

BOMAG

Service Training



Single Drum Roller

BW 177 / 179 DH / PDH-4

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Technical data and adjustment values

The following pages contain technical data valid at the date of printing (see front page of this manual).

Attention!

The currently valid technical data and adjustment values can be taken from the BOMAG Intranet or Extranet (BOMAG Secured Area) in accordance with the serial number of the machine.

Starter side

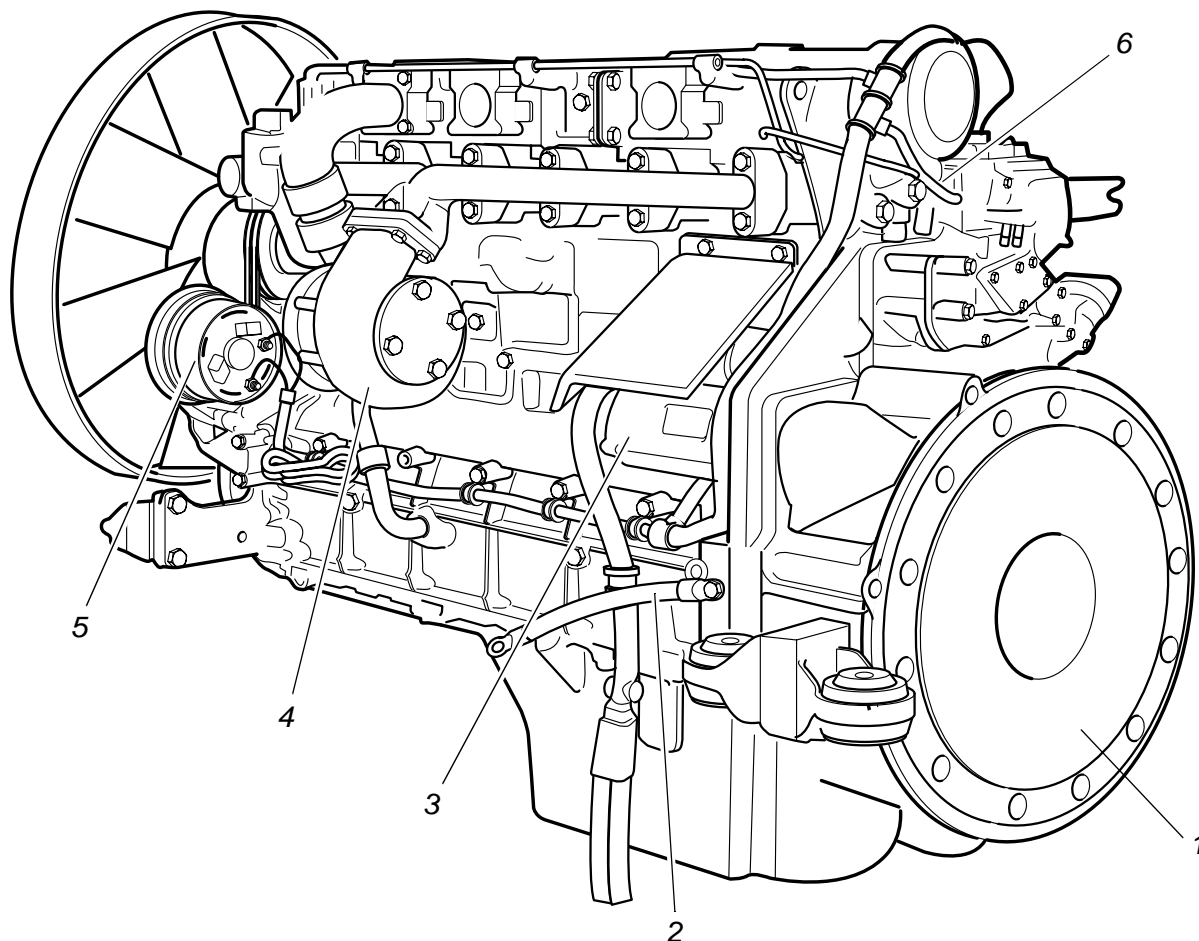


Fig. 2: Starter side

- 1 Flywheel
- 2 Ground cable
- 3 Starter
- 4 Turbo charger
- 5 Generator
- 6 Coolant temperature switch

Individual EMR II components

Control unit EMR II





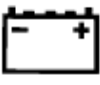







The EMR control unit is located above the central electrics in the access area under the operators platform. This is the computer unit of the EMR and it processes the input signals from the sensors to output signals for the EMR actuator (governor rod).



Fig. 8

Pos.	Designation	Pos. in wiring diagram	Deutz designation	Measuring values
1	Control unit EMR II	A 48	EMR II	
2	Plug, engine side	X 31		
3	Plug, vehicle side	X 30		

2 Ausgewählte Fehlerreaktionen der ESX Steuerung

Signal \ Reaktion	Symbol auf Störmeldeanzeige	Warnung Codeausgabe <u>ohne</u> Summer	Warnung Codeausgabe <u>mit</u> Summer	Motorstop Codeausgabe <u>mit</u> Summer
Motoröldruck (von EMR)			5100 5112 1)	5101 5112 2) nach 10s
Kühlmitteltemperatur (von EMR)			5100 5116 1)	5101 5116 2) nach 15s
Kühlmittelfüllstand			5024 nach 5s	5025 nach 10s
Motorluftfilter		5026 nach 5s		5027 nach 2min. 3)
Ladekontrolle				
Vorglühen Motor				
Bremse				
ASC	ASC	Verschiedene Fehlerursachen und Reaktionszeiten. Siehe Fehlercodes		
Hydraulikölfilter			5502 nach 5s	5503 nach 2min.
Wasserabscheider Dieselfilter			5028 nach 5s	5029 nach 2min.
Diebstahlwarnanzeige (Option)				
Sitzkontakt (Option)				
Störung Klimaanlage (Option)				

1) Nach Erreichen der Warngrenze!

