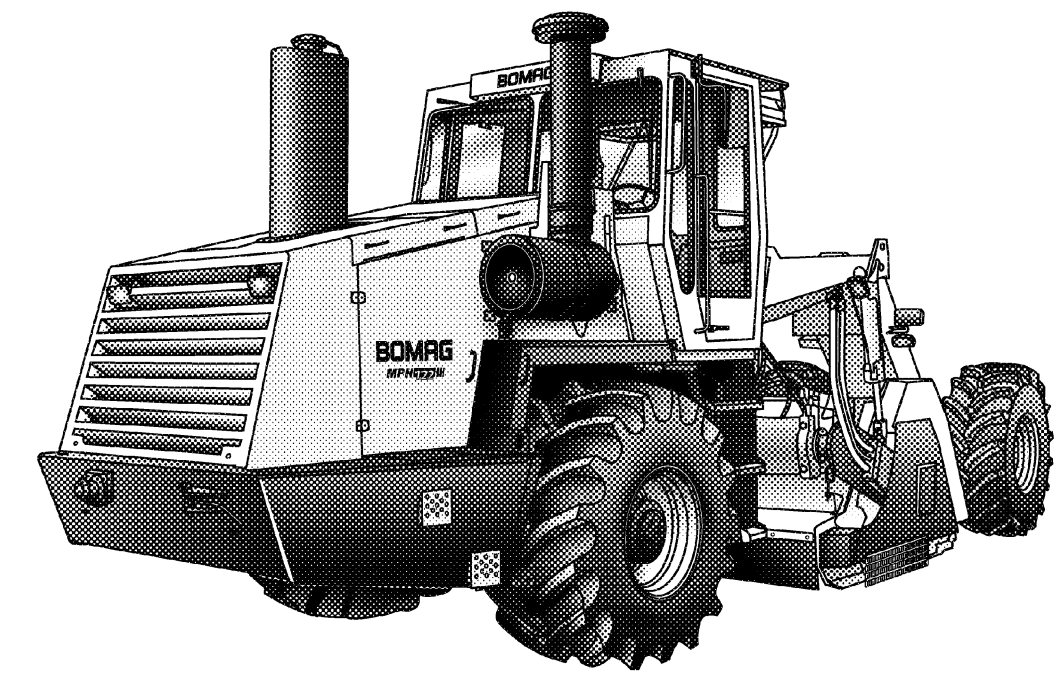
BOMAG

FAYAT GROUP

Service - Training

MPH 122-2

S/N 101 590 06 .... >
S/N 101 590 07 .... >



Soil Stabilizer

Asphalt Recycler

Katalog Nr.
008 917 87

12/2011

Environment

It is strictly prohibited to drain off oil into the soil, the sewer system or into natural waters. Old oil must be disposed of according to applicable environmental regulations. If in doubt you should consult your local authorities.

Hydraulics

- Always relieve the pressure in the hydraulic system before disconnecting any lines. Hydraulic oil escaping under pressure can penetrate the skin and cause severe injury.
- Always make sure that all screw fittings have been tightened properly and that hoses and pipes are in mint condition before pressurizing the system again.
- Hydraulic oil leaking out of a small opening can hardly be noticed, therefore please use a piece of cardboard or wood when checking for leaks. When injured by hydraulic oil escaping under pressure consult a physician immediately, as otherwise this may cause severe infections.
- Do not step in front of or behind the drums, wheels or crawler tracks when performing adjustment work in the hydraulic system while the engine is running. Block drums, wheels or crawler tracks with wedges.

Reattach all guards and safety installations after all work has been completed.

Environment

It is strictly prohibited to drain off oil into the soil, the sewer system or into natural waters. Oil oil must be disposed of according to applicable environmental regulations. If in doubt you should consult your local authorities.

Fuels

⚠ Danger

Repair work shall only performed by appropriately trained personnel or by the after sales service of BOMAG.

Follow the valid accident prevention instructions when handling fuels.

The following notes refer to general safety precautions for danger free handling of fuel.

Fuel vapours not only are easily inflammable, but also highly explosive inside closed rooms and toxic; dilution with air creates an easily inflammable mixture. The vapours are heavier than air and therefore sink down to the ground. Inside a workshop they may easily become distributed by draft. Even the smallest portion of spilled fuel is therefore potentially dangerous.

- Fire extinguishers charged with FOAM, CO^2 GAS or POWDER must be available wherever fuel is stored, filled in, drained off, or where work on fuel systems is performed.
- The vehicle battery must always be disconnected, BEFORE work in the fuel system is started. Do not disconnect the battery while working on the fuel system. Sparks could cause explosion of the fuel fumes.
- Wherever fuel is stored, filled, drained off or where work on fuel systems is carried out, all potential ignition sources must be extinguished or removed. Search lights must be fire proof and well protected against possible contact with running out fuel.

Hot fuels

Please apply the following measures before draining of fuel to prepare for repair work:

- Allow the fuel to cool down, to prevent any contact with a hot fluid.
- Vent the system, by removing the filler cap in a well ventilated area. Screw the filler cap back on, until the tank is finally emptied.

Synthetic rubber

Many O-rings, hoses, etc. are made of synthetic material, a so-called fluorocarbon elastomer. Under normal operating conditions this material is safe and does not impose any danger to health.

However, if this material becomes damaged by fire or extreme heat, it may decompose and form highly caustic hydrofluoric acid, which can cause severe burns in contact with skin.

- If the material is in such a state it must only be touched with special protective gloves. The protective gloves must be disposed of according to applicable environmental regulations immediately after use.
- If the material has contacted the skin despite these measures, take off the soiled clothes and seek medical advice immediately. In the meantime cool and wash the affected area of skin over a sufficient time with cold water or lime water.

Poisonous substances

Some of the fluids and substances used are toxic and must under no circumstances be consumed.

Skin contact, especially with open wounds, must be avoided.

These fluids and substances are, amongst others, anti-freeze agents, hydraulic oils, fuels, washing additives, refrigerants, lubricants and various bonding agents.

Feather keys and keyways

⚠ **Caution**

Feather keys may only be reused if they are free of damage.

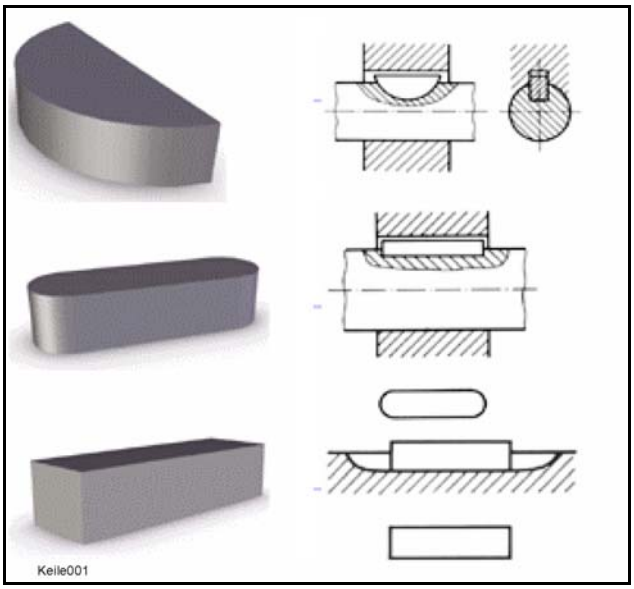


Fig. 4

- Clean and thoroughly examine the feather key.
- Deburr and thoroughly clean the edges of the keyway with a fine file before reassembling.

Ball and roller bearings

⚠ **Caution**

Ball and roller bearings may only be reused if they are free of damage and do not show any signs of wear.

Fig. 5

- If a ball or roller bearing of a bearing pair shows defects, both ball or roller bearings need to be replaced.
- Remove any lubricant residues from the ball or roller bearing to be examined by washing it with gasoline or any other appropriate degreasing agent. Ensure strict cleanliness.
- Check balls or rollers, running surfaces, outer faces of outer races and inner faces of inner races for visible damage. Replace the ball or roller bearing if necessary.
- Check the ball or roller bearing for clearance and resistance between the inner and outer races, replace if necessary.
- Lubricate the ball or roller bearing with the recommended type of grease before assembly or reassembly.
- On greased bearings (e.g. wheel bearings) fill the space between ball or roller bearing and outer seal with the recommended type of grease before assembling the seal.

2 BOMAG Stabilizer / Recycler

System		Gear pump
Displacement	cm^3/rev	22.5
Max. steering pressure	bar	190 ± 10
Steering valve		Danfoss
Type		OSPL 630 LS
System		Rotary valve
Working valve		
Type		SP-2675-10/4SP-08PC
Pressure limitation steering, gate, cross-slope	bar	160 ± 10
Pressure limitation rotor up/down	bar	200 ± 10
Priority valve		
Type		OLS80
Proportional valve, water injection		
Type		YC-551-32
High pressure limitation	bar	200 ± 10
Max. water injection quantity	l/min	500
Flow control valve, intercooler		
Type		HY/VHR4
Rear axle		
Type		305/276/251; Steering axle
Differential		Fixed value lock
Degree of locking	%	45
Reduction ratio differential/tandem/ wheel		54.8
working pump		
Type		HYZ
System		Gear pump
Max. displacement	cm^3/rev	8
Other details		
Charge circuit filter	micron	12
Return flow filter	micron	80

4.4 Running-in instructions

The following service work must be performed when taking new machines into operation.

⚠ Caution

Up to approx. 250 operating hours check the engine oil level twice every day.

Depending on the load the engine is subjected to, the oil consumption will drop to the normal level after approx. 100 to 250 operating hours.

After a running time of 15 minutes retighten the V-belts for generator and air conditioning compressor*.

Maintenance after 50 operating hours

- Change engine oil and oil filter cartridge.
- Change all fuel filters.
- Retighten bolted connections on intake and exhaust tubes, oil sump and engine mounts.
- Retighten all bolted connections on the machine.

Maintenance after 250 operating hours

- Change the oil in the front drive gears.
- Change the oil in the planetary drives of the rear axle
- Change the oil in the rear axle reduction gear
- Change the oil in the rear axle.

Maintenance after 500 operating hours

- Change the oil in the front drive gears.
- Change the oil in the planetary drives of the rear axle

Special intervals

- Switch the air conditioning on every month for about 10 minutes.

* Optional equipment

Overview of structural symbols

The structural identification overview represents the structure of the machine with respect to equipment, functions and installation locations.

Structuring symbols are mainly abbreviations for machine parts/machines, functions and installation locations, which were derived from designations in English.

Structure identifier overview
Strukturkennzeichenübersicht

& Document type = Higher-level function == Functional assignment + Mounting location
& Dokumententyp = Anlage == Funktionale Zuordnung + Einbauort

	Description	Beschreibung
&DOC1	Leading documentation	Einleitende Dokumentation
&EFS	Circuit diagram	Schaltpläne
&DOC2	Reports and drawings	Auswertungen und Zeichnungen

	Description	Beschreibung
=MPH	Basic machine	Basis Maschine
=WDP	Water dosage plant (option)	Wasser Dosierung Anlage (Option)
=CDP	cement dosage plant (option)	Zementdosieranlage (Option)
=BDP	Bitumen dosage plant	Bitumenanlage

	Description	Beschreibung
==SUPL	Supply	Versorgung
==ENGI	Engine	Motor
==COM	Communication	Kommunikation
==DRIV	Drive functions	Antriebsfunktionen
==STER	Steering functions	Lenkfunktionen
==MILL	Milling functions	Fräsfunktionen
==VIB	Vibration functions	Vibration Funktionen
==DATA	Data collector / signals	Datensammler / Signale
==COMF	Comfort devices	Komfort Einrichtungen
==ILUM	Lighting	Beleuchtung
==WDOS	Water dosing	Wasser dosieren
==CEDI	cement disperse functions	Zement Streufunktionen

	Description	Beschreibung
+BAT	Battery-box	Batteriekasten
+EBOX	Central electric	Zentralelektrik
+MOT	Engine and attachment parts	Motor und Anbauteile
+SEAT	Seat console	Sitzkonsole
+FRFR	Front frame	Vorderrahmen
+REFR	Rear frame	Hinterrahmen
+CAB	Cabin and attachment parts	Kabine und Anbau Teile

0	1	2	3	4	5	6	7	8	9
Created Erstellt: WERNER 22.07.2010	MPH 122-2		BOMAG FAYAT GROUP	Structure identifier overview Strukturkennzeichenübersicht				Higher-level function Anlage =	Page Blatt 4 from von 58
Checked Geprüft: M. Vogt 09.08.2010								Function Funktion == 42	
								Mounting location Einbauort + EPE / 000 / 00	

Fig. 19 Example: MPH122-2

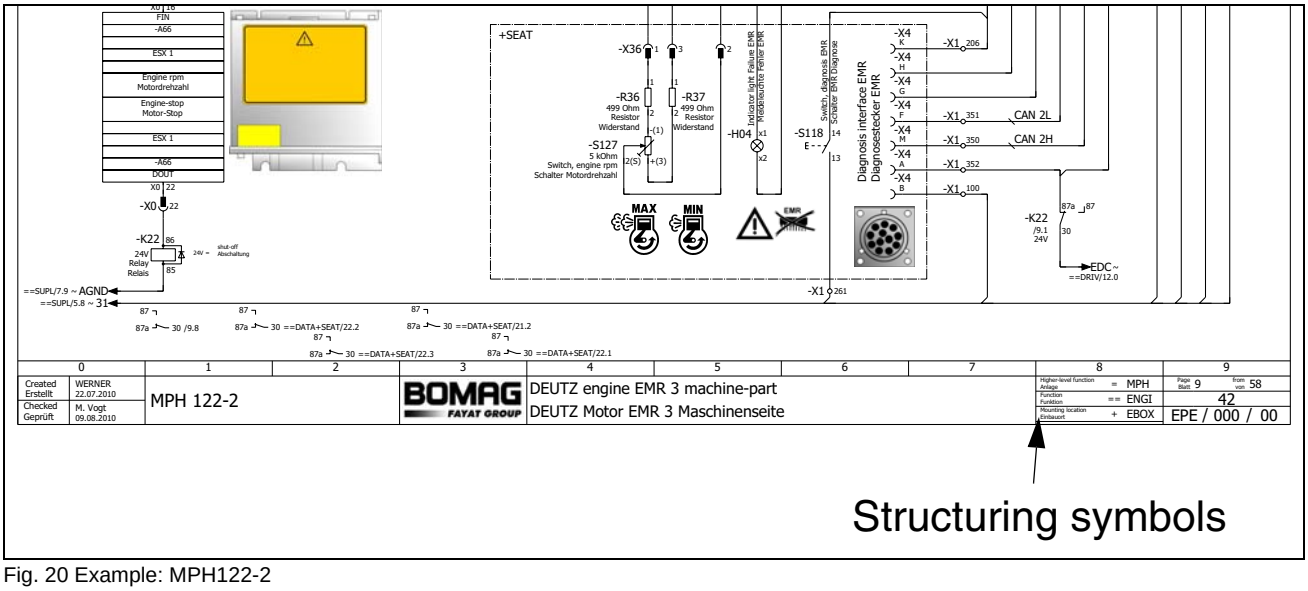


Fig. 20 Example: MPH122-2

5.3 Identification of switch blocks in the wiring diagram

Switches of modular design

- For normally open contacts the contact symbols "_3/_4" are used.
- For normally closed contacts the contact symbols "_1/_2" are used.

In combination with the contact block numbering described above each individual connection is clearly defined.

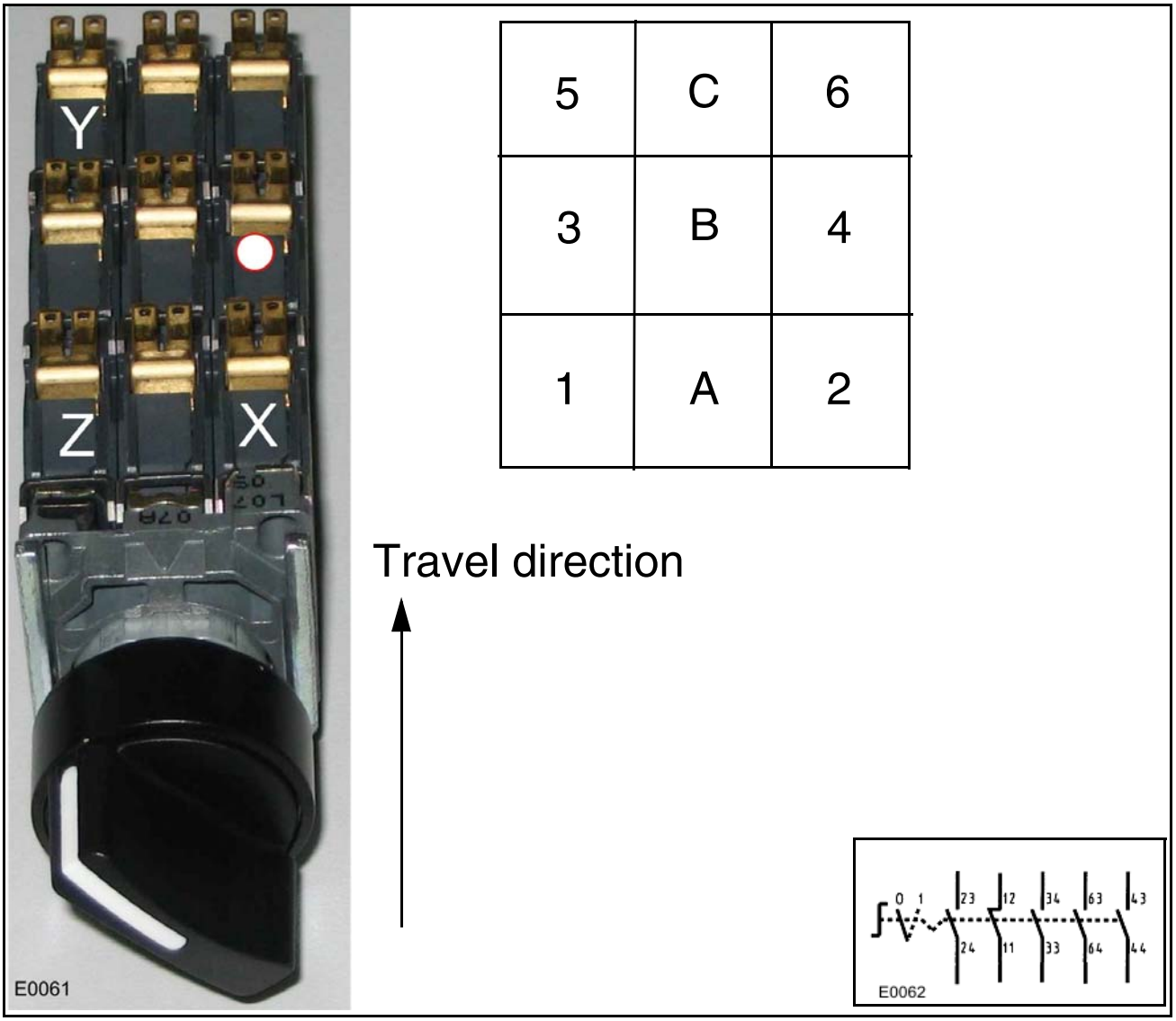


Fig. 30

Example:

The contact block marked with the "circle" is referred to as "43"/ "44" if it is a normally open contact and "41" / "42" if it is a normally closed contact.

The contact block marked with "X" is referred to as "23"/ "24" if it is a normally open contact and "21" / "22" if it is a normally closed contact.

The contact block marked with "Z" is referred to as "13"/ "14" if it is a normally open contact and "11" / "12" if it is a normally closed contact.

The contact block marked with "Y" is referred to as "53"/ "54" if it is a normally open contact and "51" / "52" if it is a normally closed contact.

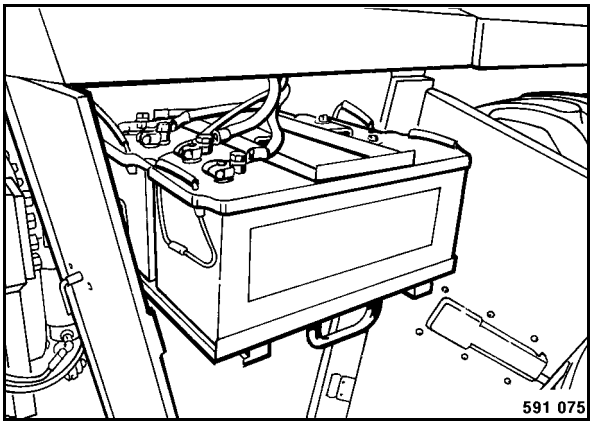


Fig. 9

- Clean battery poles and terminal clamps (Fig. 9) and grease them with pole grease (Vaseline).
- Retighten the pole clamps.
- Check the fastening of the battery.
- On serviceable batteries check the acid level, if necessary top up to the filling mark with distilled water.

Checking the main battery switch

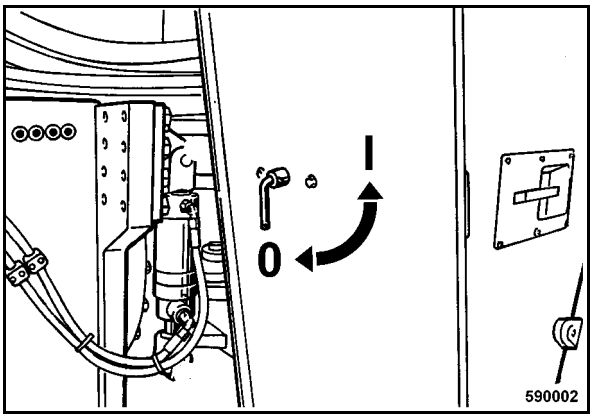


Fig. 10

⚠ Caution

Pull out the main battery switch at the earliest 40 seconds after switching off the ignition, except in cases of emergency.

