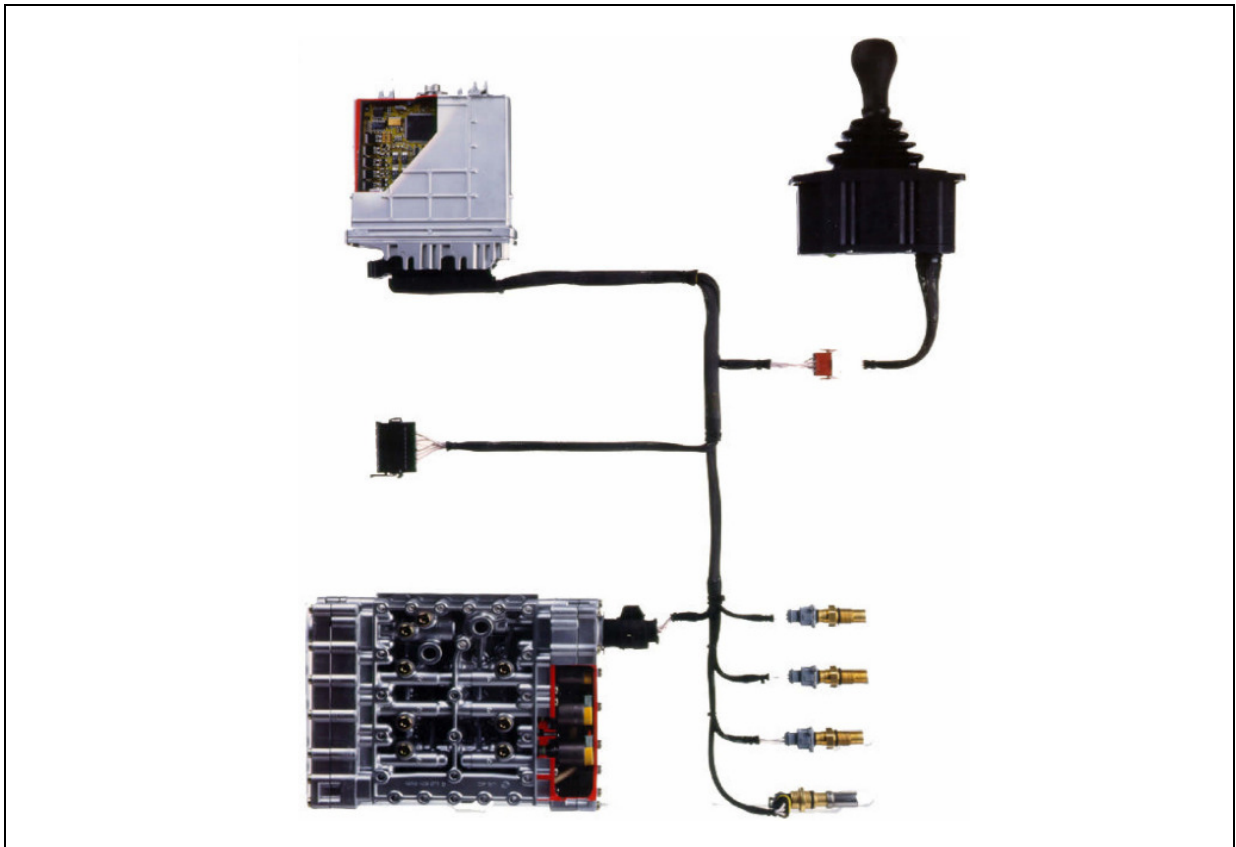




Error Code List

Ergopower- EST37/A

V-918



Order-No.: 5872 933 026



ZF Passau GmbH
Donaustr. 25 - 71
D-94030 Passau

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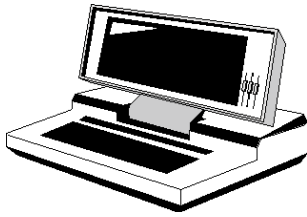
Table of fault codes

Measuring of resistance at actuator/sensors and cable

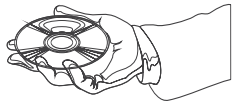
Abbreviation



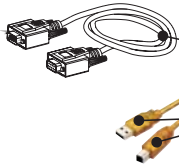
DIAGNOSE - AND PROGRAMMING ERGOPOWER with EST - 37A and DPA-05



Pentium Laptop least 1,0 GHz
Windows 98.2 / Me or NT
Windows 2000 / or Win XP



Software on CD
Testman Pro + Application
EST-37 ERGOPOWER
WG 110 up to WG 310
5870 220 017



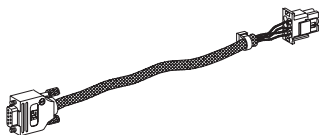
Adaptecable
6008 308 601 = RS 232
6008 207 026 = USB



Programming adapter
DPA - 05



Adaptecable
6008 207 023
6008 207 024
6029 017 005 EST-37



Diagnosis software on CD-ROM for ERGOPOWER

EST - 37	EST - 37	EST - 37	EST - 37
WG 110	WG 130/131	WG 190/191	WG 260/261
WG 115	WG 160/161	WG 210/211	WG 310/311

Language Versions : ENGLISH / FRANCE / GERMAN / ITALIAN

Diagnose - Set
5870 220 703

Wight : 2.060 kg

Data sheet for WG- 110-211

Data of the 3 Inductive transmitter of Engine, turbine and Central gear train:

- ⇒ Resistance: 1050 Ohm ($\pm 10\%$) at 20 °C
- ⇒ Temperature range: -40 °C ⇒ +150 °C
- ⇒ Torque limit: 30 Nm

Data for the Hall-Sensor of the Output:

- ⇒ Temperature range: -40 °C ⇒ +150 °C
- ⇒ Working range: 2 Hz ⇒ 5 KHz
- ⇒ Supply voltage: 24V

Data for the Proportional valves:

- ⇒ Resistance: 19 Ohm ($\pm 10\%$) at 20°C
- ⇒ Current: 100 ⇒ 500 mA
- ⇒ Pressure range: 0,8 bar ⇒ 8,3 bar

Data for the Lock-up solenoid valve:

- ⇒ Resistance: 60 Ohm ⇒ 80 Ohm
- ⇒ Current: 0,25 A ⇒ 0,35 A
- ⇒ Voltage: 24 V

Data for the Lock-up Proportional valve:

- ⇒ Resistance: 10,5 Ohm ($\pm 10\%$) at 20°C
- ⇒ Current: 0 ⇒ 926 mA
- ⇒ Pressure range: 0 bar ⇒ 15 bar

Data sheet for WG-260-311

Data of the 3 Inductive transmitter of Engine, turbine and Central gear train:

- ⇒ Resistance: 1050 Ohm ($\pm 10\%$) at 20 °C
- ⇒ Temperature range: -40 °C ⇒ +150 °C
- ⇒ Torque limit: 30 Nm
- ⇒ Gap: → Engine- and Turbinetransmitter: $0,5^{+0,3}$ mm
 → Central gear train: $0,3^{\pm 0,1}$ mm

Data for the Hall-Sensor of the Output:

- ⇒ Temperature range: -40 °C ⇒ +150 °C
- ⇒ Working range: 2 Hz ⇒ 5 KHz
- ⇒ Supply voltage: 24V
- ⇒ Gap: $1,0^{+0,5}$ mm

Data for the Proportional valves:

- ⇒ Resistance: 19 Ohm ($\pm 10\%$) at 20°C
- ⇒ Current: 100 ⇒ 500 mA
- ⇒ Pressure range: 0,8 bar ⇒ 8,3 bar

Data for the Lock-up solenoid valve:

- ⇒ Resistance: 60 Ohm ⇒ 80 Ohm
- ⇒ Current: 0,25 A ⇒ 0,35 A
- ⇒ Voltage: 24 V

Data for the Lock-up Proportional valve:

- ⇒ Resistance: 10,5 Ohm ($\pm 10\%$) at 20°C
- ⇒ Current: 0 ⇒ 926 mA
- ⇒ Pressure range: 0 bar ⇒ 15 bar

General data sheet for WG 130 → 310

Data for temperature sensors:

- ⇒ Sump: 1000 Ohm → 1500 Ohm
- ⇒ Retarder: 800 Ohm → 1500 Ohm

Data for solenoid valve:

- ⇒ Lock – up clutch:
 - Resistance: 60 Ohm → 80 Ohm
 - Current: 0,25 A → 0,35 A
 - Voltage: 24 V

Data forr:

- ⇒ Control pressure: 16^{+2} bar
- ⇒ Lubrication pressure: 0,2 → 1,5 bar
- ⇒ Pressure before the converter:
 - 130/160: max. 9 bar
 - 190/210: max. 9 bar
 - 260/310: max. 8,5 bar
- ⇒ Pressure behind the :
converter
 - 130/160: max. 3,5 bar
 - 190/210: max. 3,5 bar
 - 260/310: max. 5 bar
- ⇒ Oil-flow from the pump:
 - 130/160: 80 l/min bei $n = 2000 \text{ min}^{-1}$
 - 190/210: 105 l/min bei $n = 2000 \text{ min}^{-1}$
 - 260/310: 115 l/min bei $n = 2000 \text{ min}^{-1}$

1. Description of the fault codes for ERGO-Control EST-37/A

1.0 Introduction

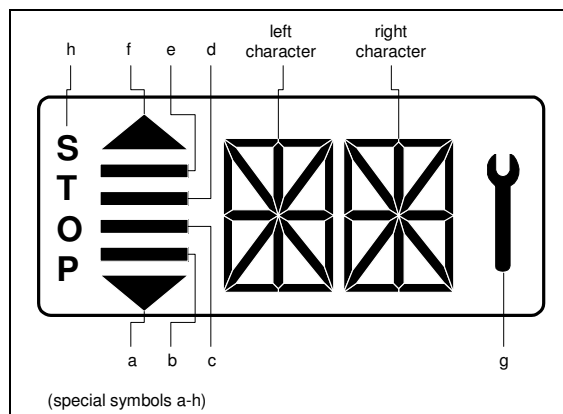
1.1 Abbreviations

o.c.	open circuit
s.c.	short circuit
OP-Mode	operating mode
TCU	transmission control unit
EEC	electronic engine controller
PTO	power take off

1.2 ZF - Display:

If a fault is detected, the display shows a spanner symbol (g) for a fault. The display shows the fault code, if the gear selector is on neutral position.

If more than one fault is detected, each fault code is shown for about 1 second.



