelstahlfolie nach "Arbeits -und Montageanleitung für Abgasleitung isoliert" des Zulieferers.
Fixation of stainless steel covering according to "Operation instruction for isolated exhaust pipes" from the supplier.



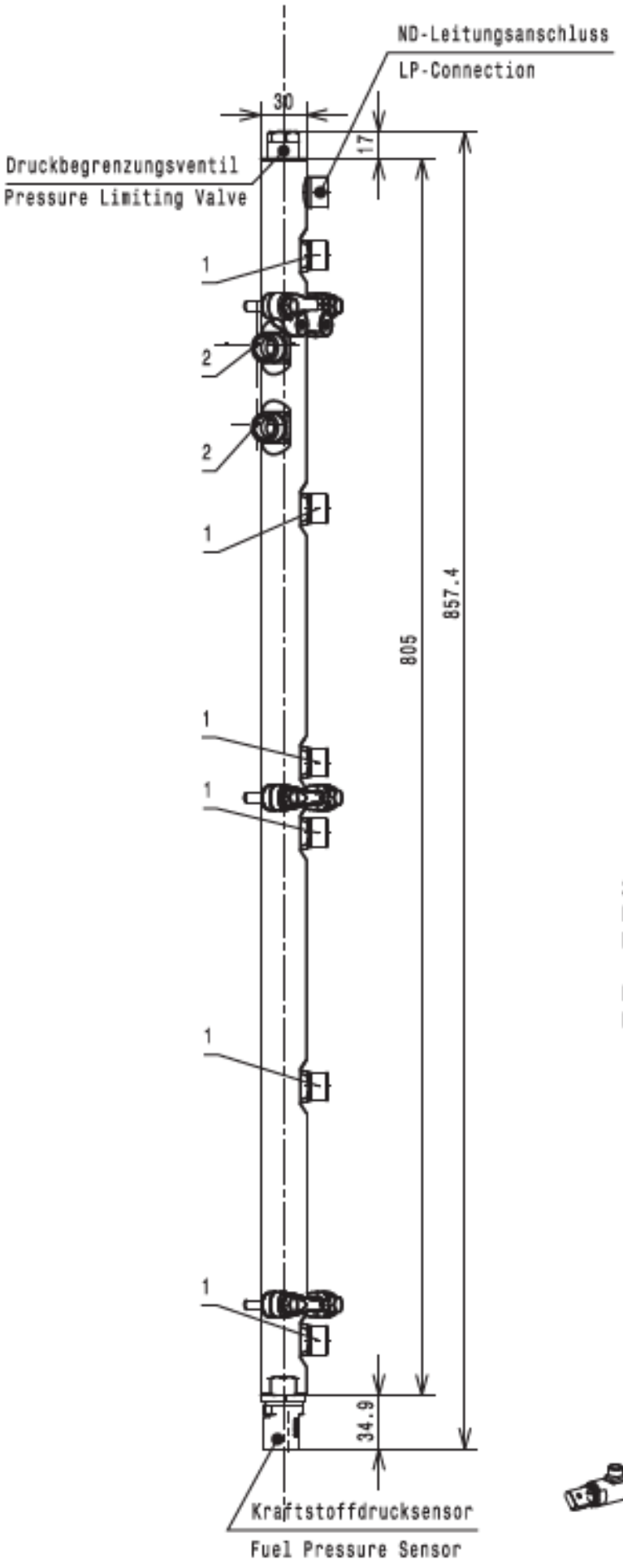
Isoliermaterial mit Zertifizierungsnr: RA 2002*
Insulating material certification Nr.: RA 2002*

mindestens zu isolierende Länge: 80%
min. isolated length should be : 80%

*wahlweise Wärmedurchlasswiderstand Silikatfaser
*optional thermal resistance silicate fibre

°C	100	200	300	400	500	600	700	800	900
m²K/W	0,357**	0,288**	0,231**	0,183**	0,153**	0,126**	0,101**	0,086**	0,079**

**Werte entsprechen Mindestanforderungen
**Values are minimum requirements



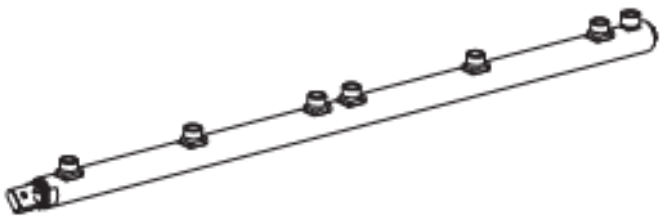
1
HD-Leitungsanschluss
Rail-Injektor mit Drossel Φ 2,4mm (6x)