- Turn the main battery switch (Fig. 10) to position "0" and check by voltage measurement (ignition key test) whether the batteries are disconnected from the electric system of the machine.

6.5 Starting with jump wires

⚠ Caution

When using external starting aid two external batteries are required, one for each on-board battery.

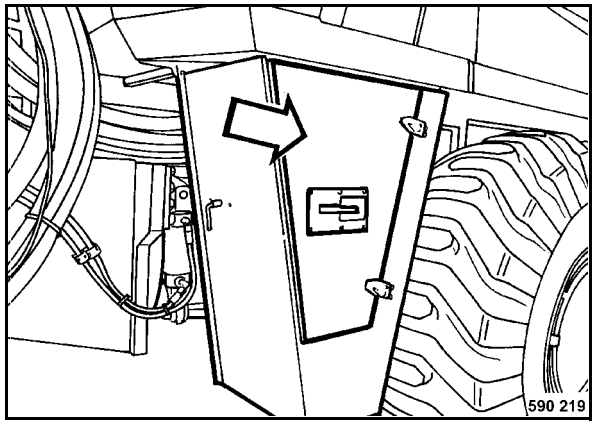


Fig. 11

- Open the maintenance door to the battery compartment (Fig. 11).

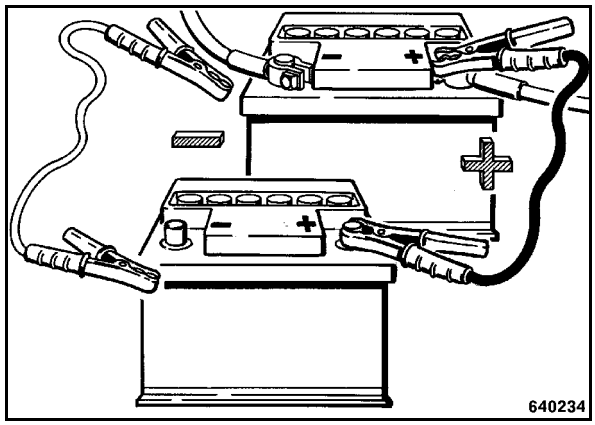


Fig. 12

⚠ Caution

A wrong connection will cause severe damage in the electric system.

- When starting with external batteries connect the positive poles (Fig. 12) first and the negative poles (ground cable) after.
- Start as described under "Starting the engine".

i Note

The ignition switch is designed with a re-start lock. For a new starting attempt the ignition key must first be turned back to position "0".

- Once the engine is running switch on a powerful consumer (working light, etc.).

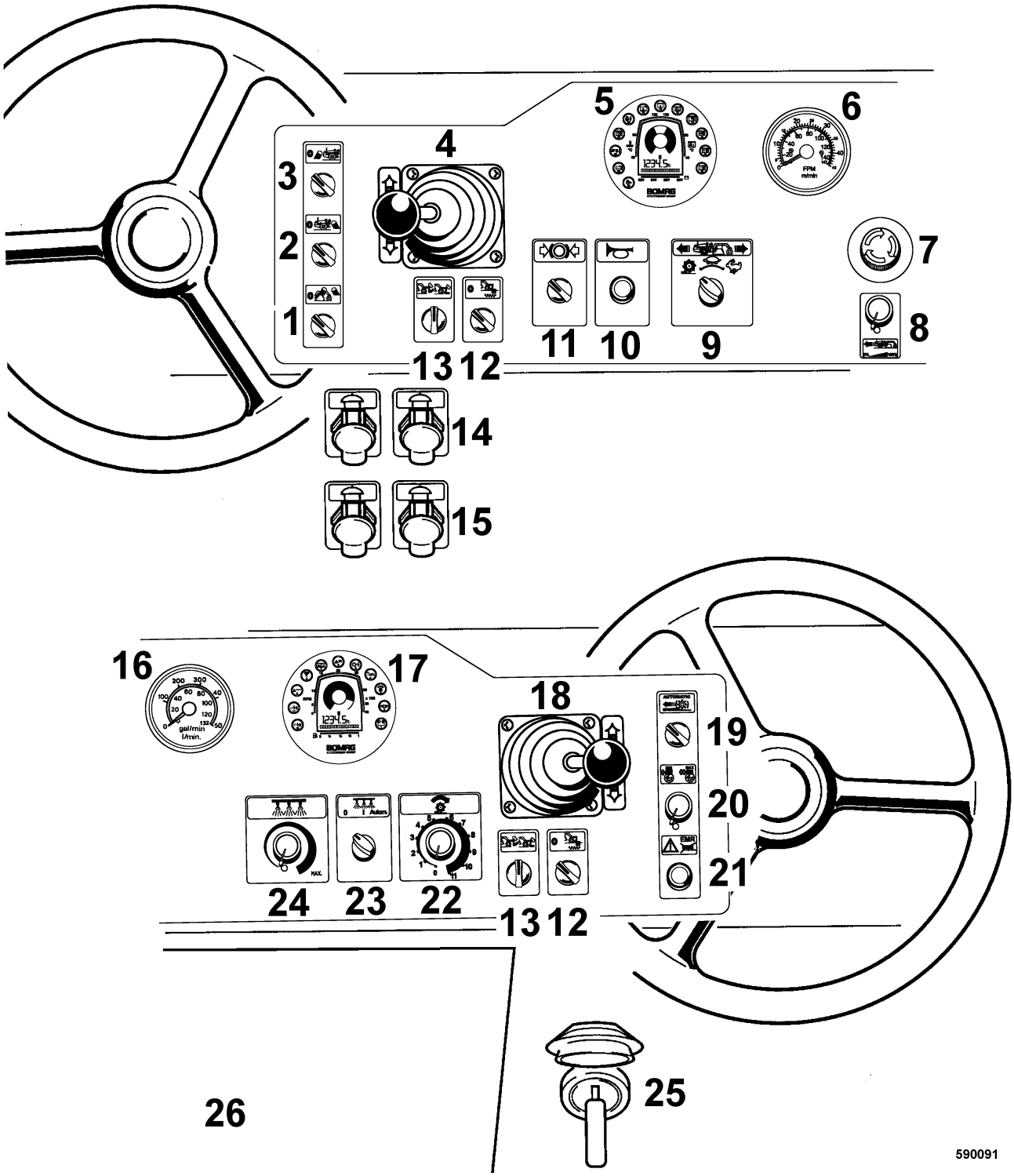


Fig. 1

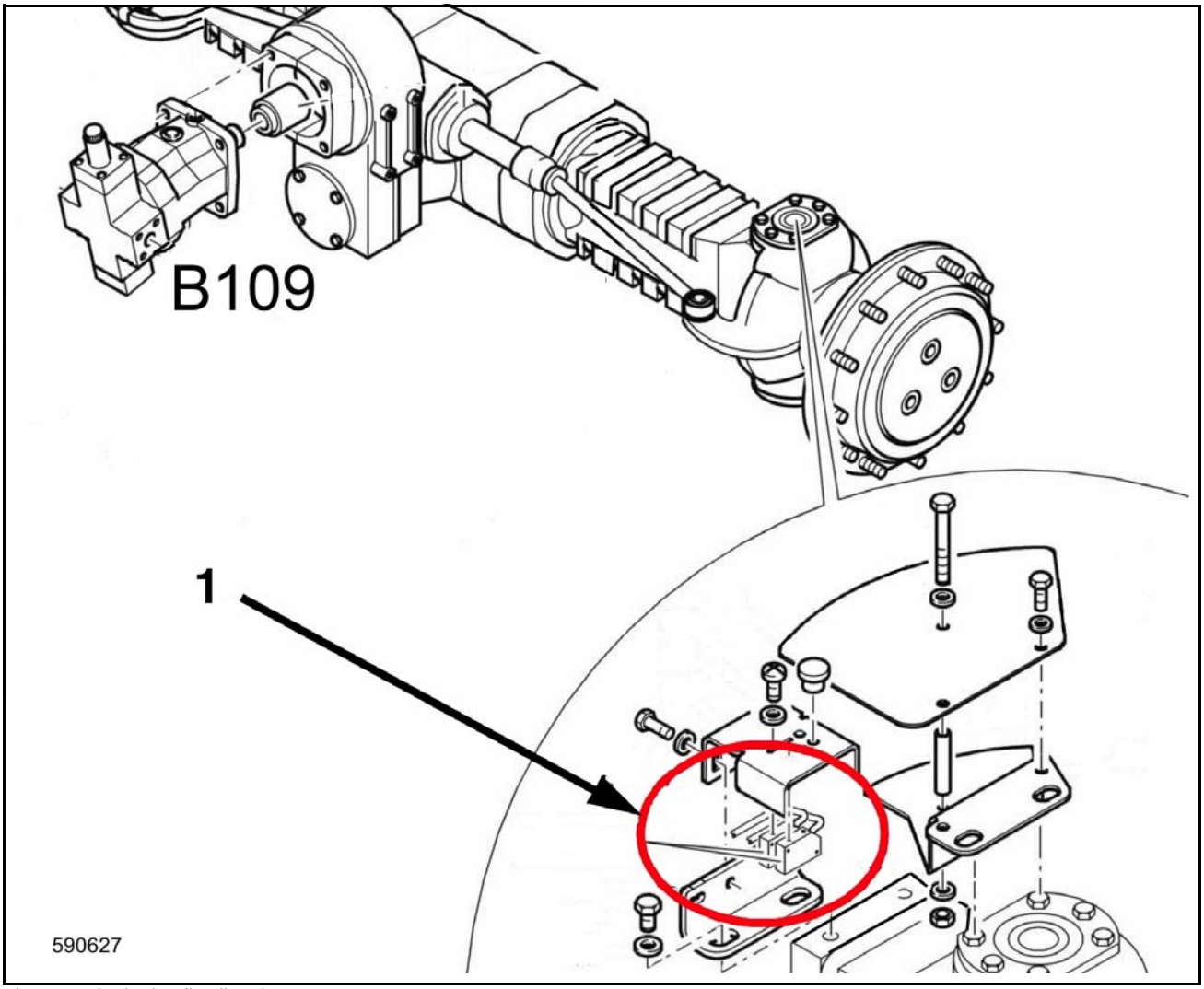


Fig. 12 under hydraulic oil tank

Pos	Designation	Position in hydraulic diagram	Position in wiring diagram	Measuring values and switching points
1	Proximity switch, rear wheel steering		B46 / 47	24 Volt

Measuring principle for line testing

When a line conducts an electric current, a voltage drop will occur in the line (U_V). The size of this voltage drop U_V depends on:

- the available amperage (I) and
- the electric resistance (R_{line}) of the current branch being checked.

In order to have reliable comparison possibilities at hand one should always work with the same amperage. Identical marginal conditions are therefore used in all of the following examples:

12 Volt – vehicle battery as voltage source or 24 Volt in a 24 Volt vehicle network.

12 V / 21 W – lamp as load in a 12 Volt vehicle network.

24 V / 21 W - lamp as load in a 24 Volt vehicle network.

Test steps

1. Switch off the ignition.

2. Unplug the control unit from wiring loom.

3. If available connect the Pinbox (Fig. 5) to the plug of the wiring loom, do not connect the control unit with the Pinbox. If no Pinbox is available, provide measuring cables with appropriate plug-in contacts, e.g. spade-type plugs.

4. Check with multimeter. If a setpoint is not reached, proceed step by step to identify the weak spot. Repair as necessary. Repeat the measurement.

⚠ Caution

The plug must not be pulled off or plugged on while the ignition is switched on. Switch off the ignition first and then pull off or plug on the plug.

Only plug the wiring loom onto the control unit, when the actual value corresponds with the setpoint.

Fig. 5 Pinbox for 68 pole ESX control

7 Electronic control

3.3 Fault management

3.3.1 Showing stored faults

Switch on function “Show stored faults”:
- Enter code number **7 0 0** . This code number enables the function “Show stored faults”.

Switch off function “Show stored faults”:
- Enter code number **7 0 I** . This code number disables the function “Show stored faults”.

i Note	**Apart from the stored faults the current faults are also displayed.**

3.3.2 Delete all stored faults

This function is only available from software version 1.12!

Execute the function “Delete all stored faults”:
- The engine must not be running!
- Enter code number **7 1 0** . This code number deletes all stored faults.

i Note	**Stored faults can only be deleted when the engine is not running.**

4.11 Rotor drive temperature monitoring

Note	Function only available from software version 4.10

Machines of type MPH122-2 with type number 590 000 06 are equipped with different rotor drives. The gears used in these machines are each fitted with a overtemperature monitoring switch. The corresponding monitoring function issues a “silent” (warning buzzer once per minute) warning message in case of overtemperature (or cable breakage). With the engine running and the rotor switched on, a permanent warning is issued after three seconds, after eight minutes the system changes to a fault message, after another 3 minutes (approx. 10 minutes after recognizing the fault) the engine will be shut down (firmware version 4.10), from version 4.11 the rotor will be shut down and machine stopped.

For machines without temperature monitoring this function can/must be disabled.

4.11.1 Setting

- Enter code **2 9 1** to activate the changeover function.

The display shows the code **2 9 1 .**

- Enter code **2 9 2** to switch off monitoring (for machines WITHOUT gearbox).
- Enter code **2 9 3** to switch on monitoring (for machines WITH gearbox).

The setting is active immediately after the code has been entered.

Note: When using the current software on machines without rotor drive the temperaturemonitoring feature must be disabled.

4.11.2 Examination and adjustment

The current setting can be interrogated by entering the display code **2 9 0** .

ESX terminal	Signal description	Nominal values (voltage / current)		
	Digital output vi terminal X1:163 to solenoid valve Y105 [001]	Water line open Water line closed	☞ ☞	approx. 24 V approx. 0 V
X0/1:14	Input **sensor lack of water** Digital input (Hi-active) from sensor B33 via terminal X11:2 [102]	*Status Voltage measured against ground* No water Water available	 ☞ ☞	 approx. 0 V approx. 24 V

Legend:

- Figures in square brackets [ ] represent display codes.
- Figures in round brackets ( ) represent fault codes.

Fault code	Description of fault	Possible cause	Terminal on ESX	Input code for diagnose	Fault reaction
1 4 0	**Input travel pressure sensor** The voltage applied to the input is outside the specified range (see signal description).	☞ Wire breakage in current path ☞ Current path has short circuit to ground ☞ Fuse FM 26 has tripped or wire breakage in voltage supply current path ☞ Travel pressure sensor defective	X0:31	1 4 0 . . 1 4 3	1
1 4 1	**Input travel pressure sensor** The voltage applied to the input is beyond the specified range (see signal description).	☞ Current path has short circuit to +24 V. ☞ Travel pressure sensor defective	X0:31	1 4 0 . . 1 4 3	1
1 4 2	**Travel pressure function** Although the engine is running the travel pressure is below 10 bar. After starting the engine the normal travel pressure of at least 10 bar must be reached after 5 seconds. Attention! In case of this fault occurring together with faults 100, 110 and 120	☞ Travel pump defective ☞ Defect on one or several travel motors ☞ Leakage in system ☞ Failure of fuse F26. Possibly caused by a ground contact in the attached current path. See wiring diagram.	X0:31	1 4 0 . . 1 4 3	4

Fault code	Description of fault	Possible cause	Terminal on ESX	Input code for diagnose	Fault re-action
570	**Input hydraulic oil contamination** (warning) The engine is running and the hydraulic oil signal indicates “contamination”.	☞ This message shows that the hydraulic oil is contaminated. ☞ Current path has short circuit to ground ☞ Dirt sensor (B19) defective			2
572	**Input hydraulic oil contamination** (warning) The engine is running and the hydraulic oil filter contamination signal indicates “contamination”.	☞ This message shows that the hydraulic oil filter is contaminated. ☞ Current path has short circuit to ground ☞ Pressure differential switch (B25/B42/B21/B22) defective			2
573	**Input hydraulic oil filter contamination** (warning) See 572 As a result the engine was automatically shut down.	☞ This message shows that the hydraulic oil filter has been soiled for more than 2 minutes (see message 527) and that the engine was automatically shut down for this reason.			5
574	**Input hydraulic oil excessive temperature** (warning) The engine is running and the signal excessive temperature of hydraulic oil indicates “excessive temperature”.	☞ This message shows that the hydraulic oil is too hot. ☞ Current path has short circuit to ground ☞ Temperature switch (B20) defective			2
575	**Input hydraulic oil excessive temperature** (fault) See 574 As a result the engine was automatically shut down.	☞ This message shows that the hydraulic oil has been overheated for more than 2 minutes (see message 574) and that the engine was automatically shut down for this reason.			5

8.1.13 Tires

Input code	Description of display function	Display values
129	**Tire type** Type (see 4.8, Adjustment/inspection of tire type)	000 ☞ Standard tires 001 ☞ EM-tires.

8.1.14 Travel pressure sensor

Input code	Description of display function	Display values
140	**Travel pressure sensor** Scaled value (bar)	Displayed value 000..400
141	**Travel pressure sensor** Current value in mA/10	Displayed value 004 ±4..215 ±10 ~ 4 mA 21.5 mA
142	**Travel pressure sensor** Standardized value (0..1000 for 4..20 mA)	*Displayed value* 000..--- (1000) ~ 4 mA 20 mA
143	**Travel pressure sensor** Status	*Status Displayed value* Not initialized 000 Initialized (normal) 001 Fault 002

8.1.15 Travel speed detection

Input code	Description of display function	Display values
I50	**Travel speed** In m/min *10	Display value 000..999
151	**Wheel speed ratio**	*Status Display value* All wheels rotate with the same speed 111 Left wheel rotates too fast, or to slow 011 Right wheel rotates too fast, or to slow 110 Rear axle rotates too fast, or to slow 101 All wheels rotate with different speeds 000

8.4.2 Optional water injection

Note **Function only available from software version 4.02**

Input code	Description of display function	Display values
600	Activation/deactivation of optional **water injection**	*Displayed* 600
601	Activate	see setting instructions para. 4.2 on page and 9
602	Deactivate	see setting instructions para. 4.2 on page and 9

8.4.3 Optional pump type for water injection

Note **Function only available from software version 4.03**

Input code	Description of display function	Display values
600	Setting the variant (pump type) for **main water injection** -	*Displayed* 600
601	Water injection is deactivated (machine WITHOUT main water injection).	see setting instructions para. 4.3 on page and 10
602	Main water system with centrifugal pump	see setting instructions para. 4.3 on page and 10
603	Main water system with spiral pump.	see setting instructions para. 4.3 on page and 10

8.4.4 Measuring tube type, water injection

Input code	Description of display function	Display values
610	Setting of **Main water metering system**	*Displayed* 610
611	for “Honsberg Basic” System, metering tube WITHOUT flow plate.	see setting instructions para. 4.4 on page 11
612	for “Honsberg Basic” System, metering tube WITH flow plate.	see setting instructions para. 4.4 on page 11
613	for “Krohne” metering system	see setting instructions para. 4.4 on page 11

8 Engine electrics

- After approx. 2 s watch the flashing code or the first or the next active fault.
- Wait until the fault lamp shows the original flashing or permanent light again after about 5 seconds.

Example: 1x short flashing, **2**x long flashing, **8** x short flashing = flashing code **1-2-8**; this flashing code indicates an interruption or short circuit in the wiring of the charge air temperature sensor. The following illustration (Fig. 16) shows the temporal sequence of the flashing signals:

All active and passive system faults can be invoked by repetitive execution of these steps. If this read-out process is continued after the last fault, the output will be restarted with the first fault.

i Note

The light will go out after the fault has been rectified. With some faults it is necessary to switch off the ignition, then wait for 30 seconds before switching the ignition back on.

Deleting the fault log

The EMR3 engine control unit has two fault logs.Each system fault is simultaneously saved in both logs. However, fault log 2 is only transmitted after switching off the voltage via terminal 15 and the associated afterrunning. Earlier switching off may result in the loss of fault messages.

The diagnostics button enables you to delete passive faults from the first fault log. The second fault log can only be cleared with SERDIA.

The following describes the steps for clearing fault log 1:

- Ignition OFF, press and hold the diagnostics button.
- Switch the ignition on.
- Only release the diagnostics button after approx. 10 seconds.
- All passive faults in fault log 1 will be deleted.
- The deleting process is confirmed by three short flashing pulses.