1.3 Display during operation

Symbol	meaning	remarks
1F, 1R 2F, 2R 3F, 3R 4F 5F 6F LF, LR	actual gear and direction left digit shows actual gear right digit shows actual direction limp home gear	

F or R, no gear	Clutch Cutoff	
F or R flashing	direction F or R selected while turbine speed is too high	CAUTION gear will engage if turbine speed drops
NN	not neutral, waiting for neutral after power up or a severe fault	to engage a gear, first move shift selector to neutral position and again to F or R position
**	oil temperature too low, no gear available	warm up engine / transmission
*N	oil temperature low, only one gear available	warm up engine / transmission
1 bar (special symbol)	manual mode 1 st gear	
2 bars	manual mode 2 nd gear	
3 bars	manual mode 3 rd gear	
4 bars	manual mode 4 th gear and also 5 th and 6 th gear in 6WG	
4 bars and 2 arrows	automatic mode	
Bars flashing	6 WG: converter lockup clutch open 4 WG: Downshift mode activ	difference of engine and turbine speed above a certain limit and lockup clutch not activated
Spanner	at least one fault activ	select neutral to get fault code displayed
Fault code	see faultcode list	
WS	warning sump temperature	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WR	warning retarder temperature	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WT	warning torque converter temperature	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WE	warning high engine speed	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WV	warning high output speed (velocity)	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WL	warning high transmission input torque (load)	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
WO	warning high transmission output torque (load)	changes between actual gear/direction while driving, in neutral only displayed if no fault is detected (spanner)
PN	direction F or R selected while parking brake engaged	transmission in neutral until parking brake is released CAUTION: vehicle starts to move after release of parking brake
EE flashing	no communication with display	checked wiring from TCU to display

1.4 Display during AEB-Mode

symbol	meaning	remarks
PL	AEB - Starter is plugged at the diagnostic plug	
ST	AEB-Starter-button is pressed	
K1..K4,KV,KR	calibrating clutch K1..K4, KV or KR resp.	
_ and Kx	wait for start, initialization of clutch Kx, x: 1, 2, 3, 4, V, R	
≡ and Kx	fast fill time determination of clutch Kx	
= and Kx	compensating pressure determination of clutch Kx	
OK	calibration for all clutches finished	Transmissions stays in neutral, you have to restart the TCU (ignition off/on) after removing AEB-Starter
STOP	AEB canceled (activation stopped)	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
STOP and Kx	AEB stopped, clutch Kx can't be calibrated	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
Spanner and Kx	Kx couldn't be calibrated, AEB finished	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
Δ E	engine speed too low, ⇒ raise engine speed	
∇ E	engine speed too high, ⇒ lower engine speed	
Δ T	transmission oil temperature too low, ⇒ heat up transmission	
∇ T	transmission oil temperature too high ⇒ cool down transmission	
FT	transmission temperature not in defined range during calibration	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
FB	operating mode not NORMAL or transmission temperature sensor defective or storing of Calibrated values to EEPROM-has failed.	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
FO	Outputspeed_not_zero	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
FN	Shift lever not in Neutral position	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
FP	Parkbrake_not_applied	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)
STOP	AEB - Starter was used incorrect or is defective. Wrong device or wrong cable used	Transmissions stays in neutral, you have to restart the TCU (ignition off/on)

1.5 Display during Inchpedal Calibration

symbol	meaning	remarks
IP ↓	push down the pedal slowly until endposition is reached and hold this position	
IP ↑	Release the pedal slowly until endposition is reached	
IP ↑ flashing	A problem occurred, release the pedal slowly until endposition is reached	If the expected enposition could not be reached, release the pedal and try again
OK	Finished inchpedal calibration successful	
FN and Stop	Shift lever not in Neutral position	Calibration is aborted
FS and Stop	sensor supply voltage AU1 is out of the specified range	Calibration is aborted
FO and Stop	Outputspeed is not zero	Calibration is aborted
SL and Stop	sensor voltage below specified rangel	Calibration is aborted
SU and Stop	sensor voltage above specified rangel	Calibration is aborted
IL and Stop	sensor position for released pedal out of specified range	Calibration is aborted
IU and Stop	sensor position for pressed pedal out of specified range	Calibration is aborted
TO and Stop	time-out calibration, pedal not moved after calibration start	Calibration is aborted
DL and Stop	angle between pedalpositions released and pressed to small	Calibration is aborted
DU and Stop	angle between pedalpositions released and pressed to big	Calibration is aborted
FI and Stop	sensor signal 1 and 2 don't match together	Calibration is aborted

2. Definition of operating modes

NORMAL:

There's no failure detected in the transmission-system or the failure has no or slight effects on transmission control. TCU will work without or in special cases with little limitations. (see following table)

SUBSTITUTE CLUTCH CONTROL:

TCU can't change the gears or the direction under the control of the normal clutch modulation. TCU uses the substitute strategy for clutch control. All modulations are only time controlled. (Comparable with EST 25)

LIMP-HOME:

The detected failure in the system has strong limitations to transmission control. TCU can engage only one gear in each direction. In some cases only one direction will be possible. TCU will shift the transmission into neutral at the first occurrence of the failure. First, the operator must shift the gear selector into neutral position.

If output speed is less than a threshold for neutral to gear and the operator shifts the gear selector into forward or reverse, the TCU will select the limp-home gear .

If output speed is less than a threshold for reversal speed and TCU has changed into the limp-home gear and the operator selects a shuttle shift, TCU will shift immediately into the limp-home gear of the selected direction.

If output speed is greater than the threshold, TCU will shift the transmission into neutral. The operator has to slow down the vehicle and must shift the gear selector into neutral position.

TRANSMISSION-SHUTDOWN:

TCU has detected a severe failure that disables control of the transmission.

TCU will shut off the solenoid valves for the clutches and also the common power supply (VPS1). Transmission shifts to Neutral. The park brake will operate normally, also the other functions which use ADM 1 to ADM 8.

The operator has to slow down the vehicle. The transmission will stay in neutral.

TCU-SHUTDOWN:

TCU has detected a severe failure that disables control of system.

TCU will shut off all solenoid valves and also both common power supplies (VPS1, VPS2).

The park brake will engage, also all functions are disabled which use ADM 1 to ADM 8.

The transmission will stay in neutral.

3. Table of fault codes

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
11	LOGICAL ERROR AT GEAR RANGE SIGNAL TCU detected a wrong signal combination for the gear range <ul style="list-style-type: none"> • <i>cable from shift lever to TCU is broken</i> • <i>cable is defective and is contacted to battery voltage or vehicle ground</i> • <i>shift lever is defective</i> 	TCU shifts transmission to neutral OP-Mode: transmission shutdown	<ul style="list-style-type: none"> • check the cables from TCU to shift lever • check signal combinations of shift lever positions for gear range 	failure cannot be detected in systems with DW2/DW3 shift lever fault is taken back if TCU detects a valid signal for the position
12	LOGICAL ERROR AT DIRECTION SELECT SIGNAL TCU detected a wrong signal combination for the direction <ul style="list-style-type: none"> • <i>cable from shift lever to TCU is broken</i> • <i>cable is defective and is contacted to battery voltage or vehicle ground</i> • <i>shift lever is defective</i> 	TCU shifts transmission to neutral OP-Mode: transmission shutdown	<ul style="list-style-type: none"> • check the cables from TCU to shift lever • check signal combinations of shift lever positions F-N-R 	fault is taken back if TCU detects a valid signal for the direction at the shift lever
13	LOGICAL ERROR AT ENGINE DERATING DEVICE TCU detected no reaction of engine while derating device activ	after selecting neutral, TCU changes to OP-Mode limp home	<ul style="list-style-type: none"> • check engine derating device 	This fault is reset after power up of TCU
14	LOGICAL ERROR AT PARKBRAKE STATUS Parkbrake-status-signal measured by TCU and parkbrake-status-signal send by CAN don't fit <ul style="list-style-type: none"> • <i>one of the cables from status-switch to electronic box is broken</i> • <i>one of the status-switches is defective</i> 	TCU shifts transmission to DCO-State OP-Mode: normal	<ul style="list-style-type: none"> • check the cables from electronic boxes to status switches • check signals of the status switches 	
15	LOGICAL ERROR AT DIRECTION SELECT SIGNAL 2. SHIFT LEVER TCU detected a wrong signal combination for the direction <ul style="list-style-type: none"> • <i>cable from shift lever 2 to TCU is broken</i> • <i>cable is defective and is contacted to battery voltage or vehicle ground</i> • <i>shift lever is defective</i> 	TCU shifts transmission to neutral if selector activ OP-Mode: transmission shutdown if selector activ	<ul style="list-style-type: none"> • check the cables from TCU to shift lever 2 • check signal combinations of shift lever positions F-N-R 	fault is taken back if TCU detects a valid neutral signal for the direction at the shift lever

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
16	LOGICAL ERROR AT AXLE CONNECTION feedback axle connection measured by TCU and output signal axle connection don't fit <ul style="list-style-type: none"> • <i>axle can't be connected or disconnected due to mechanical problem</i> • <i>one of the cables from feedback axle connection - switch to TCU is broken</i> 	OP-Mode: normal	<ul style="list-style-type: none"> • check the cables from TCU to feedback axle connection switch • check signals of the feedback axle connection switch 	
17	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 1 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>customer specific function no. 1 device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 1 device • check the connectors from customer specific function no. 1 to TCU • check the resistance of customer specific function no. 1 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
18	S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 1 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>customer specific function no. 1 device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 1 device • check the connectors from customer specific function no. 1 to TCU • check the resistance of customer specific function no. 1 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
19	O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 1 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>customer specific function no. 1 device has an internal defect</i> • <i>connector has no connection to TCU</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 1 device • check the connectors from customer specific function no. 1 device to TCU • check the resistance of customer specific function no. 1 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
1A	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 2 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>customer specific function no. 2 device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 2 device • check the connectors from customer specific function no. 2 device to TCU • check the resistance of customer specific function no. 2 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
1B	S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 2 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>customer specific function no. 2 device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 2 device • check the connectors from customer specific function no. 2 device to TCU • check the resistance of customer specific function no. 2 device 	
1C	O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 2 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>customer specific function no. 2 device has an internal defect</i> • <i>connector has no connection to TCU</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 2 device • check the connectors from customer specific function no. 2 device to TCU • check the resistance of customer specific function no. 2 device 	
1D	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 3 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>customer specific function no. 3 device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 3 device • check the connectors from customer specific function no. 3 device to TCU • check the resistance of customer specific function no. 3 device 	
1E	S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 3 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>customer specific function no. 3 device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific customer specific function no. 3 device • check the connectors from customer specific function no. 3 device to TCU • check the resistance of customer specific function no. 3 device 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
1F	O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 3 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>customer specific function no. 3 device has an internal defect</i> • <i>connector has no connection to TCU</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 3 device • check the connectors from customer specific function no. 3 device to TCU • check the resistance of customer specific function no. 3 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
21	S.C. TO BATTERY VOLTAGE AT CLUTCH CUTOFF INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>clutch cut off sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	clutch cutoff function is disabled OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the clutch cutoff sensor 	
22	S.C. TO GROUND OR O.C. AT CLUTCH CUTOFF INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>cable has no connection to TCU</i> • <i>clutch cut off sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground or is broken</i> 	clutch cutoff function is disabled OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the clutch cutoff sensor 	
23	S.C. TO BATTERY VOLTAGE AT LOAD SENSOR INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>load sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	retarder function is affected TCU uses default load OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the load sensor sensor • check the assembly tolerances of load sensor 	availability of retarder depends on default load
24	S.C. TO GROUND OR O.C. AT LOAD SENSOR INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>cable has no connection to TCU</i> • <i>load sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground or is broken</i> 	retarder function is affected TCU uses default load OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the load sensor sensor • check the assembly tolerances of load sensor 	availability of retarder depends on default load

