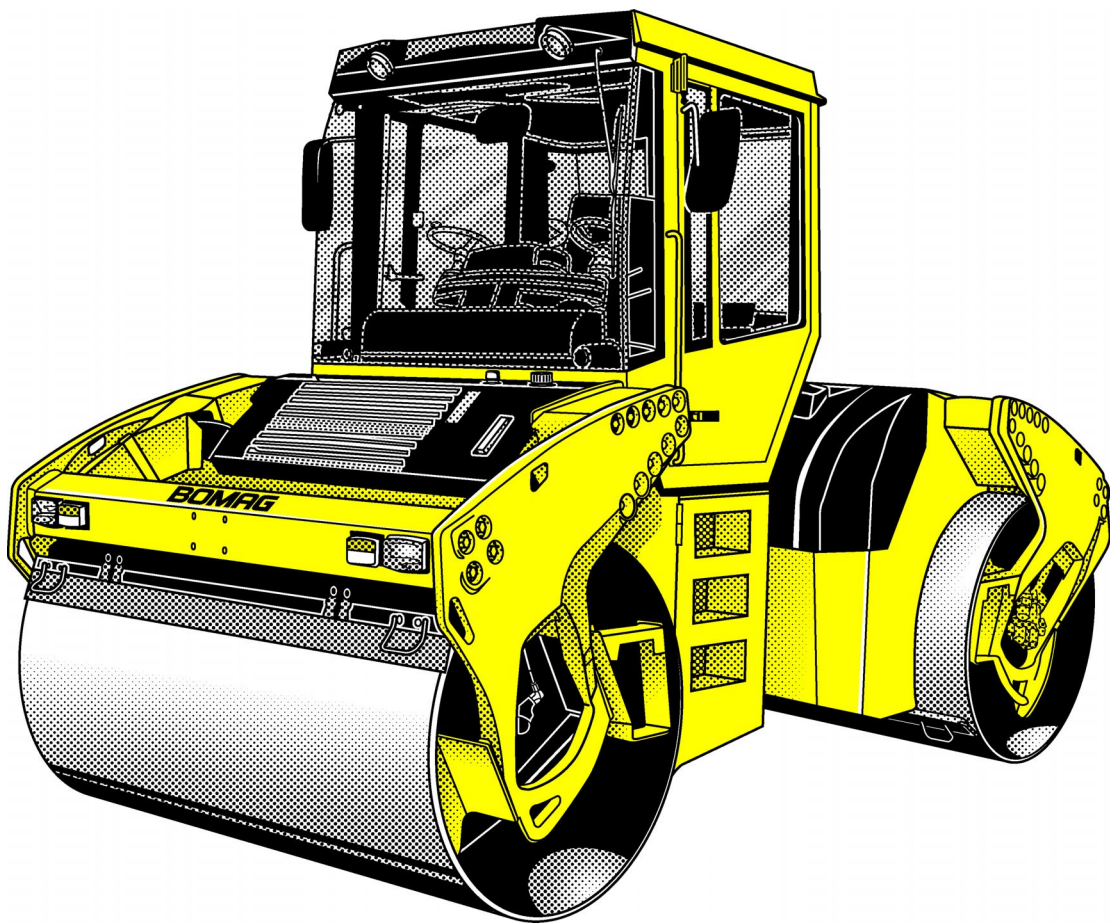


BOMAG

Service Training



Tandem Rollers BW 161 AD-4, BW 202 AD-4

Table of contents

Foreword	A 1
Documentation	A 2
General	A 3
 Technical data and adjustment values	 B 1
 Maintenance	 C1
Maintenance schedule	C2
 DEUTZ diesel engine	 D 1
Service side	D 2
Starter side	D 3
Lubrication oil circuit	D 4
Coolant circuit	D 5
Fuel system	D 6
Checking and adjusting the valve clearance	D 11
Plug-type injection pump	D 14
Electrical components and measuring points on the engine	D 30
 Travel system	 E 1
Travel pump	E 3
Control	E 6
Charge pressure relief valve	E 9
High pressure relief valve	E 10
Pressure override	E 12
Travel motor	E 14
Drum reduction gear	E 17
Test and adjustment points, travel system	E 18
Trouble shooting in travel system	E 24

Vibration	F 1
Vibration pump	F 3
High pressure relief valves	F 6
Control	F 7
Vibration motor	F 8
Vibration shut-off valve	F 9
Drum BW 161 AD-4	F 11
Drum BW 202 AD-4	F 12
3D-cut-away drawing of drum	F 13
Exciter weights	F 14
Test and adjustment points, vibration system	F 15
Trouble shooting in vibration system	F 21

Steering	G 1
Steering/charge pump(s)	G 4
Steering valve	G 6
Priority valve	G 8
Crab walk	G 9
Articulated joint	G 10
Measuring and adjustment points	G 11
Trouble shooting steering system	G 14

Electrics, module descriptions

see separate lists

Wiring diagram

Hydraulic diagram

Foreword

Reliable construction equipment is of greatest advantage for all parties involved:

- for the customer/user it is a basis for an exact calculation of utilization periods and the completion of projects as scheduled.
- in the rental business it means that the equipment can be reliably used and planned without having to stock a large number of stand-by machines.
- for the manufacturer it means that customers are satisfied, provides him with a good image and gives him a feeling of confidence.

It is BOMAG's philosophy to design and produce the machines with highest possible reliability. This aspect of simple and easy maintenance was one of the key issues when developing and designing the machine:

- the location of components in the machine eases maintenance work,
- the high quality standard of BOMAG is the basis for the considerable extension of the service and maintenance intervals.
- the After Sales Service of BOMAG, including excellent operating and maintenance instruction manuals, high quality training courses and on-site machine demonstrations helps the customer to maintain their machines in good condition over a long period of time.

Permanent training of BOMAG's own service personnel as well as the service personnel of BOMAG Profit Centres and dealers is therefore a general prerequisite for BOMAG's excellent world-wide service.

This program of permanent training is only possible with appropriate and up-to-date training material for trainers as well as persons attending the training courses.

This training manual has not only been written as a support for the professional work of the trainer, but also for the trainees attending these training courses.

The different levels of product training demand, that the training performed by BOMAG, its Profit Centres or its dealers reflects the high quality of the training conducted at the Training Centre at BOMAG in Boppard. For this reason we invested a lot of time in the preparation of these materials .

The structure of this training manual enables us to change or up-date individual chapters in case of alterations to the machine.

Documentation

For the BOMAG machines described in this training manual the following documentation is additionally available:

Attention!

The currently valid part numbers for the documents can be taken from the Doclist or the Customer Service page in the BOMAG (BOMAG Secured Area) in accordance with the serial number of the machine.

- 1. Operating and maintenance instructions**
- 2. Spare parts catalogue**
- 3. Wiring diagram ***
- 4. Hydraulic diagram ***
- 5. Repair instructions**
- 6. Service Information**

* The document versions valid at the date of printing are part of this training manual.

General

The tandem rollers of series BW 161 AD-4 and 202 AD-4 are high performance machines for the extremely difficult use in asphalt compaction and earth work.

The machines of this product range are powered by water cooled Deutz diesel engines of series BF4M 2012 (BW 161 AD-4) or BF4M 2012 C (BW 202 AD-4).

Engine driven pumps transfer the engine output power via hydrostatic circuits for travel and vibration systems to the drums. These hydrostatic drives ensure lowest possible power losses and a high efficiency. The steering and crab-walk functions as well as the additional edge cutter option are supplied by gear pumps driven by the auxiliary engine output.

The machines are equipped with a 2 cylinder operated articulated steering and a crab-walk function with a separate hydraulic cylinder to offset the front frame laterally relative to the rear frame.

For the first time a machine of this product range is equipped with axial piston drum drive motors with reduction gears. The discs of the parking brakes are integrated in the reduction gears. When starting the engine and opening the brake valve the brakes are relieved by charge pressure. When closing the brake valve or when shutting the engine down the brakes are automatically applied by spring pressure. These parking brakes should not be used as service brake, because the deceleration effect is extremely high and the braking process may damage the brake discs.

The drums are equipped with an exciter shaft and two vibrator units each. The exciter shafts are driven by hydraulic motors via Bowex couplings. Vibration of the drum is caused by the centrifugal forces generated by the exciter shaft mounted eccentric weights.

Since the machines are designed for operation with two different frequencies and amplitudes, the sense of rotation of the exciter shaft can be reversed. Changing the sense of rotation also changes the position of the change-over weights inside the eccentric weights on the exciter shafts.

This also changes the centrifugal force and the amplitude. The rotary speed of the exciter shaft is also different to both directions of rotation. This means, that the vibration frequency will also change.