Error code SERDIA	Component / Location	Description (Error location)	Defined for DCR	Defined for DMV	ID	Blink code	SPN	FMI	Self-curing[1]
48	Shut-off request	Shut-off request ignored by operator	●	●	CoEngShOffDemIgr	3-4-1	1109	2, 11	
52	Engine brake (internal)	Internal engine brake: cable break or short circuit	●	●	CRERCD	5-2-8	1072	3, 4, 5, 11	
53	Preheating signal lamp	Cable break or short circuit	●	●	CSLpCD	3-2-8	1081	2, 3, 4, 5	
54	Coolant temperature warning lamp	Cable break or short circuit	●	●	CTLpCD	1-2-3	704	11	
55	Coolant temperature sensor	Cable break or short circuit	●	●	CTSCD	2-2-5	110	2, 3, 4	●
56	Coolant temperature	Outside target range with system reaction	●	●	CTSCDSysReac	2-3-2	110	0, 11	●
57	Reserve output	Short circuit to Ubatt (output 1)	●	●	Dummy1CD_Max	-	701	11	
58	Reserve output	Short circuit to ground (output 1)	●	●	Dummy1CD_Min	-	701	11	
59	Reserve output	Cable break or ECU internal error (output 1)	●	●	Dummy1CD_SigNpl	-	701	11	
60	Reserve output	Short circuit to Ubatt (output 2)	●	●	Dummy2CD_Max	-	702	11	
61	Reserve output	Short circuit to ground (output 2)	●	●	Dummy2CD_Min	-	702	11	
62	Reserve output	Cable break or ECU internal error (output 2)	●	●	Dummy2CD_SigNpl	-	702	11	
69	EGR actuator (external)	Short circuit to Ubatt	●	●	EGRCD_Max	4-1-4	2791	3, 11	
70	EGR actuator (external)	Short circuit to ground	●	●	EGRCD_Min	4-1-4	2791	4, 11	
71	EGR actuator (external)	Cable break or ECU internal error	●	●	EGRCD_SigNpl	4-1-5	2791	2, 5, 11	
72	EGR actuator (external)	Cable break or short circuit	●	●	EGRCDIntEGR	4-1-6	2791	2, 3, 4, 5	
74	Engine power output	Engine Power output: cable break or short circuit	●	●	EngCDTrqCalcOut	5-5-5	923	2, 3, 4, 5	
75	Engine speed sensor	Engine running with cam-shaft speed signal only	●	●	EngMBackUp	2-1-2	190	11, 12	●
76	Engine speed sensor	Speed signal from cam-shaft bad or missing	●	●	EngMCaS1	2-1-2	190	8, 11, 12	●
77	Engine speed sensor	Speed signal from crank-shaft bad or missing	●	●	EngMCrS1	2-1-2	190	8, 11, 12	●
78	Engine speed sensor	Speed signals of crank-shaft and cam-shaft are phase-shifted	●	●	EngMOfsCaSCrS	2-1-3	190	2, 11	
79	Overspeed	Engine overspeed with system reaction	●	●	EngPrtSysReacFOC	2-1-4	190	0, 11	
80	Overrun conditions	Overrun conditions with system reaction	●	●	EngPrtSysReacORC	2-1-4	190	11, 14	●
81	Engine operating signal lamp	Cable break or ECU internal error	●	●	ESLpCD	1-4-2	703	2, 3, 4, 5	
82	Engine brake flap actuator	Engine brake flap actuator: cable break or short circuit	●	●	ExFlCD	2-1-9	1074	3, 4, 5, 11	
83	Fan actuator	Fan actuator: cable break or short circuit	●	●	FanCD	2-3-8	975	2, 3, 4, 5	
86	Fan speed	Above target range with system reaction	●	●	FanCDSysReac	2-3-8	523602	2, 11	●
87	Fuel filter water level sensor	Cable break or short circuit	●	●	FlFCD	2-2-8	97	3, 4, 11	●
89	Water level in fuel filter	Above target range	●	●	FlFCD_WtLvl	2-2-8	97	11, 12	
90	Fuel low pressure sensor	Cable break or short circuit	●	●	FlPSCD	2-1-6	94	3, 4, 11	●
91	Fuel low pressure	Below target range with system reaction	●	●	FlPSCDSysReac	2-1-6	94	2, 11	●
94	CAN message	Missing or value above target range (message "DecV1" = pseudo pedal)	●	●	FrmMngDecV1	5-2-6	523239	2, 12	●
95	CAN message	Missing (message "FunModCtl" = function mode control)	●	●	FrmMngFunModCtl	5-2-7	523240	11, 12	●
106	CAN message	Missing (message "EngPrt" = engine protection)	●	●	FrmMngTOEngPrt	3-3-3	523212	11, 12	●

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

25 / 523562 / BIPCyl2

Error description INJECT. PERIOD ZYL.2
Begin of injection of cylinder 2: the ECU can not identify the magnet valve or the injection pump with the measured value of current drain at the begin of the injection

Error codes
DEUTZ-Errorcode: 25
BlinkCode (short-long-short): 5 - 3 - 2
SPN: 523562
possible FMI:
2: data stream is defective
2: data stream is defective
2: data stream is defective
2: data stream is defective

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Value outside target range or missing (cylinder 2), magnet valve or injection pump defective

Take actions for error repair
Check magnetic valve or injection pump and if necessary change them

other error properties
System reaction: No function at the moment/ Allocation check cylinder!
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: actual value

26 / 523563 / BIPCyl3

Error description INJECT. PERIOD ZYL.3
Begin of injection of cylinder 3: the ECU can not identify the magnet valve or the injection pump with the measured value of current drain at the begin of the injection

Error codes
DEUTZ-Errorcode: 26
BlinkCode (short-long-short): 5 - 3 - 3
SPN: 523563
possible FMI:
2: data stream is defective
2: data stream is defective
2: data stream is defective
2: data stream is defective

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Value outside target range or missing (cylinder 3), magnet valve or injection pump defective

Take actions for error repair
Check magnetic valve or injection pump and if necessary change them

other error properties
System reaction: No function at the moment/ Allocation check cylinder!
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: actual value

27 / 523564 / BIPCyl4

Error description INJECT. PERIOD ZYL.4
Begin of injection of cylinder 4: the ECU can not identify the magnet valve or the injection pump with the measured value of current drain at the begin of the injection

Error codes
DEUTZ-Errorcode: 27
BlinkCode (short-long-short): 5 - 3 - 4
SPN: 523564
possible FMI:
2: data stream is defective
2: data stream is defective
2: data stream is defective
2: data stream is defective

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Value outside target range or missing (cylinder 4), magnet valve or injection pump defective

Take actions for error repair
d

other error properties
System reaction: No function at the moment/ Allocation check cylinder!
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: actual value

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

61 / 702 / Dummy2CD_Min

Error description THRUST MODE
Reserve output 2: the ECU detects a short circuit to ground

Error codes
DEUTZ-Errorcode: 61
BlinkCode (short-long-short): 1 - 0 - 0
SPN: 702
possible FMI:
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Short circuit to ground (output 2), connection cable demaged

Take actions for error repair
Check connection cable and if necessary repair or replace it

other error properties
System reaction: Warning, shutoff output
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: shut off value

62 / 702 / Dummy2CD_SigNpl

Error description THRUST MODE
Reserve output 2: the ECU detects no load or excess temperature of the ECU component for power supply of the connected components

Error codes
DEUTZ-Errorcode: 62
BlinkCode (short-long-short): 1 - 0 - 0
SPN: 702
possible FMI:
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Cable break or ECU internal error (output 2), connection cable demaged, connected components defective, parametering of the output inaccurate, ECU defective

Take actions for error repair
Check connection cable and if necessary repair or replace it, check parameters and if necessary correct it, replace ECU

other error properties
System reaction: Warning, shutoff output
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: shut off value

69 / 2791 / EGRCD_Max

Error description EGR ACTUATOR
Actuator of the external EGR valve: the ECU detects a short circuit to battery

Error codes
DEUTZ-Errorcode: 69
BlinkCode (short-long-short): 4 - 1 - 4
SPN: 2791
possible FMI:
3: Voltage to high or short circuit to +Ubatt
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Short circuit to Ubatt, connection cable demaged

Take actions for error repair
Check cabling, sensor defect, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it

other error properties
System reaction: Warning, shutoff output, power reduction via second topcurve?
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 3
Measurement @ errortime: shut off value

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

120 / 523605 / FrmMngTOTSC1AE

Error description CAN ERROR TSC1-AE
CAN message TSC1-AE (Torque/Speed Control #1 from Automatic Traction Control to Engine): the message can not be received by ECU

Error codes
DEUTZ-Errorcode: 120
BlinkCode (short-long-short): 1 - 1 - 8
SPN: 523605
possible FMI:
12: Defective component
12: Defective component
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Missing message "TSC1-AE", CAN bus wrong cabled, wiring is demaged, receiver (sender of the message) work inaccurately, parametering inaccurate

Take actions for error repair
Check CAN Bus cabling (Bus sheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range

other error properties
System reaction: Warning, changing to substitute values according to priority chain.
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: default value

121 / 523606 / FrmMngTOTSC1AR

Error description CAN ERROR TSC1-AR
CAN message TSC1-AR (Torque/Speed Control #1 from Automatic Traction Control to Retarder): the message can not be received by ECU

Error codes
DEUTZ-Errorcode: 121
BlinkCode (short-long-short): 1 - 1 - 9
SPN: 523606
possible FMI:
12: Defective component
12: Defective component
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Missing message "TSC1-AR", CAN bus wrong cabled, wiring is demaged, receiver (sender of the message) work inaccurately, parametering inaccurate

Take actions for error repair
Check CAN Bus cabling (Bus sheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range

other error properties
System reaction: Warning, changing to substitute values according to priority chain.
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: default value

122 / 523607 / FrmMngTOTSC1DE

Error description CAN ERROR TSC1-DE
CAN message TSC1-DE (Torque/Speed Control #1 from Driveline to Engine): the message can not be received by ECU

Error codes
DEUTZ-Errorcode: 122
BlinkCode (short-long-short): 1 - 1 - 8
SPN: 523607
possible FMI:
12: Defective component
12: Defective component
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Missing message "TSC1-DE", CAN bus wrong cabled, wiring is demaged, receiver (sender of the message) work inaccurately, parametering inaccurate

Take actions for error repair
Check CAN Bus cabling (Bus sheduling, polarity, short circuit, power interrupt), test protocol of receiver, check CAN functional range

other error properties
System reaction: Warning, changing to substitute values according to priority chain.
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: default value

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

157 / 523354 / InjVlvChipA

Error description PWR. INJ. BANK B
Internal hardware monitoring: the ECU detects an error of ist injector high current output

Error codes
DEUTZ-Errorcode: 157
BlinkCode (short-long-short): 1 - 5 - 3
SPN: 523354
possible FMI:
3: Voltage to high or short circuit to +Ubatt
2: data stream is defective
14: Special Instructions
12: Defective component

Errordetection
Errorlamp shows blinking. Entry in errormemory.

Possible reason for error
High power stage Injector A, ECU defective

Take actions for error repair
If error is not removable, change ECU

other error properties
System reaction: Warninig, outputs shut off
Behaviour error lamp: blinking
Selfhealing: no
Signal Priority: 5
Measurement @ errortime: actual value

158 / 523355 / InjVlvChipB

Error description PWR. INJ. BANK B
Internal hardware monitoring: the ECU detects a disturbance in its injector high current output

Error codes
DEUTZ-Errorcode: 158
BlinkCode (short-long-short): 1 - 5 - 3
SPN: 523355
possible FMI:
12: Defective component
12: Defective component
12: Defective component
12: Defective component

Errordetection
Errorlamp shows blinking. Entry in errormemory.

Possible reason for error
High power stage Injector B, ECU defective

Take actions for error repair
If error is not removable, change ECU

other error properties
System reaction: Warninig, outputs shut off
Behaviour error lamp: blinking
Selfhealing: no
Signal Priority: 5
Measurement @ errortime: actual value

159 / 651 / InjVlvCyl1A

Error description INJECTOR 1
Injector 1: the current drain measured by ECU is above the target range

Error codes
DEUTZ-Errorcode: 159
BlinkCode (short-long-short): 1 - 5 - 4
SPN: 651
possible FMI:
3: Voltage to high or short circuit to +Ubatt
13: out of calibrated range
4: Voltage to low or short circuit to -Ubatt
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Short circuit (cylinder 1), injector defective, connection cable demaged

Take actions for error repair
Check cabling, check injectors and if necessary replace them, check connection cable and if necessary repair or replace it

other error properties
System reaction: Warning, fuel injection failed, shut off wenn the number of active cylinders below minimum
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 4
Measurement @ errortime: actual value

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

190 / 523451 / MSSCD2

Error description MULTISTATE SWITCH 2
Multi state switch 2: the voltage measured by ECU is out of the target range or the swith setting is not plausible

Error codes
DEUTZ-Errorcode: 190
BlinkCode (short-long-short): 1 - 4 - 3
SPN: 523451
possible FMI:
3: Voltage to high or short circuit to +Ubatt
4: Voltage to low or short circuit to -Ubatt
12. Errormode not identifiable
2: data stream is defective

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Cable break or short circuit, input voltage outside target range (switch 2), switch defective, connection cable demaged

Take actions for error repair
Check cabling and sensor, check switch and if necessary replace it, check connection cable and if necessary repair or replace it

other error properties
System reaction: Warning, substitute value
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 2
Measurement @ errortime: default value

191 / 523452 / MSSCD3

Error description MULTISTATE SWITCH 3
Multi state switch 3: the voltage measured by ECU is out of the target range or the swith setting is not plausible

Error codes
DEUTZ-Errorcode: 191
BlinkCode (short-long-short): 1 - 4 - 3
SPN: 523452
possible FMI:
3: Voltage to high or short circuit to +Ubatt
4: Voltage to low or short circuit to -Ubatt
12. Errormode not identifiable
2: data stream is defective

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Cable break or short circuit, input voltage outside target range (switch 3), switch defective, connection cable demaged

Take actions for error repair
Check cabling and sensor, check switch and if necessary replace it, check connection cable and if necessary repair or replace it

other error properties
System reaction: Warning, substitute value
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 2
Measurement @ errortime: default value

192 / 639 / NetMngCANAOff

Error description CAN A BUS OFF
CAN bus A: the ECU is not allowed to send messages, because the status "BusOff" is detected

Error codes
DEUTZ-Errorcode: 192
BlinkCode (short-long-short): 2 - 7 - 1
SPN: 639
possible FMI:
14: Special Instructions
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable

Errordetection
Errorlamp shows permanent light. Entry in errormemory.

Possible reason for error
Cable break or short circuit, off-state (CAN bus A), CAN bus deactivated, connection cable demaged

Take actions for error repair
Check cabling of CAN bus and if necessary repair it, check connection cable and if necessary repair or replace it

other error properties
System reaction:
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 2
Measurement @ errortime:

DTC-List
Diagnosis- and Errorcodes

referrenced ECU-Software
P490_: 220, 310, 501
P491_: 220, 310, 400, 501
P492_: 213
P513_: 214, 300

227 / 523550 / T50CD

Error description TERMINAL 50
Terminal 50: ECU receives a permanent signal
Error codes
DEUTZ-Errorcode: 227
BlinkCode (short-long-short): 5 - 1 - 5
SPN: 523550
possible FMI:
12: Defective component
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable
Errordetection
Errorlamp shows permanent light. Entry in errormemory.
Possible reason for error
Engine start switch stuck, start switch clamped, connection cable demaged
Take actions for error repair
Check cabling, if sensor not working, check start switch and if necessary replace it, check connection cable and if necessary repair or replace it
other error properties
System reaction: Warning
Behaviour error lamp: permanent light
Selfhealing: no
Signal Priority: 1
Measurement @ errortime: actual value

228 / 523550 / TPUMon

Error description TERMINAL 50
Internal hardware monitoring: ECU detects a deviation between the signal of time module and the system time
Error codes
DEUTZ-Errorcode: 228
BlinkCode (short-long-short): 5 - 5 - 5
SPN: 523550
possible FMI:
12. Errormode not identifiable
12. Errormode not identifiable
12. Errormode not identifiable
2: data stream is defective
Errordetection
Errorlamp shows blinking. Entry in errormemory.
Possible reason for error
Time processing unit (TPU) defective, ECU defective
Take actions for error repair
If error not removable, change ECU
other error properties
System reaction: Recovery of ECU
Behaviour error lamp: blinking
Selfhealing: no
Signal Priority: 5
Measurement @ errortime: -

232 / 84 / VSSCD1

Error description VEHICLE SPEED
Vehicle speed: over the maximum, signal invalid or implausible compared with the injection quantity and the engine speed, offset factors unlearned
Error codes
DEUTZ-Errorcode: 232
BlinkCode (short-long-short): 5 - 2 - 1
SPN: 84
possible FMI:
0: data valid, but above normal working area
12: Defective component
8: unusual frequency, pulse or period.
14: Special Instructions
Errordetection
Errorlamp shows permanent light. Entry in errormemory.
Possible reason for error
Speed above target range, signal invalid or implausible compared to injection volume and engine speed, distance factor not learned, sensor defective, connection cable demaged
Take actions for error repair
Check cabling, if sensor not working, check sensor and if necessary replace it, check connection cable and if necessary repair or replace it
other error properties
System reaction: Warning
Behaviour error lamp: permanent light
Selfhealing: yes
Signal Priority: 3
Measurement @ errortime: default value

8.9 Sensors

⚠ Caution

Sensors and actuators must not be connected to external power sources for the purpose of testing, but must only be operated on the EMR3. Otherwise components may be permanently damaged.

Sensors must under no circumstances be repaired, but must be replaced if they are defective.

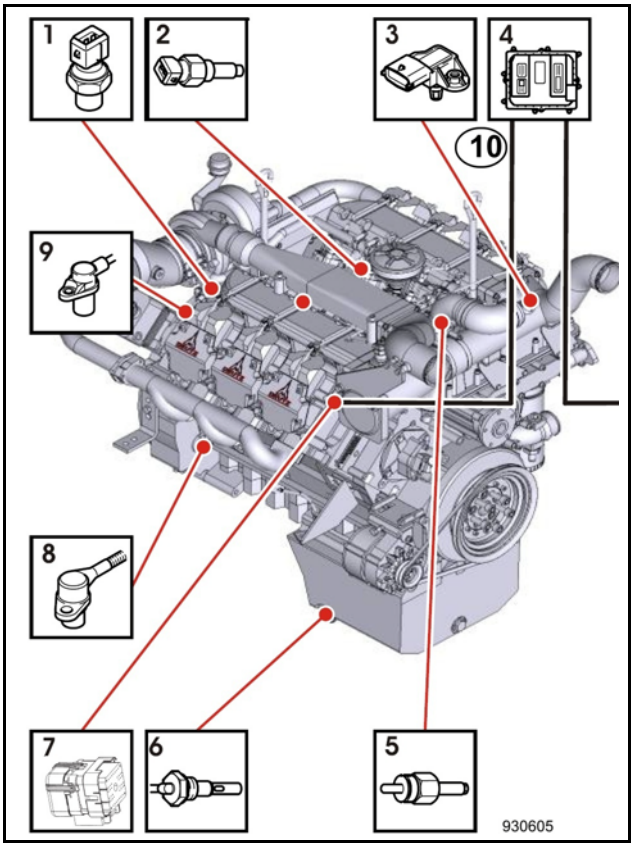


Fig. 1

1 Oil pressure sensor
2 Fuel temperature sensor
3 Sensor for charge air temperature and charge air pressure
4 Engine control unit
5 Coolant temperature sensor
6 Oil level sensor, option
7 Central plug
8 Rotary speed sensor for crankshaft
9 Rotary speed sensor for camshaft
10 Wiring loom connecting cable

Coolant temperature monitoring

EMR fault code

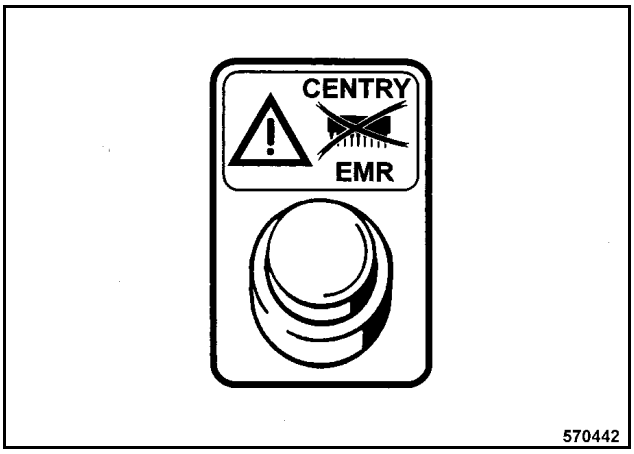


Fig. 3

The operator is warned if

- the temperature exceeds the warning limit and/or
- the power is reduced by the EMR after a pre-warning time, or
- the temperature exceeds the shut-down limit and the engine is shut down after a pre-warning time.

permanent light = A fault message is present, the engine can be started and the refuse compactor is still operable with limitations.

the control light flashes after 2 seconds= Severe fault, the engine cannot be started.

Monitoring by ESX-control

i Note

The signal is evaluated by the ESX-control (Pin X0:18) and displayed 30 seconds later in the display module (P18) (Fig. 4) with code "522".

The warning buzzer sounds.

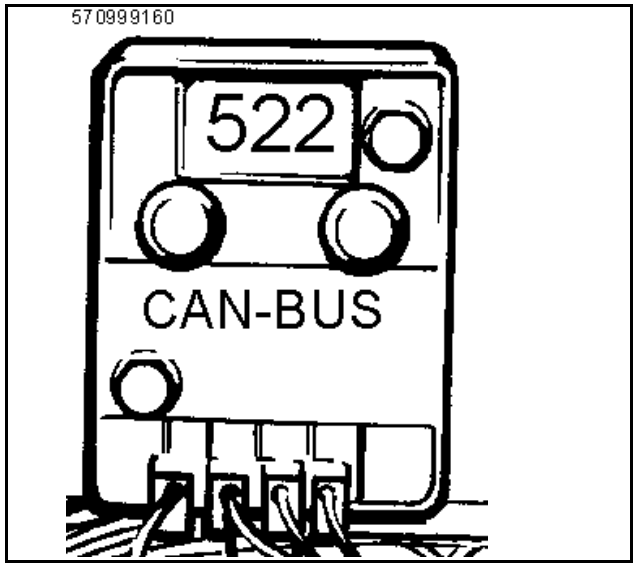


Fig. 4 Display module in central electrics (P18)

Warning light engine overheating

If the coolant temperature is exceeded the EMR-control (PIN XD2.1.39, ground switching) switches, whereby the coil of relay (K146) is excited. The switch contact of relay (K146) supplies the monitoring module (A81, terminal X1:229) with ground potential. The engine temperature warning lamp **b** (Fig. 5) flashes.