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
25	S.C. TO BATTERY VOLTAGE OR O.C. AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>temperature sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or is broken</i> 	no reaction, TCU uses default temperature OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the temperature sensor 	
26	S.C. TO GROUND AT TRANSMISSION SUMP TEMPERATURE SENSOR INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>temperature sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction, TCU uses default temperature OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the temperature sensor 	
27	S.C. TO BATTERY VOLTAGE OR O.C. AT RETARDER / TORQUECONVERTER TEMPERATURE SENSOR INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>temperature sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or is broken</i> 	no reaction, TCU uses default temperature OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the temperature sensor 	
28	S.C. TO GROUND AT RETARDER / TORQUECONVERTER TEMPERATURE SENSOR INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>temperature sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction, TCU uses default temperature OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the temperature sensor 	
29	S.C. TO BATTERY VOLTAGE OR O.C. AT PARKING BRAKE SENSOR INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or is broken</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the parking brake sensor 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
2A	S.C. TO GROUND PARKING BRAKE SENSOR INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the parking brake sensor 	
2B	INCHSENSOR-SIGNAL MISMATCH the measured voltage from CCO and CCO2 signal don't match: <ul style="list-style-type: none"> • <i>cable is defective</i> • <i>sensor has an internal defect</i> 	During inching mode: TCU shifts to neutral While not inching: no change OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check sensor 	
2C	S.C. TO BATTERY VOLTAGE OR O.C. AT DLM TRACTION ADJUST DASHBOARD DEVICE INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or is broken</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the DLM Traction Adjust dashboard device 	
2D	S.C. TO GROUND DLM TRACTION ADJUST DASHBOARD DEVICE INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the DLM Traction Adjust dashboard device 	
2E	S.C. TO BATTERY VOLTAGE OR O.C. AT DLM STEERING ANGLE SENSOR INPUT the measured voltage is too high: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or is broken</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the DLM STEERING ANGLE SENSOR 	
2F	S.C. TO GROUND DLM STEERING ANGLE SENSOR INPUT the measured voltage is too low: <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> 	TCU uses default value OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • <i>sensor has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 		<ul style="list-style-type: none"> • check the DLM STEERING ANGLE SENSOR 	
31	<p>S.C. TO BATTERY VOLTAGE OR O.C. AT ENGINE SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin</p> <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>speed sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or has no contact</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
32	<p>S.C. TO GROUND AT ENGINE SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin</p> <ul style="list-style-type: none"> • <i>cable / connector is defective and is contacted to vehicle ground</i> • <i>speed sensor has an internal defect</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
33	<p>LOGICAL ERROR AT ENGINE SPEED INPUT TCU measures a engine speed over a threshold and the next moment the measured speed is zero</p> <ul style="list-style-type: none"> • <i>cable / connector is defective and has bad contact</i> • <i>speed sensor has an internal defect</i> • <i>sensor gap has the wrong size</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap 	This fault is reset after power up of TCU
34	<p>S.C. TO BATTERY VOLTAGE OR O.C. AT TURBINE SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin</p> <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>speed sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or has no contact</i> 	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
35	S.C. TO GROUND AT TURBINE SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin <ul style="list-style-type: none"> • <i>cable / connector is defective and is contacted to vehicle ground</i> • <i>speed sensor has an internal defect</i> 	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
36	LOGICAL ERROR AT TURBINE SPEED INPUT TCU measures a turbine speed over a threshold and at the next moment the measured speed is zero <ul style="list-style-type: none"> • <i>cable / connector is defective and has bad contact</i> • <i>speed sensor has an internal defect</i> • <i>sensor gap has the wrong size</i> 	OP-Mode: substitute clutch control if a failure is existing at output speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap 	This fault is reset after power up of TCU
37	S.C. TO BATTERY VOLTAGE OR O.C. AT INTERNAL SPEED INPUT TCU measures a voltage higher than 7.00 V at speed input pin <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>cable has no connection to TCU</i> • <i>speed sensor has an internal defect</i> • <i>connector pin is contacted to battery voltage or has no contact</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
38	S.C. TO GROUND AT INTERNAL SPEED INPUT TCU measures a voltage less than 0.45V at speed input pin <ul style="list-style-type: none"> • <i>cable / connector is defective and is contacted to vehicle ground</i> • <i>speed sensor has an internal defect</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
39	LOGICAL ERROR AT INTERNAL SPEED INPUT TCU measures a internal speed over a threshold and at the next moment the measured speed is zero <ul style="list-style-type: none"> • <i>cable / connector is defective and has bad contact</i> • <i>speed sensor has an internal defect</i> • <i>sensor gap has the wrong size</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap 	This fault is reset after power up of TCU

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
3A	S.C. TO BATTERY VOLTAGE OR O.C. AT OUTPUT SPEED INPUT TCU measures a voltage higher than 12.5 V at speed input pin <ul style="list-style-type: none"> • cable is defective and is contacted to battery voltage • cable has no connection to TCU • speed sensor has an internal defect • connector pin is contacted to battery voltage or has no contact 	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
3B	S.C. TO GROUND AT OUTPUT SPEED INPUT TCU measures a voltage less than 1.00V at speed input pin <ul style="list-style-type: none"> • cable / connector is defective and is contacted to vehicle ground • speed sensor has an internal defect 	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor 	
3C	LOGICAL ERROR AT OUTPUT SPEED INPUT TCU measures a output speed over a threshold and at the next moment the measured speed is zero <ul style="list-style-type: none"> • cable / connector is defective and has bad contact • speed sensor has an internal defect • sensor gap has the wrong size 	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the cable from TCU to the sensor • check the connectors • check the speed sensor • check the sensor gap 	This fault is reset after power up of TCU
3D	TURBINE SPEED ZERO DOESN'T FIT TO OTHER SPEED SIGNALS	-	-	not used
3E	OUTPUT SPEED ZERO DOESN'T FIT TO OTHER SPEED SIGNALS if transmission is not neutral and the shifting has finished, TCU measures outputspeed zero and turbine speed or internal speed not equal to zero. <ul style="list-style-type: none"> • speed sensor has an internal defect • sensor gap has the wrong size 	special mode for gear selection OP-Mode: substitute clutch control if a failure is existing at turbine speed, TCU shifts to neutral OP-Mode: limp home	<ul style="list-style-type: none"> • check the sensor signal of output speed sensor • check the sensor gap of output speed sensor • check the cable from TCU to the sensor 	This fault is reset after power up of TCU