In combination with the hydraulic vibration drive the change-over weights are arranged in such a way, that the high amplitude works with low frequency and vice-versa.

The combination of high amplitude and low frequency is particularly suitable for compaction work in earthwork with high lift heights and for preliminary compaction. For soil compaction the combination of low amplitude and high frequency should be used for the finishing passes.

The individual machine functions like travel system, vibration and steering are described in more detail in the corresponding chapters. Optional equipment like Speed Control, E-Vib display etc. are not included in this training manual.

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.

BOMAG Central Service - Technical data and adjustment values**Status: 2003-05-21**

Product type:	BW 161 AD-4
Type No.:	920 02
Serial numbers from:	101 920 02 1001
Engine:	
Manufacturer:	Deutz
Type:	BF4M2012
Combustion principle:	4-stroke-Diesel
Cooling:	Water
Number of cylinders:	4
Power acc. to ISO 9249:	74,9 kW
Power data at nominal speed of:	2300 1/min
Low idle speed:	900+/-200 1/min
High idle speed:	2400+/-50 1/min
Spec. fuel consumption:	225 g/kWh
Valve clearance, inlet:	0,3 mm
Valve clearance, outlet:	0,5 mm
Opening pressure, injection valves:	220 bar
Starter voltage:	12 V
Starter power:	3,1 kW
Travel pump:	
Manufacturer:	Bosch-Rexroth
Type:	A4VG 56 HW/32
System:	Axial piston-swash plate
Max. displacement:	56 cm ³ /U
Max. flow ratio:	136,1 l/min
High pressure limitation:	455 bar
Pressure override:	420+/- 15 bar
Charge pressure, high idle:	25 +3/-1 bar
Reduction gear, drum:	
Manufacturer:	Bonfiglioli
Type:	706 C 2H
Transmission ratio:	43,8
Drum drive:	
Manufacturer:	Sauer-Danfoss
Type:	51C 060
Number:	2
System:	Axial piston-swash plate
Displacement stage 1:	60 cm ³ /U
Displacement stage 2:	30 cm ³ /U
Perm. leak oil quantity:	1,5 l/min
Vibration pump:	
Manufacturer:	Bosch-Rexroth
Type:	A10VG 45 EZ

System:	Axial piston-swash plate
Max. displacement:	45 cm ³ /U
Starting pressure:	360+/-20 bar
Operating pressure, soil dependent:	ca. 100 bar

Vibration motor:

Manufacturer:	Bosch-Rexroth
Type:	A4FM 28
Number:	2
System:	Axial piston-swash plate
Displacement:	28 cm ³ /U
Frequency:	45/55 Hz
Amplitude:	0,91/0,39 mm

Steering and charge pump:

Manufacturer:	Bosch
Type:	HY/ZFFS11/16+8
System:	Tandem-/Gear pump
Displacement:	16 / 8 cm ³ /U
Max. steering pressure:	205 +/-15 bar

Steering valve:

Manufacturer:	Sauer-Danfoss
Type:	OSCP 400 LS
System:	Rotary valve

Filling capacities:

Engine coolant:	15 l (50% Water, 50% Anti-freeze agent on Ethane-diol-basis)
Engine oil:	9,5 l (SAE 15W-40, API CG-4 (for details see maintenance manual))
Hydraulic oil:	60 l (HVL 46 VI 150)
Vibration bearing housing:	7,5 l (SAE 15W-40, API SJ/CF)
Reduction gear, drum:	1,5 l (SAE 90 EP, API GL 5)

BOMAG Central Service - Technical data and adjustment values**Status: 2003-05-21**

Product type:	BW 202 AD-4
Type No.:	920 03
Serial numbers from:	101 920 03 1001
Engine:	
Manufacturer:	Deutz
Type:	BF4M2012C
Combustion principle:	4-stroke-Diesel
Cooling:	Water
Number of cylinders:	4
Power acc. to ISO 9249:	98 kW
Power data at nominal speed of:	2300 1/min
Low idle speed:	900+/-200 1/min
High idle speed:	2430+/-50 1/min
Spec. fuel consumption:	225 g/kWh
Valve clearance, inlet:	0,3 mm
Valve clearance, outlet:	0,5 mm
Opening pressure, injection valves:	220 bar
Starter voltage:	12 V
Starter power:	3,1 kW
Travel pump:	
Manufacturer:	Bosch-Rexroth
Type:	A4VG 56 HW/32
System:	Axial piston-swash plate
Max. displacement:	56 cm ³ /U
Max. flow ratio:	136,1 l/min
High pressure limitation:	455 bar
Pressure override:	420+/- 15 bar
Charge pressure, high idle:	25 +3/-1 bar
Reduction gear, drum:	
Manufacturer:	Bonfiglioli
Type:	706 C 2H
Transmission ratio:	43,8
Drum drive:	
Manufacturer:	Sauer-Danfoss
Type:	51C 060
Number:	2
System:	Axial piston-swash plate
Displacement stage 1:	60 cm ³ /U
Displacement stage 2:	30 cm ³ /U
Perm. leak oil quantity:	1,5 l/min
Vibration pump:	
Manufacturer:	Bosch-Rexroth
Type:	A10VG 45 EZ

System:	Axial piston-swash plate
Max. displacement:	45 cm ³ /U
Starting pressure:	360+/-20 bar
Operating pressure, soil dependent:	ca. 100 bar

Vibration motor:

Manufacturer:	Bosch-Rexroth
Type:	A4FM 28
Number:	2
System:	Axial piston-swash plate
Displacement:	28 cm ³ /U
Frequency:	45/55 Hz
Amplitude:	0,83/0,36 mm

Steering and charge pump:

Manufacturer:	Bosch
Type:	HY/ZFFS11/16+8
System:	Tandem-/Gear pump
Displacement:	16 / 8 cm ³ /U
Max. steering pressure:	205 +/-15 bar

Steering valve:

Manufacturer:	Sauer-Danfoss
Type:	OSCP 400 LS
System:	Rotary valve

Filling capacities:

Engine coolant:	15 l (50% Water, 50% Anti-freeze agent on Ethane-diol-basis)
Engine oil:	9,5 l (SAE 15W-40, API CG-4 (for details see maintenance manual))
Hydraulic oil:	60 l (HVL 46 VI 150)
Vibration bearing housing:	7,5 l (SAE 15W-40, API SJ/CF)
Reduction gear, drum:	1,5 l (SAE 90 EP, API GL 5)

Maintenance

The products of series BW 161/202 AD-4 are high performance machines for the extremely difficult use in asphalt compaction and earth work. To be able to meet these demands the machines must always be ready to be loaded up to their limits. Furthermore, all safety installations, protections and guards must always be in place and fully functional.

Thorough maintenance of the machine is therefore mandatory. This not only guarantees a remarkably higher functional safety, but also prolongs the lifetime of the machine and of important components.

The time required for thorough maintenance is only minor when being compared with the malfunctions and faults that may occur if these instructions are not observed.

The maintenance intervals are given in operating hours. It is quite obvious that with each maintenance interval all the work for shorter preceding intervals must also be performed. During the 2000 hours interval you must also perform the work described for the service intervals after 50, 250 and 500 hours.

During maintenance work you must only use the fuels and lubricants mentioned in the table of fuels and lubricants (oils, fuels, grease etc.).

This training manual is handed out together with the presently valid operation and maintenance manual. For the individual maintenance intervals and the description of the maintenance work involved please refer to these maintenance instructions.

Maintenance table

Maintenance work	Remark	Running-in inspection	every 10 oper. hours	every 125 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	as required
Tighten all bolted connections on air intake, exhaust, oil sump and engine mounts	50 h	X							
Tighten the bolted connections on the machine	50 h	X							
Check the engine for leaks	50 h	X							
1. Oil change in drum drive gear	150 h	X							
Check the engine oil level	Dipstick mark		X	X	X	X	X	X	
Check, drain the fuel pre-cleaner / water separator			X	X	X	X	X	X	
Check, clean the fuel supply			X	X	X	X	X	X	
Check the hydraulic oil level	Inspection glass		X	X	X	X	X	X	
Check the coolant level			X	X	X	X	X	X	
Check the condition of the V-belt			X	X	X	X	X	X	
Lubricate the articulated joint				X	X	X	X	X	
Check oil level in drum drive gear				X	X	X	X	X	
Check state of radiator, hydraulic oil cooler, intercooler (only BW 202) and fuel cooler, clean cooling fins					X	X	X	X	
Check oil level in exciter shaft tube					X	X	X	X	
Change engine oil and oil filter	min. 1x per year API CG-4/CH-4					X	X	X	
Check condition of battery, grease poles	pole grease					X	X	X	
Check coolant concentration						X	X	X	
Drain the fuel tank sludge						X	X	X	