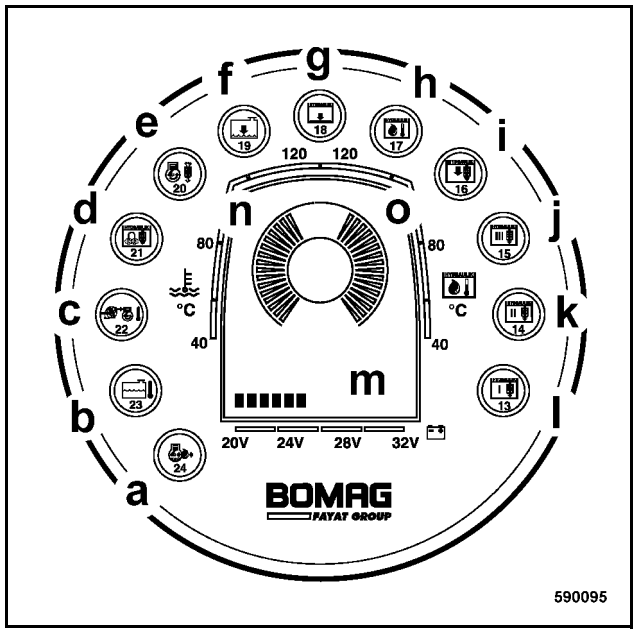


Fig. 5 Monitoring module (A81)

Charge control light

The charge control light has two duties:

- Indication of the correct generator function
- External excitation of the generator during the starting phase

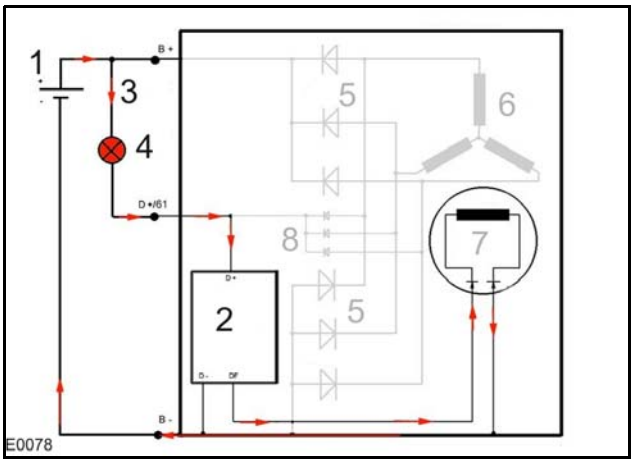


Fig. 7 plus controlled charging regulator

(Fig. 7) shows the current flow with the ignition switched on, engine stopped.

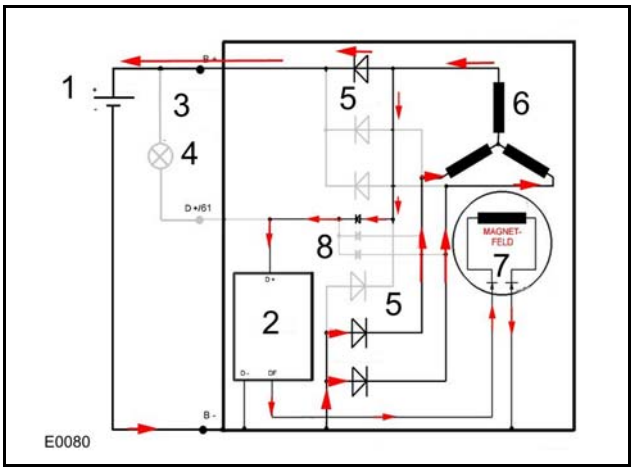


Fig. 8 plus controlled charging regulator

(Fig. 8) shows the current flow with the ignition switched on, engine running.

1 Battery

2 Charge controller

3 Ignition switch

4 Charge control light

5 Rectifier

6 Rotor

7 Sliprings / carbon brush

8 Auxiliary rectifier

Normally the charge control light lights with the engine stopped and the ignition switched on and goes out at low engine speed, but at the latest after a single, short-term increase in engine speed from idle speed, because there is no longer a voltage difference on the lamp.

Any other behaviour would indicate a defect on the generator (rectifier, carbon brushes, regulator) or a defect on the lamp, presumed the on-board battery is not discharged.

A far more important function of the lamp is the transition and provision of field current. At standstill there is no magnetic field in the de-energized generator. Since this is necessary for the generation of electric current, the rotor must be supplied with current, so that a weak field can build up.

The current flows from the ignition switch via the charge control light through the generator winding against ground (terminal 31) and is limited to approx. 300 mA by the light bulb (4 W) (without the lamp the current flow would be 2 to 5 A). While the rotor is rotating current is induced into the stator winding, whereby a small part (2–5 A, depending on speed) flows through the charge regulator into the field winding of the rotor and the major part flows to the output terminals (B+), where it can be tapped as useful current. If the charge control light is defective or no battery is available or the battery is discharged, external excitation is no longer possible at standstill and no voltage will be generated, even when the generator is running.

With used, older generators a weak permanent magnetic field may have developed over the lifetime, which does even exist when no voltage is applied. This type of machines can even start without charge control light and produce current during operation. However, this is an unintended effect and you should not presume that a generator without charge control light or external excitation can be started up.

Directly acting electric starter

This shows the design of this starter. It consists of a starter motor and a magnetic switch.

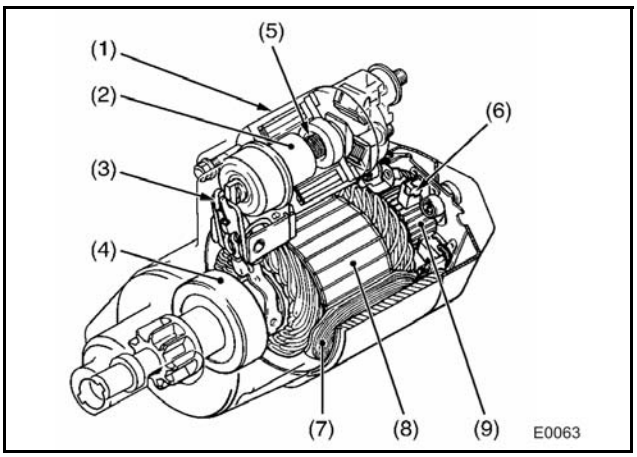


Fig. 5

1 Magnetic switch
2 Armature
3 Actuating lever
4 Freewheeling clutch
5 Resetting spring
6 Brush
7 Exciting winding
8 Armature
9 Collector

Ignition switch in position "START"

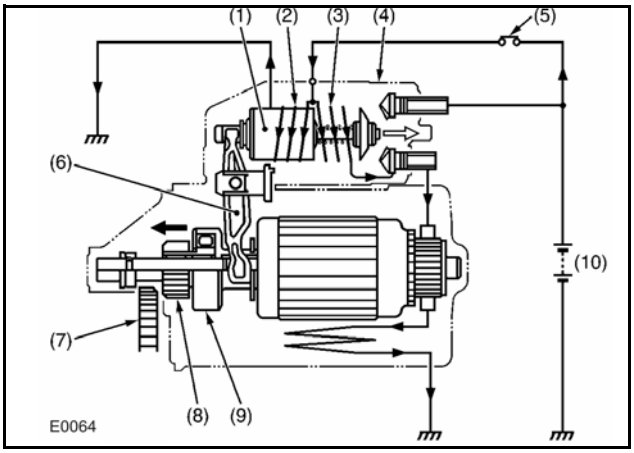


Fig. 6 Magnetic switch open

With the ignition switch (5) in "START" position current flows from the battery (10) through the holding winding (2) and the pick-up winding (3).

The armature (1) is magnetically picked up and forces the pinion (8) with the actuating lever (6) to engage with the ring gear (7).

1 Armature
2 Holding winding
3 Pick-up winding
4 Magnetic switch
5 Ignition switch
6 Actuating lever
7 Ring gear
8 Pinion
9 Freewheeling clutch
10(Battery

Pinion meshes with the ring gear

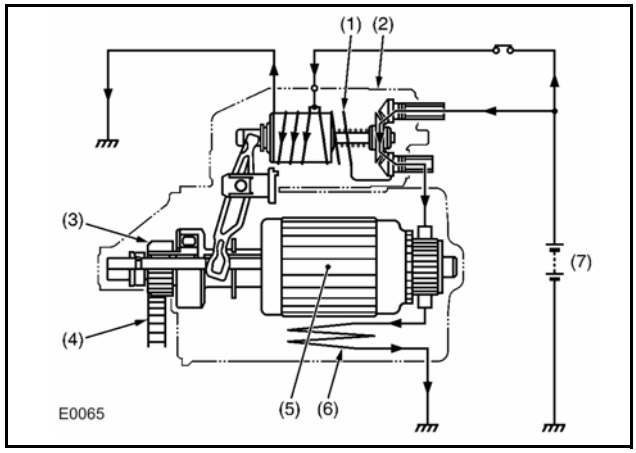


Fig. 7 Magnetic switch closed

When the pinion (3) meshes with the flywheel mounted ring gear (4) and the magnetic switch (2) is closed, a strong current flows from the battery (7) directly into the exciting winding (6) and the armature winding, but not into the pick-up winding.

This causes the armature (5) to rotate with high speed and drives the pinion, which in turn drives the ring gear (4) with a speed of 200 to 300 rpm.

1 Pick-up winding
2 Magnetic switch
3 Pinion
4 Ring gear
5 Armature
6 Exciting winding
7 Battery

9.3 Lubrication oil circuit TCD 2015

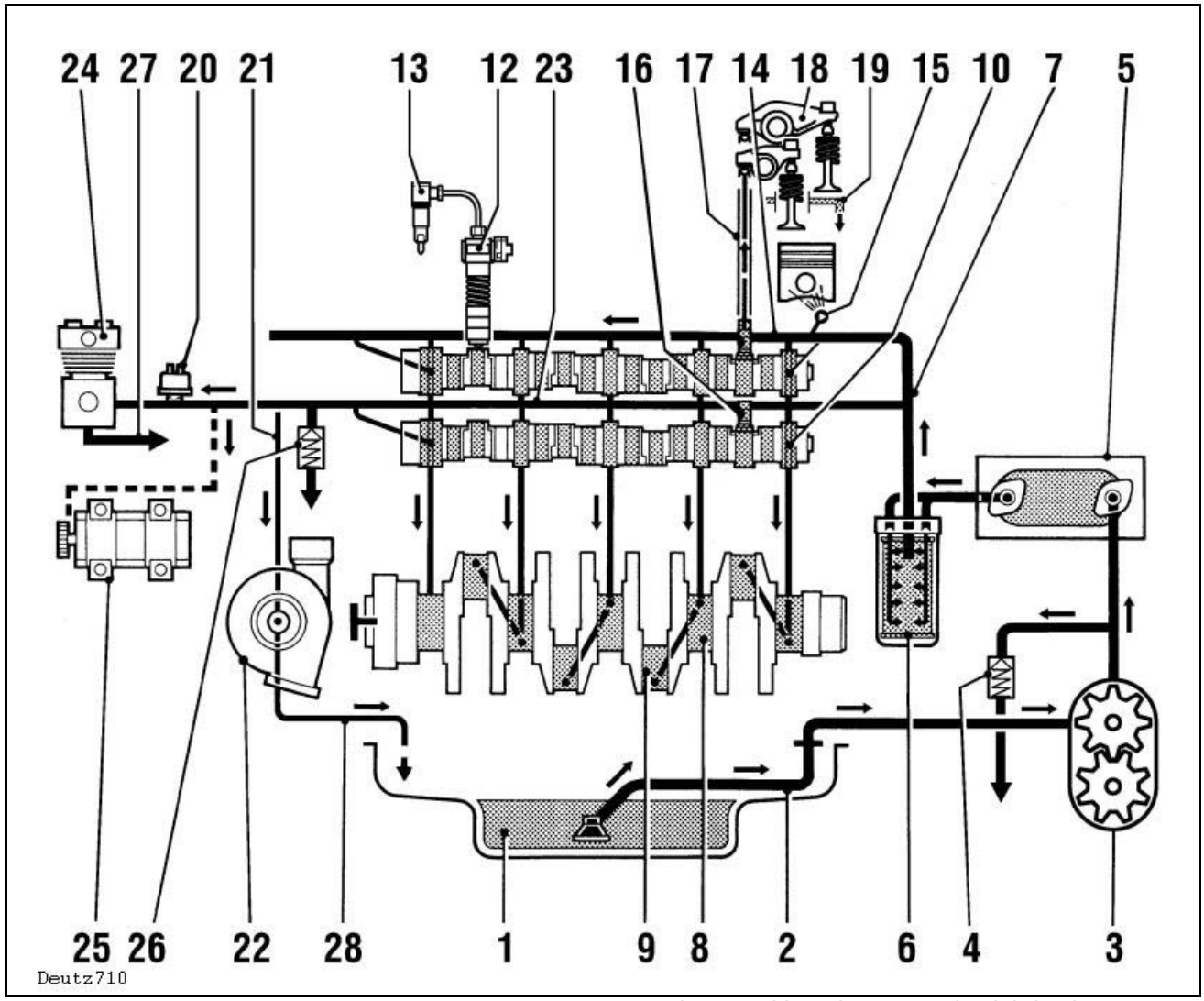


Fig. 1 Lubrication oil schematic

1 Lubrication oil sump
2 Lubrication oil suction pipe
3 Lubrication oil pump
4 Pressure relief valve
5 Lubrication oil cooler
6 Lubrication oil filter
7 Main oil galleries
8 Crankshaft bearings
9 Conrod bearings
10 Camshaft bearings
11 Oil flow to individual injection pumps
12 Injection pump with injection valve
13 Camshaft lubrication
14 Line to spray nozzle
15 Spray nozzle with pressure retaining valve for piston cooling
16 Plunger with rocker arm pulse lubrication
17 Push rod, oil supply to rocker arm lubrication
18 Rocker arm
19 Oil return bore in cylinder head leading to crankcase
20 Oil pressure sensor / oil pressure switch
21 Oil line to exhaust turbo charger
22 Exhaust turbo charger
23 Oil line to crankshaft and camshaft, compressor / hydraulic pump
24 Compressor (optional)
25 Hydraulic pump (optional)
26 Pressure retaining valve (adjustable)
27 Return flow from compressor / hydraulic pump to crankcase
28 Return flow from exhaust turbo charger

Wastegate on TCD 2013

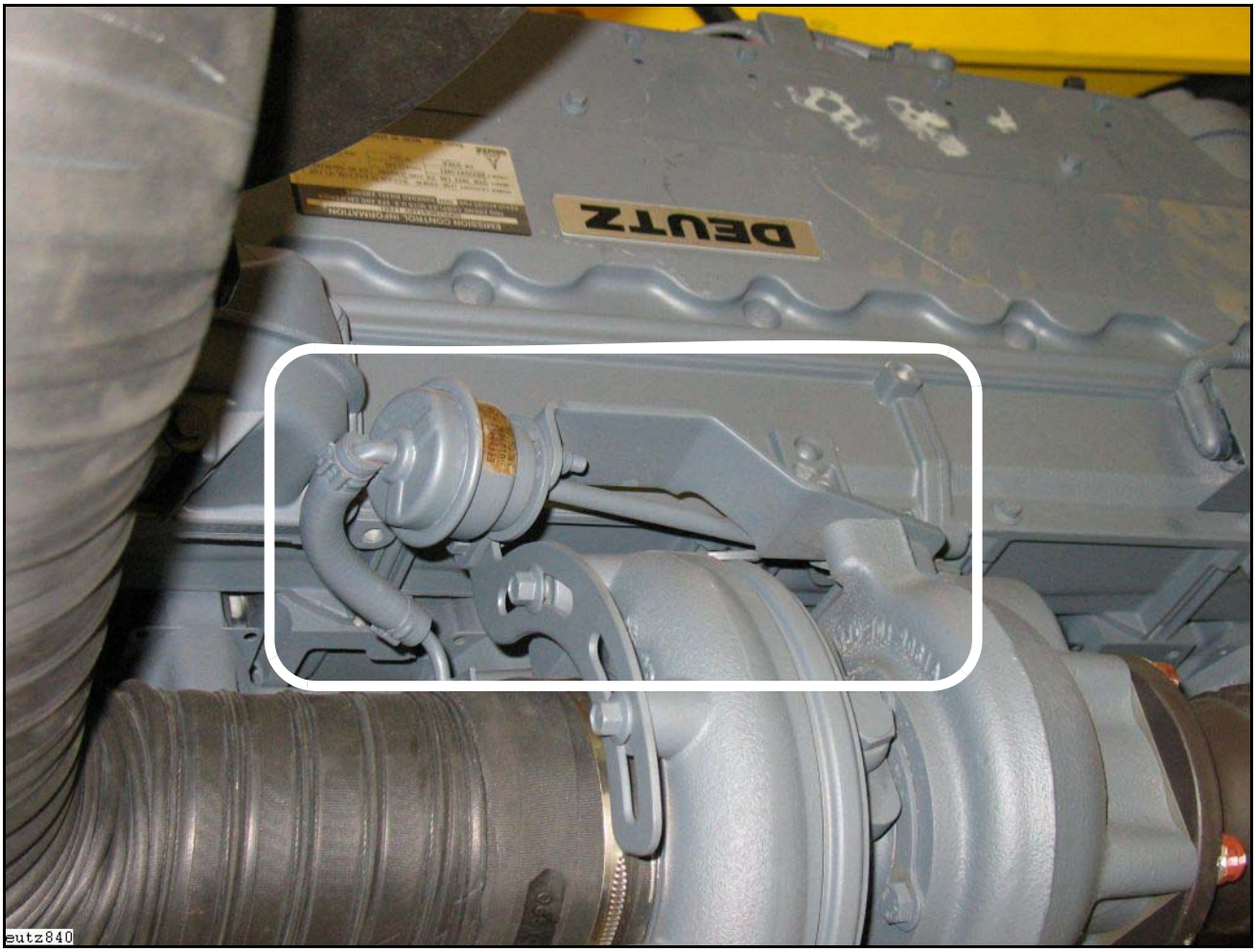


Fig. 2 Exhaust gas turbocharger with Wastegate

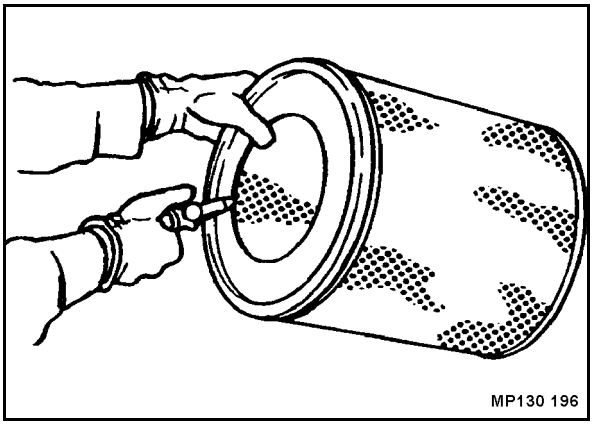


Fig. 25

- Blow the filter cartridge out from inside to outside with dry compressed air (max. 5 bar) (Fig. 25), until all dust has been removed.

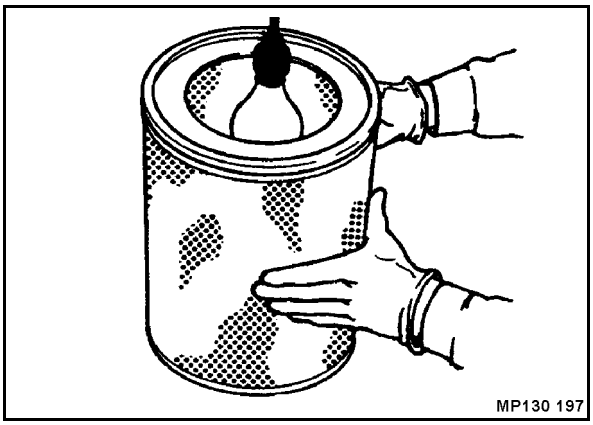


Fig. 26

- Examine the filter cartridge with a torch for cracks and holes in the paper bellows (Fig. 26).

⚠ Caution

Do not continue to run the machine with a damaged main filter element. If in doubt use a new main filter element.

Cleaning the dust bowl

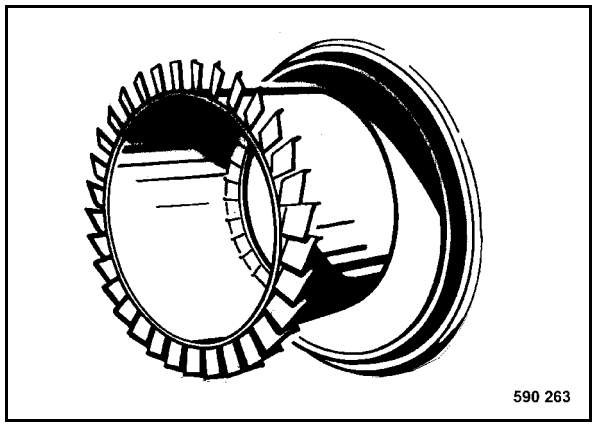


Fig. 27

- Remove the insert (Fig. 27) from the filter housing and clean it.
- Wipe the filter housing out with a cloth. Do not clean with compressed air.
- Reinsert the element.