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
40	GEAR RANGE RESTRICTION SIGNAL CAN signal for gear range restriction is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	no gear range restriction	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
40	FCAN MESSAGE 'GEAR RANGE SELECT (ZF_3_IDENT)' contains invalid data	gear range set from 1 st to 5 th	<ul style="list-style-type: none"> • check FWD controller • check wire of CAN-Bus 	
41	DECLUTCH MODULATION SELECTION SIGNAL	-	-	not used
41	TCU RECEIVES MESSAGES 'GEAR RANGE SELECT (ZF_3_IDENT)' AND 'FRONT WHEEL DRIVE STATUS' (V_IDENT_FWD) ALTHOUGH CONFIGURATION STATES THAT FWD CONTROLLER IS NOT INSTALLED	ignore FWD commands	<ul style="list-style-type: none"> • reconfigure with TCU Configuration Command (ID PC) 	
50	FMR1 TIMEOUT Timeout of CAN-message FMR1 from engine controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> • <i>engine controller is defective</i> 	TCU operates like jake brake is off and exhaust brake is off. OP-Mode: normal	<ul style="list-style-type: none"> • check engine controller • check wire of CAN-Bus • check cable to engine controller 	
51	FMR2 TIMEOUT Timeout of CAN-message FMR2 from engine controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> • <i>engine controller is defective</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check engine controller • check wire of CAN-Bus • check cable to engine controller 	
52	EAMODUL1 TIMEOUT Timeout of CAN-message EAM1 from I/O - controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU shifts to neutral and uses substitute gear selector OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
53	ABS TIMEOUT Timeout of CAN-message ABS from ABS - controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	no reaction	<ul style="list-style-type: none"> • check ABS controller • check wire of CAN-Bus • check cable to ABS controller 	
54	MDU1 TIMEOUT Timeout of CAN-message MDU1 from cluster controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU keeps old auto downshift information and old manual downshift information OP-Mode: normal	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
54	DCT1 TIMEOUT Timeout of CAN-message DCT1 from display computer <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	OP-Mode: normal	<ul style="list-style-type: none"> • check display computer • check wire of CAN-Bus • check cable to display computer 	
54	GEAR RANGE SELECT TIMEOUT Timeout of CAN-message 'Gear Range Select (ZF_3_IDENT)' <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> • <i>FWD Controller is defective</i> 	gear range set from 1 st to 5 th	<ul style="list-style-type: none"> • check wire of CAN-Bus • check FWD controller 	
55	DNS1 TIMEOUT Timeout of CAN-message DNS1 from OMRON-master <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU shifts to neutral OP-Mode: normal	<ul style="list-style-type: none"> • check OMRON-master • check wire of CAN-Bus • check cable to OMRON-master 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
55	SCT1 TIMEOUT Timeout of CAN-message SCT1 from steering computer <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	OP-Mode: normal	<ul style="list-style-type: none"> • check steering computer • check wire of CAN-Bus • check cable to steering computer 	
55	FLC1 TIMEOUT Timeout of CAN-message FCL1 from cluster controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU keeps old auto/man selection, old Clutch cutoff selection and old Clutch Cutoff Setting OP-Mode: normal	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
55	FRONT WHEEL DRIVE STATUS TIMEOUT Timeout of CAN-message 'Front Wheel Drive Status (V_IDENT_FWD)' <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> • <i>FWD Controller is defective</i> 	TCU shifts to neutral	<ul style="list-style-type: none"> • check wire of CAN-Bus • check FWD controller 	
56	ENGINE CONF TIMEOUT Timeout of CAN-message ENGINE CONF from engine controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check engine controller • check wire of CAN-Bus • check cable to engine controller 	
57	EEC1 TIMEOUT Timeout of CAN-message EEC1 from EEC controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check EEC controller • check wire of CAN-Bus • check cable to EEC controller 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
58	EEC3 TIMEOUT Timeout of CAN-message EEC3 from EEC controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective an has contact to vehicle ground or battery voltage</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check EEC controller • check wire of CAN-Bus • check cable to EEC controller 	
59	TEST MODE SIGNAL CAN signal for test mode status is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	Testmode is aborted, if activ	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
5A	PARKBRAKE STATUS SIGNAL CAN signal for parkbrake status is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	no reaction ????	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
5B	SHIFT QUALITY SEL SIGNAL CAN signal for shift qualtiy selection is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 		<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	Not used
5C	AUTO DOWNSHIFT SIGNAL CAN signal for automatic downshift is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	last selection is kept	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
5D	MANUAL DOWNSHIFT SIGNAL CAN signal for manual downshift is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	last selection is kept	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to ???? controller 	
5E	CCO REQUEST SIGNAL CAN signal for CCO request is defective <ul style="list-style-type: none"> • <i>cluster controller is defective</i> • <i>interference on CAN-Bus</i> 	last selection is kept	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to ???? controller 	
5F	SHIFT LEVER SIGNAL CAN signal for shift lever is defective <ul style="list-style-type: none"> • <i>I/O controller is defective</i> • <i>interference on CAN-Bus</i> 	TCU shifts to neutral and uses informations from substitute shift lever OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
5F	TRANSMISSION NEUTRAL REQUEST SIGNAL CAN signal for transmission Neutral Request is defective <ul style="list-style-type: none"> • steering computer <i>is defective</i> • interference on CAN-Bus 	OP-Mode: normal	<ul style="list-style-type: none"> • check steering computer • check wire of CAN-Bus • check cable to steering computer 	
5F	CAN MESSAGE ' FRONT WHEEL DRIVE STATUS (V_IDENT_FWD)' CONTAINS INVALID DATA	TCU shifts to neutral	<ul style="list-style-type: none"> • check FWD controller 	
60	ADDITIONAL BRAKE STATUS SIGNAL CAN signal for additional park brake status is defective <ul style="list-style-type: none"> • I/O controller <i>is defective</i> • interference on CAN-Bus 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	
61	AEB REQUEST SIGNAL CAN signal for AEB request is defective <ul style="list-style-type: none"> • I/O controller <i>is defective</i> • interference on CAN-Bus 	no reaction OP-Mode: normal Last selection is kept	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	
62	PTO TORQUE SIGNAL CAN signal for PTO torque is defective <ul style="list-style-type: none"> • I/O controller <i>is defective</i> • interference on CAN-Bus 	no reaction, TCU uses default PTO torque signal OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	
63	DRIVING MODE SIGNAL CAN signal for driving mode is defective <ul style="list-style-type: none"> • I/O controller <i>is defective</i> • interference on CAN-Bus 	no reaction, TCU uses default driving mode signal OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	
64	STARTING GEAR SIGNAL CAN signal for starting gear is defective <ul style="list-style-type: none"> • I/O controller <i>is defective</i> • <i>(illegal starting gear)</i> • interference on CAN-Bus 	no reaction, TCU uses default starting gear OP-Mode: normal	<ul style="list-style-type: none"> • check I/O controller • check wire of CAN-Bus • check cable to I/O controller 	
65	ENGINE TORQUE SIGNAL CAN signal for engine torque is defective <ul style="list-style-type: none"> • engine controller <i>is defective</i> • interference on CAN-Bus 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check engine controller • check wire of CAN-Bus • check cable to engine controller 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
69	REFERENCE ENGINE TORQUE SIGNAL CAN signal for reference of engine torque is defective <ul style="list-style-type: none"> engine controller is defective interference on CAN-Bus 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> check engine controller check wire of CAN-Bus check cable to engine controller 	
6A	ACTUAL ENGINE TORQUE SIGNAL CAN signal for actual engine torque is defective <ul style="list-style-type: none"> engine controller is defective interference on CAN-Bus 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> check engine controller check wire of CAN-Bus check cable to engine controller 	
6B	NOM FRICTION TORQUE SIGNAL CAN signal for nominal friction torque is defective <ul style="list-style-type: none"> engine controller is defective interference on CAN-Bus 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> check engine controller check wire of CAN-Bus check cable to engine controller 	
6E	EEC2 TIMEOUT Timeout of CAN-message EEC2 from EEC controller <ul style="list-style-type: none"> interference on CAN-Bus CAN wire/connector is broken CAN wire/connector is defective and has contact to vehicle ground or battery voltage 	no reaction, TCU uses default signal accelerator pedal in idle position OP-Mode: normal	<ul style="list-style-type: none"> check EEC controller check wire of CAN-Bus check cable to EEC controller 	
71	S.C. TO BATTERY VOLTAGE AT CLUTCH K1 the measured resistance value of the valve is out of limit, the voltage at K1 valve is too high. <ul style="list-style-type: none"> cable / connector is defective and has contact to battery voltage regulator has an internal defect 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> check the cable from TCU to the gearbox check the connectors from TCU to the gearbox check the regulator resistance ¹⁾ check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
72	S.C. TO GROUND AT CLUTCH K1 the measured resistance value of the valve is out of limit, the voltage at K1 valve is too low. <ul style="list-style-type: none"> cable / connector is defective and has contact to vehicle ground cable / connector is defective and has contact to another regulator output of the TCU regulator has an internal defect 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> check the cable from TCU to the gearbox check the connectors from gearbox to TCU check the regulator resistance ¹⁾ check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
73	O.C. AT CLUTCH K1 the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • <i>cable / connector is defective and has no contact to TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
74	S.C. TO BATTERY VOLTAGE AT CLUTCH K2 the measured resistance value of the valve is out of limit, the voltage at K2 valve is too high. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to battery voltage</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
75	S.C. TO GROUND AT CLUTCH K2 the measured resistance value of the valve is out of limit, the voltage at K2 valve is too low. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to vehicle ground</i> • <i>cable / connector is defective and has contact to another regulator output of the TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
76	O.C. AT CLUTCH K2 the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • <i>cable / connector is defective and has no contact to TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
77	S.C. TO BATTERY VOLTAGE AT CLUTCH K3 the measured resistance value of the valve is out of limit, the voltage at K3 valve is too high. <ul style="list-style-type: none"> • cable / connector is defective and has contact to battery voltage • regulator has an internal defect • 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
78	S.C. TO GROUND AT CLUTCH K3 the measured resistance value of the valve is out of limit, the voltage at K3 valve is too low. <ul style="list-style-type: none"> • cable / connector is defective and has contact to vehicle ground • cable / connector is defective and has contact to another regulator output of the TCU • regulator has an internal defect 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
79	O.C. AT CLUTCH K3 the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • cable / connector is defective and has no contact to TCU • regulator has an internal defect 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
7A	S.C. TO BATTERY VOLTAGE AT CONVERTER CLUTCH	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the regulator resistance ¹⁾ 	
7B	S.C. TO GROUND AT CONVERTER CLUTCH	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the regulator resistance ¹⁾ 	
7C	O.C. AT CONVERTER CLUTCH	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the regulator resistance ¹⁾ 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
7D	S.C. TO GROUND AT ENGINE DERATING DEVICE <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>engine derating device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	engine derating will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine derating device • check the connectors from engine derating device to TCU • check the resistance ¹⁾ of engine derating device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
7E	S.C. TO BATTERY VOLTAGE AT ENGINE DERATING DEVICE <ul style="list-style-type: none"> • <i>cable / connector is defective and is contacted to battery voltage</i> • <i>engine derating device has an internal defect</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine derating device • check the connectors from backup alarm device to TCU • check the resistance ¹⁾ of backup alarm device 	
7F	O.C. AT ENGINE DERATING DEVICE TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>engine derating device has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine derating device • check the connectors from engine derating device to TCU • check the resistance ¹⁾ of engine derating device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
81	S.C. TO BATTERY VOLTAGE AT CLUTCH K4 the measured resistance value of the valve is out of limit, the voltage at K4 valve is too high. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to battery voltage</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
82	S.C. TO GROUND AT CLUTCH K4 the measured resistance value of the valve is out of limit, the voltage at K4 valve is too low. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to vehicle ground</i> • <i>cable / connector is defective and has contact to another regulator output of the TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
83	O.C. AT CLUTCH K4 the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • <i>cable / connector is defective and has no contact to TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
84	S.C. TO BATTERY VOLTAGE AT CLUTCH KV the measured resistance value of the valve is out of limit, the voltage at KV valve is too high. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to battery voltage</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
85	S.C. TO GROUND AT CLUTCH KV the measured resistance value of the valve is out of limit, the voltage at KV valve is too low. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to vehicle ground</i> • <i>cable / connector is defective and has contact to another regulator output of the TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
86	O.C. AT CLUTCH KV the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • <i>cable / connector is defective and has no contact to TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
87	S.C. TO BATTERY VOLTAGE AT CLUTCH KR the measured resistance value of the valve is out of limit, the voltage at KR valve is too high. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to battery voltage</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
88	S.C. TO GROUND AT CLUTCH KR the measured resistance value of the valve is out of limit, the voltage at KR valve is too low. <ul style="list-style-type: none"> • <i>cable / connector is defective and has contact to vehicle ground</i> • <i>cable / connector is defective and has contact to another regulator output of the TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
89	O.C. AT CLUTCH KR the measured resistance value of the valve is out of limit. <ul style="list-style-type: none"> • <i>cable / connector is defective and has no contact to TCU</i> • <i>regulator has an internal defect</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check the cable from TCU to the gearbox • check the connectors from gearbox to TCU • check the regulator resistance ¹⁾ • check internal wire harness of the gearbox 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
8A	S.C. TO GROUND AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors • check the resistance of valve 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
8B	S.C. TO BATTERY VOLTAGE AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors • check the resistance of valve 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
8C	O.C. AT DLM TRANSVERSAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • cable is defective and has no connection to TCU • device has an internal defect • connector has no connection to TCU 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors • check the resistance of valve 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
8D	S.C. TO GROUND AT DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • cable is defective and is contacted to vehicle ground • device has an internal defect • connector pin is contacted to vehicle ground 	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the device • check the connectors • check the resistance of device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
8E	S.C. TO BATTERY VOLTAGE AT DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • cable is defective and is contacted to battery voltage • device has an internal defect • connector pin is contacted to battery voltage 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the device • check the connectors • check the resistance of device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
8F	O.C. DLM INDICATOR LAMP OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • cable is defective and has no connection to TCU • device has an internal defect • connector has no connection to TCU 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the device • check the connectors • check the resistance of device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
91	S.C. TO GROUND AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • cable is defective and is contacted to vehicle ground • backup alarm device has an internal defect • connector pin is contacted to vehicle ground 	backup alarm will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU • check the resistance ¹⁾ of backup alarm device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
92	S.C. TO BATTERY VOLTAGE AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • cable is defective and is contacted to battery voltage • backup alarm device has an internal defect • connector pin is contacted to battery voltage 		<ul style="list-style-type: none"> • check the resistance ¹⁾ of backup alarm device 	
93	<p>O.C. AT RELAY REVERSE WARNING ALARM TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> • cable is defective and has no connection to TCU • backup alarm device has an internal defect • connector has no connection to TCU 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the backup alarm device • check the connectors from backup alarm device to TCU • check the resistance ¹⁾ of backup alarm device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
94	<p>S.C. TO GROUND AT RELAY STARTER INTERLOCK TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground</p> <ul style="list-style-type: none"> • cable is defective and is contacted to vehicle ground • starter interlock relay has an internal defect • connector pin is contacted to vehicle ground 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance ¹⁾ of starter interlock relay 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
95	<p>S.C. TO BATTERY VOLTAGE AT RELAY STARTER INTERLOCK TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage</p> <ul style="list-style-type: none"> • cable is defective and is contacted to battery voltage • starter interlock relay has an internal defect • connector pin is contacted to battery voltage 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance ¹⁾ of starter interlock relay 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
96	<p>O.C. AT RELAY STARTER INTERLOCK TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> • cable is defective and has no connection to TCU • starter interlock relay has an internal defect • connector has no connection to TCU 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the starter interlock relay • check the connectors from starter interlock relay to TCU • check the resistance ¹⁾ of starter interlock relay 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
97	<p>S.C. TO GROUND AT PARK BRAKE SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground</p> <ul style="list-style-type: none"> • cable is defective and is contacted to vehicle ground • park brake solenoid has an internal defect • connector pin is contacted to vehicle ground 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the park brake solenoid • check the connectors from park brake solenoid to TCU • check the resistance ¹⁾ of park brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
98	S.C. TO BATTERY VOLTAGE AT PARK BRAKE SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>park brake solenoid has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction optional: (some customers) TCU shifts to neutral caused by park brake feed back OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the park brake solenoid • check the connectors from park brake solenoid to TCU • check the resistance ¹⁾ of park brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
99	O.C. AT PARK BRAKE SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>park brake solenoid has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction optional: (some customers) TCU shifts to neutral caused by park brake feed back OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the park brake solenoid • check the connectors from park brake solenoid to TCU • check the resistance ¹⁾ of park brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
9A	S.C. TO GROUND AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>converter clutch solenoid has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance ¹⁾ of converter clutch solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
9B	O.C. AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>converter clutch solenoid has an internal defect</i> • <i>connector has no connection to TCU</i> 	converter clutch always open, retarder not available OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance ¹⁾ of converter clutch solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
9C	S.C. TO BATTERY VOLTAGE AT CONVERTER LOCK UP CLUTCH SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>converter clutch solenoid has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the converter clutch solenoid • check the connectors from converter clutch solenoid to TCU • check the resistance ¹⁾ of converter clutch solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
9D	S.C. TO GROUND AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the retarder solenoid • check the connectors from retarder solenoid to TCU 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
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	<ul style="list-style-type: none"> retarder solenoid has an internal defect connector pin is contacted to vehicle ground 		<ul style="list-style-type: none"> check the resistance ¹⁾ of retarder solenoid 	
9E	<p>O.C. AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> cable is defective and has no connection to TCU retarder solenoid has an internal defect connector has no connection to TCU 	<p>no reaction OP-mode: normal</p>	<ul style="list-style-type: none"> check the cable from TCU to the retarder solenoid check the connectors from retarder solenoid to TCU check the resistance ¹⁾ of retarder solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
9F	<p>S.C. TO BATTERY VOLTAGE AT RETARDER SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage</p> <ul style="list-style-type: none"> cable is defective and is contacted to battery voltage retarder solenoid has an internal defect connector pin is contacted to battery voltage 	<p>no reaction OP-mode: normal</p>	<ul style="list-style-type: none"> check the cable from TCU to the retarder solenoid check the connectors from retarder solenoid to TCU check the resistance ¹⁾ of retarder solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A1	<p>S.C. TO GROUND AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground</p> <ul style="list-style-type: none"> cable is defective and is contacted to vehicle ground difflock solenoid has an internal defect connector pin is contacted to vehicle ground 	<p>no reaction OP-mode: normal</p>	<ul style="list-style-type: none"> check the cable from TCU to the difflock solenoid check the connectors from difflock solenoid to TCU check the resistance ¹⁾ of difflock solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A2	<p>S.C. TO BATTERY VOLTAGE AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage</p> <ul style="list-style-type: none"> cable is defective and is contacted to battery voltage difflock solenoid has an internal defect connector pin is contacted to battery voltage 	<p>no reaction OP-mode: normal</p>	<ul style="list-style-type: none"> check the cable from TCU to the difflock solenoid check the connectors from difflock solenoid to TCU check the resistance ¹⁾ of difflock solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A3	<p>O.C. AT DIFFLOCK OR AXLE CONNECTION SOLENOID TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> cable is defective and has no connection to TCU difflock solenoid has an internal defect connector has no connection to TCU 	<p>no reaction OP-mode: normal</p>	<ul style="list-style-type: none"> check the cable from TCU to the difflock solenoid check the connectors from difflock solenoid to TCU check the resistance ¹⁾ of difflock solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
A4	S.C. TO GROUND AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>warning device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the warning device • check the connectors from warning device to TCU • check the resistance ¹⁾ of warning device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A5	O.C. AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>warning device has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the warning device • check the connectors from warning device to TCU • check the resistance ¹⁾ of warning device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A6	S.C. TO BATTERY VOLTAGE AT WARNING SIGNAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>warning device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the warning device • check the connectors from warning device to TCU • check the resistance ¹⁾ of warning device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A7	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 4 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>customer specific function no. 4 device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 4 device • check the connectors from customer specific function no. 4 device to TCU • check the resistance of customer specific function no. 4 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
A8	S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 4 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>customer specific function no. 4 device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 4 device • check the connectors from customer specific function no. 4 device to TCU • check the resistance of customer specific function no. 4 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
A9	O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 4 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>customer specific function no. 4 device has an internal defect</i> • <i>connector has no connection to TCU</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 4 device • check the connectors from customer specific function no. 4 device to TCU • check the resistance of customer specific function no. 4 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
AA	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 5 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>customer specific function no. 5 device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 5 device • check the connectors from customer specific function no. 5 device to TCU • check the resistance of customer specific function no. 5 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
AB	S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 5 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>customer specific function no. 5 device has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 5 device • check the connectors from customer specific function no. 5 device to TCU • check the resistance of customer specific function no. 5 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
AC	O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 5 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>customer specific function no. 5 device has an internal defect</i> • <i>connector has no connection to TCU</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to customer specific function no. 5 device • check the connectors from customer specific function no. 5 device to TCU • check the resistance of customer specific function no. 5 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
AD	S.C. TO GROUND AT CUSTOMER SPECIFIC FUNCTION NO. 6 TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> 	customer specific	<ul style="list-style-type: none"> • check the cable from TCU to function 6 device • check the connectors from customer specific function no. 6 device to TCU 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> customer specific function no. 6 device has an internal defect connector pin is contacted to vehicle ground 		<ul style="list-style-type: none"> check the resistance of function 6 device 	
AE	<p>S.C. TO BATTERY VOLTAGE AT CUSTOMER SPECIFIC FUNCTION NO. 6 TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage</p> <ul style="list-style-type: none"> cable is defective and is contacted to battery voltage customer specific function no. 6 device has an internal defect connector pin is contacted to battery voltage 	customer specific	<ul style="list-style-type: none"> check the cable from TCU to customer specific function no. 6 device check the connectors from customer specific function no. 6 device to TCU check the resistance of customer specific function no. 6 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
AF	<p>O.C. AT CUSTOMER SPECIFIC FUNCTION NO. 6 TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> cable is defective and has no connection to TCU customer specific function no. 6 device has an internal defect connector has no connection to TCU 	customer specific	<ul style="list-style-type: none"> check the cable from TCU to customer specific function no. 6 device check the connectors from customer specific function no. 6 device to TCU check the resistance of customer specific function no. 6 device 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
B1	<p>SLIPPAGE AT CLUTCH K1 TCU calculates a differential speed at closed clutch K1. If this calculated value is out of range, TCU interprets this as slipping clutch.</p> <ul style="list-style-type: none"> low pressure at clutch K1 low main pressure wrong signal at internal speed sensor wrong signal at output speed sensor wrong size of the sensor gap clutch is defective 	<p>TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown</p>	<ul style="list-style-type: none"> check pressure at clutch K1 check main pressure in the system check sensor gap at internal speed sensor check sensor gap at output speed sensor check signal at internal speed sensor check signal at output speed sensor replace clutch 	
B2	<p>SLIPPAGE AT CLUTCH K2 TCU calculates a differential speed at closed clutch K2. If this calculated value is out of range, TCU interprets this as slipping clutch.</p> <ul style="list-style-type: none"> low pressure at clutch K2 low main pressure 	<p>TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown</p>	<ul style="list-style-type: none"> check pressure at clutch K2 check main pressure in the system check sensor gap at internal speed sensor check sensor gap at output speed sensor 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • <i>wrong signal at internal speed sensor</i> • <i>wrong signal at output speed sensor</i> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 		<ul style="list-style-type: none"> • check signal at internal speed sensor • check signal at output speed sensor • replace clutch 	
B3	<p>SLIPPAGE AT CLUTCH K3 TCU calculates a differential speed at closed clutch K3. If this calculated value is out of range, TCU interprets this as slipping clutch.</p> <ul style="list-style-type: none"> • <i>low pressure at clutch K3</i> • <i>low main pressure</i> • <i>wrong signal at internal speed sensor</i> • <i>wrong signal at output speed sensor</i> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 	<p>TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown</p>	<ul style="list-style-type: none"> • check pressure at clutch K3 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at output speed sensor • check signal at internal speed sensor • check signal at output speed sensor • replace clutch 	
B4	<p>SLIPPAGE AT CLUTCH K4 TCU calculated a difference speed at TCU calculates a differential speed at closed clutch K4. If this calculated value is out of range, TCU interprets this as slipping clutch.</p> <ul style="list-style-type: none"> • <i>low pressure at clutch K4</i> • <i>low main pressure</i> • <i>wrong signal at internal speed sensor</i> • <i>wrong signal at turbine speed sensor</i> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 	<p>TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown</p>	<ul style="list-style-type: none"> • check pressure at clutch K4 • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor • replace clutch 	
B5	<p>SLIPPAGE AT CLUTCH KV TCU calculates a differential speed at closed clutch KV. If this calculated value is out of range, TCU interprets this as slipping clutch.</p> <ul style="list-style-type: none"> • <i>low pressure at clutch KV</i> • <i>low main pressure</i> • <i>wrong signal at internal speed sensor</i> • <i>wrong signal at turbine speed sensor</i> 	<p>TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown</p>	<ul style="list-style-type: none"> • check pressure at clutch KV • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 		<ul style="list-style-type: none"> • replace clutch 	
B6	SLIPPAGE AT CLUTCH KR TCU calculates a differential speed at closed clutch KR. If this calculated value is out of range, TCU interprets this as slipping clutch. <ul style="list-style-type: none"> • <i>low pressure at clutch KR</i> • <i>low main pressure</i> • <i>wrong signal at internal speed sensor</i> • <i>wrong signal at turbine speed sensor</i> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 	TCU shifts to neutral OP-Mode: limp home if failure at another clutch is pending TCU shifts to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check pressure at clutch KR • check main pressure in the system • check sensor gap at internal speed sensor • check sensor gap at turbine speed sensor • check signal at internal speed sensor • check signal at turbine speed sensor • replace clutch 	
B7	OVERTEMP SUMP TCU measured a temperature in the oil sump that is over the allowed threshold.	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • cool down machine • check oil level • check temperature sensor 	
B8	OVERTEMP RETARDER TCU measured a temperature in the retarder oil that is over the allowed threshold.	TCU disables retarder OP-Mode: normal	<ul style="list-style-type: none"> • cool down machine • check oil level • check temperature sensor 	
B9	OVERSPEED ENGINE	retarder applies if configured OP-Mode: normal	-	
BA	DIFFERENTIAL PRESSURE OIL FILTER TCU measured a voltage at differential pressure switch out of the allowed range <ul style="list-style-type: none"> • <i>oil filter is polluted</i> • <i>cable/connector is broken or cable/connector is contacted to battery voltage or vehicle ground</i> • <i>differential pressure switch is defective</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check oil filter • check wiring from TCU to differential pressure switch • check differential pressure switch (measure resistance) 	
BB	SLIPPAGE AT CONVERTER LOCKUP CLUTCH TCU calculates a differential speed at closed converter lockup clutch. If this calculated value is out of range, TCU interprets this as slipping clutch. <ul style="list-style-type: none"> • <i>low pressure at converter lockup clutch</i> 		<ul style="list-style-type: none"> • check pressure at converter lockup clutch • check main pressure in the system • check sensor gap at engine speed sensor 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • <i>low main pressure</i> • <i>wrong signal at engine speed sensor</i> • <i>wrong signal at turbine speed sensor</i> • <i>wrong size of the sensor gap</i> • <i>clutch is defective</i> 		<ul style="list-style-type: none"> • check sensor gap at turbine speed sensor • check signal at engine speed sensor • check signal at turbine speed sensor • replace clutch 	
BC	OVERSPEED OUTPUT TCU measures an transmission output speed above the defined threshold	No reaction OP-Mode: normal		
BD	S.C. TO GROUND AT ENGINE BRKAE SOLENOID TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>engine brake solenoid has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance ¹⁾ of engine brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
BE	S.C. TO BATTERY VOLTAGE AT ENGINE BRAKE TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>engine brake solenoid has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance ¹⁾ of engine brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
BF	O.C. AT ENGINE BRAKE TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>engine brake solenoid has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction OP-mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the engine brake solenoid • check the connectors from engine brake solenoid to TCU • check the resistance ¹⁾ of engine brake solenoid 	¹⁾ see chapter Fehler! Verweisquelle konnte nicht gefunden werden.
C0	ENGINE TORQUE OR ENGINE POWER OVERLOAD TCU calculates an engine torque or engine power above the defined thresholds	OP-Mode: normal		
C1	TRANSMISSION OUTPUT TORQUE OVERLOAD TCU calculates an transmission output torque above the defined threshold	OP-Mode: normal		