2) Nach Erreichen der Abschaltgrenze!

3) Abschaltung derzeit über Parameter deaktiviert

5. Set the cylinder of the injection pump to be replaced to ignition top dead centre (valves overlapping). Then turn the crankshaft approx. 120° against the sense of rotation.

Note:

View on flywheel

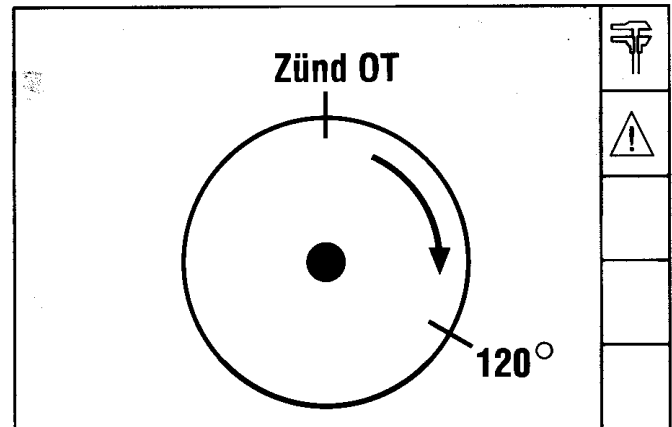


Fig. 20:

6. Remove injection line and injection pump.

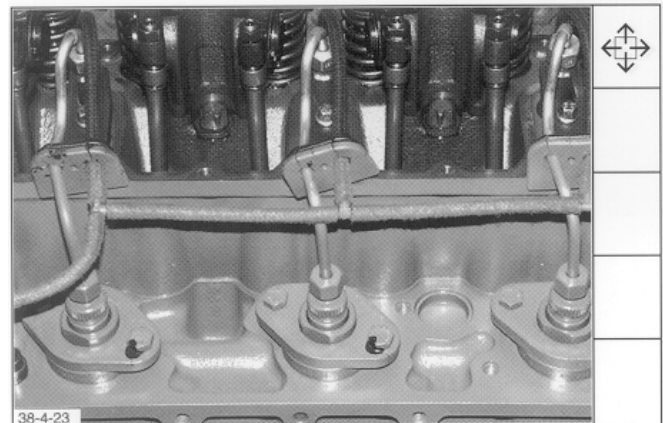


Fig. 21:

7. Take the compensation shim carefully out with the rod magnet.

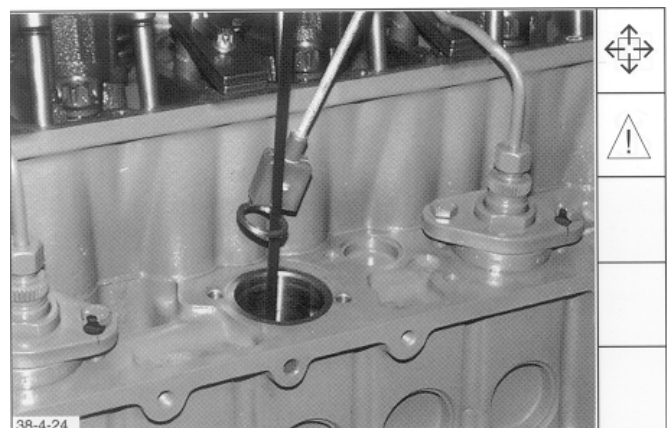


Fig. 22:

Determine the thickness of the new compensation shim:

12. Slightly oil the screws and tighten them evenly with 5Nm.



Fig. 33:

13. Loosen the screws again for 60°.

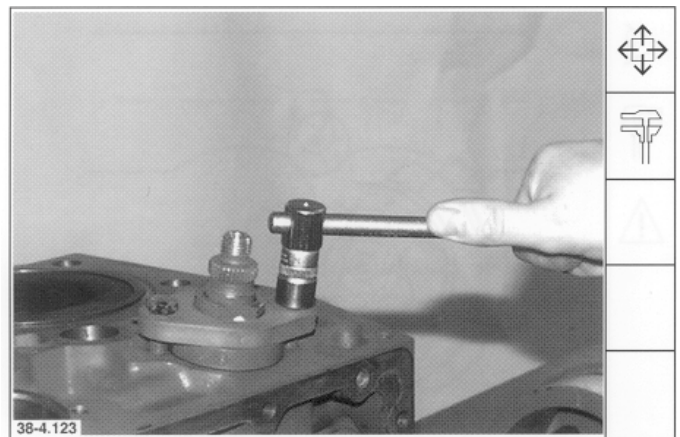


Fig. 34:

14. **Carefully** turn the injection pump with and open end spanner in anti-clockwise direction against the noticeable stop



Fig. 35:

The pump is equipped with all control and safety elements needed for operation in a closed hydraulic circuit, such as:

- high pressure relief valves,
- charge pressure relief valve,
- pressure override and
- electric proportional servo control

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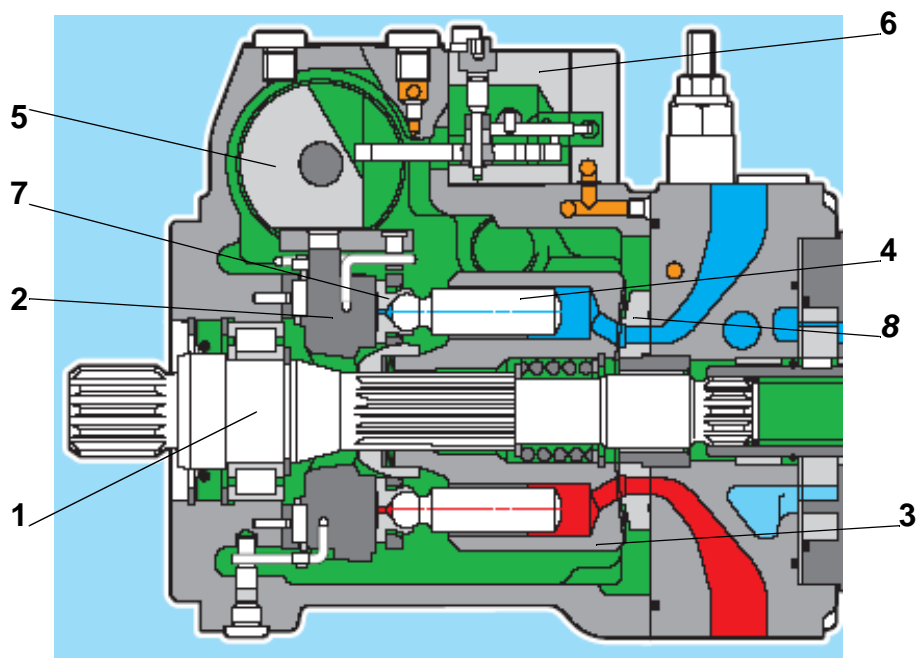