Changing the safety filter element

⚠ Caution

The safety filter element must not be cleaned and should not be used again after it has been removed.

Break the seal only to replace the safety filter element.

The safety filter element must be replaced,

if the main filter element is defective,

after five times cleaning of the main filter element,

at the latest after 2 years,

if the air filter warning light in the instrument cluster comes on again after the main filter element has been serviced.

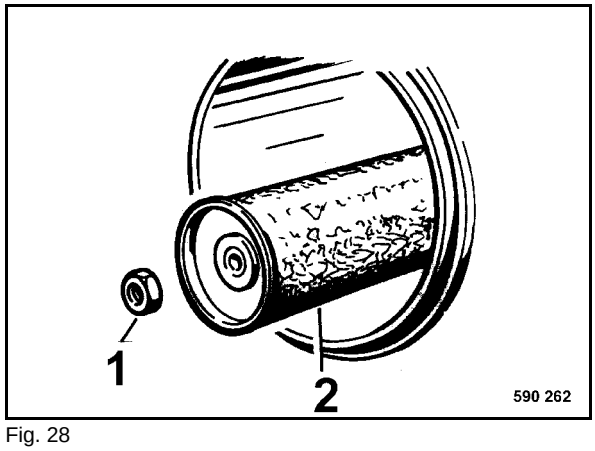
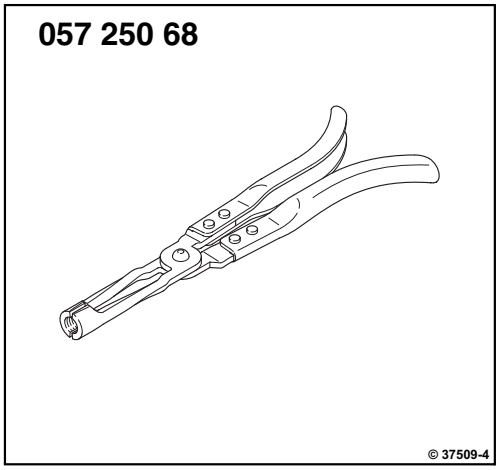


Fig. 28

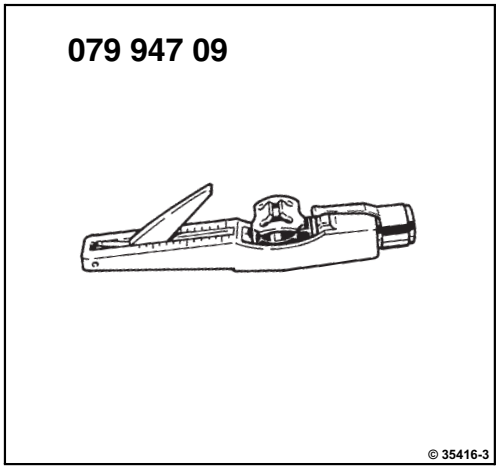
- Unscrew hexagon nut 1 (Fig. 28) and pull safety cartridge (2) out.

TCD 2015 Standard tools

8024
Assembly pliers
e. g. removing valve stem seals



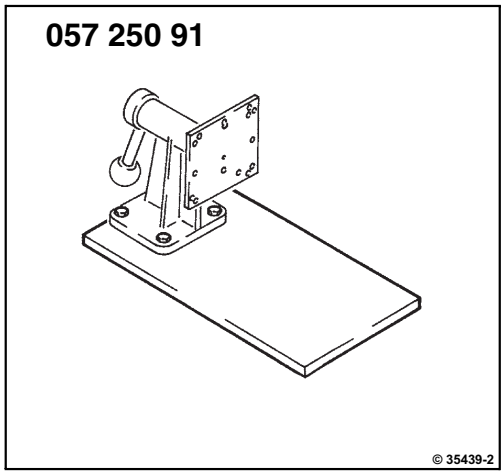
8115
V-belt tension measuring device
150 to 600 N
Check V-belt tension



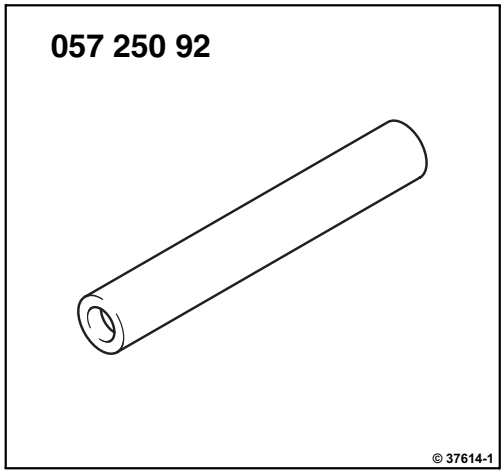
8189
Pricker
Removing rotary shaft lip seal

Special tools TCD 2015

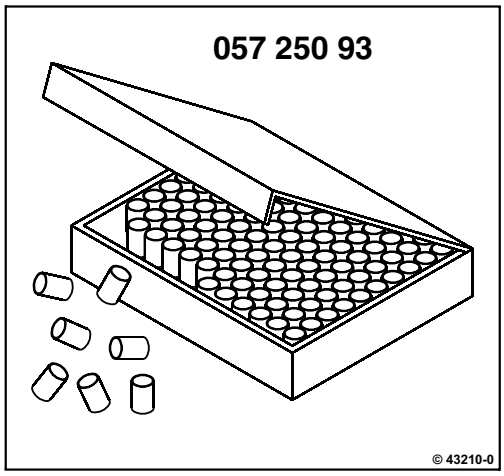
120910
Base plate
(in conjunction with support bracket 120900 if support bracket is not screwed tightly)



121410
Assembly tool
Assembling valve stem gasket



121420
Assembly sleeves
Set of assembly sleeves for valve stem gasket



Pressure and boiling point

The boiling point is the temperature at which fluid changes to gaseous state.

Changing the pressure above a fluid also changes the boiling point. It is a well known fact, that e.g. the lower the pressure applied to water, the lower the boiling point.

When looking at water, the following values do apply:

- Atmospheric pressure, boiling point 100°C
- Overpressure 0.4 bar, boiling point 126°C
- Vacuum -0.6 bar, boiling point 71°C

For an optimal exchange of heat, liquid refrigerants must have a low boiling point, so that they can absorb and dissipate heat quickly.

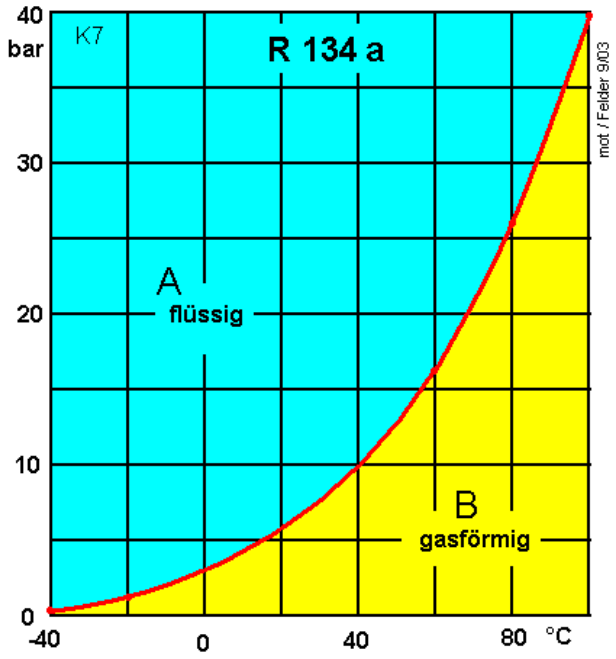


Fig. 3 Steam pressure curve

Steam pressure curve for refrigerant R134a

The steam pressure curve is a means for explaining the operation principle of an air conditioning system.

A- liquid

B- gaseous

The diagram shows the evaporation curve of R134a. The diagram for example shows, that R134a is liquid at 0°C and a pressure of 5 bar, but becomes gaseous at 40°C and 5 bar.

For better understanding one must also be aware of the following:

1. A gas heats up when being compressed (e.g. air pump, turbo charger, ...).

2. When relieving gas it will cool down (e.g. white frost forms on the valve when relieving air pressure from a car tire).

3. Condensing gas dissipates a lot of heat energy.

4. If a fluid evaporates it requires a lot of heat, i.e. the fluid thereby cools down the surrounding environment (e.g. alcohol on skin)

i Note

At absolute pressure 0 bar correspond with an absolute vacuum. The normal ambient pressure (overpressure) corresponds with 1 bar absolute pressure. On the scales of most pressure gauges 0 bar corresponds with an absolute pressure of 1 bar (indicated by the statement -1 bar below the 0).

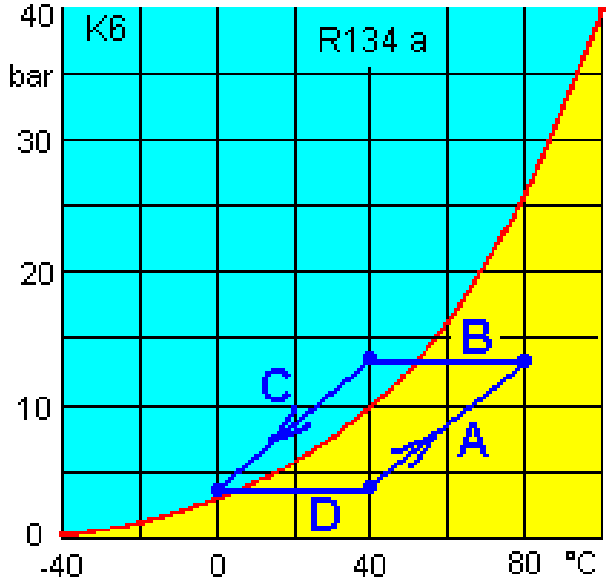


Fig. 4 Pressure - Temperature Diagram

In the pressure - temperature diagram for the refrigerant the drawn in closed curve shows the cycle of the refrigerant. This cycle permanently continues in direction of the arrow.

The characters A, B, C, D stand for:

A - compression

B- condensation

C- relaxation

D- evaporation.

Pressure switch

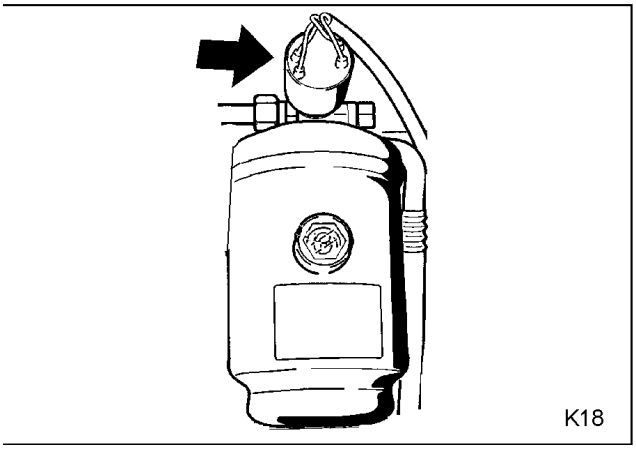


Fig. 1

After a minimum pressure is reached in the low pressure side or a maximum pressure in the high pressure side, the pressure switch will switch of the magnetic clutch of the compressor, thus to avoid destruction of system components by excessive pressure or drawing in external gases and foreign matter as a result of too low pressure.

Working pressure:

Low pressure off: 1.5 $^{\pm 0.5}$ bar

Low pressure on: 3.5 bar

Overpressure off: 25.0 $^{\pm 1.5}$ bar

Overpressure on: 18.0 $^{\pm 1.5}$ bar

i Note

The pressure switch can be installed in filled condition.

Pipes and hoses

Pipes and hoses in air conditioning systems must meet very high requirements with respect to resistance against heat and pressure. The requirements concerning leak tightness and, in case of hoses, against diffusion, i.e. seepage of refrigerant through the hose material, are very high. Pipes and hoses to be used must therefore be specially made for air conditioning purposes. For this reason the hoses have an inside lining of butyl rubber and an outside coating of EDPM rubber. Hose sections exposed to heat are provided with a special heat insulation.

O-rings are made of a special type of chloroprene rubber (neoprene). Before assembly of the air conditioning system these O-rings must be lubricated with compressor oil / refrigeration oil. The O-rings must always be replaced when assembling A/C-components.

Recommended tightening torques for O-ring sealed fittings

Thread	Spanner width	Torque
5/8“	17 or 19	13,6 - 20,3 Nm
3/4“		32,5 - 39,3 Nm
7/8“	27	35,3 - 42,0 Nm
1 1/16“	32	40,7 - 47,5 Nm
M30X2	36	105,0 - 115,0 Nm
M36X2	41	165,0 - 175,0 Nm

Bending radii for air conditioning hoses

Hose type	Nominal width	Bending radius
GH 134	NW8	min. 50 mm
GH 134	NW10	min. 65 mm
GH 134	NW12	min. 75 mm
GH 134	NW16	min. 100 mm
GH 494	NW20	min. 160 mm
GH 494	NW25	min. 194 mm
GH 494	NW32	min. 225 mm

19 Pressure reducing valve
20 Vacuum pump
21 Nitrogen bottle
22 Refrigerant bottle
23 Pressure gauge bar

Filling instructions

1 Connect the service adapter with the blue hand wheel in the suction side.
2 Connect the service adapter with the red hand wheel in the pressure side (the hand wheels on the service adapters must be fully backed out - left hand stop)
3 Connect the blue suction hose below the blue hand wheel on the pressure gauge bar to the blue service adapter.
4 Connect the red pressure hose below the red hand wheel on the pressure gauge bar to the red service adapter.
5 Connect the yellow hose below the yellow hand wheel on the manometer bar to the 2-stage vacuum pump.
6 Connect the last hose below the black hand wheel on the nitrogen bottle via the pressure reducing valve.
7 Check on the pressure gauge bar that all hand wheels are closed.
8 Turn the hand wheels on both service adapter clockwise. This opens the valves (right hand stop).
9 Open the valve on the nitrogen bottle (only via pressure reducer); pressure approx. 20 bar.
10 Open the black and red hand wheels on the pressure gauge bar and fill nitrogen into the system, until a pressure of approx. 3.5 to 5.0 bar is indicated on the suction side.
11 Then open the blue hand wheel and raise the pressure in the suction side (max. 10 bar). Check for leaks with a leak detection fluid or soapsuds.
12 If the system is leak tight, release the nitrogen from the system. For this purpose disconnect the hose from the nitrogen bottle and open the red, blue and black hand wheels on the pressure gauge bar.
13 Then connect the hose to the refrigerant bottle.
14 Switch on the vacuum pump and open all hand wheels on the pressure gauge bar. In case of a leak no or only an insufficient vacuum will be reached. In this case proceed as described under point 9-12. Once the leak is sealed continue with point 14.
15 Once a sufficient vacuum is reached, both pressure gauges show -1, close all hand wheels on the pressure gauge bar.
16 Switch off the vacuum pump, watch the pressure gauges to see whether the vacuum is maintained.
17 Open the valve on the refrigerant bottle and open the black and red hand wheels on the pressure gauge bar. Fill refrigerant into the system, until a pressure equilibrium between suction and pressure side is reached (reading of pressure gauges).
18 Close the red hand wheel.
19 Perform a leak test with the electronic leak detector.
20 Start the engine and switch on the system.
21 Open the blue hand wheel and continue filling in refrigerant until the inspection glass is free or air bubbles (in fluid container/dryer combinations the white pearl should float in the upper third of the inspection glass). Then close the refrigerant bottle.
22 Close the blue hand wheel on the pressure gauge bar.
23 Preparing the test run: -Close windows and doors -Fan on full speed stage -Mount measuring feelers to air discharge and air intake.
24 Run the system for approx. 20 minutes with medium engine speed.
25 The temperature difference between air discharge and air intake should be (depending on type of air condition) 8-10°C. The ambient temperature thereby is approx. 20°C. (These data are only reference values, which may be influenced by possible insolation)
26 Switch off system and engine and check for leaks again.
27 Turn out (left hand stop) and remove the hand wheels on both service adapters.
28 Fit all valves with dust caps.
29 Perform a leak test.
30 Mark the system with the corresponding type plates and information decals, such as type of oil and refrigerant.

Suction pressure too low (1), high pressure too low to normal (2)

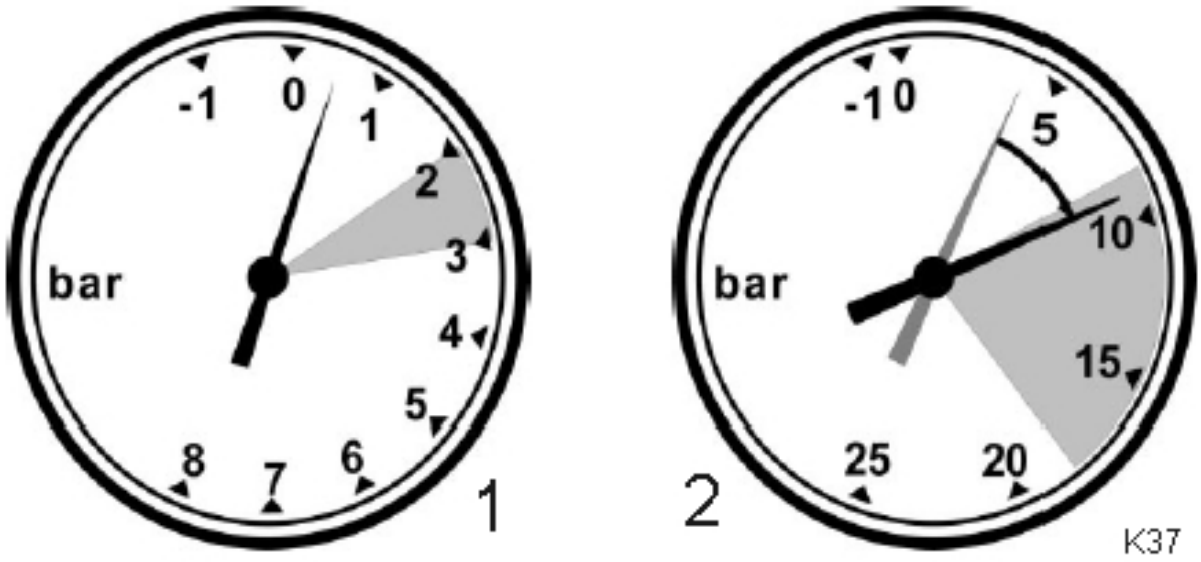


Fig. 3

Cause	Possible effect	Remedy
Lack of refrigerant	no supercooling, bubbles in inspection glass, high overheating, hoarfrost on evaporator	Check for leaks, refill
Evaporator fins or air filter soiled	Cooling power too low	clean
Evaporator fan failed	Low pressure shut off	Repair the fan
Expansion valve defective	Suction pressure gauge shows vacuum, because the valve has closed	Replace the valve
Screen or nozzle in expansion valve clogged	high overheating	clean
Filter dryer clogged	Bubbles in inspection glass, high overheating, filter dryer cold	Change filter dryer
Heat power too low	Frequent low pressure shut off, thawing thermostat / rotary thermostat switching too frequently	Check the control

Tempe-ratur	Druck	Dichte		spez. Volumen		spez. Enthalpie		Verdamp-fungs-wärme
t °C	p bar	der Flsskt. ρ´ kg/dm^3	des Dampfes ρ´´ kg/m^3	der Flsskt. v´ dm^3/kg	des Dampfes v´´ dm^3/kg	der Flsskt. h´ kJ/kg	des Dampfes h´´ kJ/kg	r kJ/kg
90	32,45	0,837	216,31	1,195	4,62	343,09	426,20	83,10
91	33,12	0,826	224,73	1,211	4,45	345,29	425,58	80,29
92	33,80	0,813	233,84	1,229	4,28	347,53	424,86	77,33
93	34,49	0,801	243,77	1,249	4,10	349,79	424,00	74,21
94	35,19	0,787	254,71	1,271	3,93	352,08	422,99	70,91
95	35,91	0,771	266,92	1,296	3,75	354,41	421,78	67,37
96	36,64	0,755	280,84	1,325	3,56	356,77	420,30	63,53
97	37,39	0,736	297,17	1,359	3,37	359,17	418,44	59,27
98	38,14	0,714	317,43	1,400	3,15	361,60	415,97	54,37
99	38,92	0,687	346,24	1,455	2,89	364,07	412,16	48,09
100	39,71	0,650	636,32	1,537	1,57	366,58	375,04	8,46
101,06	40,56	0,515	515,30	1,941	1,94	390,05	390,05	0,00

Hydraulic diagram

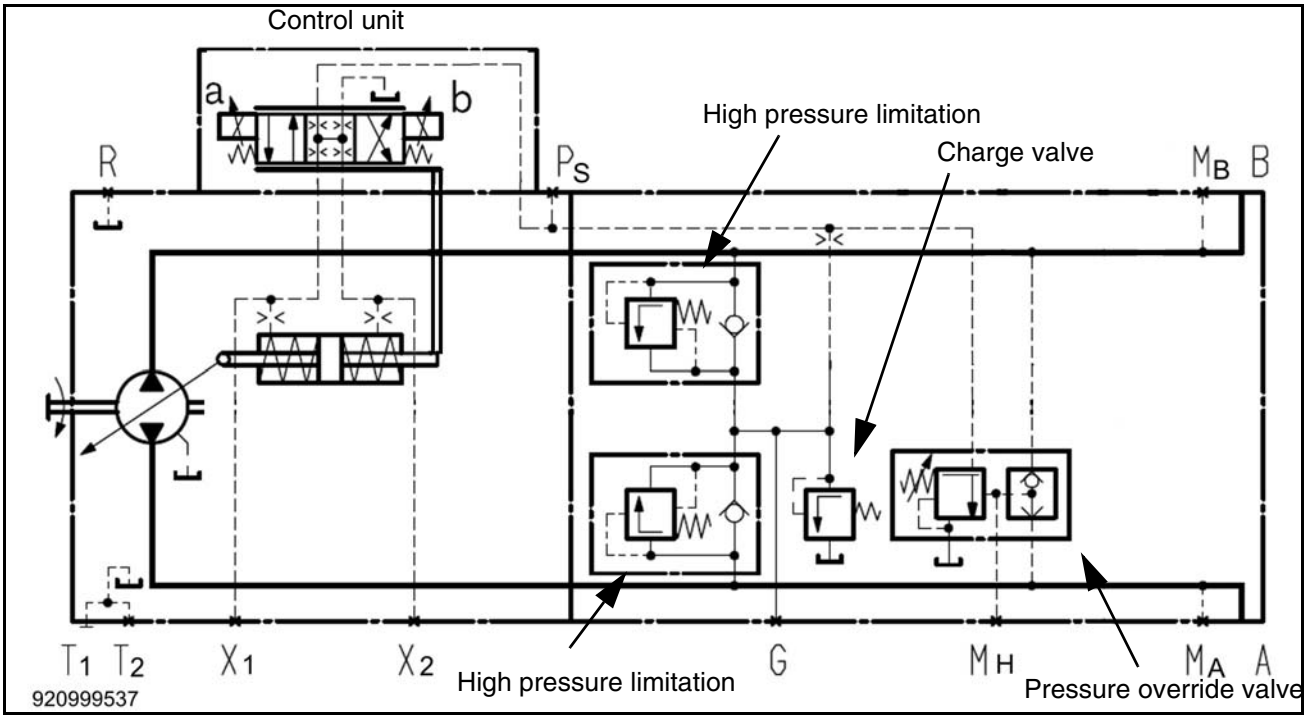


Fig. 3 Hydraulic diagram, A4VG EP

A	Work connection	P_S	Control pressure inlet
B	Work connection	R	Ventilation
G	Pressure port for charge circuit	T_1	Leak oil
M_A	Pressure test port, pressure A	T_2	Leak oil
M_B	Pressure test port, pressure B	X_1 X_2	Port for control pressures, pressure in front of nozzle
M_H	Port for balanced high pressure		

⚠ Caution

The spring reset in the control unit is no safety feature.