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
C2	TRANSMISSION INPUT TORQUE OVERLOAD TCU calculates an transmission input torque above the defined threshold	programmable :No reaction or shift to neutral OP-Mode: normal		
C3	OVERTEMP CONVERTER OUTPUT TCU measured a oil temperature at the converter ouput that is over the allowed threshold.	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • cool down machine • check oil level • check temperature sensor 	
C4	S.C. TO GROUND AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>joystick status indicator has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance ¹⁾ of joystick status indicator 	
C5	S.C. TO BATTERY VOLTAGE AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage <ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>joystick status indicator has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance ¹⁾ of joystick status indicator 	
C6	O.C. AT JOYSTICK STATUS INDICATOR TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>joystick status indicator has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to joystick status indicator • check the connectors from joystick status indicator to TCU • check the resistance ¹⁾ of joystick status indicator 	
C7	S.C. TO GROUND AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>overtemp status indicator has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to OVERTEMP NEUTRAL INDICATOR • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance ¹⁾ of OVERTEMP NEUTRAL INDICATOR 	
C8	S.C. TO BATTERY VOLTAGE AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to OVERTEMP NEUTRAL INDICATOR 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • <i>cable is defective and is contacted to battery voltage</i> • <i>overtemp status indicator has an internal defect</i> • <i>connector pin is contacted to battery voltage</i> 		<ul style="list-style-type: none"> • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance ¹⁾ of OVERTEMP NEUTRAL INDICATOR 	
C9	O.C. AT OVERTEMP NEUTRAL INDICATOR TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin <ul style="list-style-type: none"> • <i>cable is defective and has no connection to TCU</i> • <i>OVETEMP status indicator has an internal defect</i> • <i>connector has no connection to TCU</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to OVERTEMP NEUTRAL INDICATOR • check the connectors from OVERTEMP NEUTRAL INDICATOR to TCU • check the resistance ¹⁾ of OVERTEMP NEUTRAL INDICATOR 	
CA	ENGINE_RETARDER CONFIG_TIMEOUT Timeout of CAN-message ENGINE_RETARDER CONFIG from EEC controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective an has contact to vehicle ground or battery voltage</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check EEC controller • check wire of CAN-Bus • check cable to EEC controller 	
CB	ERC1 TIMEOUT Timeout of CAN-message ERC1 from EEC controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective an has contact to vehicle ground or battery voltage</i> 	OP-Mode: substitute clutch control	<ul style="list-style-type: none"> • check EEC controller • check wire of CAN-Bus • check cable to EEC controller 	fault codes no. 21 to no. 2C may be a reaction of this fault
D1	S.C. TO BATTERY VOLTAGE AT POWER SUPPLY FOR SENSORS TCU measures more than 6V at the pin AU1 (5V sensor supply)	see fault codes no. 21 to 2C	<ul style="list-style-type: none"> • check cables and connectors to sensors, which are supplied from AU1 • check the power supply at the pin AU1 (should be appx. 5V) 	
D2	S.C. TO GROUND AT POWER SUPPLY FOR SENSORS TCU measures less than 4V at the pin AU1 (5V sensor supply)	see fault codes no. 21 to 2C	<ul style="list-style-type: none"> • check cables and connectors to sensors, which are supplied from AU1 • check the power supply at the pin AU1 (should be appx. 5V) 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
D3	LOW VOLTAGE AT BATTERY measured voltage at power supply is lower than 10 V (12V device) lower than 18 V (24V device)	shift to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check power supply battery • check cables from batteries to TCU • check connectors from batteries to TCU 	
D4	HIGH VOLTAGE AT BATTERY measured voltage at power supply is higher than 18 V (12V device) higher than 32.5 V (24V device)	shift to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check power supply battery • check cables from batteries to TCU • check connectors from batteries to TCU 	
D5	ERROR AT VALVE POWER SUPPLY VPS1 TCU switched on VPS1 and measured VPS1 is off or TCU switched off VPS1 and measured VPS1 is still on <ul style="list-style-type: none"> • <i>cable or connectors are defect and are contacted to battery voltage</i> • <i>cable or connectors are defect and are contacted to vehicle ground</i> • <i>permanent power supply KL30 missing</i> • <i>TCU has an internal defect</i> 	shift to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check fuse • check cables from gearbox to TCU • check connectors from gearbox to TCU • replace TCU 	
D6	ERROR VALVE POWER SUPPLY VPS2 TCU switched on VPS2 and measured VPS2 is off or TCU switched off VPS2 and measured VPS2 is still on <ul style="list-style-type: none"> • <i>cable or connectors are defect and are contacted to battery voltage</i> • <i>cable or connectors are defect and are contacted to vehicle ground</i> • <i>permanent power supply KL30 missing</i> • <i>TCU has an internal defect</i> 	shift to neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • check fuse • check cables from gearbox to TCU • check connectors from gearbox to TCU • replace TCU 	
D7	S.C. TO GROUND AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to vehicle ground <ul style="list-style-type: none"> • <i>cable is defective and is contacted to vehicle ground</i> • <i>device has an internal defect</i> • <i>connector pin is contacted to vehicle ground</i> 	output will be on until TCU power down even if fault vanishes (loose connection) OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors • check the resistance of valve 	
D8	S.C. TO BATTERY VOLTAGE AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a s.c. to battery voltage	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors 	