Fig. 1 Cross-sectional view of travel pump

- 1 Drive shaft
- 2 Swashing cradle
- 3 Cylinder block
- 4 Working pistons
- 5 control piston
- 6 Control unit
- 7 Slipper pad
- 8 Valve plate

Axle drive motor,

The axle drive motor is a swash plate controlled (electrically proportional) Sauer-Sundstrand axial piston motor (series 51 C 080) with variable displacement.

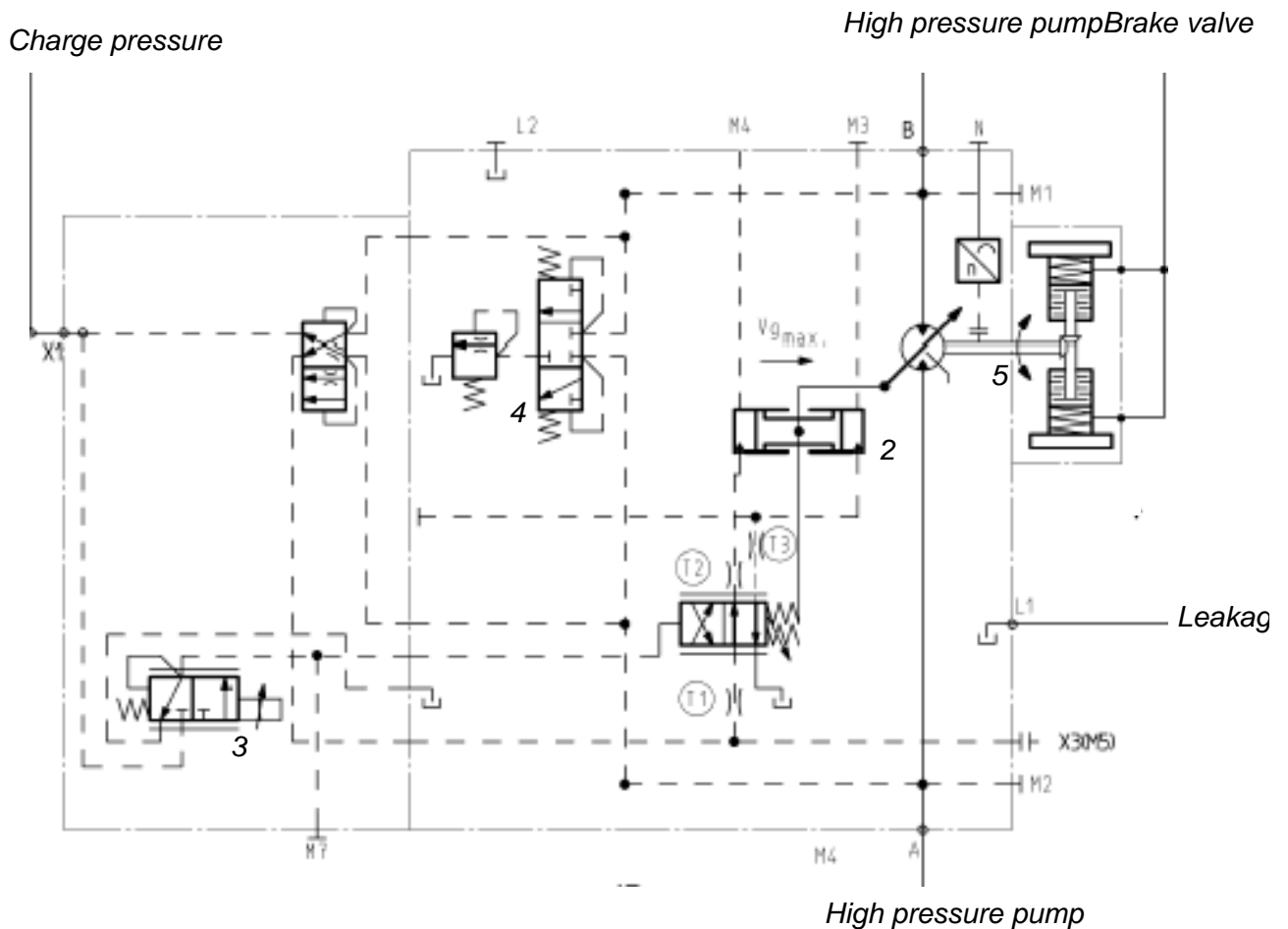


Fig. 3 Hydraulic diagram, axle drive motor

- 1 Motor drive
- 2 Control piston
- 3 Proportional control with proportional solenoid
- 4 Flushing valve with flushing pressure limitation valve
- 5 Axle with brake



NEW : Flange mounted speed sensors in both travel motors and a travel pressure sensor in the frame front left under the operator's stand!