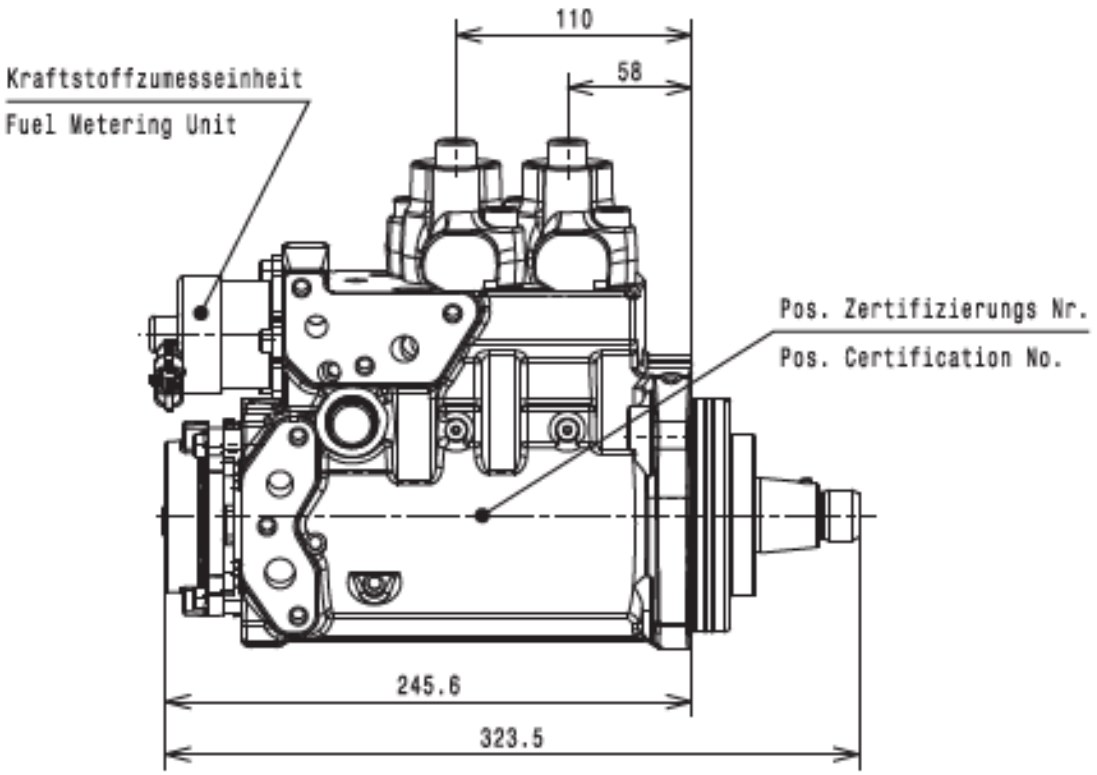
HP-Connection
Pipe To Injector With Throttle Φ 2,4mm (6x)

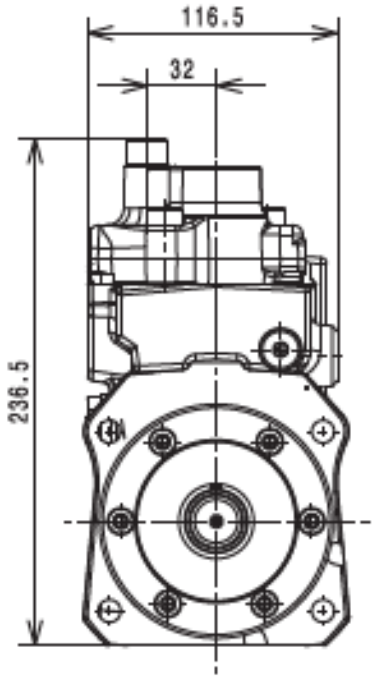
2
HD-Leitungsanschluss
Rail-Pumpe mit Drossel Φ 2,05mm (2x)