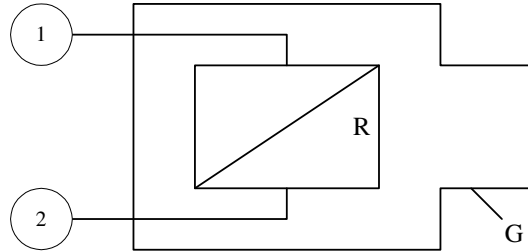
Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
	<ul style="list-style-type: none"> • cable is defective and is contacted to battery voltage • device has an internal defect • connector pin is contacted to battery voltage 		<ul style="list-style-type: none"> • check the resistance of valve 	
D9	<p>O.C. AT DLM LONGITUDINAL OUTPUT TCU detected a wrong voltage at the output pin, that looks like a o.c. for this output pin</p> <ul style="list-style-type: none"> • cable is defective and has no connection to TCU • device has an internal defect • connector has no connection to TCU 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the valve • check the connectors • check the resistance of valve 	
E1	<p>OPEN CIRCUIT AT DIRECTION SELECT SIGNALS TCU detected a o.c signals for the direction</p> <ul style="list-style-type: none"> • cable from shift lever to TCU is broken • cable is defective and is contacted to vehicle ground • shift lever is defective 	<p>TCU shifts transmission to neutral OP-Mode: transmission shutdown</p>	<ul style="list-style-type: none"> • check the cables from TCU to shift lever 	
E2	<p>OPEN CIRCUIT AT DIRECTION SELECT SIGNALS OF SHIFTER 2 TCU detected a o.c signals for the direction</p> <ul style="list-style-type: none"> • cable from shift lever to TCU is broken • cable is defective and is contacted to vehicle ground • shift lever is defective 	<p>TCU shifts transmission to neutral OP-Mode: transmission shutdown</p>	<ul style="list-style-type: none"> • check the cables from TCU to shift lever 	
E3	<p>S.C. TO BATTERY VOLTAGE AT DISPLAY OUTPUT TCU sends data to the display and measures allways a high voltage level on the connector</p> <ul style="list-style-type: none"> • cable or connectors are defective and are contacted to battery voltage • display has an internal defect 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the display • check the connectors at the display • change display 	
E4	<p>S.C. TO GROUND AT DISPLAY OUTPUT TCU sends data to the display and measures allways a high voltage level on the connector</p> <ul style="list-style-type: none"> • cable or connectors are defective and are contacted to vehicle ground • display has an internal defect 	<p>no reaction OP-Mode: normal</p>	<ul style="list-style-type: none"> • check the cable from TCU to the display • check the connectors at the display • change display 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
E5	DISPID1_TIMEOUT Timeout of CAN-message DISPID1 from display controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU select parameter set with ID0 OP-Mode: Limp Home	<ul style="list-style-type: none"> • check display controller • check wire of CAN-Bus • check cable to display controller 	
E5	CL1_TIMEOUT Timeout of CAN-message CL1 from cluster controller <ul style="list-style-type: none"> • <i>interference on CAN-Bus</i> • <i>CAN wire/connector is broken</i> • <i>CAN wire/connector is defective and has contact to vehicle ground or battery voltage</i> 	TCU keeps old information for: status test mode status plock shift quality selection gear range restriction OP-Mode: normal	<ul style="list-style-type: none"> • check cluster controller • check wire of CAN-Bus • check cable to cluster controller 	
E6	ILLEGAL ID REQUEST VIA CAN	transmission stay neutral OP-Mode: TCU shutdown		
F1	GENERAL EEPROM FAULT TCU can't read non volatile memory <ul style="list-style-type: none"> • <i>TCU is defective</i> 	no reaction OP-Mode: normal	<ul style="list-style-type: none"> • replace TCU 	
F2	CONFIGURATION LOST TCU has lost the correct configuration and can't control the transmission. <ul style="list-style-type: none"> • <i>interference during saving data on non volatile memory</i> • <i>TCU is brand new or from another vehicle</i> 	transmission stay neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> • Reprogramm the correct configuration for the vehicle (e.g. with cluster controller,...) 	
F2	FWD CONFIGURATION LOST TCU has lost the FWD configuration. <ul style="list-style-type: none"> • <i>interference during saving data on non volatile memory</i> • <i>TCU is brand new or from another vehicle</i> 	gear range set from 1 st to 4 th	<ul style="list-style-type: none"> • reconfigure with TCU Configuration Command (ID PC) 	