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Flange mounted speed sensor PPU Axle motor	B60		
1	Flange mounted speed sensor PPU Drum drive motor	B59		
2	Travel pressure sensor front left under operator's platform	B112		

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High pressure relief valves

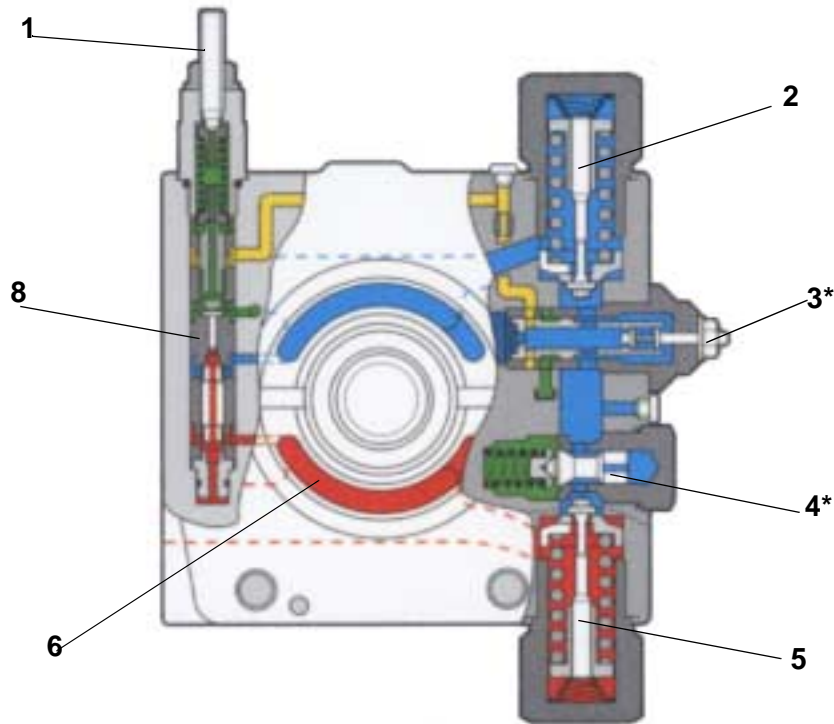


Fig. 5 High pressure relief valves

- 1 Setscrew for pressure override
- 2 High pressure relief valve with integrated boost check valve
- 3 ***(not in vibration pump)**
- 4 ***(not in vibration pump)** (charge pressure relief valve)
- 5 High pressure relief valve with integrated boost check valve
- 6 Valve plate
- 7 Pressure override

When switching the vibration off the vibration motors for a short while have the function of a pump. They pump the oil back to the vibration pump. This effect is caused by the rotating exciter shafts with the attached eccentric weights.

Since the vibration pump is already in neutral position, the oil cannot pass through the pump. In this case the pressure override valve has no function. Under this condition the high pressure relief valves work as brake valves.

The functions of pressure override valve and high pressure relief valves in the vibration circuit are identical with the functions of these valves in the travel circuit. The description of these components does therefore not need to be repeated.

FEHLERSUCHE VIBRATION BW 177DH-4	SYMPTOME						
	Keine Vibration (Speisedruck OK)	Vibration nur in einer Amplitude Erregerwellendrehzahl nicht korrekt					
MÖGLICHE URSACHEN							
Vibrationschalter (Amplitudenvorwahl)	1	1					
Fahrhebel, Taster Vibration (an/aus), Verkabelung	1						
Elektrik defekt / Verkabelung	2	2					
Pumpenansteuerung (elektrisch / hydraulisch)	1	1					
Druckabschneidung/ Hochdruckbegrenzung Vibrationspumpe verschmutzt/verstellt/defekt			2				
Speisepumpe / Speisedruckbegrenzungsventil verschmutzt/defekt	2						
Frequenzeinstellung Vibrationspumpe			2				
Vibrationspumpe defekt	2	2					
Kupplung zwischen Dieselmotor und Fahrpumpe defekt							
Erregerwellenlager defekt			3				
Vibrationsmotorkupplung defekt	2						
Vibrationsmotor defekt	2	1					
Dieselmotor	1	1	1				
Drehzahlsensor (Verkabelung)	1	1	1				
Spülventil Vibmotor hängt			2				
<i>FEHLERSUCHE</i>							

The display shows error codes



A detailed description of how to read out the error codes and on the display can be found in chapter "Electrics" (Service Training "Electrics")

The following trouble shooting chart contains a small selection of possible faults, which may occur during operation of the machine. The fault list is by no means complete, however, the fault table is based on the experience of the central service department, i.e. the list covers almost all faults that have occurred in the past.

Procedure:

The following trouble shooting table contains both electrical as well as mechanical and hydraulic faults.

The number specified in the table indicate the probability of the fault cause and thereby the recommended trouble shooting sequence, based on our latest field experience.

3.3 Adjusting the machine type

Since the same control is used for all single drum rollers of series DH-4 with electronically controlled engines (EPA II), it is necessary to adjust the machine type after installing a new control.

This work must be carried out during first time commissioning as well as in case of a spare parts installation. This type adjustment is absolutely necessary, because the machines have e.g. wheel and axle drive motors or different tire sizes and therefore different rolling speeds or are equipped with extension plates or other attachments.

For simple checking the currently set machine type is displayed for approx. 3 seconds on the display module of the central electrics when switching the ignition on. The machine type can also be checked by entering code 0720 .