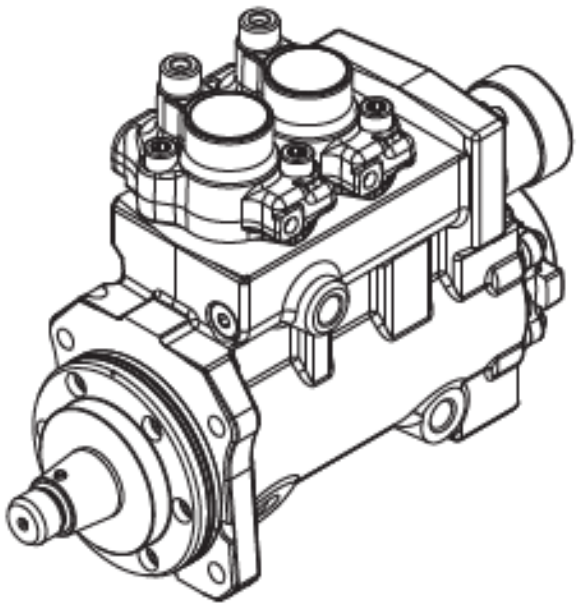
HP-Connection
Pipe To Pumpe With Throttle Φ 2,05mm (2x)

Zertifizierungs Nr. CA 2006
Certification No. CA 2006



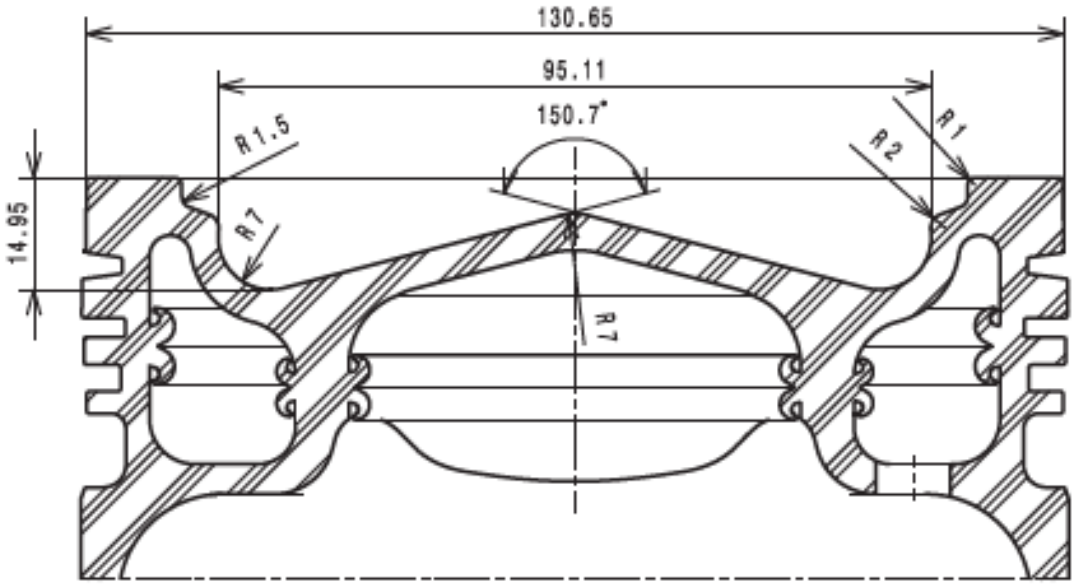