Fault Code (hex)	MEANING OF THE FAULT CODE Possible reason for fault detection	Reaction of the TCU	Possible steps to repair	Remarks
F3	APPLICATION ERROR something of this application is wrong	transmission stay neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> replace TCU !! 	This fault occurs only if an test engineer did something wrong in the application of the vehicle
F4	LIMP HOME REQUEST no fault! indicates that another computer requested limp home via CAN	shift to neutral OP-Mode: limp home	<ul style="list-style-type: none"> The external controller has to cancel the request 	
F5	CLUTCH FAILURE AEB was not able to adjust clutch filling parameters <ul style="list-style-type: none"> One of the AEB-Values is out of limit 	transmission stay neutral OP-Mode: TCU shutdown	<ul style="list-style-type: none"> check clutch 	TCU shows also the affected clutch on the Display
F6	CLUTCH ADJUSTMENT DATA LOST OR INCHPEDAL CALIBRATION DATA LOST TCU was not able to read correct clutch adjustment parameters <ul style="list-style-type: none"> <i>interference during saving data on non volatile memory</i> <i>TCU is brand new</i> 	default values = 0 for AEB offsets used OP-Mode: normal no Inchmode available	<ul style="list-style-type: none"> execute AEB 	

4. Measuring of resistance at actuator/sensors and cable

4.1 actuator:



open circuit:

$$R_{12} \approx R_{1G} \approx R_{2G} \approx \infty$$

short cut to ground:

$$R_{12} \approx R; \quad R_{1G} \approx 0, R_{2G} \approx R \text{ or } R_{1G} \approx R, R_{2G} \approx 0$$

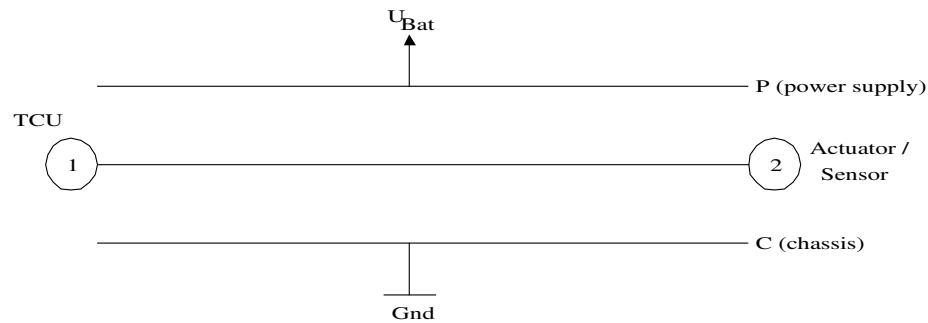
(for s.c. to ground, G is connected to vehicle ground)

short cut to battery:

$$R_{12} \approx R; \quad R_{1G} \approx 0, R_{2G} \approx R \text{ or } R_{1G} \approx R, R_{2G} \approx 0$$

(for s.c. to battery, G is connected to battery voltage)

4.2 cable:



open circuit:

$$R_{12} \approx R_{1P} \approx R_{1C} \approx R_{2P} \approx R_{2C} \approx \infty$$

short cut to ground:

$$R_{12} \approx 0; \quad R_{1C} \approx R_{2C} \approx 0, \quad R_{1P} \approx R_{2P} \approx \infty$$

short cut to battery:

$$R_{12} \approx 0; \quad R_{1C} \approx R_{2C} \approx \infty, \quad R_{1P} \approx R_{2P} \approx 0$$

Abkürzung abbreviation	Deutsch	Englisch	Französisch	Spanisch	Italienisch
ABS	Anti-Blockier-System	anti-block system	Système antiblocage des roues (ABS)	Sistema antibloqueo de frenos	Sistema antibloccaggio delle ripte (ABS)
AD	Ausgang Digital 24 V	digital output 24 V (output digital)	Sortie numérique 24 V	Salida digital 24 V	Uscita digitale 24 V
ADM	Ausgang Digital Masse	digital output ground/earth	Sortie numérique masse	Salida digital masa	Uscita digitale massa
ADS	Ausgang Digitale schellschaltend	digital output fast switching	Sortie numérique connexion rapide	Salida digital conexión rápida	Uscita digitale connessione rapida
ADVP	Ausgang Digital Versorgung Plus	digital output power supply	Sortie numérique alimentation plus	Salida digital alimentación positivo	Uscita digitale alimentazione positivo
AIP	Ausgang Strom Proportional	power output proportional (+)	Sortie courant proportionnel	Salida de corriente electroimán proporcional	Uscita corrente proporzionale
alpha_fp	Gaspedalstellung (Wert in %)	accelerator pedal position (value in %)	Position pédale accélérateur (valeur en %)	Posición pedal acelerador (valor en %)	Posizione pedale acceleratore (valore in %)
ASR	Antriebs-Schlupf-Regelung	anti-slip control	Système d'antipatinage (ASR)	Control antipatinaje ruedas motrices	Sistema antislittamento (ASR)
AU	Ausgang Spannung (5V Referenz)	voltage output (5V reference)	Sortie tension (5V - référence)	Salida de tensión (5V referencia)	Usicta tensione (5V - riferimento)
aux_stat_zbr	CAN Botschaft	CAN message	Message CAN	Mensaje CAN	Messaggio CAN
BC-DR	Bordrechner Driveline retarder	On-board Computer - driveline retarder	Calculateur de bord - chaine cinématique ralentisseur	Ordenador de a bordo - Accionam retardador	Computer di bordo - catena cinematica rallentatore
BN	Bordnetz	vehicle power circuit	Réseau de bord	Red de a bordo	Rete di bordo
BSG	Bremssteuergerät	brake control unit	Module de contrôle du freinage	Unidad de control frenos	Module di controllo della frenatura
BSH	Bremsstufenhebel	brake step level	Sélecteur de freinage á crans	Palanca de frenado por escalones	Selettore dei gradi di frenatura
Buka	Buchsenkasten	terminal tester	Bollier á douilles	Caja de bornes	Cassetta delle prese
CAN	Controller-Area-Network	Controller Area Network (CAN)	Controller-Area-Network (réseau multiplexe)	Controller Area Network (CAN)	Controller-Area-Network (rete interscambio dati CAN)
CAN-Bus	Datenleitung	CAN-bus data network	Ligne données	Linea de datos CAN	Linca dati
CANF-H	CAN Full - High	CAN Full - High	CAN Full - High	CAN Full - High	CAN Full - High
CANF-L	CAN Full - Low	CAN Full - Low	CAN Full - Low	CAN Full - Low	CAN Full - Low
CC	Tempomat	cruise control	Tempomat (régulateur de vitesse)	Tempomat (control autom. velocidad)	Tempomat (regolatore della velocità)
CCVS	Tempomat/Fahrzeuggeschwindigkeit	cruise control/vehicle speed	Tempomat/vitesse véhicule	Tempomat/Velocidad del vehículo	Tempomat/velocità veicolo
DIP	Instrumententafel	instrument panel	Planche de bord	Tablero de instrumentos	Cruscotto portastrumenti
DM	Diagnose Botschaft	Diagnosis Message	Diagnostique message	Mensaje de diagnosis	Diagnosi messaggio
EBC	Elektronische Brems-Steuerung	Electronic Brake Controller	Contrôleur électronique de freinage	Control electrónico de frenos	Controllore elettronico della frenatura
EBS	Elektronisches Brems-System	Electronic Brake System	Système de freinage électronique	Sistema electrónico de frenado	Sistema di frenature elettronico
EBZ	Einbauzeichnung	installation drawing	Plan d'encombrement	Plano de instalacion	Disegno di installazione
ECO	Motor Konfiguration	engine configuration	Configuration du moteur	Configuración del motor	Configurazione del motore
ECU	Elektronisches Steuergerät (Getriebssteuerung)	Electronic control unit (ECU) (Transmission control)	Unité de commande électronique (UCE) (calculateur de boîte)	Unidad electrónica de control (ECU) (control caja cambios)	Unità di comando elettronico (UCE) (calcolatore cambio)
ED	Eingang Digital 24 V +	Digital input 24 V +	Entrée numérique 24 V +	Entrada digital 24 V +	Entrata digitale 24 V +
EDC	Elektronische Dieselregelung (Motorelektronik)	Electronic diesel control (EDC) (engine electronics)	Gestion électronique pour moteurs Diesel	Regulación electrónica diesel (EDC) (unidad electr. del motor)	Pompa iniezione elettronica (EDC)
EDM	Eingang Digital Masse	Digital input ground/earth	Entrée numérique masse	Entrada digital masa	Entrata digitale massa

Abkürzung abbreviation	Deutsch	Englisch	Französisch	Spanisch	Italienisch
EEC	Motorelektronik	Electronic Engine Controller	Calculateur moteur	Unidad electrónica de control motor	Centralina elettronica del motore
EF	Eingang Frequenz	Frequency input	Entrée fréquence	Entrada frecuencia	Entrafa frequenza
EM 1	Elektronik-Modul 1 (Schnittstelle Fahrschalter/Bordnetz ASTRONIC)	electronic-modul 1 (interface level/ vehicle circuit -> ASTRONIC)	Module électronique 1 (interface sélecteur de marche/réseau de bord ASTRONIC)	Módulo electrónico 1 (interfaz selector marchas/red be a bordo ASTRONIC)	Modulo elettronico 1 (interfaccia selettore di marcia/rette di bordo ASTRONIC)
EMC	Elektromagnetische Verträglichkeit	electro-magnetic compatibility	Compatibilité électromagnétique	Compatibilidad electromagnética	Compatibilità elettromagnetica
EMV	Elektromagnetische Verträglichkeit	electro-magnetic compatibility	Compatibilité électromagnétique	Compatibilidad electromagnética	Compatibilità elettromagnetica
EOL	Bandende	End-of-Line (EOL)	Fin de ligne	Final de la linea	End of line
Ed_Paramele	End of line (Eintrag Fahrzeugparameter wie z. B. Hinterachsübersetzung)	End of line (entry of vehicle parameter e. g. rear axle ratio)	Fin de ligne (entrée paramètres véhicule comme p. ex. Rapport pont arrière)	Final de la linea (registro parámetro vehiculo p. ej.: relación eje trasero)	End of line (entrata parametri veicolo come p. es. Rapporto al ponte)
EPS	Elektro-Pneumatische-Schaltung	Electro-pneumatic-shifting unit	Commande électro-pneumatique	Unidad de cambio electroneumático	Comando elettropneumatico
ER	Retarder-Steuergerät	Electronic Retarder Controller	Boilier de commande ralentisseur	Unidad electrónica del retardador	Centralina elettronica del rallentatore
ERC 1_DR	CAN Botschaft	CAN message	Message CAN	Mensaje CAN	Messaggio CAN
ESG	Elektronisches Steuergerät	electronic control unit	Unité de commande électronique (UCE)	Unidad electrónica de control	Unità di comando elettronica (UCE)
EST	Elektronische Steuerung	electronic control	Commande électronique	Unidad electrónica de control	Comando elettronico
ETC	Elektronische Getriebe-Steuerung	Electronic Transmission Control (ETC)	Unité de commande électronique de boîte	Unidad electrónica control caja de cambios	Unità di comando elettronica del cambio
SPN	Fehlerpfad	Error path (suspect number)	Trafet anomalie	Via del fallo	Percorso errore
STVZO	Straßen-Verkehrs-Zulassungs-Ordnung	German road transport code	Prescriptions d'homologation des véhicules	Código de Circulación alemana	Norme d'ammissione alla circolazione dei veicoli
SW	Software	software	Logiciel	Software	Software
TC1_FT	CAN Botschaft	CAN message	Message CAN	Mensaje CAN	Messaggio CAN
TCO	Getriebe-Konfiguration	transmission configuration	Configuration boîte	Configuración de la caja de cambios	Configurazione cambio
TCO	Tachograph	Tachograph	Tachygraphe	Tacógrafo	Tachigrafo
TCU	Getriebe-Steuerung	Transmission Control Unit	Calculateur de boîte de vitesses	Unidad de control de la caja de cambios	Centralina cambio
TKI	Technische Kundeninformation	Technical customer information	Informations clients techniques	Información técnica para clients	Informazioni clienti tecniche
TSC	Drehmoment-/Geschwindigkeit-Regler	torque/speed control	Régulateur couple/vitesse	Regulador par/velocidad	Regolatore coppia/velocità
TSC	Drehmoment-/Geschwindigkeit-Kontrolle	torque/speed control	Contrôle couple/vitesse	Control par/velocidad	Controllo coppia/velocità
UPEC	Motor-Steuergerät	engine control unit (ECU)	Unité de commande électronique del motor	Unidad de control del motor	Centralina motore
v_cc_set	von Tempomat gesetzte Sollgeschwindigkeit	cruise control set requested speed	Vitesse théorique chargée par le régulateur de vitesse	velocidad teórica ajustada por el Tempomat	Velocità teorica impostata dal regolatore della velocità
Valeo	Kupplungshersteller-Firma	clutch manufacturer	Fabricant embrayage	Fabricante del embrague	Costruttore frizione
VD	Fahrzeug Laufleistung	vehicle mileage	Kilométrage véhicule	Kilometraje del vehiculo	Percorrenza veicolo
VECU	Fahrzeugrechner	Vehicle control unit	Calculateur véhicule	Ordenador del vehiculo	Centralina veicolo
VM	Versorgung Masse	Supply ground	Alimentation masse	Alimentación masa	Alimentazione massa