The following machine types can be set:

72XX	0	1	2	3	4	5	6	7	8	9	
0	Default	BW 177 DH-4 (dozer blade)	BW 177 PDH-4	BW 179 DH-4	BW 179 PDH-4	BW 213 DH-4	BW 213 PDH-4	BW 213 DH-4 USA	BW 213 PDH-4 USA	BW 216 DH-4	DH
1	BW 216 PDH-4	BW 219 DH-4	BW 219 PDH-4	BW 226 DH-4 147kW	BW 226 PDH-4 147kW	BW 226 DH-4 174kW	BW 226 PDH-4 174kW				DH
2											DH
3											DH
4											DH
5	BW 177 DH-4 BVC	BW 213 DH-4 BVC	BW 213 DH-4 BVC w. plates	BW 226 DH-4 BVC 147 kW	BW 226 DH-4 BVC 174 kW						BVC
6											BVC
7											BVC
8											BVC
9											BVC

EXAMPLE: Machine code for **BW 219 PDH-4**: **7212**

Note: **Parameter adjustments can only be performed when the engine is not running.**

Note: **This function can only be activated / deactivated when the travel lever is in brake lock position. (→ Input mode)**

The following method must be used for initial start-up of a control:

ESX terminal	Signal description	Nominal values (voltage / current)
X35:15	Input seat contact switch Digital input active high	Seat occupied ☞ 0 V Seat not occupied ☞ ? V
X35:16	Not used	---
X35:17	Input BTS brake (from travel lever) Digital input active high	Release brake ☞ approx.12 V Apply brake ☞ 0 V
X35:18	Input steering sensor (S1/A) Digital input active high	Signal changes between approx. 0V and 12V, when steering wheel is turned. Frequency depends on speed of rotation
X35:19	Input steering sensor (S1/B) Digital input active high	Signal changes between approx. 0V and 12V, when steering wheel is turned. Frequency depends on speed of rotation
X35:20	Output steering left PWM digital output (max. 4 A)	Steering left active ☞ 0,4..1,2 A Steering left inactive ☞ 0 A
X35:21	Output steering right PWM digital output (max. 4 A)	Steering right active ☞ 0,4..1,2 A Steering right inactive ☞ 0 A
X35:22	Output vibration pump for extension plate PWM current output (max. 4 A)	permissible current range: approx. 0..0,6 A Vibration pump active ☞ 0,0..2,0 A Vibration pump not active ☞ 0 A
X35:23	Voltage supply for sensors This output supplies steering angle sensor and steering unit. Without this voltage the control cannot work correctly and will switch to override mode (emergency function).	Nominal voltage = 8,5 V Permissible range: approx. 7,65..9,35 V This voltage must be measured against AGND.
X35:24	Output Backup alarm Digital output (max. 2.5 A)	Backup alarm inactive ☞ 0 V Backup alarm active ☞ approx.12 V
X35:25	Not used	---
X35:26	Interface CAN-Bus 1 Wire - , is used for communication with the MESX, the data collector, the LC-Display and the BOP.	MEASUREMENT NOT POSSIBLE!
X35:27	Interface CAN-Bus 1 Wire + , is used for communication with the MESX, the data collector, the LC-Display and the BOP.	MEASUREMENT NOT POSSIBLE!
X35:28	Input potential terminal 15 Digital input active high This signal must be present, so that the control can work.	Control switched on ☞ approx.12 V Control switched off ☞ approx.2 V
X35:29	Input steering angle sensor Analogue input / voltage input 0..8.5 V	Position steering angle sensor (measured against AGND) right hand stop ☞ 0,50..1,00 V