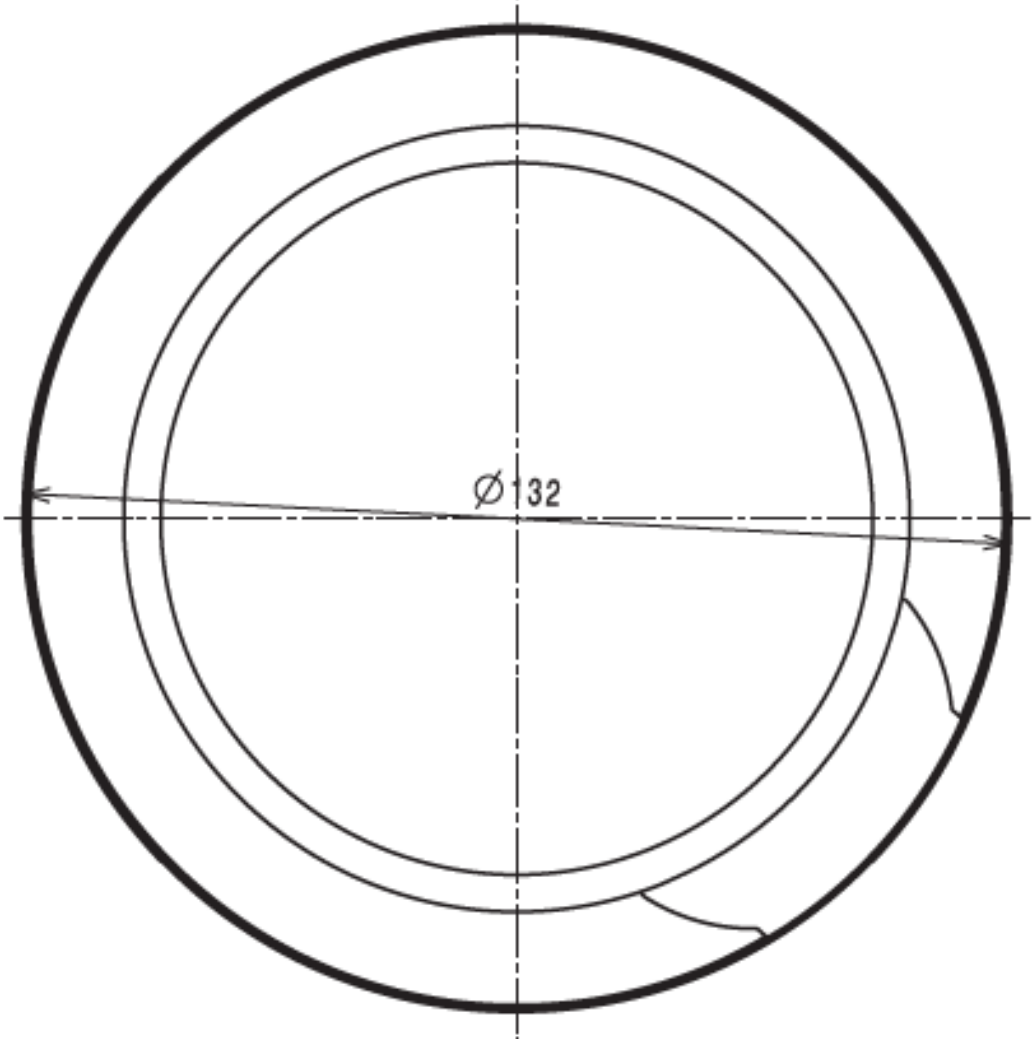




Zertifitierungs Nr. PH 2003
Certification No. PH 2003

Kolbenmulde OM 471 FE1 Piston cown OM 471 FE1	T 0 738

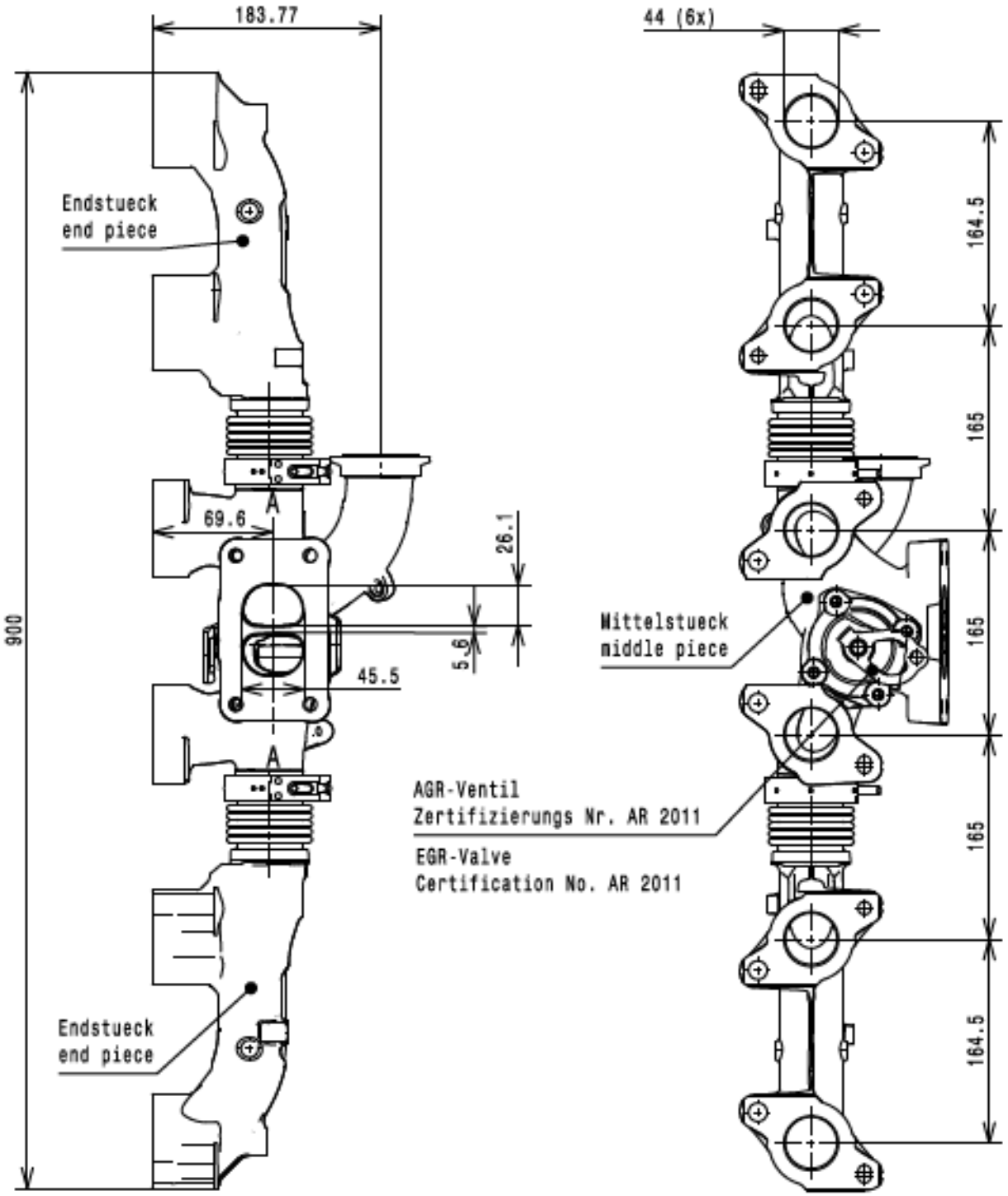


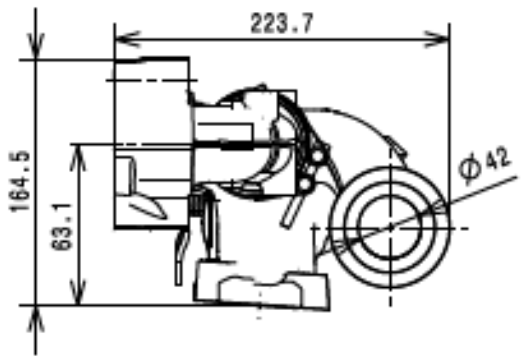


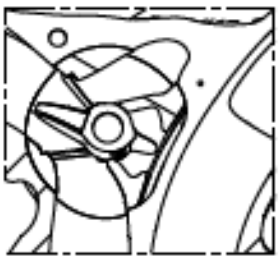
Daimler AG	Abteilung: TG/LPS	Ausg.-Datum: 22.10.2014 Stand: 22.10.2014

Abgaskruemmer komplett mit AGR-Ventil OM 47x FE1
Exhaust Gas Manifold complete with EGR-Valve OM 47xFE1