Maintenance work	Remark	First time after the following op. hours	every 10 oper. hours	every 125 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	as required
Service the air conditioning (if fitted)						X	X	X	
Check, adjust the valve clearance	I = 0,3 mm E = 0,5 mm						X	X	
Change the main fuel filter cartridge, bleed the fuel system							X	X	
Clean filter element for fuel pre-cleaner/ water separator, replace if necessary							X	X	
Change the oil in drum drive gear							X	X	
Check, tension, grease the steering chains							X	X	
Check tension of V-belt, tighten / replace if necessary							X	X	
Check the engine mounts							X	X	
Change hydraulic oil and breather filter*	min. every 2 years							X	
Change the hydraulic oil filter*	min. every 2 years							X	
Change the coolant	min. every 2 years							X	
Change the oil in the exciter shaft tube								X	
Replace injection valves on engine	only every 3000 operating hours							X	
Check, clean, replace the combustion air filter	min. 1x every year, safety cartridge min. every 2 years								X
Bleed the fuel system									X
Clean water tank and water filter									X
Fill the container for windscreen washer									X

Maintenance work	Remark	First time after the following op. hours	every 10 oper. hours	every 125 oper. hours	every 250 oper. hours	every 500 oper. hours	every 1000 oper. hours	every 2000 oper. hours	as required
Check the preheating system, maintenance in case of frost									X
Check the scrapers									X
Tightening torques									X
Engine conservation									X

Note:

When changing filters use only the original filters specified in the operating and maintenance instructions for this machine. The installation of incorrect filters (e.g. insufficient pressure resistance) can lead to severe damage on engine or hydraulic components.

The coolant for the water cooled engine must always be mixed with approx. 50% anti-freeze additive (even under hot environmental conditions) as a preventive measure against corrosion and cavitation. However, the additive proportion must not exceed 60%, since this would have an adverse effect on the cooling ability of the coolant.

When using diesel fuel with a sulphur content of more than 0.5%, the oil change intervals must be halved. The same applies when using engine oils of specification API CF/CF-4.

* Also in case of repairs in the hydraulic system

Deutz diesel engine

Tandem rollers of series BW 161 AD-4 are powered by Deutz diesel engines of series BF4M 2012. Machines of series 202 AD-4 are powered by an even stronger engine of the same series BF 4 M 2012 C with intercooler.

These engines are characterized by the following positive features:

- short and compact design,
- low noise level,
- almost vibration-free running,
- low fuel consumption,
- low exhaust emissions (EPA II),
- high power reserves and
- good access to all service points.

Crankcase and cylinders of this engine are made of alloyed cast iron. This provides strength and ensures high wear resistance.

The forged steel conrods are fitted with compensation weights near the conrod bearing seats. These weights compensate manufacturing tolerances with respect to weight and centre of gravity.

The pistons are made of an aluminium alloy. The combustion chamber recess is slightly offset from the middle at its side walls are inclined for 10° towards the inside. All pistons are fitted with three piston rings and a cast iron ring carrier for the first ring. The pistons are lubricated by an oil mist.

The forged crankshaft is equipped with integrated counterweights.

The block-type cylinder head is made of cast steel. Each cylinder is fitted with one intake and one exhaust valve. The valve guides are shrunk into the cylinder head. The valve seat rings are made of high-grade steel and are also shrink fitted.

Service side

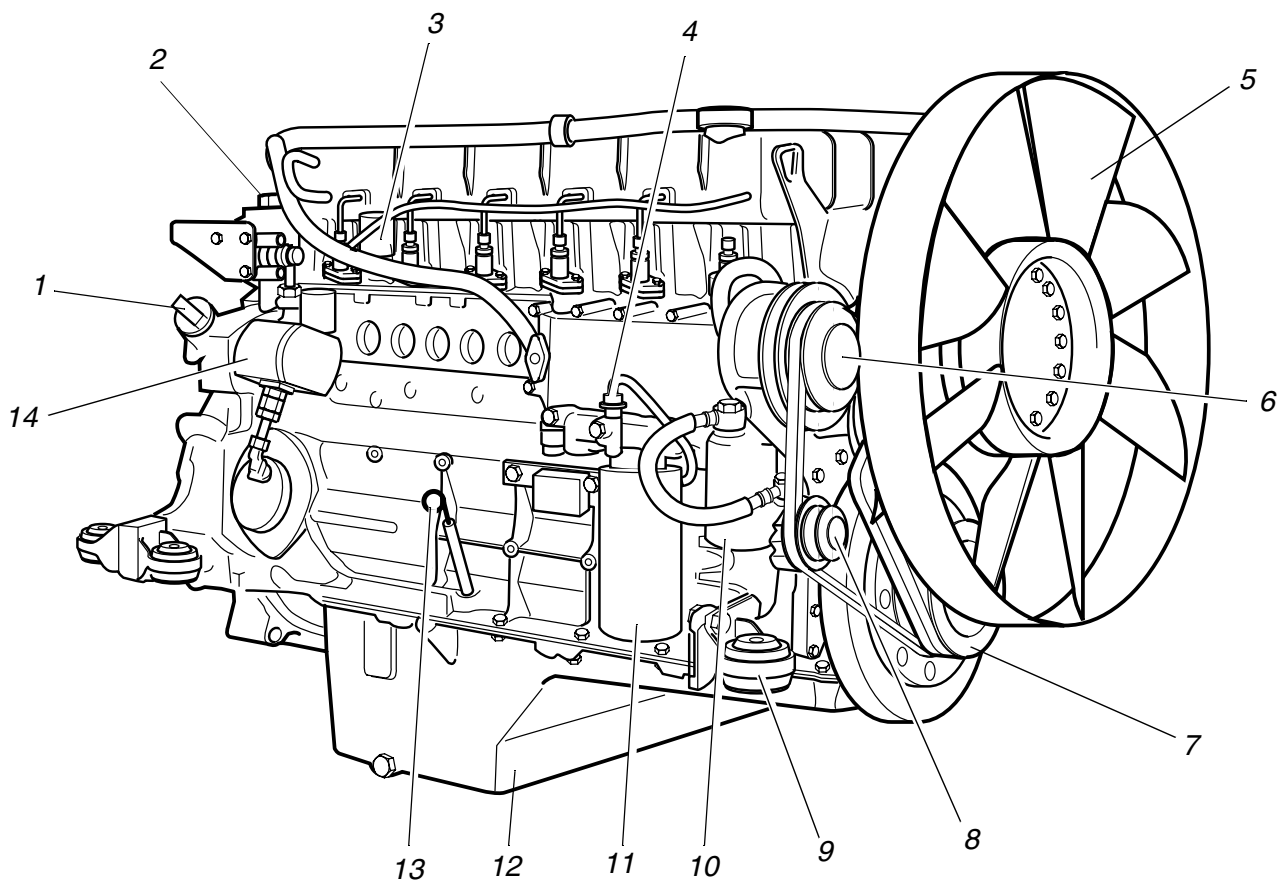


Fig. 1: Service side BFM 2012

- | | | | |
|---|--------------------------------------|----|------------------------|
| 1 | Oil filler neck | 8 | Fuel pump |
| 2 | Valve, boost fuel supply (not BOMAG) | 9 | Engine mounting |
| 3 | Engine solenoid | 10 | Fuel filter |
| 4 | Oil pressure switch | 11 | Lubrication oil filter |
| 5 | Cooling air blower | 12 | Oil sump |
| 6 | Coolant pump | 13 | Dipstick |
| 7 | V-belt pulley | 14 | Steering/charge pump |