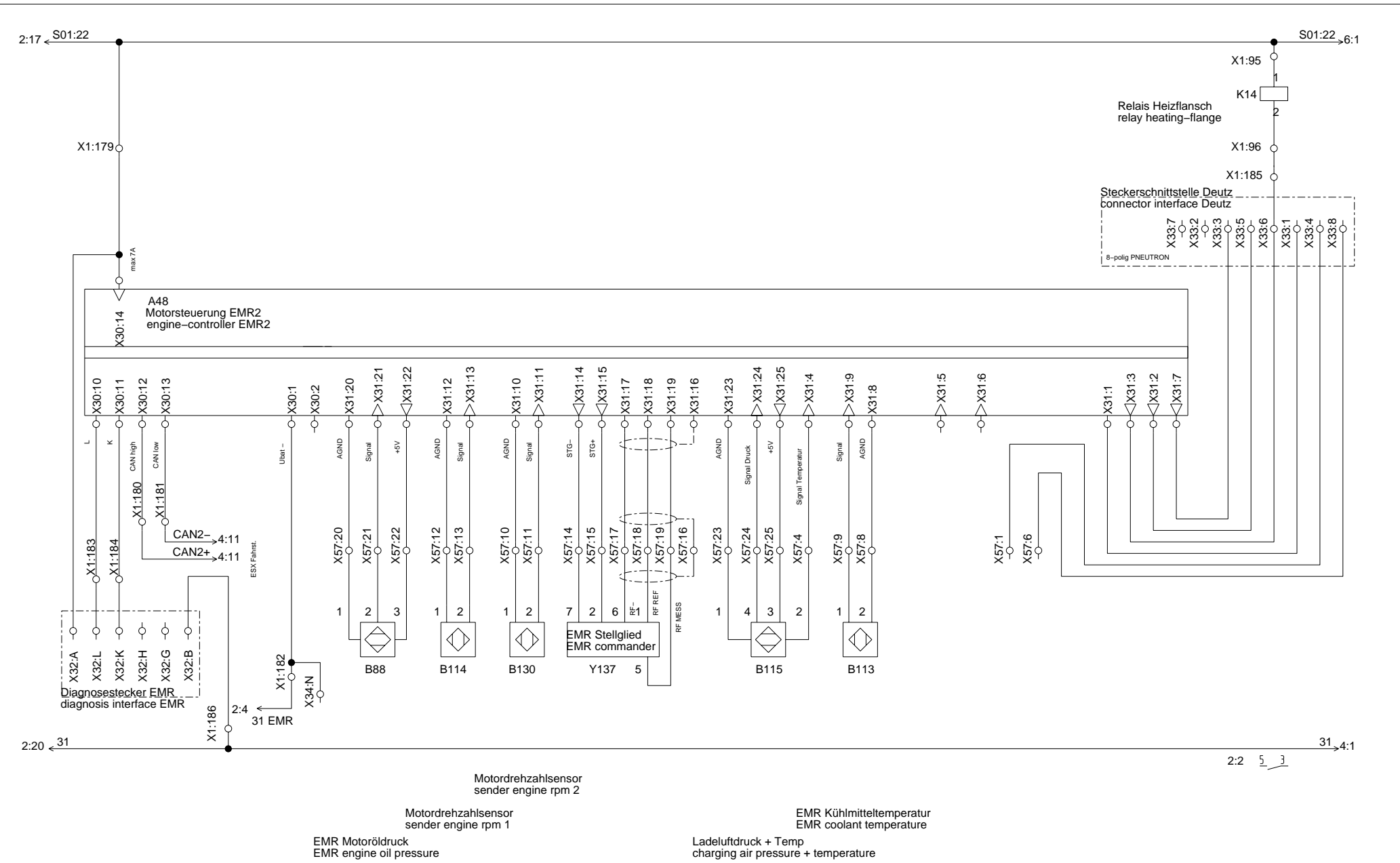
10 Fault codes of the ESX control

10.1 Overview

Fault code	Fault description
0 0 0 0 - 0 9 9 9	General faults / warnings / machine tests
1 0 0 0 - 1 9 9 9	Fault in travel system
2 0 0 0 - 2 4 9 9	Fault in steering system
2 5 0 0 - 2 9 9 9	Fault in remote control
3 0 0 0 - 4 4 9 9	Fault of work functions (vibration, rotor, dozer blade, chip spreader)
4 5 0 0 - 4 9 9 9	Fault in measuring systems
5 0 0 0 - 5 4 9 9	Fault diesel engine
5 5 0 0 - 5 9 9 9	Fault hydraulic system
6 0 0 0 - 6 9 9 9	Fault anti-theft warning system, locating system, access system, time calculation, etc.
7 0 0 0 - 7 4 9 9	Input of machine codes
7 5 0 0 - 7 8 9 9	Input of measuring technology codes
7 9 0 0 - 7 9 9 9	Operating hours, load spectrum, etc.
8 0 0 0 - 8 9 9 9	Severe software fault
9 0 0 0 - 9 9 9 9	Fault of external I/O-nodes (joystick, data collector, Dios-module, LCD-display, etc.)

11.3 Travel lever / driving

Input code	Description of display function	Display values		
1 0 2 5	Display "travel lever direction"	100 = forward 0 = neutral 1 = reverse		
1 0 2 6	Display "movement direction"	0 = neutral 1 = forward 2 = reverse		
1 0 2 7	Display "travel lever enable"	1		
1 0 4 0	Display "speed range / gear"	The display shows the travel range switch position from 1...24		
1 0 4 1	Display "voltage value for speed range / gear"	Stages 0...4 = 4 Stages 5...9 = 3 Stages 10...14 = 2 Stages 15...19 = 1 Stages 20...24 = 0		
1 0 4 2	Display "voltage value for speed range / gear standardized"	Stage 1 ≈ 956 Stage 4 ≈ 835 Stage 7 ≈ 716 Stage 10 ≈ 597 Stage 13 ≈ 478 Stage 16 ≈ 357 Stage 19 ≈ 238 Stage 22 ≈ 120	Stage 2 ≈ 916 Stage 5 ≈ 795 Stage 8 ≈ 675 Stage 11 ≈ 557 Stage 14 ≈ 436 Stage 17 ≈ 318 Stage 20 ≈ 200 Stage 23 ≈ 80	Stage 3 ≈ 875 Stage 6 ≈ 756 Stage 9 ≈ 637 Stage 12 ≈ 517 Stage 15 ≈ 396 Stage 18 ≈ 279 Stage 21 ≈ 160 Stage 24 ≈ 40
1 0 4 4	Display "speed range / gear" end value	Stage 1 = 4'17 Stage 4 = 1'667 Stage 7 = 2'917 Stage 10 = 4'167 Stage 13 = 5'417 Stage 16 = 6'667 Stage 19 = 9'167 Stage 22 = 16'667	Stage 2 = 833 Stage 5 = 2'089 Stage 8 = 3'333 Stage 11 = 4'583 Stage 14 = 5'833 Stage 17 = 7'500 Stage 20 = 10'000 Stage 23 = 20'000	Stage 3 = 1'250 Stage 6 = 2'500 Stage 9 = 3'750 Stage 12 = 5'000 Stage 15 = 6'250 Stage 18 = 8'333 Stage 21 = 13'334 Stage 24 = 23'333
1 0 7 0	Display "nominal current travel pump forward"	0 – 1200 mA		
1 0 7 1	Display "Actual current travel pump forward"	Display in mA		



1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
		Gez.: 28.06.2004 Name: Seis		Motor Deutz EMR II engine Deutz EMR II												Seite: 1 von: 1 page: 1 from: 1		582 700 95	
		Gepr.: 28.06.2004 Name: Werner														Ers.f.: Replaces:		Blatt Nr.: 003 sheet no.:	