T 0 739

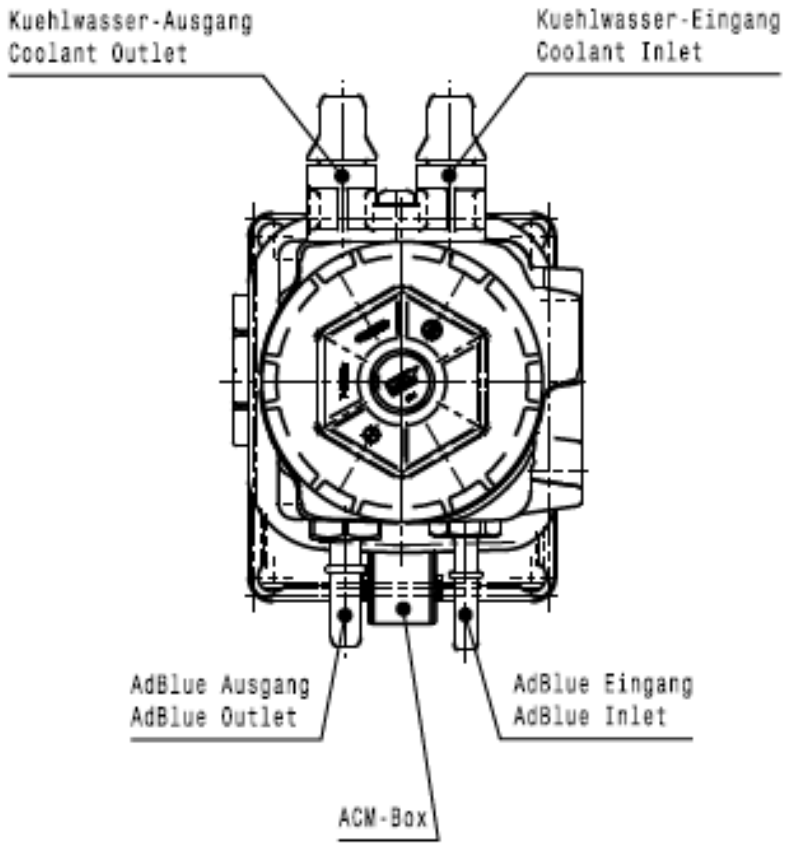






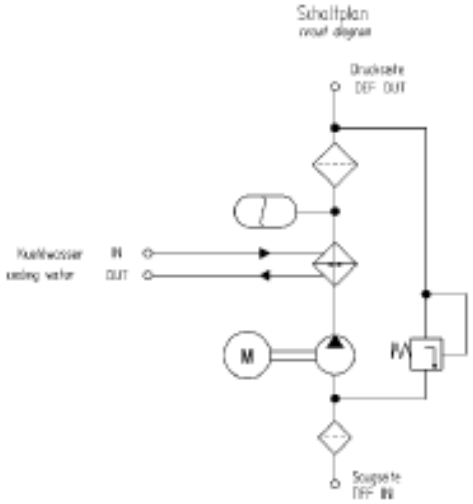
Detail A - A

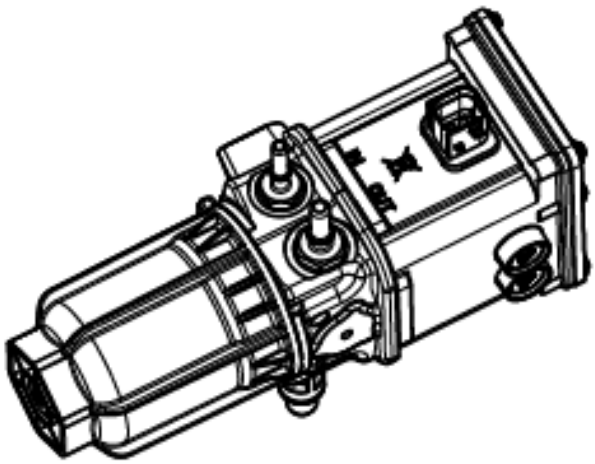
Daimler AG	Abteilung: TG/ECS	Ausg.-Datum: 11.11.2014 Stand: 11.11.2014



LU Versorgungseinheit 12/24 V
LU Supply Unit 12/24 V

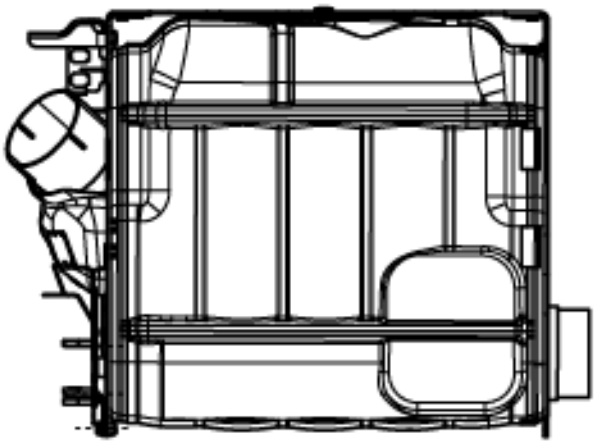
Lagertemperatur: -40°C bis +85°C [max. 90°C (einmalig fuer 120min. ohne Funktion)]
Storage Temperature: -40°C Until +85°C [max. 90°C (uniquely for 120min. Without Function)]

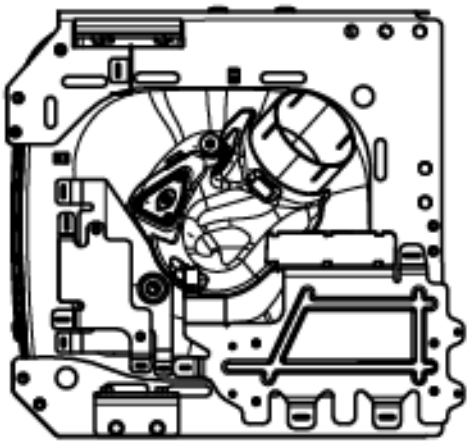




Repräsentativer SCR Katalysator (SC 2100)
Presentable SCR Catalyst (SC 2100)