Starter side

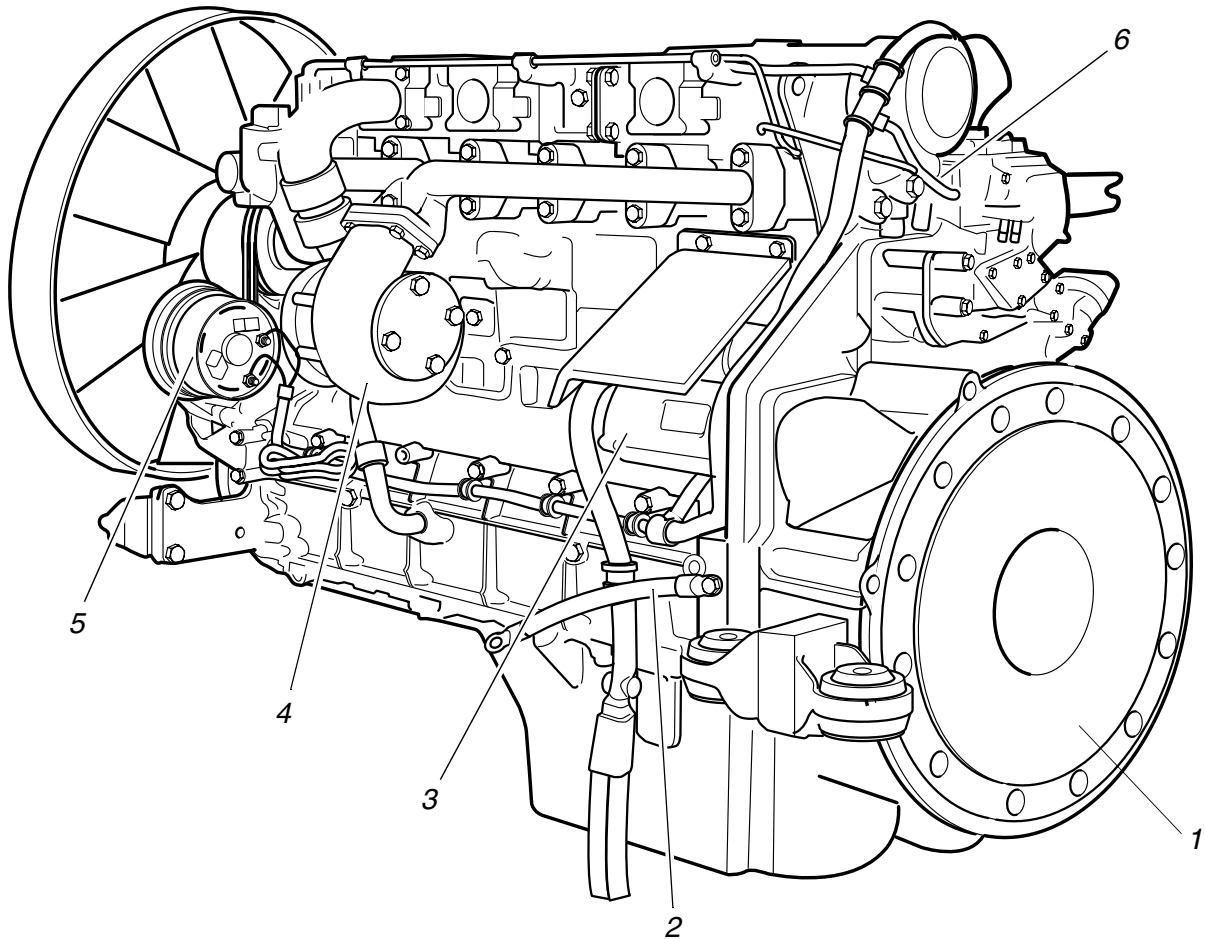


Fig. 2: Starter side

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

Lubrication oil circuit

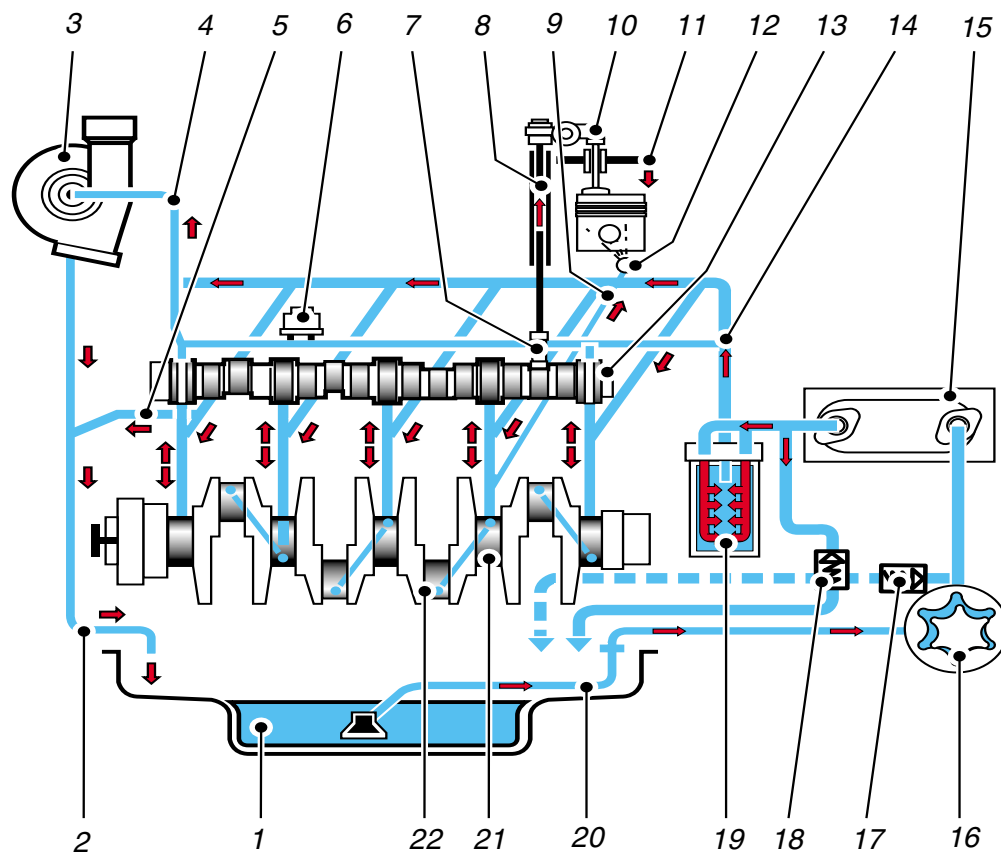


Fig. 3: Lubrication oil circuit

- | | |
|--|---------------------------|
| 1 Oil sump | 12 Piston cooling nozzle |
| 2 Return flow turbo charger to crankcase | 13 Camshaft bearing |
| 3 Turbo charger | 14 Main oil channel |
| 4 Oil line to turbo charger | 15 Lubrication oil cooler |
| 5 Line to mass balance wheel (2 x) | 16 Lubrication oil pump |
| 6 Oil pressure sensor | 17 Pressure relief valve |
| 7 Valve with pulse lubrication | 18 Leak oil return line |
| 8 Push rod, oil supply to rocker arms | 19 Lubrication oil filter |
| 9 Line to spray nozzles | 20 Suction line |
| 10 Rocker arm | 21 Crankshaft bearing |
| 11 Return flow to oil sump | 22 Conrod bearing |

Lubrication oil circuit

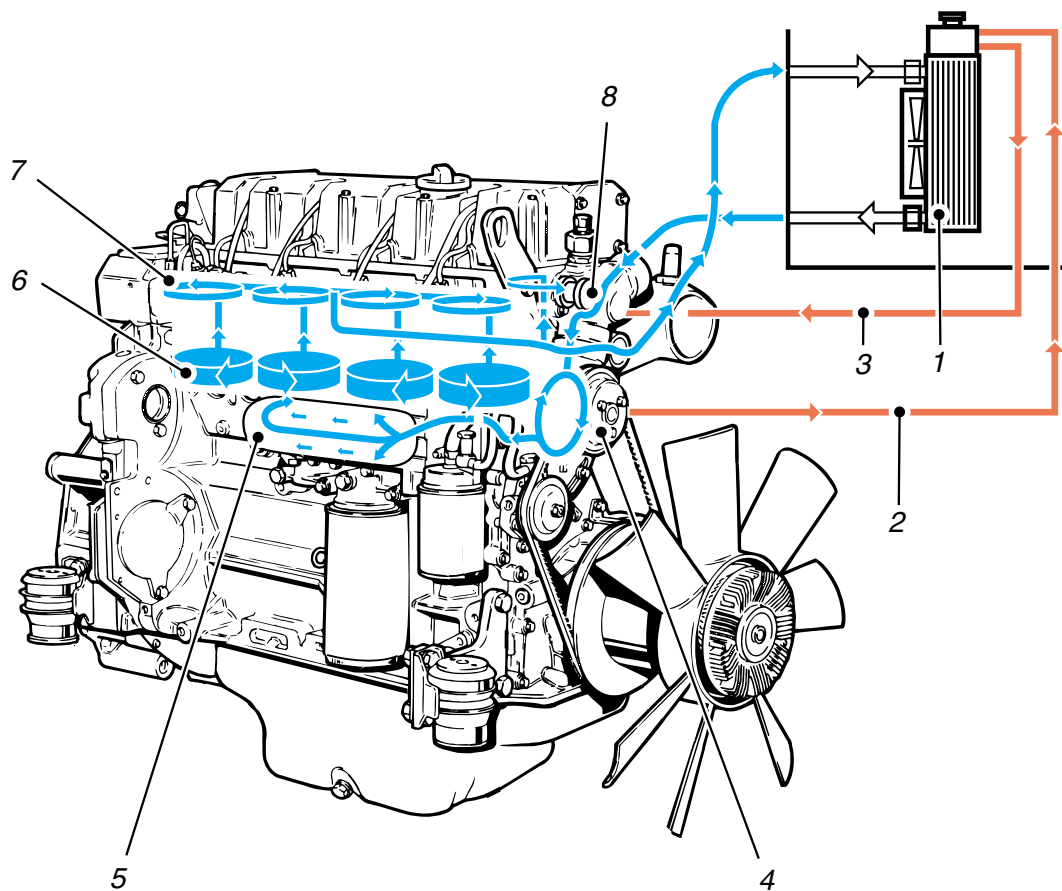


Fig. 4: Lubrication oil circuit

- 1 Cooler
- 2 To cooler
- 3 From cooler
- 4 Coolant pump
- 5 Lubrication oil cooler
- 6 Cylinder cooling
- 7 Cylinder head cooling
- 8 Ventilation connection between cylinder head and heat exchanger