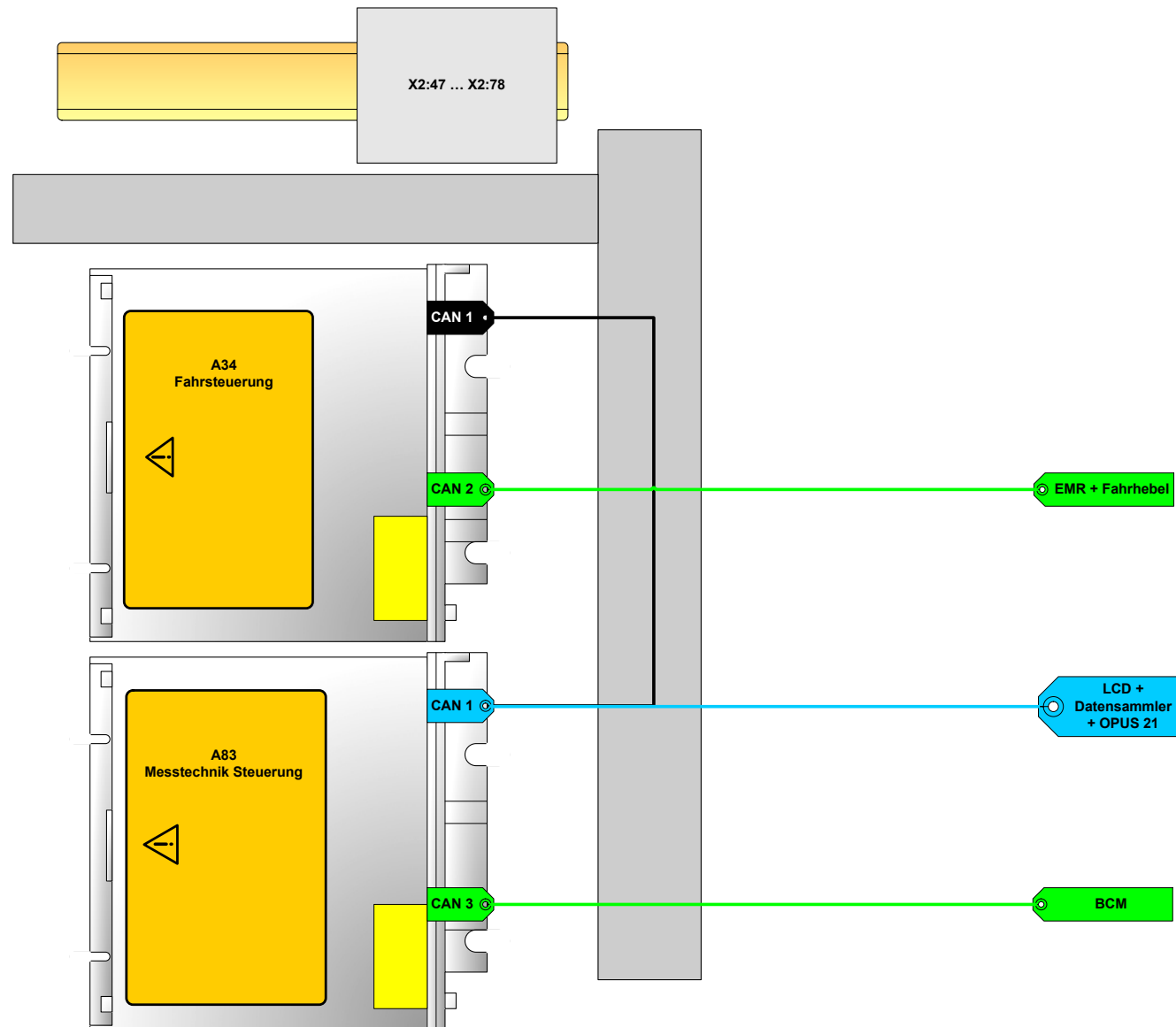
		Name	Bl.	Pf.	Benennung	title	TYP
		A02	010	17	Blinkrelais	indicator relay	
		A12	011	5	Radio	Radio	
		A16	011	6	Elektronik Tachograph	Electronic system, tachograph	
		A34	004	6	Prozessorplatine	Processing circuit board	
		A34	006	5	Prozessorplatine	Processing circuit board	
		A45	006	9	Lenkrad	Steering wheel	
		A48	003	3	Elektronische Motorsteuerung	Electronic engine management	
		A54	007	17	Modul Pumpenansteuerung	Modul pump control	
		A72	012	11	Steuergeraet Klimaanlage, Heizung	Control unit,air conditioning,heating	
		A80	005	3	Modul Datensammler	modul data-collector	
		A81	005	18	Anzeigeeinheit	Display-Unit	
		A83	008	6	Elektronik Messtechnik	electronic measurement-equipment	
		A87	009	15	USB-CAN Schnittstelle BCM	USB-CAN Interface BCM	
		B03	005	3	Unterdruckschalter Luftfilter	Vacuum switch, air cleaner	
		B11	002	16	Signalhorn	Warning horn	
		B11	002	18	Signalhorn	Warning horn	
		B16	006	16	Aufnehmer Vibrationsfrequenz vorne	Transducer, vibration frequency, front	
		B21	005	2	Differenzdruckschalter Hydr.-Oelfilter	Pressure diff. switch, hydr. oil filter	
		B51	011	4	Lautsprecher Radio	Speaker radio	
		B51	011	6	Lautsprecher Radio	Speaker radio	
		B55	005	4	Kuehlmittelstand Ausgleichsbehaelter	Coolant charge expansion tank	
		B57	004	6	Neigungssensor Stufenumschaltung	Slope sensor, speed range selection	
		B59	004	4	Aufnehmer Bandagengeschwindigkeit	Sensor, drum speed	
		B60	004	2	Aufnehmer Achsgeschwindigkeit	Sensor, axle speed	
		B61	008	12	Aufnehmer Verstellzylinder	Sensor, adjustable cylinder	
		B62	008	8	Beschleunigungsaufnehmer	Acceleration sensor	
		B62	008	10	Beschleunigungsaufnehmer	Acceleration sensor	
		B65	006	4	Sensor, Lenkwinkel vorn	Sensor, angularity steering, front	
		B88	003	6	Druckgeber Motoroel	Sender, engine oil pressure	
		B103	012	7	Temperaturschalter Klimaanlage	Temperature switch, air conditioning	
		B104	012	7	Druckschalter Klimaanlage	Pressure switch, air conditioning	
		B112	004	3	Druckgeber Fahrpumpe	pressure sender, driving pump	
		B113	003	13	EMR Temperaturregeber Kuehlmittel	EMR Temperature switch, coolant	
		B114	003	7	EMR Aufnehmer, Motordrehzahl 1	EMR Transducer, engine speed 1	
		B115	003	11	Geber Ladeluftdruck	Sender, charging air pressure	
		B124	005	5	Geber Wasserstandsabscheider Diesel	Sender, water separator fuel	
		B126	003	14	EMR Temperaturregeber Kraftstoff	EMR fuel temperature sender	
		B130	003	8	EMR Aufnehmer, Motordrehzahl 2	EMR Transducer, engine speed 2	
		B131	012	10	Temperaturschalter Heizung	Temperature switch, heating	
		B132	006	2	Initiator Armllehne links	proximity switch left arm rest	
		B134	007	17	Naerungsschalter Platten oben	proximity switch, plate up	
		B135	007	16	Naerungsschalter Platten mitte	proximity switch, plate middle	
		E08	010	17	Blinkleuchte vorne links	Indicator, front, lh.	MAX. 1,75A
		E09	010	18	Blinkleuchte hinten links	Indicator, rear, lh.	MAX. 1,75A
		E10	010	19	Blinkleuchte vorne rechts	Indicator, front, rh.	MAX. 1,75A
		E11	010	19	Blinkleuchte hinten rechts	Indicator, rear, rh.	MAX. 1,75A
		E12	010	7	Parkleuchte links	Parking light, lh.	MAX. 0,42A
		E13	010	6	Schlussleuchte links	Tail light, lh.	MAX. 0,42A
		E14	010	7	Parkleuchte rechts	Parking light, rh.	MAX. 0,42A
		E15	010	8	Schlussleuchte rechts	Tail light, rh.	MAX. 0,42A
		E16	010	2	Scheinwerfer links	Head light, lh.	MAX. 4,6A
		E17	010	2	Scheinwerfer rechts	Head light, rh.	MAX. 4,6A