T 0 759

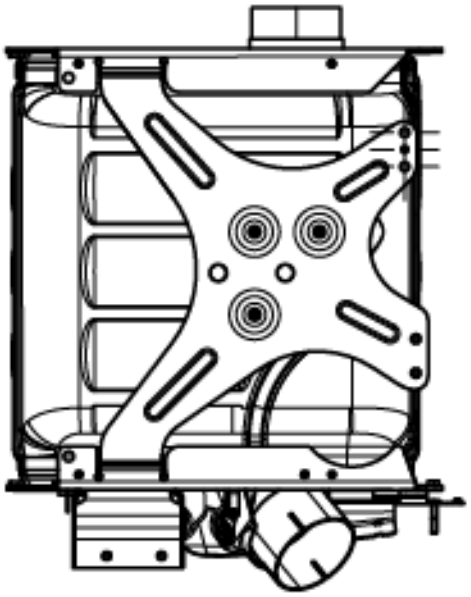




Material/.....: Rostfreier Edelstahl/
Material Stainless steel

Bauart/.....: Resonanz-Absorptions-Schalldämpfer/
Type Muffler

Volumen/.....: 240 l
Volume



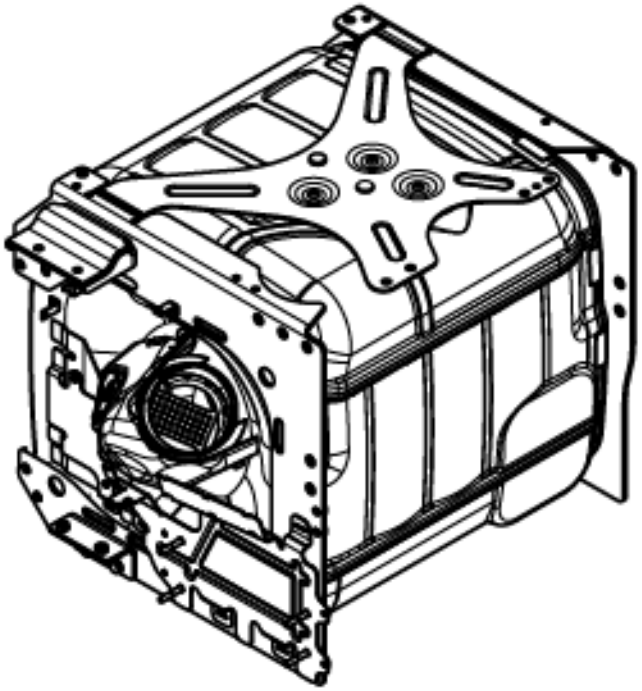
Katalysator / Catalyst

Zellendichte/.....: 300 cpsi
cell density

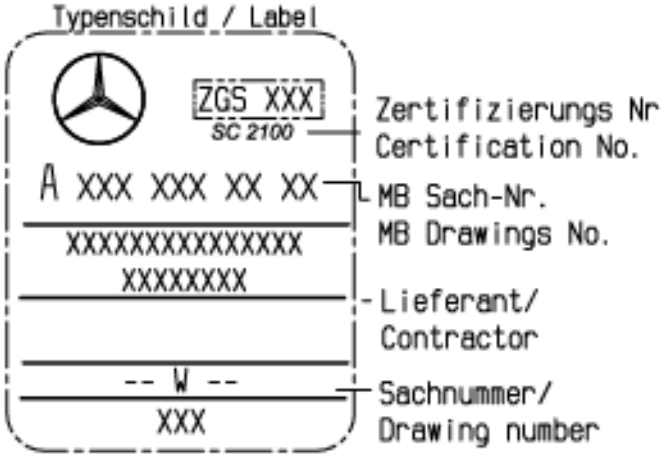
Beschichtung.....: nein / no
mit Edelmetall/
coating with
precious metal

Maße, Volumen/.....: 4 x Φ8,5" x 6,0" = 22 ltr.
Dimensions, Volume Zylindrisch / cylindric