Fuelsystem

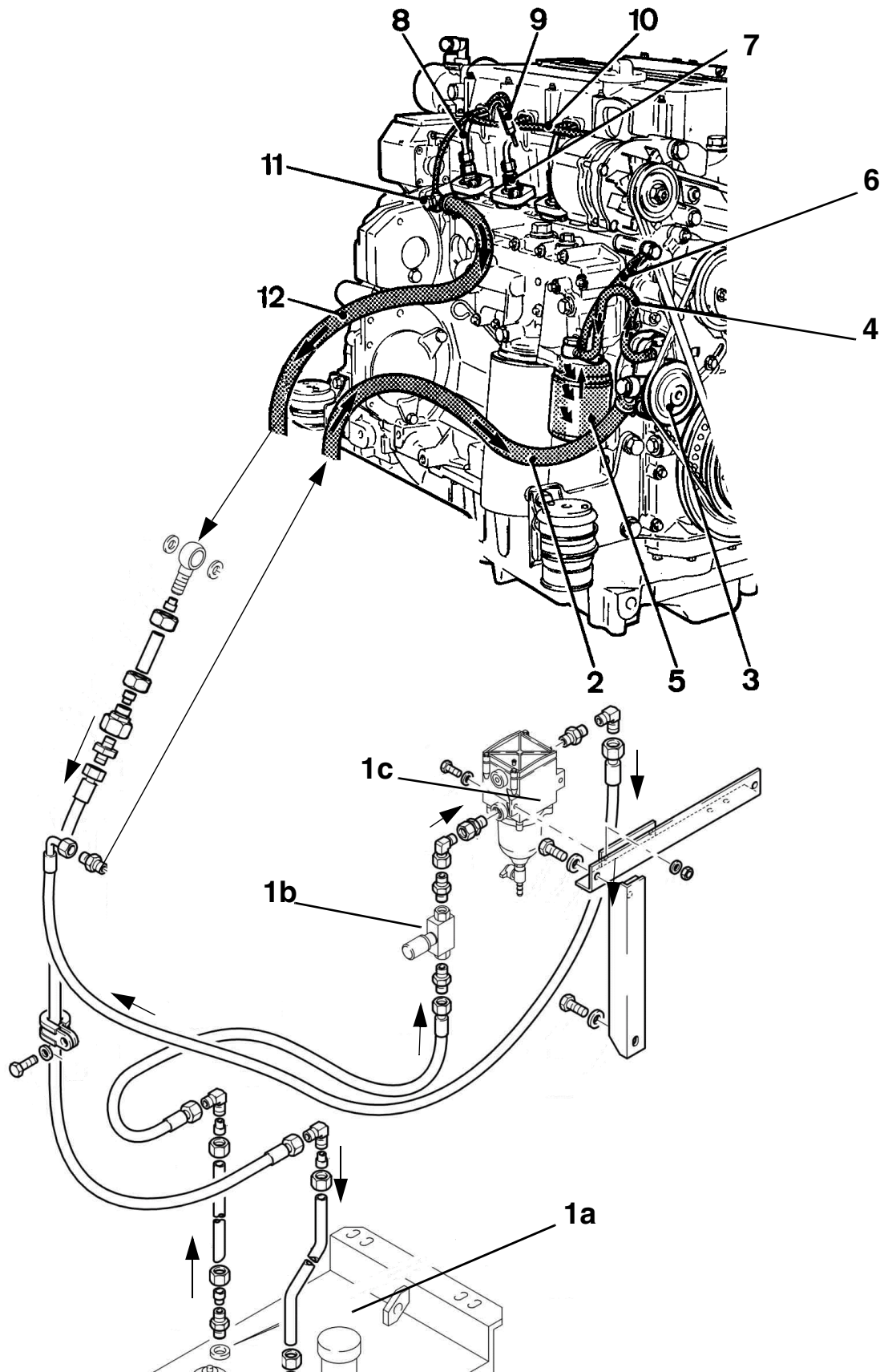


Fig. 5: Fuel system

Legend Fig. 6:

- 1a *Fuel tank*
- 1b *Manual fuel pump with integrated check valve*
- 1c *Fuel pre-filter / water separator*
- 2 *Feed to fuel lift pump*
- 3 *Fuel lift pump*
- 4 *Connecting line lift pump – main filter (**fuel pre-pressure up to 10 bar**)*
- 5 *Main fuel filter (**pressure resistant**)*
- 6 *Connecting line main filter – supply for injection pump*
- 7 *Single injection pump*
- 8 *High pressure line*
- 9 *Injection nozzle*
- 10 *Leakage line*
- 11 *Pressure retaining valve - 5 bar*
- 12 *Return flow to tank*

Fuel pre-filter / water separator (SEPAR-Filter)

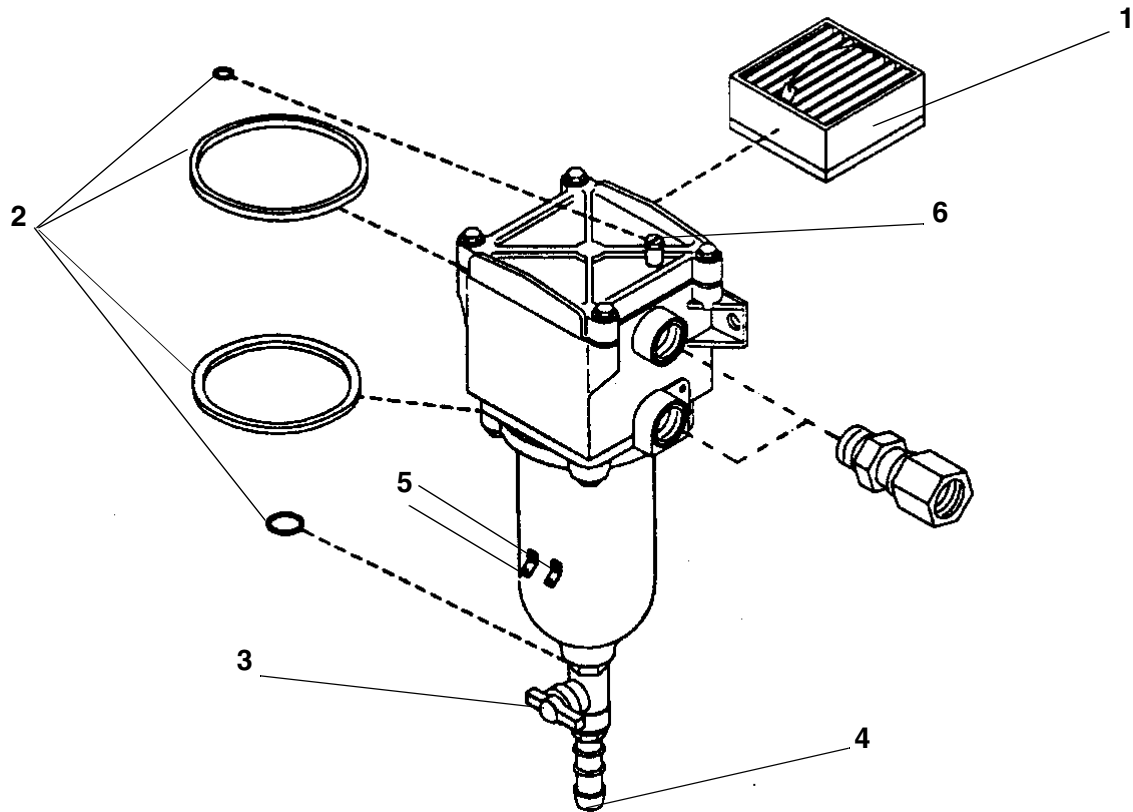


Fig. 6: Fuel filter / water separator

- 1 Filter element
- 2 Seal kit
- 3 Drain valve
- 4 Discharge from drain valve
- 5 Electric connection for water level sensor