		E23	010	11	Arbeitsscheinwerfer vorne links	Working head light, front, lh.	MAX. 4,6A
		E23	011	18	Arbeitsscheinwerfer vorne links	Working head light, front, lh.	4,6A
		E25	010	12	Arbeitsscheinwerfer vorne rechts	Working head light, front, rh.	MAX. 4,6A
		E25	011	19	Arbeitsscheinwerfer vorne rechts	Working head light, front, rh.	4,6A
		E27	010	10	Arbeitsscheinwerfer hinten links	Working head light, rear, lh.	MAX. 4,6A
		E27	011	17	Arbeitsscheinwerfer hinten links	Working head light, rear, lh.	4,6A
		E28	010	11	Arbeitsscheinwerfer hinten rechts	Working head light, rear, rh.	MAX. 4,6A
		E28	011	17	Arbeitsscheinwerfer hinten rechts	Working head light, rear, rh.	4,6A
		E29	011	3	Innenleuchte Kabine	Inside light, cabin	1,75A
		E30	012	13	Heizgeraet	Heating unit	
		E32	011	19	Kennleuchte	Warning light	5A
		E70	011	15	Nachtleuchte	Night lamp	0,83A
		E71	011	3	Kontrollleuchte Schalter Heckscheibenheizung	indicator light switch rear screen	1,75A
		E72	011	16	Beleuchtung Bedienschalte	illum. Switches	
		F00	002	4	Hauptsicherung Batterie	Fuse, main, battery	125A
		F05	002	14	Sicherung Steckdose	Fuse, socket	15A
		F07	010	15	Sicherung Warnblinker	Fuse, hazard light	15A
		F08	010	18	Sicherung Blinker u. Arbeitsscheinw.	Fuse, indicators a. work, head light	15A
		F09	010	6	Sicherung Park- u. Schlussl. links	Fuse, parking and tail light, lh.	10A
		F10	010	8	Sicherung Park- u. Schlussl. rechts	Fuse, parking and tail light, rh.	10A
		F11	010	2	Sicherung Scheinwerfer links	Fuse, head light, lh.	15A
		F13	002	10	Sicherung Startschalter	Fuse, starter switch	30A
		F15	012	18	Sicherung Heizgeraet	Fuse, heating unit	5A
		F18	010	5	Vorsicherung Arbeitsscheinw. vorne	Primary fuse, work, head light, fr.	30A
		F19	010	12	Sicherung Arbeitsscheinw. vorne li.	Fuse, working head light, front, lh.	30A
		F22	010	10	Sicherung Arbeitsscheinwerfer hinten	Fuse, working head lights, rear	30A
		F23	002	18	Sicherung Signalhorn	Fuse, warning horn	15A
		F24	005	2	Sicherung Ueberwachungsmodul	Fuse, monitoring module	15A
		F31	012	3	Sicherung Kabinenluefter	Fuse, cabin ventilator	20A
		F39	002	19	Hauptsicherung Kabine	Main fuse, cab	15A
		F40	012	13	Sicherung Kabinenheizung	Fuse, heating unit cab	20A
		F41	011	19	Sicherung Rundumkennleuchte	Fuse, rotary beacon	10A
		F42	011	3	Sicherung Kabineninnenleuchte	Fuse, inside light cab	10A
		F43	011	10	Sicherung Wischermotor hinten	Fuse, wiper motor rear	15A
		F44	011	13	Sicherung Wischermotor vorn	Fuse, wiper motor front	15A
		F48	002	3	Sicherung Gluehanlage	Fuse, glow plug system	125A
		F67	004	7	Sicherung Steuerung (Potential 30)	Fuse, controller (pot.30)	15A
		F84	004	9	Sicherung Steuerung (Klemme 54)	Fuse, controller (Pin 54)	10A
		F95	002	16	Sicherung Motormanagement intern	Fuse, engine controller (internal)	15A
		FM1	006	6	Platinensicherung	Multifuse	MULTIFUSE
		FM2	006	5	Platinensicherung	Multifuse	MULTIFUSE
		FM4	008	11	Platinensicherung	Multifuse	MULTIFUSE
		FM5	006	5	Platinensicherung	Multifuse	MULTIFUSE
		F130	011	15	Sicherung Nachtleuchte	Fuse, night lamp	10A

Component listing

Bauteilliste

Gez.: 28.06.2004
Name: Seis
Gedr.: 28.06.2004
Name: Weimer

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Gez.: 28.06.2004
 Name: Seis
 Gepr.: 28.06.2004
 Name: Werner

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 overview e-box door BW 177...266 DH-4

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