Abkürzung abbreviation	Deutsch	Englisch	Französisch	Spanisch	Italienisch
VMG	Versorgung Masse für Sensoren	Supply ground to sensors	Alimentation masse pour capteurs	Alimentación masa para sensores	Alimentazione massa per trasduttori
VMHF	Versorgung Masse für CAN	Supply ground to CAN	Alimentation masse pour CAN	Alimentación masa para CAN	Alimentazione massa per CAN
VOE	Vor-Ort-Elektronik	integrated electronic transmission control	Unité électronique embarquée	Unidad electrónica de control instalada	Centralina elettronica integrata
VPE	Versorgung Plus - Klemme 30	supply plus terminal 30	Alimentation + borne 30	Alimentación positivo - borne 30	Alimentazione positivo - morsetto 30
VPI	Versorgung Plus - Klemme 15	supply plus terminal 15	Alimentation + borne 15	Alimentación positivo - borne 15	Alimentazione positivo - morsetto 15
WSI	Raddrehzahlinformation (CAN Botschaft)	Wheel speed information (CAN message)	information régime roues (message CAN)	información revoluc. De rueda (mensaje-CAN)	Informazione regime ruote (message CAN)
WT	Wärmetauscher	Heat exchanger	Echangeur thermique	Intercambiador de calor	Scambiatore di calore
z_Fbr	Signal Fußbremse	foot brake signal	Signal frein à pied	Senal freno de pie	Segnale freno a piede
z_kd	Signal Kick-Down	kickdown signal	Signal kick-down	Senal kick-down	Segnale kick-down
z_low_idie	Signal Leerlaufschalter	idling switch signal	Signal contacteur point mort	Senal interruptor de ralenti	Segnale interruttore di folle
z_ret_rück	Rückschaltanforderung vom Intarder	intarder down-shifting request	Requête rétrogradage Intarder	Requerimiento de reducción de marcha desde el Intarder	Richiesta scalata da Intarder
ETP	Motortemperatur	Engine temperature	Température moteur	Temperatura del motor	Temperatura motore
EU	Analog-Eingang Spannung	Analog input voltage	Entrée analogique tension	Tensión analógica de entrada	Entrata analogica tensione
FFR	Fahrzeugführungsrechner	Vehicle Controller	Calculateur de gestion du véhicule	Ordenador del vehiculo	Centralina di gestione del veicolo
FMI	Fehlerart	Failure Mode Identifier	Type d'anomalie	Tipe de fallo	Tipo di anomalia
FMR	Fahrzeug-Motor-Regulierung	vehicle engine regulation	Régulation véhicule-moteur	Regulación del motor del vehiculo	Regolazione veicolo-motore
FR	Fahrzeug-Rechner	Vehicle Control Unit	Calculateur véhicule	Ordenador del vehiculo	Centralina veicolo
Fzg	Fahrzeug	vehicle	Véhicule	Vehiculo	Veicolo
GP	Bereichsgruppe (Planetengruppe9)	planetary group	Group-relais (groupe épicycloidal)	Grupo planetario	Selettore di gamma (gruppo epicicloidate)
GS	Getriebe-Steller	transmission actuator	Actionneur le la boite da vitesses	Unidad de mando de la caja de cambios	Attuatore del cambio
GV	Split-Gruppe (Vorschalt-Gruppe)	splitter group	Doubleur de gamma (relais avant)	Grupo multiplicador	Splitter (gruppo epicicloidale a monte)
HG	Haupt-Getriebe	main transmission	Boite de base	Caja de camblos principal	Cambio base
HRVD	Fahrzeug Laufleistung	Vehicle performance (mileage)	Kilométrage véhicule	Kilometraje principal	Pervorrenza veicolo
i. O.	in Ordnung	OK	ok	correcto	ok
i_HA	Hinterachsenübersetzung	rear axle ratio	Rapport de pont	Relación del eje trasero	Rapporto al ponte
IES	Integriertes Elektronik-System	integrated electronic system	Système électronique intégré	Sistema electrónico intergrado	Sistema elettronico integrato
IKL	Intarder-Kontrollleuchte	Intarder pilot lamp	Témoin anomalie Intarder	Lámpare de control del Intarder	Spia anomalia Intarder
Ink	Inkrement	incremental (step)	incrément	incremento	incremento
ISMA	Intelligentes Schalt Management (Automatik-Modus)	intelligent shift management (automatic mode)	Gestion intelligente de change- ment de vitesses (mode automatique)	Gestión inteligente dei mando (Modo automático)	Gestione intelligente del cambio marcia (modalità automatica)
IT	Intarder	Intarder	Intarder	Intarder	Intarder
K 1	Konstante 1	constant ratio 1	Constante 1	Pareja pinones en toma constante 1	Constante 1
KB	Kernbüchse	core bush	Douille centrale	Casquillo central	Boccola central
KBE	Kupplungsbetätigungseinheit	clutch actuation system	Unité d'actionnement de l'embrayage	Unidad de accionamiento del embrague	Unità di azionamento della frizione

Abkürzung abbreviation	Deutsch	Englisch	Französisch	Spanisch	Italienisch
Kitas	aktiver Abtriebsdrehzahlgeber für Tacho	active output speed sensor for speedo	Capteur actif de régime de sortie pour tachymètre	Sensor activo revoluc salida para velocimetro	Trasduttore attivo del regime di uscita per tachimetro
K-Line	Kommunikationsleitung	communication circuit	Ligne de communication	Cable de comunicación	Linea di comunicazione
KS	Kupplungssteller	clutch actuator	Actionneur d'embrayage	Unidad de accionamiento del embrague	Attuatore della frizione
LL	Leerlauf	idle	Ralentie	Ralenti	Folle
LR	Leitrechner	vehicle guide controller	Calculateur véhicule	Ordenador principal del vehiculo	Centrallna veicolo
m_dd_edc	Berechnete Einspritzmenge von EDC (Fahrerwunsch	Calculated EDC injection rate (driver's request)	Quantité d'injection calculée par l'EDC (souhait conducteur)	Cant. Combustible yectada por el EDC (deseo del conductor)	Quantia d'iniezione calcolata dall'Edc (richiesta autista)
m_mbr	aktuelles Motorbremsmoment	current engine brake torque	Couple frein moteur momentané	Par actual del freno-motor	Coppia freno motore momentanea
m_mot_akt	Aktuell eingespritzte Menge der EDC	current injection quantity for EDC engine	Quantité momentanée injectée par l'EDC	Cant. Actual de combustible in-yectada del EDC	Quantità momentanea iniettata dall'EDC
m_sekret	Sekundärretarderbremsmoment aus der CAN-Botschaft ERC1 vom (Driveline Retarder)	Secondary retarder brake torque form CAN message ERC1 taken from Intarder (Driveline Retarder)	Couple de freinage du ralentisseur secondaire du message CAN ERC1 de l'Intarder (chaîne cinématique Retarder)	Par de frenado del retardador secundario desde el mensaje-CAN ERC1 bel Intarder (Driveline Retarder)	Coppia di frenatura del rallentatore secundario da messaggio CAN ERZ 1 proventiente dall'Intarder (catena cinematica Retarder)
MB	Motorbremse	Engine brake	Frein moteur	Freno-motor	Freno motore
MBr	Motorbremse	Engine brake	Frein moteur	Freno-motor	Freno motore
MUX	Multiplex-Signal	multiplex signal	Signal multiplexé	Senal multiplex	Segnale multiplex
MUX	Multiplex-System	Multiplex system (channel)	Système multiplexé	Sistema multiplex	Sistema multiplex
n. d.	nicht definiert	not defined	non défini	no definido	non definio
n_mot	Drehzahl Motor	engine speed	Régime moteur	Revoluciones del motor	Regime motore
n_sek	Drehzahl Antriebswelle Getriebe	transmission output shaft speed	Régime arbre de sortie de la boîte	Revoluciones eje entrada caja de cambio	Regime albero d'uscita del cambio
NA	Nebenantrieb	power-take-off	Prise de mouvement	Toma de fuerza	Presa di forza
OEM	Fahrzeughersteller	original equipment manufacturer	Constructeur véhicule	Fabricante del vehiculo	Costruttore veicolo
PTO	Nebenantrieb	power-take-off	Prise de mouvement	Toma de fuerza	Presa di forza
RCO	Retarder Konfigurationretarder	retarder configuration	Configuration du ralentisseur	Configuración dei retardador	Configurazione del rallentatore
REC	Retarder Konfiguration	retarder configuration	Configuration ralentisseur	Configuración dei retardador	Configurazione del rallentatore
RL	Rückwärtsgang-Langsam	reverse gear low	Marche-amère lente	Marcha alrás corta	Reformarcia lenta
s. n. v.	Signal nich verfügbar	Signal not available	Signal non disponible	Senal no está dispnible	Segnate non dispoibile
SA	Absender	Source Address	Emetteur	Remitente	Emittente
SDDK	Schnittstelle Digital-Diagnose K.-Leitung	Interface Digital-Diagnosis K-line	interface diagnostic numérique ligne K	Interfaz cable-K diagnosis digital	Interfaccia diagnosi digitale linea K