Internal contamination – like e.g. contaminated hydraulic fluid, abrasion or dirt residues from system components – can cause blockage of the spool valve in the control unit. The flow volume from the variable displacement pump will in this case no longer follow the instructions of the operator.

Auxiliary pump

The auxiliary pump permanently delivers a sufficient amount of fluid (charging volume) from a small tank through a check valve into the low pressure side of the closed circuit, in order to replace internal leakages in variable displacement pump and consumers.

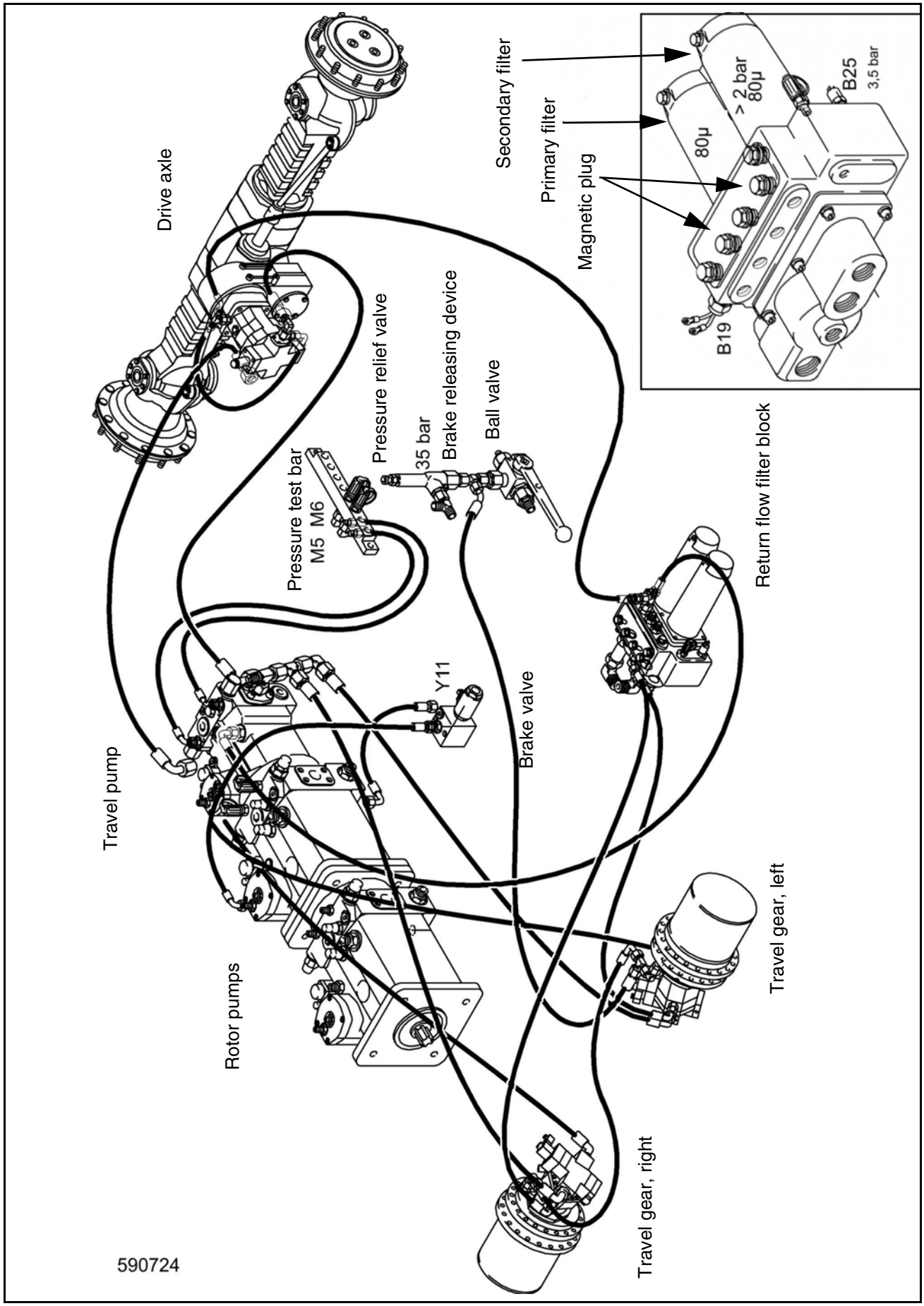

Drive axle
Secondary filter
Primary filter
Magnetic plug
> 2 bar
80µ
80µ
B25
3,5 bar
B19
Pressure relief valve
35 bar
Brake releasing device
Ball valve
Pressure test bar
M5 M6
Return flow filter block
Y11
Brake valve
Travel pump
Rotor pumps
Travel gear, left
Travel gear, right
590724

Fig. 2

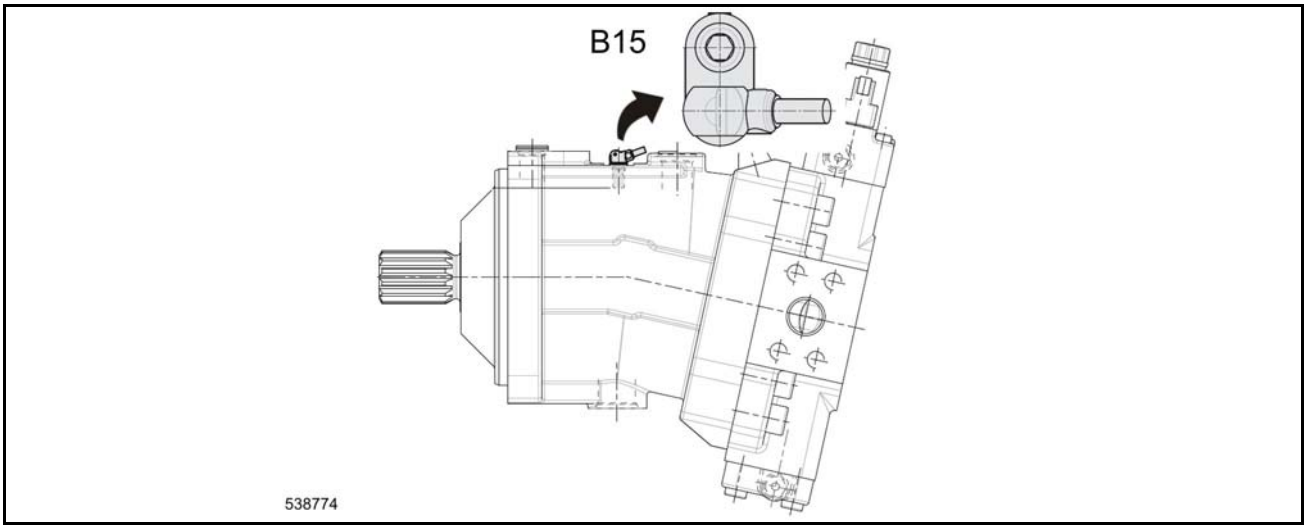


Fig. 12

The DSM sensor is fastened to the specially intended connection with a fastening screw

Control

In a variable displacement axial piston motor the angle of the bent axle can be infinitely adjusted within certain limits. The change in swashing angle of the bent axle causes a difference in stroke length and thus a change in displacement. The swashing angle of the bent axle is hydraulically changed via the control piston (3). The valve plate rests light moving in a slideway. Enlarging the swashing angle increases the displacement and the torque, reducing the angle reduces the values accordingly, while the output speed increases.. Various control facilities are available to meet different requirements.

Control chamber short-circuit valves

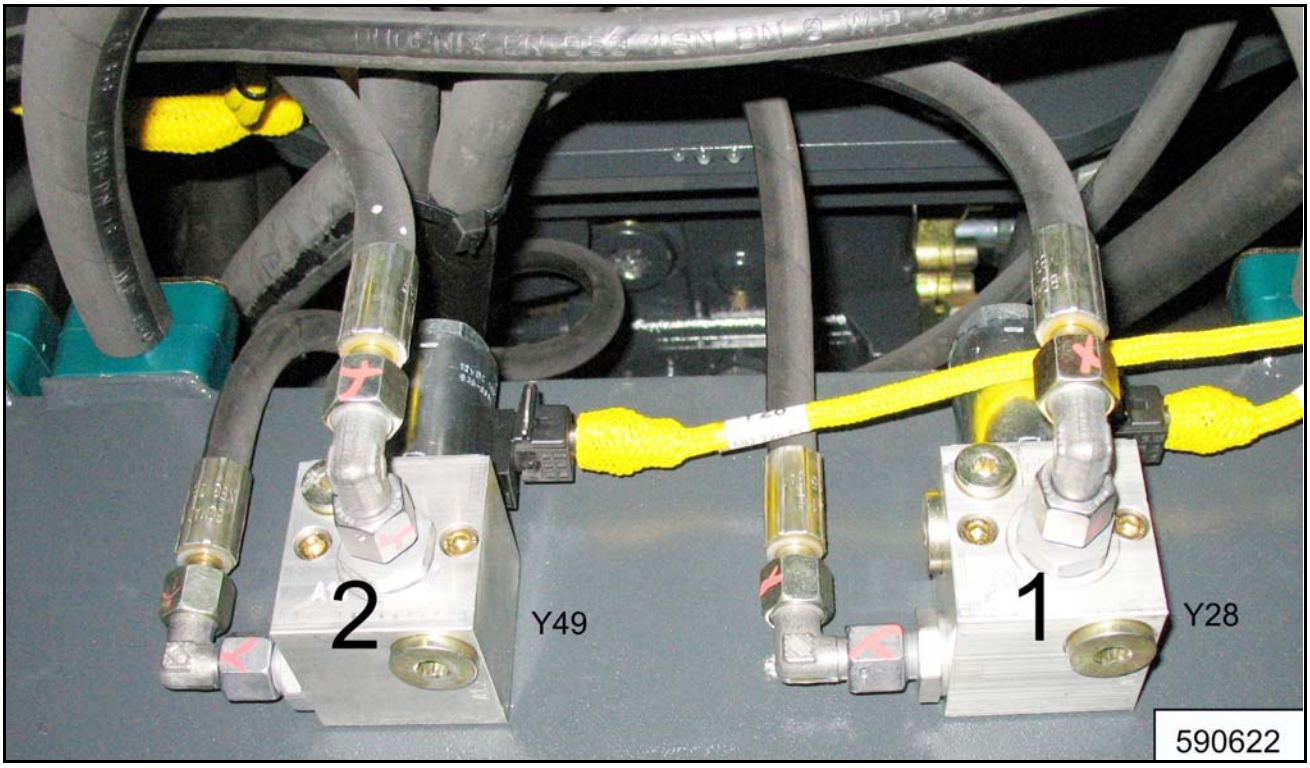


Fig. 6 Control chamber short circuit valve rotor pumps

Pos	Designation	Position in hydraulic diagram	Position in wiring diagram	Measuring values and switching points
1	Control chamber short circuit valve from rotor pump 1	43	Y28, page 007	open without current
2	Control chamber short circuit valve from rotor pump 2	44	Y49, page 007	open without current

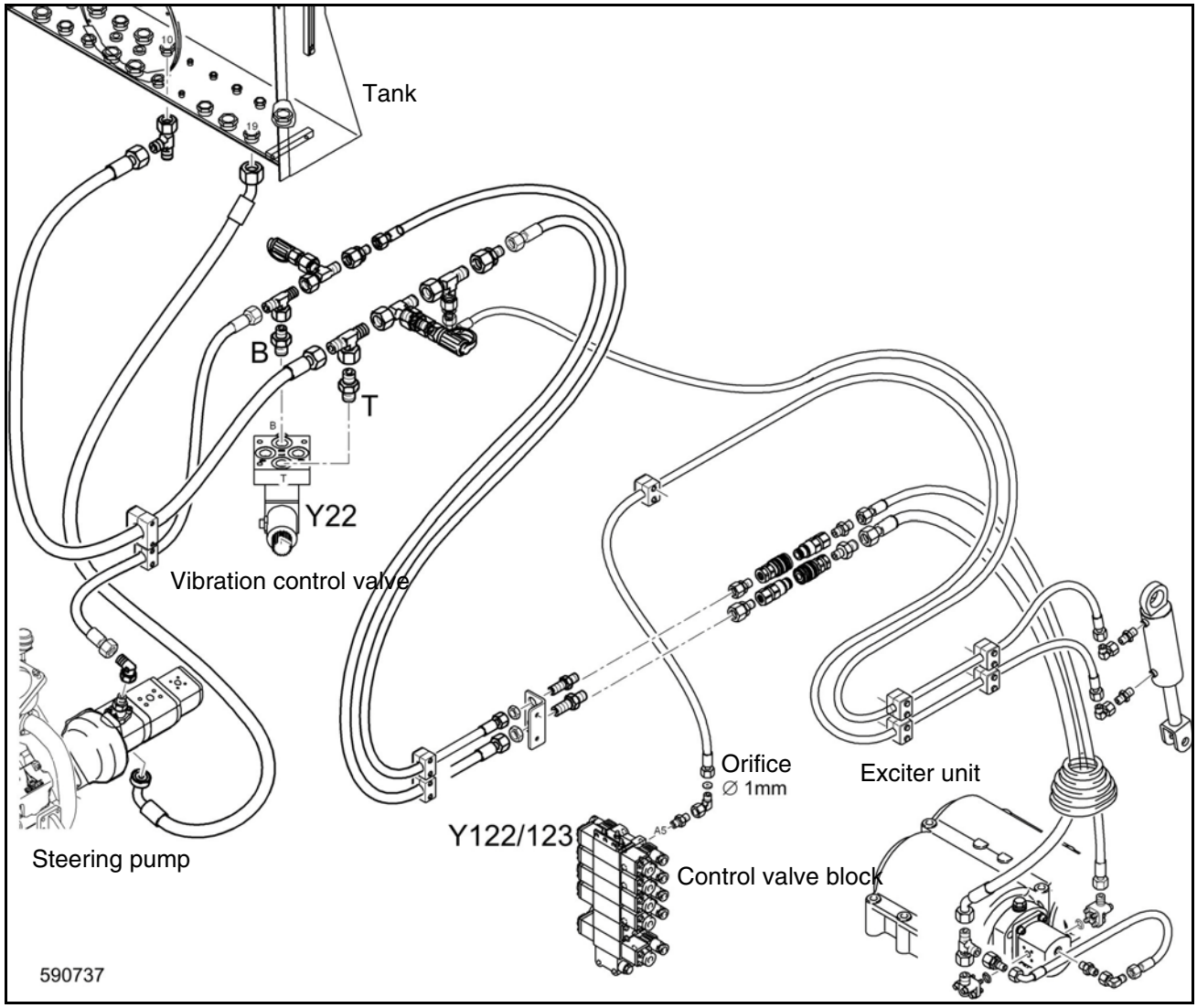


Fig. 3 Vibratory plate

Control valve blocks SP-08

The way valves are switchable valves or proportional valves

1	Housing	8	Plug
2	Main piston	9	Section pressure balance
3	Adjustable orifice with load retaining function	10	Pressure balance spring
4	Pressure/charge valve	P	Pump
5	hydraulically unlockable check valves	A, B	consumers
6	Magnet	LS	Load-Sensing (LS)
7	Compression spring	T	Tank

Consumer control with electro-magnetic actuation

The position of the main piston (2) relative to the housing (1) determines the flow direction and the volumetric quantity of the flow volume that is directed to the consumer ports (A or B).

In non-operated condition the main piston is centred by compression spring (7). There is no connection from "P" to "A" or "B".

If the electric control current exceeds the spring force, the main piston starts to move away from its middle position and opens the connection from P to A or P to B.

Flow volume limitation

The maximum flow volume can be mechanically adjusted via the adjusting orifice (3).

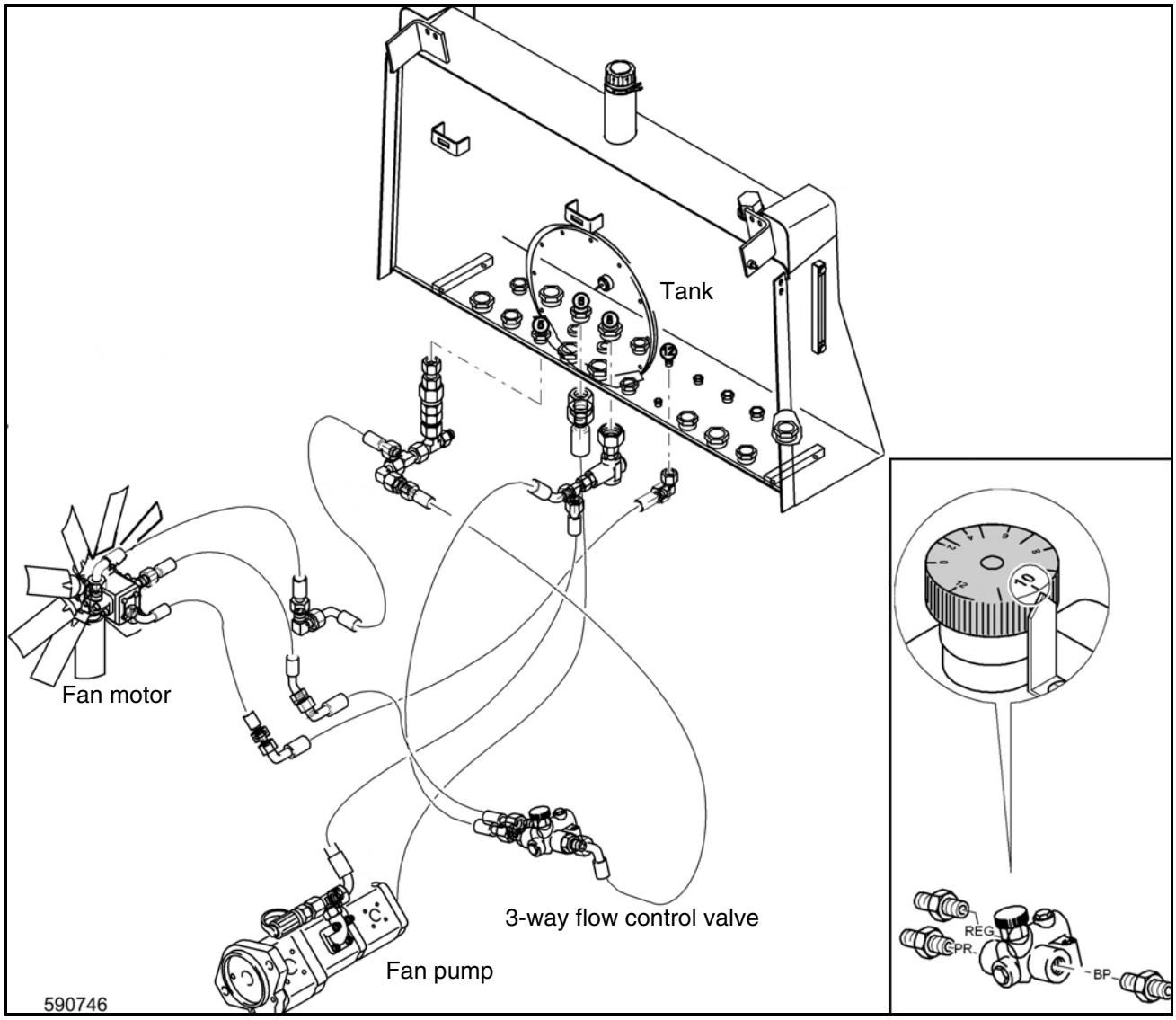

Tank
Fan motor
3-way flow control valve
Fan pump
590746
REG
PR
BP

Fig. 1

12 Water injection

Axial piston pumps, A10VO/VSO 18 to 100 DFR1

i Note

*This document is valid for pump types **VO** and **VSO**!*

The pump delivers oil only to one direction, i.e. the swash plate moves out of neutral position only to one direction. It is therefore particularly suitable for the use in open hydraulic circuits.