The fuel pre-filter / water separator consists mainly of:

- the centrifugal water separator
- the dirt / water sediment bowl with water level warning sensor
- and the filter element

Function:

The fuel is drawn by the fuel lift pump into the filter through inlet port B (Fig.8). Inlet A is closed

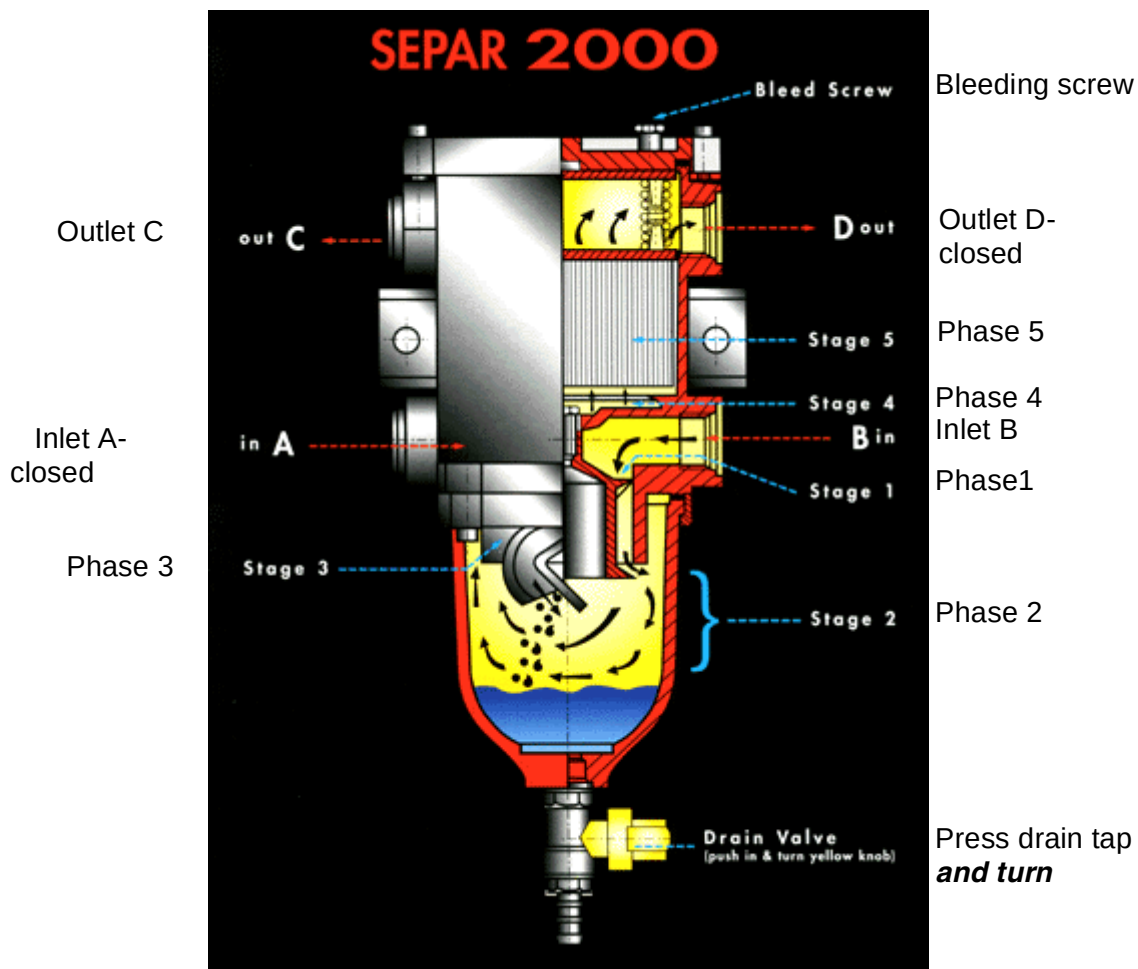


Fig. 7: SEPAR-Filter

Phase1:

The fuel flows from the inlet to the centrifuge. The centrifuge itself does not rotate. Rotation of the fuel is caused by the geometry of the centrifuge.

Phase 2:

The fuel coming out of the centrifuge flows against the outside wall of the collecting vessel. Here the velocity of the fuel is braked. Due to the inertia of the heavier dirt and water particles these are pressed to the outside so that they drop down into the collecting bowl by their gravity.

Phase 3:

Fuel now flow up along the outside of the centrifuge while it is still rotating inside the vessel. In this phase smaller dirt and water particles move to the middle of the vessel, where the water particles accumulate to larger drops. There they are picked up by the middle bigger wing of the centrifuge,

from where they drop down. This is caused by the fact that the lowest pressure in vessel is at the lowest point of the centrifuge.

Phase 4:

Even directly in front of the filter element the fuel is still in rotation. This causes further dirt and water particles to settle and drop down into the vessel.

Phase 5:

The water resistant filter element retains remaining smaller dirt and water particles.

Once the water level reaches the height of the warning connections, the warning light H 70 in the dashboard will light up.

Draining of water/fuel / regeneration of the filter element:

To open the drain valve keep the actuating button depressed and turn it.

If the filter element is clogged before a service is due (indicated by e.g. a power drop), the filter may be regenerated as follows to keep up operation of the engine:

- Open the bleeding screw (this applies atmospheric pressure to the filter element and releases bigger dirt particles from the bottom side of the filter, which will then sink down.
- Open the drain valve and let approx. 0.5 l of fuel run out. The fuel above the filter element presses through the filter element and cleans the underside of the filter element from dirt.
- Close the drain valve.
- Bleed the system with the manual fuel pump and then tighten the bleeding screw.

Main fuel filter

Attention!

The main fuel filter is subjected to approx. 10 bar fuel pre-pressure from the fuel lift pump. This pressure is considerably higher than on other engines. For this reason only original filter elements must be used. Filter elements of similar design or with adequate dimensions are not necessarily pressure resistant!

A filter element of insufficient pressure resistance will be damaged by the high pressure and will disintegrate. This causes severe damage to the injection system!

Checking and adjusting the valve clearance

Excessive or insufficient valve clearance can cause failure of the engine as a result of mechanical and thermal overloads. The valve clearance must therefore be checked and, if necessary, adjusted at the intervals specified in the operating and maintenance instructions.

Note:

The valve clearance must be checked and adjusted when the engine is cold.

Intake valve: = 0.3 mm

Exhaust valve= 0.5 mm

- Turn the crankshaft until both valves on cylinder 1 are overlapping (the exhaust valve is not yet closed, the intake valve starts to open).

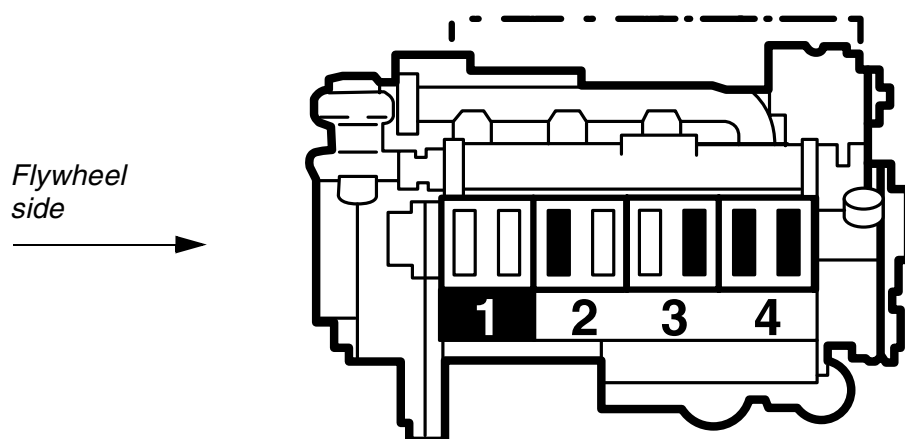


Fig. 8: Crankshaft position 1

- Check and adjust the valve clearance by following the black marking in the adjustment schematics. For control purposes mark the respective rocker arm with chalk.