Trägerkörper/.....: Keramik, Wabe/
Catalyst substrate Ceramic,comb



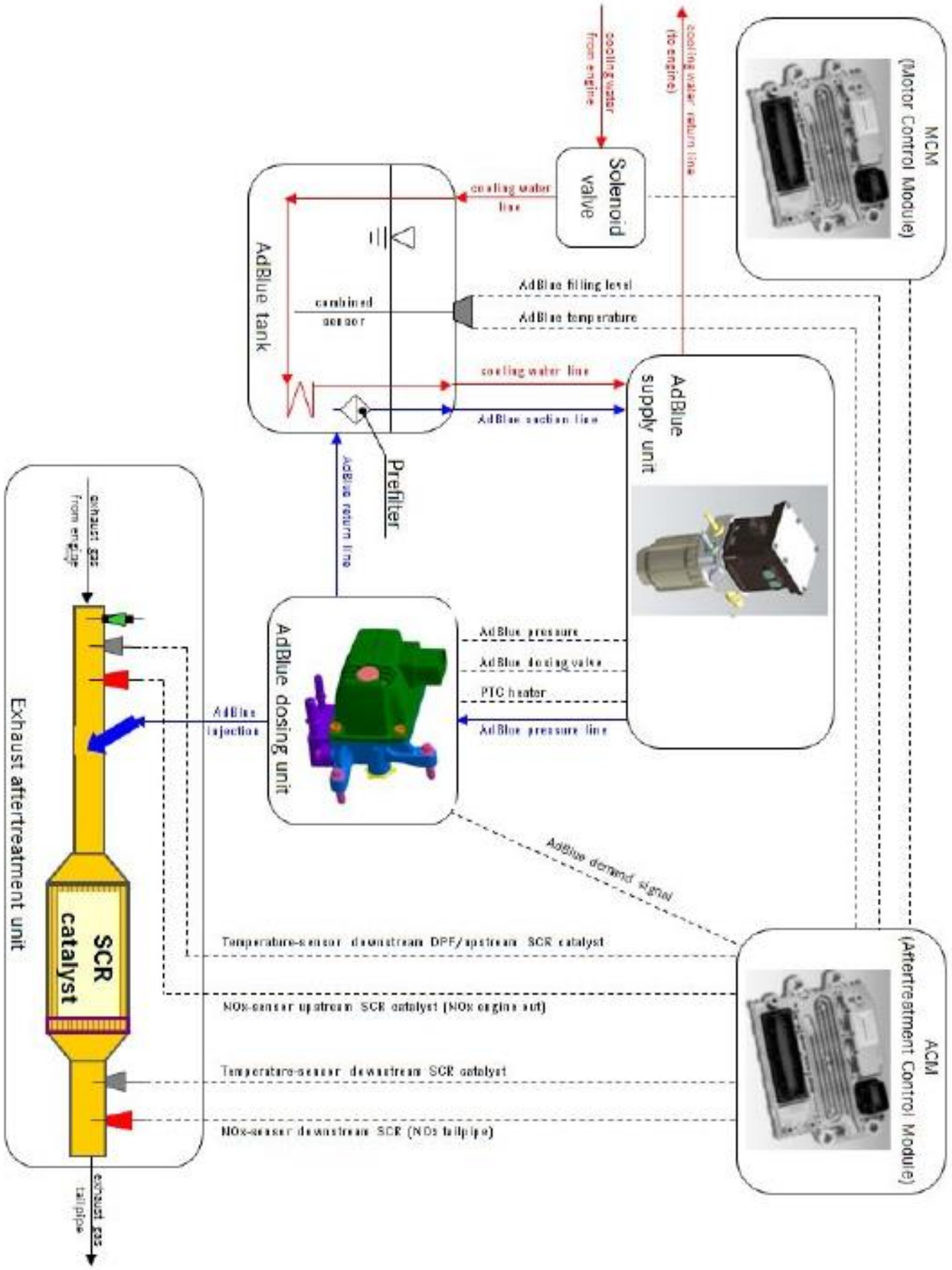
Typenschild / Label



Daimler AG	Abteilung: TG/LPS	Ausg.-Datum: 22.03.2016 Stand: 23.10.2019

Funktionsschema Abgasemission OM 47x Euro V DG FLO
Function Diagram for exhaust emission OM 47x Euro V DG FLO

T 0 760



Daimler AG	Abteilung: TG/LPS	Ausg.-Datum: 02.11.2015 Stand: 02.11.2015