⚠ Caution

The axial piston pump must be filled with pressure fluid and purged during start-up and operation. This must also be considered for longer periods of rest, because the system may run empty through the hydraulic lines.

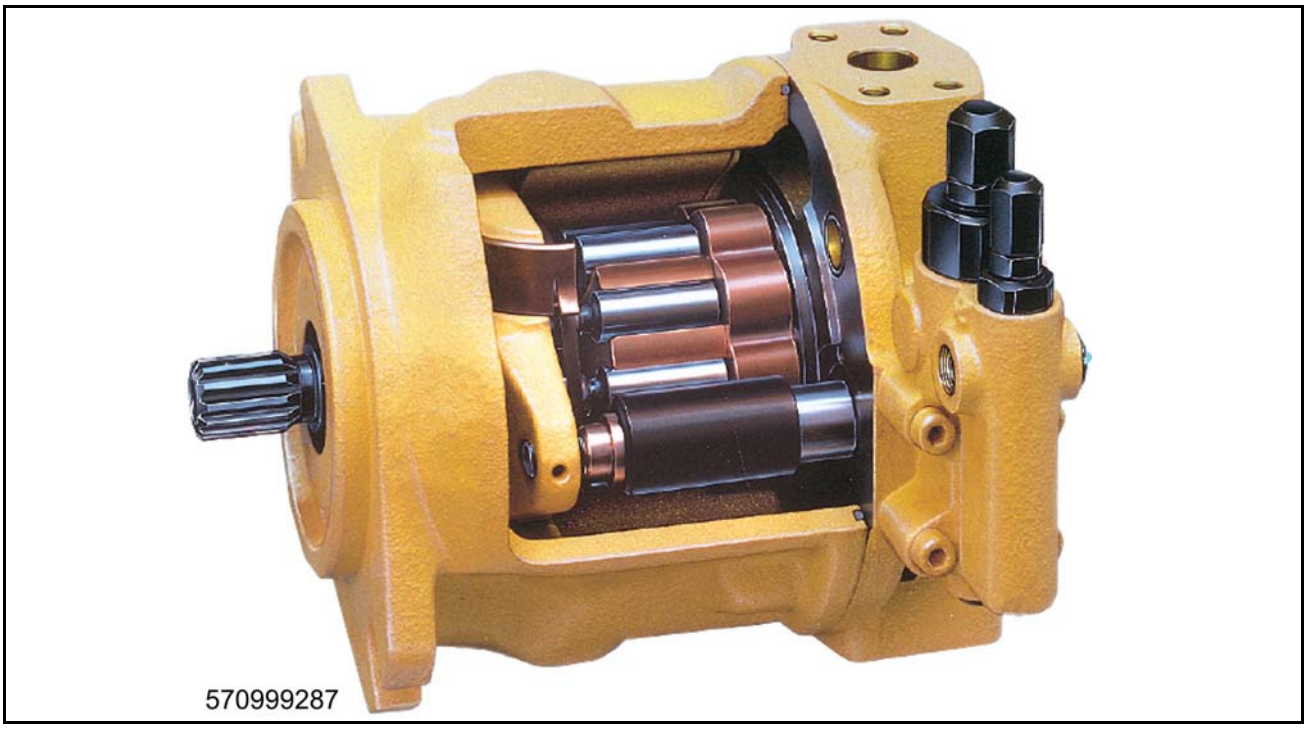


Fig. 24

DFR1, pressure-flow controller

Pressure control valve

The pressure control valve keeps the pressure in an hydraulic system at a constant level within the control range of the pump. This way the pump will only deliver as much hydraulic fluid as can be absorbed by the hydraulic consumers. The pressure can be infinitely adjusted on the control valve.

DFR1 – pressure and flow controller

In addition to the function of a pressure controller an orifice records the differential pressure before and after the orifice, which then controls the flow rate of the pump. The pump delivers the pressure fluid quantity actually required by the consumer.

The pressure controller is superimposed.

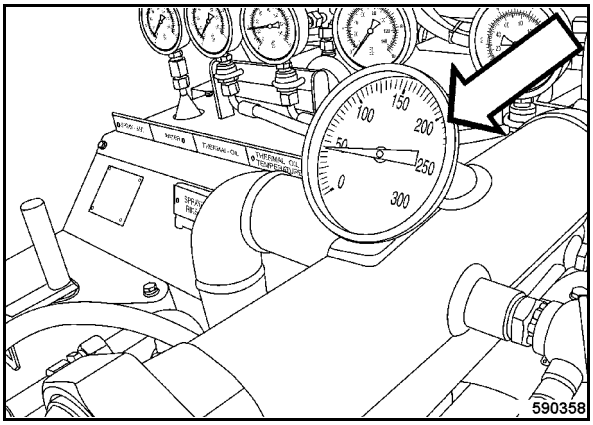


Fig. 38

No. 8 = Temperature gauge for binder tank*

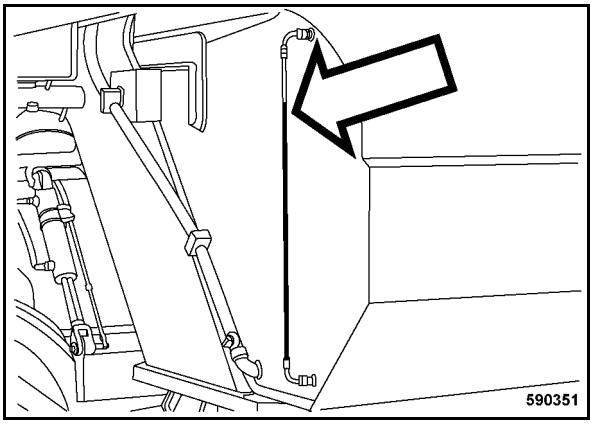


Fig. 39

No. 9 = Water level gauge for reaction water tank**

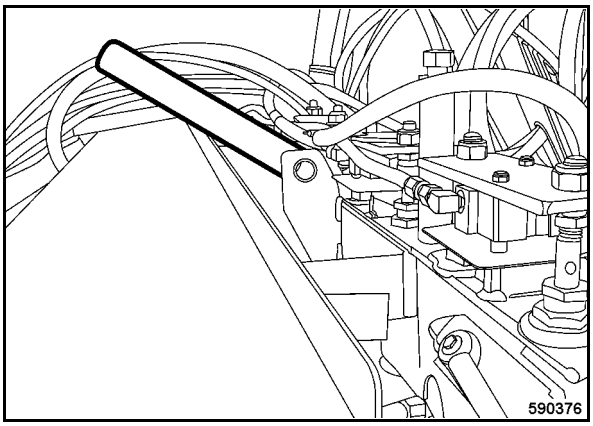


Fig. 40

No. 10 = Ventilation lever***

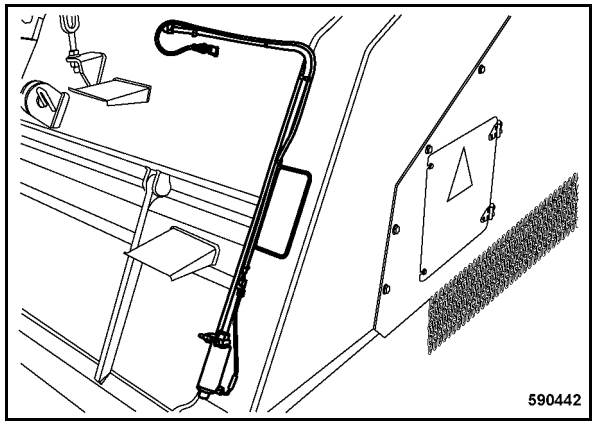


Fig. 41

No. 11 = Test nozzle for foam bitumen****

* only with binder metering system
** only with binder metering system
*** only with binder metering system
**** only with binder metering system

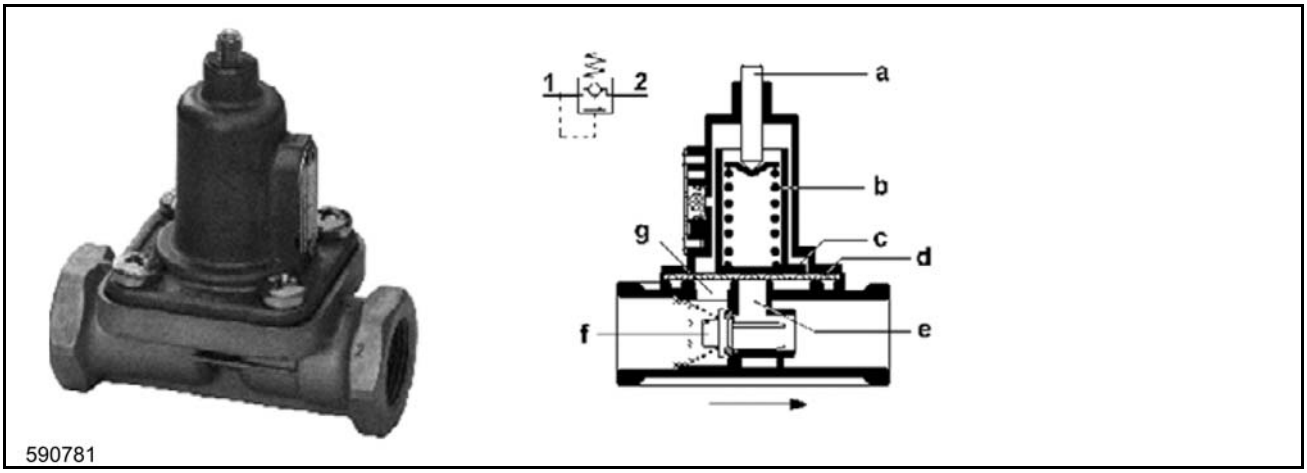


Fig. 48 Overflow valve

At the overflow valve comprtessed air flows in direction of arrow into the housing and through bore (g) under the mdiaphragm (d), which is pressed down onto its seat by compression spring (b) and piston (c). When the overflow pressure is reached, the force of the compression spring (b) is overcome, so that the diaphragm (b) lifts off its seat and releases the bore (e). The air flows to the vessels or users in direction of arrow, directly or after the check valve (h) has opened.

In the overflow valve with back flow the compressed air can flow back out of the 2nd vessel after opening the check valve (f), if the pressure in the 1st vessel has dropped by more than 0.1 bar.

Thermal oil pump

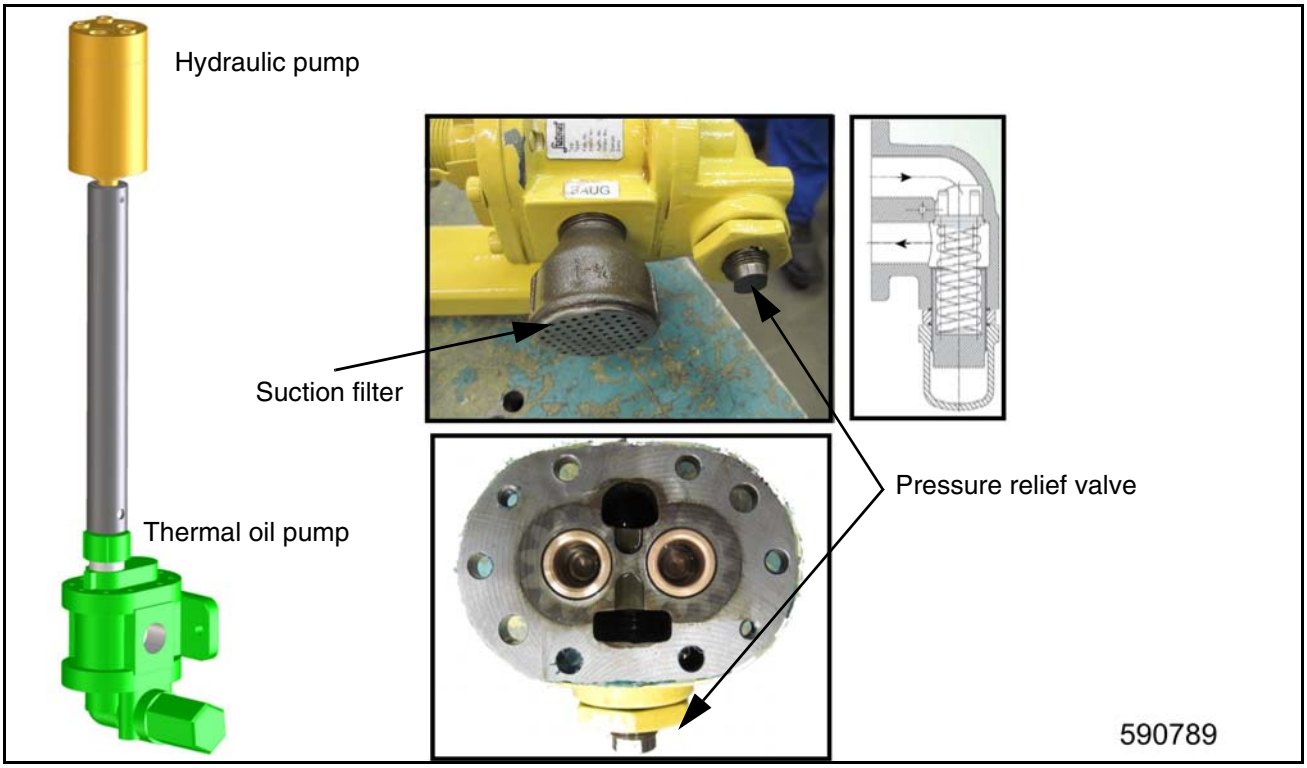


Fig. 49 Thermal oil gear pump

13.8 Checking the thermal oil* level

⚠ Caution

Check the oil level in cold condition.

For quality and quantity of oil refer to the "table of fuels and lubricants".

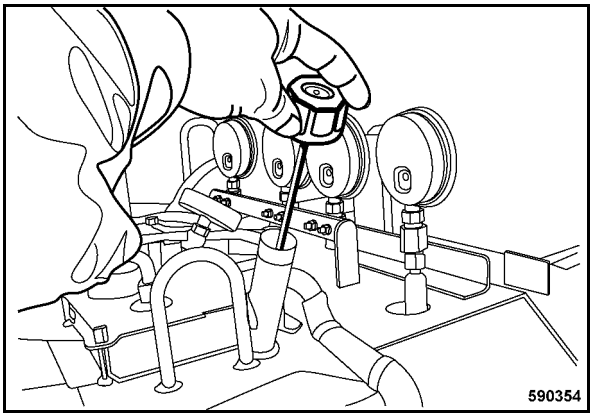


Fig. 12

- Unscrew the oil dipstick (Fig. 12) from the thermal oil tank.
- The oil level must always be between the "MIN"- and "MAX"-marks, fill up oil if necessary.

13.9 Checking the contamination of the hydraulic oil filters**

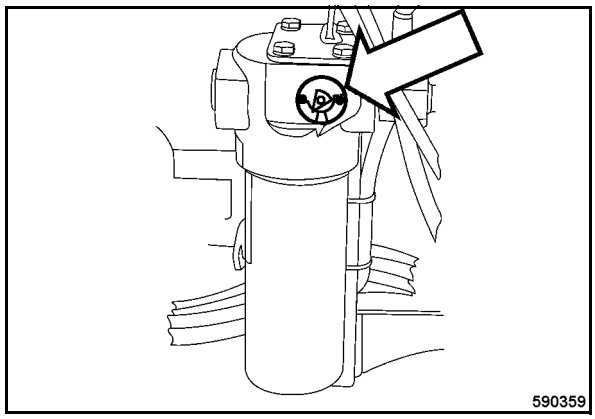


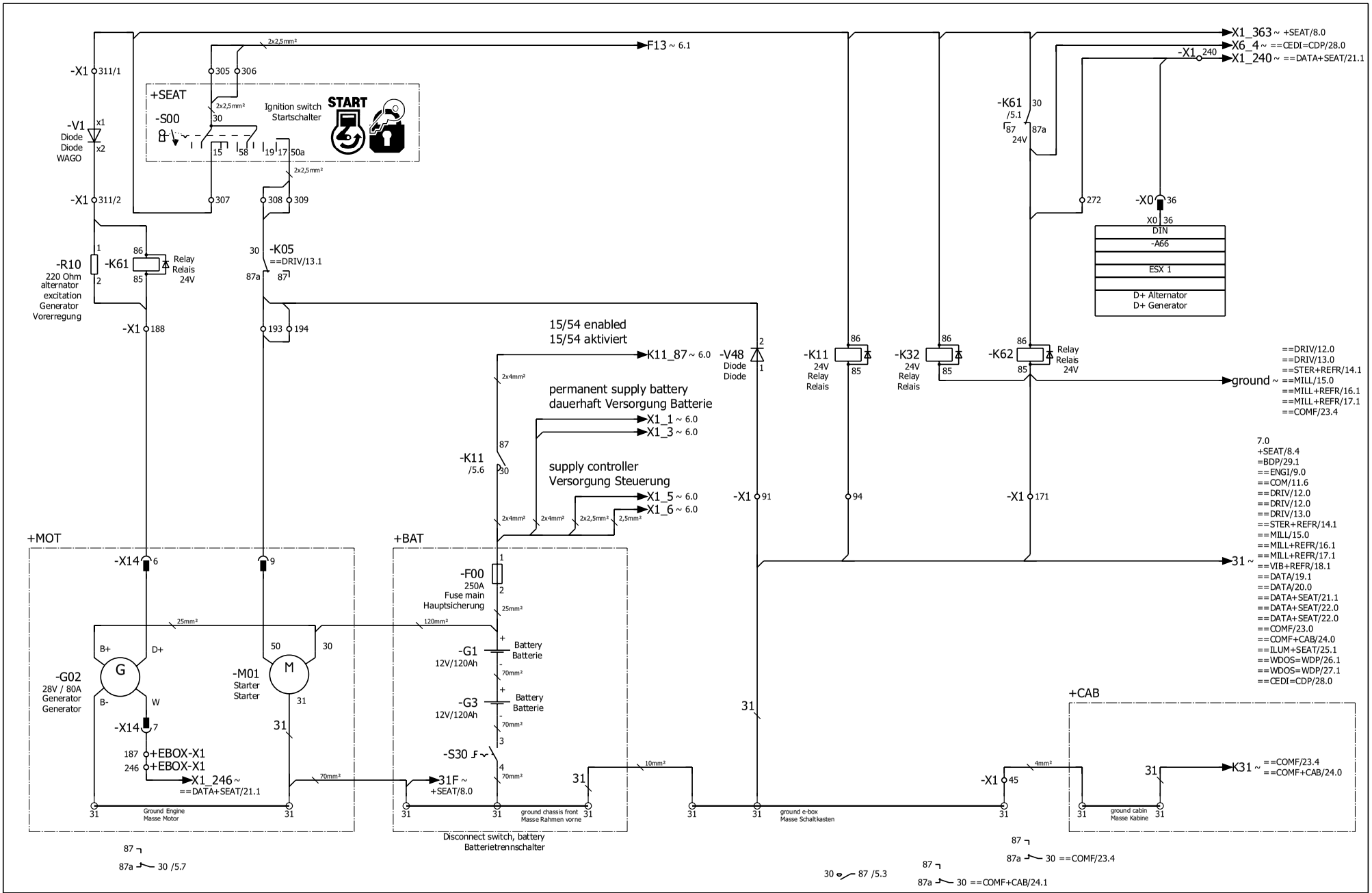
Fig. 13

- Check the degree of contamination in the display (Fig. 13) on the hydraulic oil filter, if necessary replace the hydrauilic oil filter.

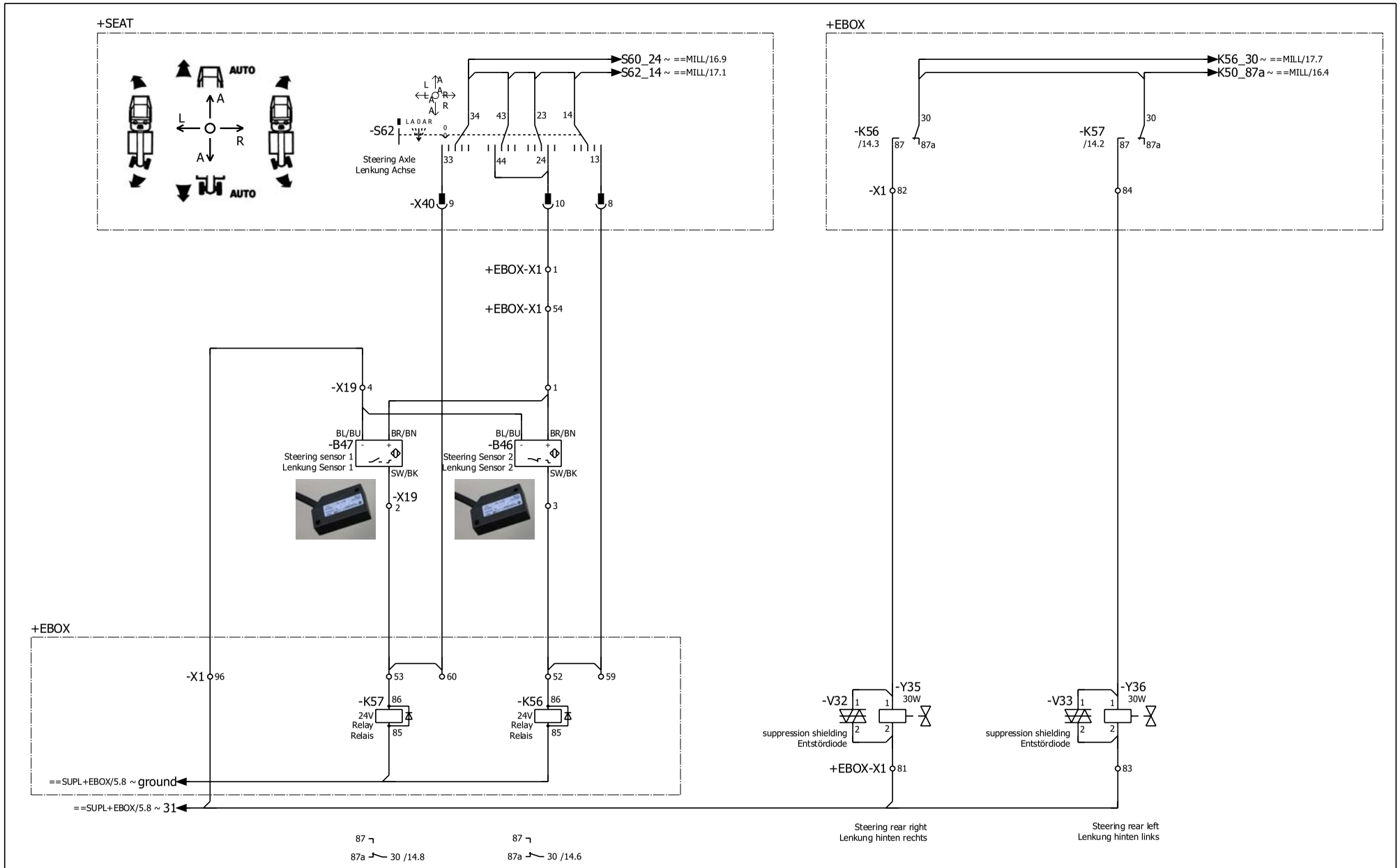
* only with binder metering system

** only with binder metering system

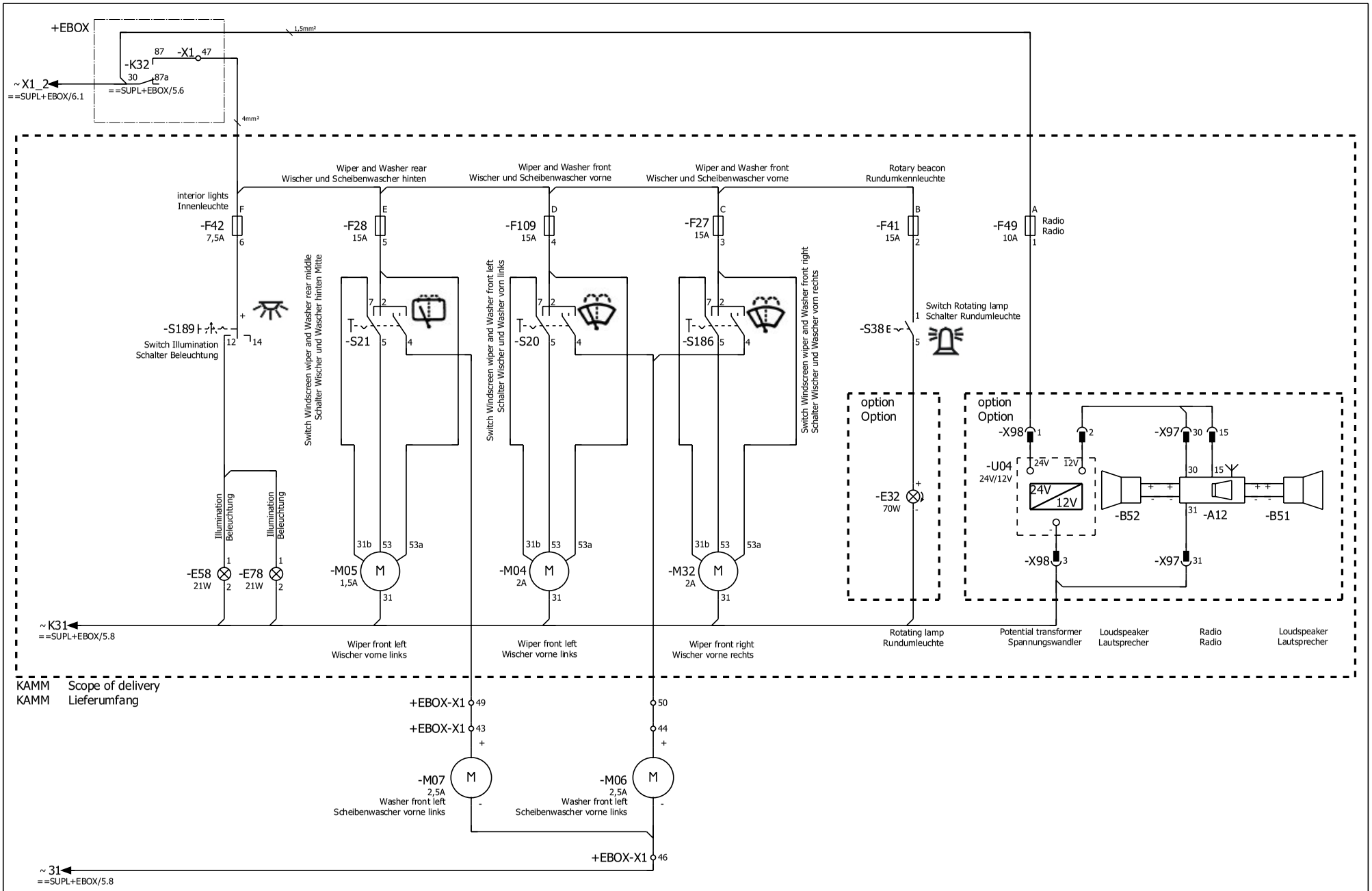
14.1 Hydraulic diagram 593 301 24



0	1	2	3	4	5	6	7	8	9
Created / Erstellt: WERNER 22.07.2010 Checked / Geprüft: M. Vogt 09.08.2010	MPH 122-2		BOMAG FAYAT GROUP	generating supply voltage, Ignition switch Erzeugung Versorgung Spannung, Zündung Schalter				Higher-level function / Anlage = MPH Function / Funktion == SUPL Mounting location / Einbauort + EBOX	Page / Blatt 5 from / von 58 42 EPE / 000 / 00



0	1	2	3	4	5	6	7	8	9
Created / Erstellt: WERNER 22.07.2010 Checked / Geprüft: M. Vogt 09.08.2010	MPH 122-2		BOMAG FAYAT GROUP	Steering rear Axle Lenkung hinten Achse				Higher-level function / Anlage = MPH Function / Funktion == STER Mounting location / Einbauort + REFR	Page / Blatt 14 from / von 58 42 EPE / 000 / 00



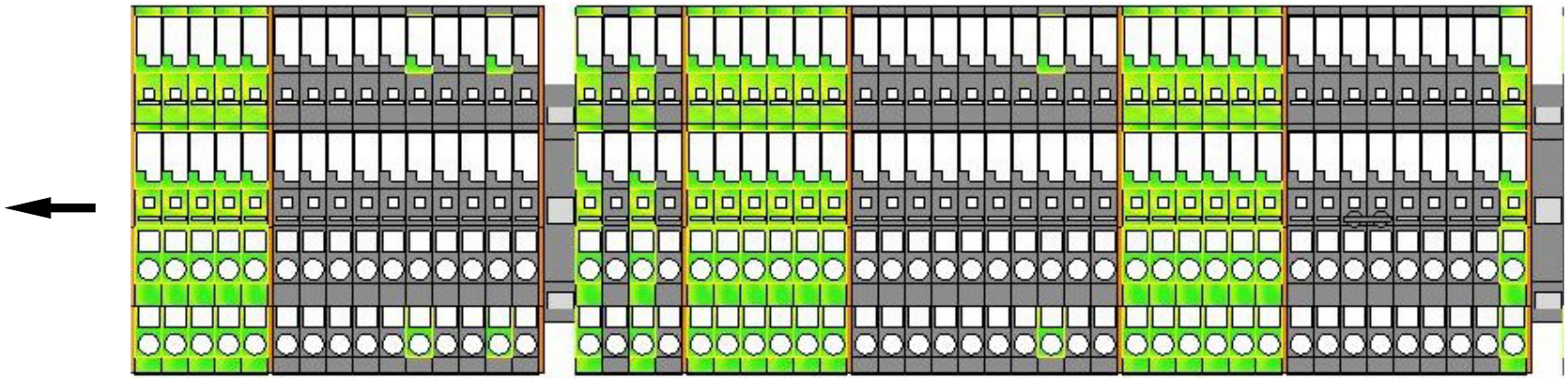
0	1	2	3	4	5	6	7	8	9
Created / Erstellt: WERNER 22.07.2010 Checked / Geprüft: M. Vogt 09.08.2010	MPH 122-2		BOMAG FAYAT GROUP	KAMM cabin KAMM Kabine				Higher-level function / Anlage = MPH Function / Funktion == COMF Mounting location / Einbauort + CAB	Page / Blatt 24 from / von 58 42 EPE / 000 / 00

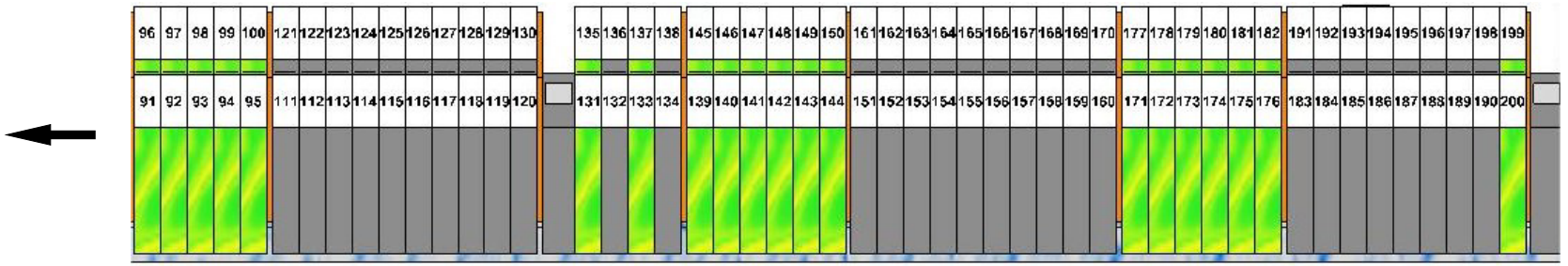
Device tag list
Betriebsmittelliste

Device tag BMK	Page Blatt	Path Pfad	Mounting location Einbauort	Higher-level function Anlage	Function text	Funktionstext	characteristics Techn.-Kenngrößen
S54	12	3	+SEAT	=MPH	Switch Speed range	Schalter Geschwindigkeit Bereich	
S55	13	2	+SEAT	=MPH	Travel lever	Fahrhebel	
S56	15	1	+REFR	=MPH	Milling-Tool exchange	Fräswerkzeug Wechsel	
S57	15	2	+REFR	=MPH	turn Rotor	drehen Rotor	
S59	15	7	+SEAT	=MPH	Switch rpm Rotor	Schalter Drehzahl Rotor	
S60	16	8	+SEAT	=MPH	Switch Flap rear	Schalter Klappe hinten	
S62	14	3	+SEAT	=MPH	Steering Axle	Lenkung Achse	
S63	17	3	+SEAT	=MPH	Cross-Slope	Querneigung	
S118	9	6	+SEAT	=MPH	Switch, diagnosis EMR	Schalter EMR Diagnose	
S127	9	4	+SEAT	=MPH	Switch, engine rpm	Schalter Motordrehzahl	5 kOhm
S130	18	2	+SEAT	=MPH	Switch Lift - Lower Plates	Schalter heben - senken Platten	
S148	15	5	+SEAT	=MPH	Maximum load control	Grenzlastregelung	
S151	27	7	+SEAT	=WDP	poti water	Potentiometer Wasser	5 kOhm
S155	13	7	+SEAT	=MPH	Potentiometer Speed Range	Potentiometer Geschwindigkeit Einstellbereich	5 kOhm
S172	12	1	+FRFR	=MPH	Emergency stop Pushbutton	Not Stop Taster	
S173	12	1	+FRFR	=MPH	-- " --	-- " --	
S186	24	5	+CAB	=MPH	Switch Windscreen wiper and Washer front right	Schalter Wischer und Wascher vorn rechts	
S189	24	1	+CAB	=MPH	Switch Illumination	Schalter Beleuchtung	
S192	18	6	+SEAT	=MPH	Switch Lift - Lower Plates	Schalter heben - senken Platten	
U01	8	1	+SEAT	=MPH	Potential transformer	Spannungswandler	24V/12V
U02	8	3	+SEAT	=MPH	-- " --	-- " --	24V/12V
U04	24	7	+CAB	=MPH	-- " --	-- " --	24V/12V
V1	5	0	+EBOX	=MPH	Diode	Diode	WAGO
V02	22	5	+EBOX	=MPH	-- " --	-- " --	
V03	22	5	+EBOX	=MPH	-- " --	-- " --	
V04	22	5	+EBOX	=MPH	-- " --	-- " --	
V05	22	5	+EBOX	=MPH	-- " --	-- " --	
V06	22	5	+EBOX	=MPH	-- " --	-- " --	
V07	22	5	+EBOX	=MPH	-- " --	-- " --	
V08	21	7	+EBOX	=MPH	-- " --	-- " --	
V09	21	7	+EBOX	=MPH	-- " --	-- " --	
V10	22	5	+EBOX	=MPH	-- " --	-- " --	
V11	22	5	+EBOX	=MPH	-- " --	-- " --	
V12	22	5	+EBOX	=MPH	-- " --	-- " --	
V13	22	5	+EBOX	=MPH	-- " --	-- " --	
V14	22	5	+EBOX	=MPH	-- " --	-- " --	
V15	22	5	+EBOX	=MPH	-- " --	-- " --	

Pin overview
Pin Übersicht

A83			Water dosage controller Wasser Dosierung Steuerung		
Pin Kontakt	Page Blatt	Path Pfad	Description Beschreibung	Signal	Signal
X0/1 : 1	11	2	CAN	CAN 1H	CAN 1H
X0/1 : 2	11	3	CAN	CAN 1L	CAN 1L
X0/1 : 3	7	1	Potential 30	Power Supply	Leistung Versorgung
X0/1 : 4	7	1	Potential 31	CODE 1	CODE 1
X0/1 : 5	27	3	PWM	valve water quantity	Ventil Wassermenge
X0/1 : 6	27	2	DIN	Display Water	Anzeige Wasser
X0/1 : 7	27	1	FIN	Water Quantity	Wasser Anzahl
X0/1 : 8	27	1	DOUT	Failure water system	Fehler Wasser System
X0/1 : 9	7	2	Potential 30	Power Supply	Leistung Versorgung
X0/1 : 10	7	3	Potential 30	-- " --	-- " --
X0/1 : 11	7	2	Potential 31	Supply Ground	Versorgung Masse
X0/1 : 13	27	2	DOUT	Shut-off valve	Absperrventil
X0/1 : 14	27	3	DIN	Lack of Water	Wassermangel





ground rear frame
Masse hinten Rahmen

rear frame
hinten Rahmen

Control-chamber Rotor and Travel Pump
Brake
Stellkammer Rotor und Fahren Pumpe
Bremse

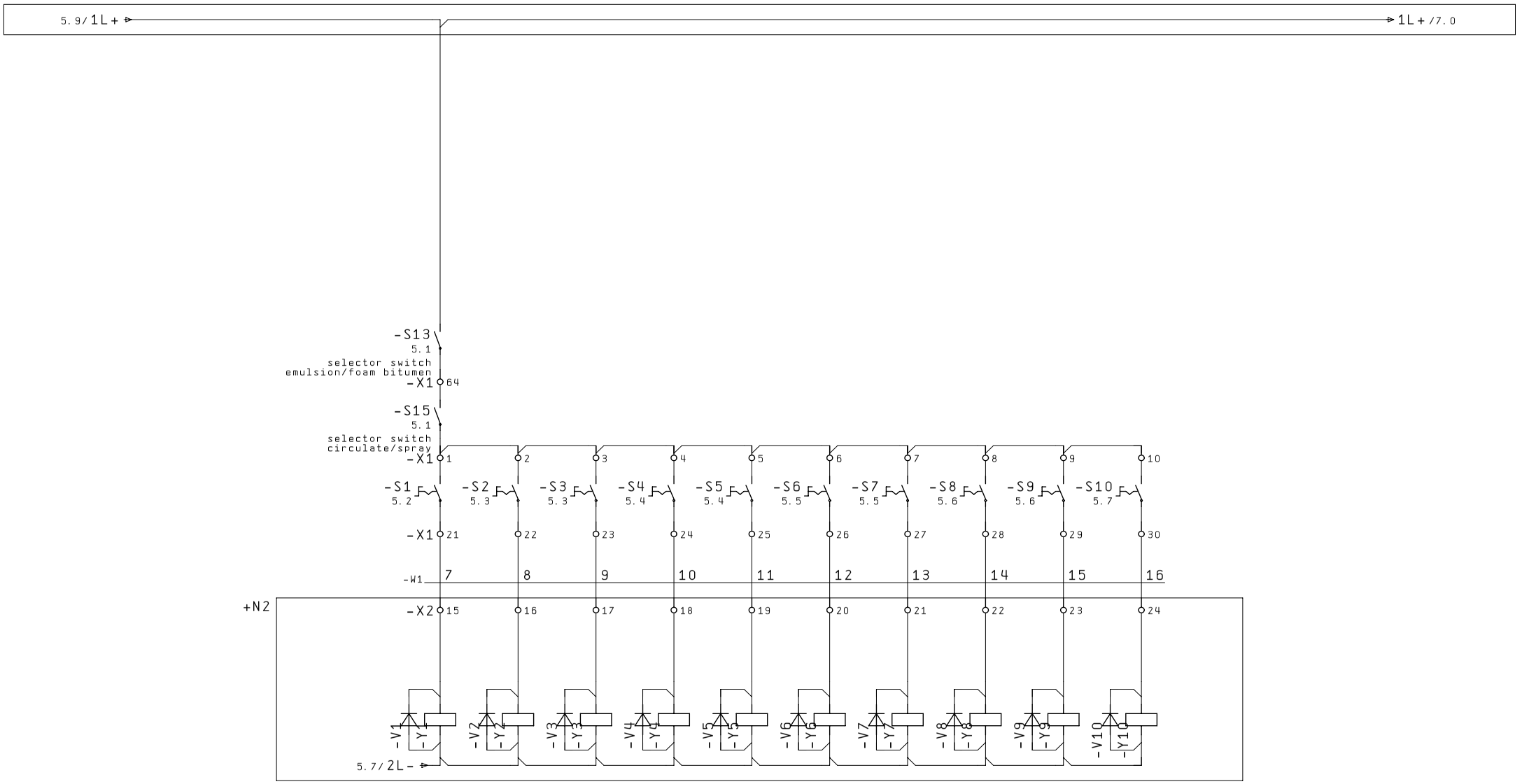
ground frame front
Masse Rahmen vorne

frame front
Rahmen vorne

Ground Engine
Masse Motor

Engine
Motor

0		1	2	3	4	5	6	7	8	9
Created Erstellt	WERNER 22.07.2010	MPH 122-2		BOMAG FAYAT GROUP	Illustration X1 Darstellung X1				Higher-level function Anlage =	Page Blatt 55 from von 58
Checked Geprüft	M. Vogt 09.08.2010								Function Funktion ==	42
									Mounting location Einbauort +	EPE / 000 / 00



	date	name
designed	26. Jan. 2010	
changes	03. Mär. 2010	FOJ
check		

stadler steuerungstechnik
Stadler Steuerungstechnik
Mühlbachstraße 14
A-4073 Wilhering
Tel +(43)7226/2358
Fax +(43)7226/2846

6008

Water

BOMAG

=
+N1

6008

S T U E C K L I S T E / P A R T S L I S T

GE_STK 11.11.2001

Part	Quantity	Product number	Denomination	Page/path	Place of installation	Supplier
+N1-S24	1,0	$	BEISTELLTEIL ALLGEMEIN part from customer generally	+N1/7.8		BEISTELLTEIL

	date	name
designed	26. Jan. 2010	
changes	03. Mär. 2010	FOJ
check		

stadler steuerungstechnik
Stadler Steuerungstechnik
Mühlbachstraße 14
A-4073 Wilhering
Tel +(43)7226/2358
Fax +(43)7226/2846

6008

part list

BOMAG

=
+N1

6008

14.6 Bitumen metering system bitumen