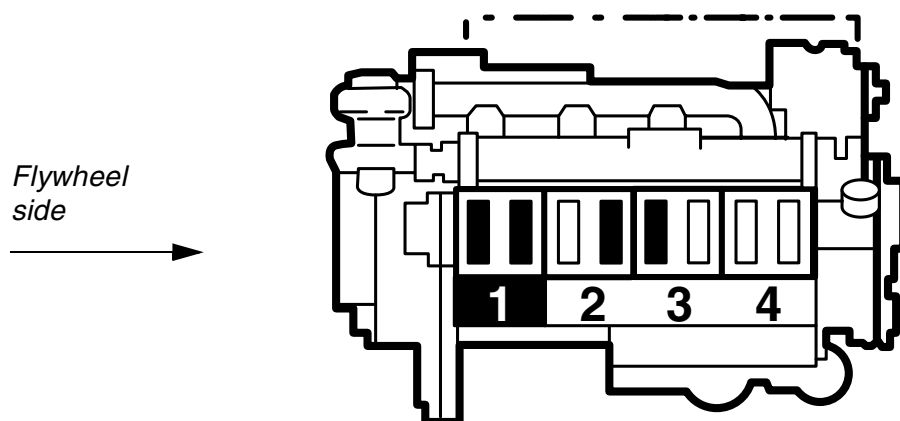


Fig. 9: Crankshaft position 2

- Turn the crankshaft one full turn (360°) further.
- Check and adjust the valve clearance by following the black marking in the adjustment schematics.

Explanation of pictograms

During the following work the following pictograms are used for the reason of simplicity:

	Zerlegen von Baugruppen		Personenschäden verhüten Hinweis auf Gefahrenstelle
	Zusammenbauen zu einer Baugruppe		Materialschaden verhüten Teilbeschädigung
	Abbauen - Ausbauen behindernder Teile		Unterbauen - Abstützen - Abfangen
	Einbauen - Anbauen Teile, die beim Ab-/ Ausbau hinderten		Einölen
	Achtung, wichtiger Hinweis		Einfetten
	Prüfen - Einstellen z. B. Drehmomente, Maße, Drücke usw.		Markieren vor dem Zerlegen, beachten beim Zusammenbau
	Spezialwerkzeug		Wuchten Ausgleichen von Unwuchten
	Einbaurichtung beachten		Einfüllen - Auffüllen - Nachfüllen z. B. Öl, Kühlwasser usw.
	Kontrollieren - Prüfen Sichtprüfung		Ablassen z. B. Öl, Kühlwasser usw.
	Bedingt wiederverwendbar Bei Bedarf auswechseln		Lösen z. B. Lockern einer Spanneinrichtung
	Beim Zusammenbau immer erneuern		Spannen z. B. Anziehen einer Spanneinrichtung
	Entsichern - Sichern z. B. Splint, Sicherungsblech usw.		Entlüften
	Sichern - Kleben z. B. Dichtmittel flüssig		Spanabhebende Bearbeitung

plug-in injection pump

Deutz diesel engines of product range 2012 are equipped with plug-in injection pumps of series PF 33 from Bosch.

The concept of the plug-in fuel injection pumps enables the realization of high injection pressures in connection with extremely short injection lines, which contributes to a high hydraulic stiffness of the injection system. This in turn provides the prerequisite for low exhaust emission values (soot) in combination with a low fuel consumption.

Plug-in fuel injection pumps have the following plunger dimensions:

- Stroke 12 mm
- Diameter 9 mm

Cavitation in the injection lines and injection overrun, which is normally associated with high pressures, is prevented by a return flow nozzle arranged after the pressure valve
Das The constant volume relief is 50 mm³.

Assembling the plug-type injection pumps

The adjustment of the injection pump timing (FB) affects:

- the fuel consumption,
- the power
- the exhaust emission

of the engine.

On engines of series 2012 the start of delivery is adjusted without tolerance. The start of delivery is entered in degree of crank angle measured from the top dead centre of the piston and depends on application, power and speed setting of the engine.

The plug-in injection pump is in position of start of delivery when the plunger just closes the fuel supply bore in the plunger sleeve.

On engines with inline injection pumps the engine drive is turned to start of delivery position and closing of the fuel supply bore is determined by means of a high pressure pump. Occurring tolerances are compensated in the coupling of the injection pump drive, whereby the injection pump camshaft is turned to start of delivery position against the fixed engine drive.

The injection pump cams on engines of series 2012 are arranged on the camshaft of the engine. For this reason the conventional adjustment method for the start of delivery cannot be used.

The start of delivery of the injection pump must be adjusted using the new method.

For this the conventional adjustment method is subdivided into length measurements of individual engine parts and calculations.

The permissible manufacturing tolerances for the components

- cylinder crankcase,
- camshaft,
- plunger
- plug-in injection pump

are measured and eliminated by the adjustment of the start of delivery.

However, in cases of interest for BOMAG engineers the engine will not be overhauled completely, but individual injection pumps will be replaced.

Crankcase, camshaft and plunger remain unchanged.

This results in a certain installation measurement for the engine drive, which is stamped on the engine type plate.

In column „EP“ it is stamped as „CODE“ for each cylinder.

Note:

If an injection pump and/or nozzle is replaced, the respective high pressure line between pump and nozzle must also be replaced..

1. Remove crankcase ventilation and cylinder head cover.



Fig. 10:

2. Remove the engine solenoid

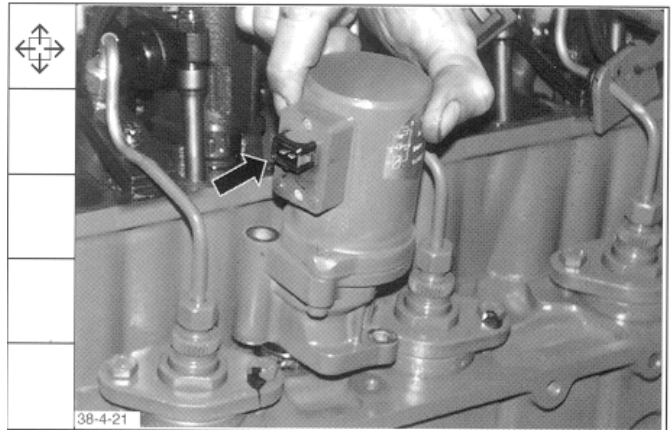


Fig. 11:

3. Insert the pressing device WILBÄR No. 100 830 carefully into the groove of the governor rod and fasten it.

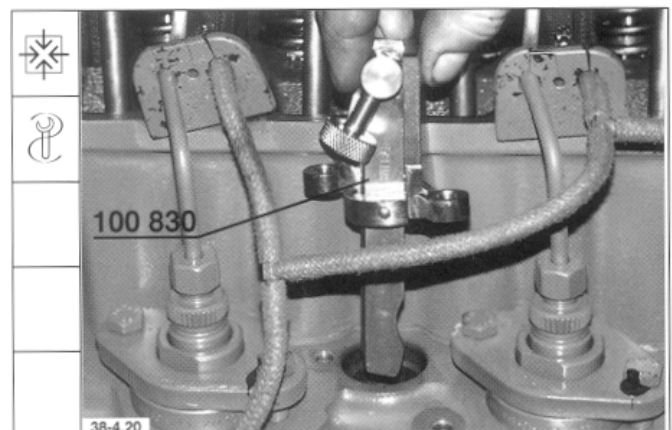


Fig. 12:

4. Turn the knurled fastening screw to press the governor rod to stop position.

Note:

Tighten the knurled fastening screw by hand.

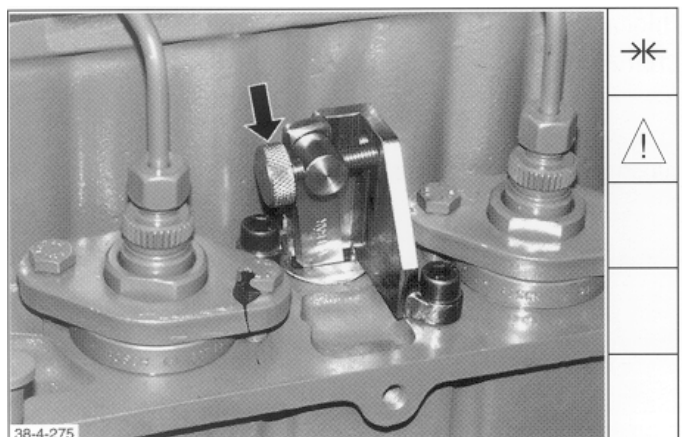


Fig. 13:

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

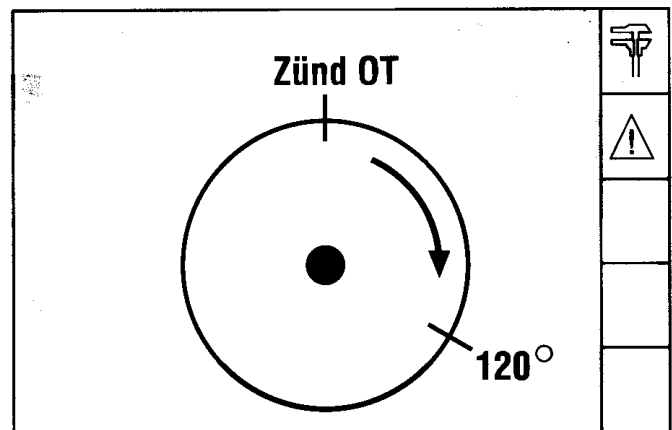


Fig. 14:

6. Remove injection line and injection pump.

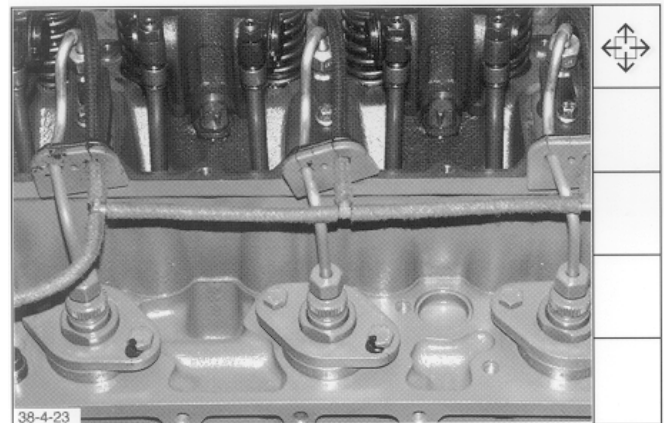


Fig. 15:

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

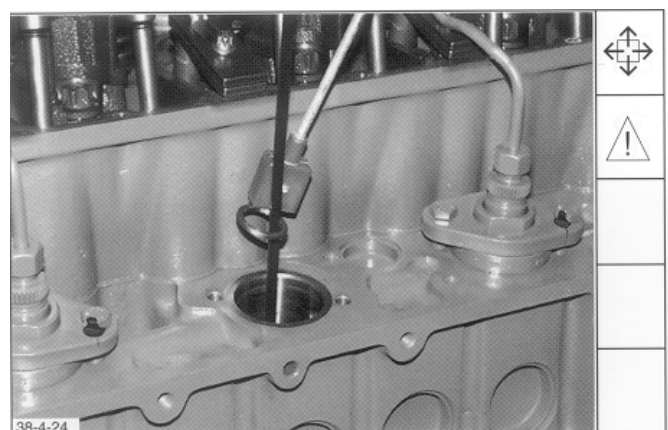


Fig. 16:

Determine the thickness of the new compensation shim:

Determination of the compensation shim thickness when replacing plug-in fuel injection pumps

On the engine type plate column - EP – contains a code for the plug-in fuel injection pump for each cylinder.

Mot. - Typ	Code	Mot. - Nr.	kW(G) red.	EP	K
kW(G)	kW(S)	1/min	←*		
kW(W)				295	
			°C		
			m		

DEUTZ MOTOR Industriemotoren GmbH
MADE IN GERMANY

0122 3183

Each line represents 1 cylinder
e.g. 1st line = cylinder 1
2. line = cylinder 2 etc.

Fig. 17: Injection pump code BFM 2012

The EP-code is used to determine the installation measurement to be corrected „E_k“ from table 1.

E _K (mm)	EP code	E _K (mm)	EP code	E _K (mm)	EP code	E _K (mm)	EP code
119,250	230	119,850	254	120,450	278	121,050	302
119,275	231	119,875	255	120,475	279	121,075	303
119,300	232	119,900	256	120,500	280	121,100	304
119,325	233	119,925	257	120,525	281	121,125	305
119,350	234	119,950	258	120,550	282	121,150	306
119,375	235	119,975	259	120,575	283	121,175	307
119,400	236	120,000	260	120,600	284	121,200	308
119,425	237	120,025	261	120,625	285	121,225	309
119,450	238	120,050	262	120,650	286	121,250	310
119,475	239	121,075	263	120,675	287	121,275	311
119,500	240	120,100	264	120,700	288	121,300	312
119,525	241	120,125	265	120,725	289	121,325	313
119,550	242	120,150	266	120,750	290	121,350	314
119,575	243	120,175	267	120,775	291	121,375	315
119,600	244	120,200	268	120,800	292		
119,625	245	120,225	269	120,825	293		
119,650	246	120,250	270	120,850	294		
119,675	247	120,275	271	120,875	295		
119,700	248	120,300	272	120,900	296		
119,725	249	120,325	273	120,925	297		
119,750	250	120,350	274	120,950	298		
119,775	251	120,375	275	120,975	299		
119,800	252	120,400	276	121,000	300		
119,825	253	120,425	277	121,025	301		

Fig. 18: Injection pump code table **BFM 2012**

E_K (mm) = corrected injection pump measurement, determined by EP-code on type plate and from table 1.

During the manufacture of the plug-in fuel injection pump the high pressure method is used to determine the wear in the fuel supply bore. In this position – injection pump plunger in start of fuel delivery position - the distance between pump contact face and plunger foot contact face is measured.

Measurement "A" in 1/100 mm has been written on the pump with an electric marker.

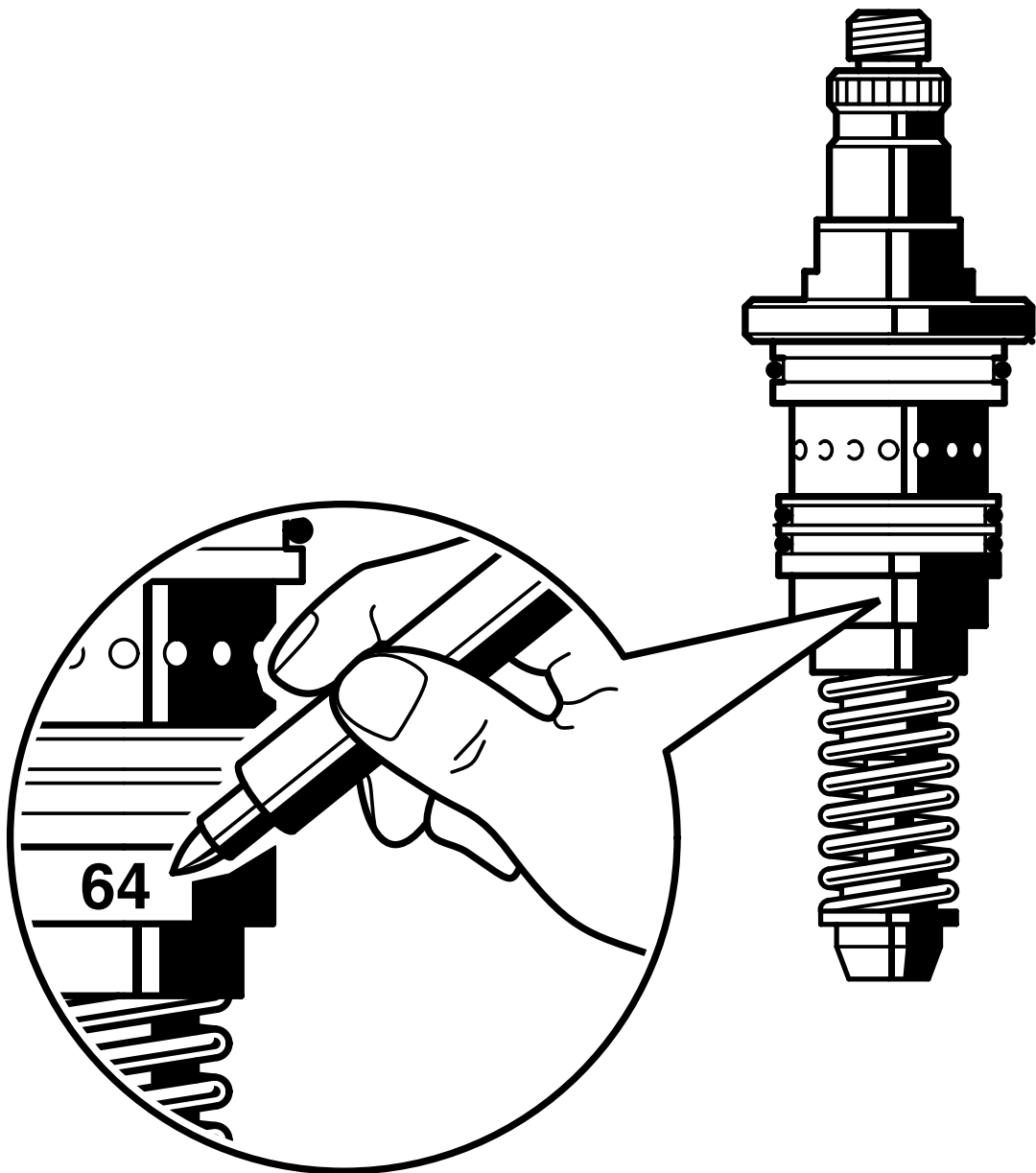


Fig. 19: Plunger code inscription

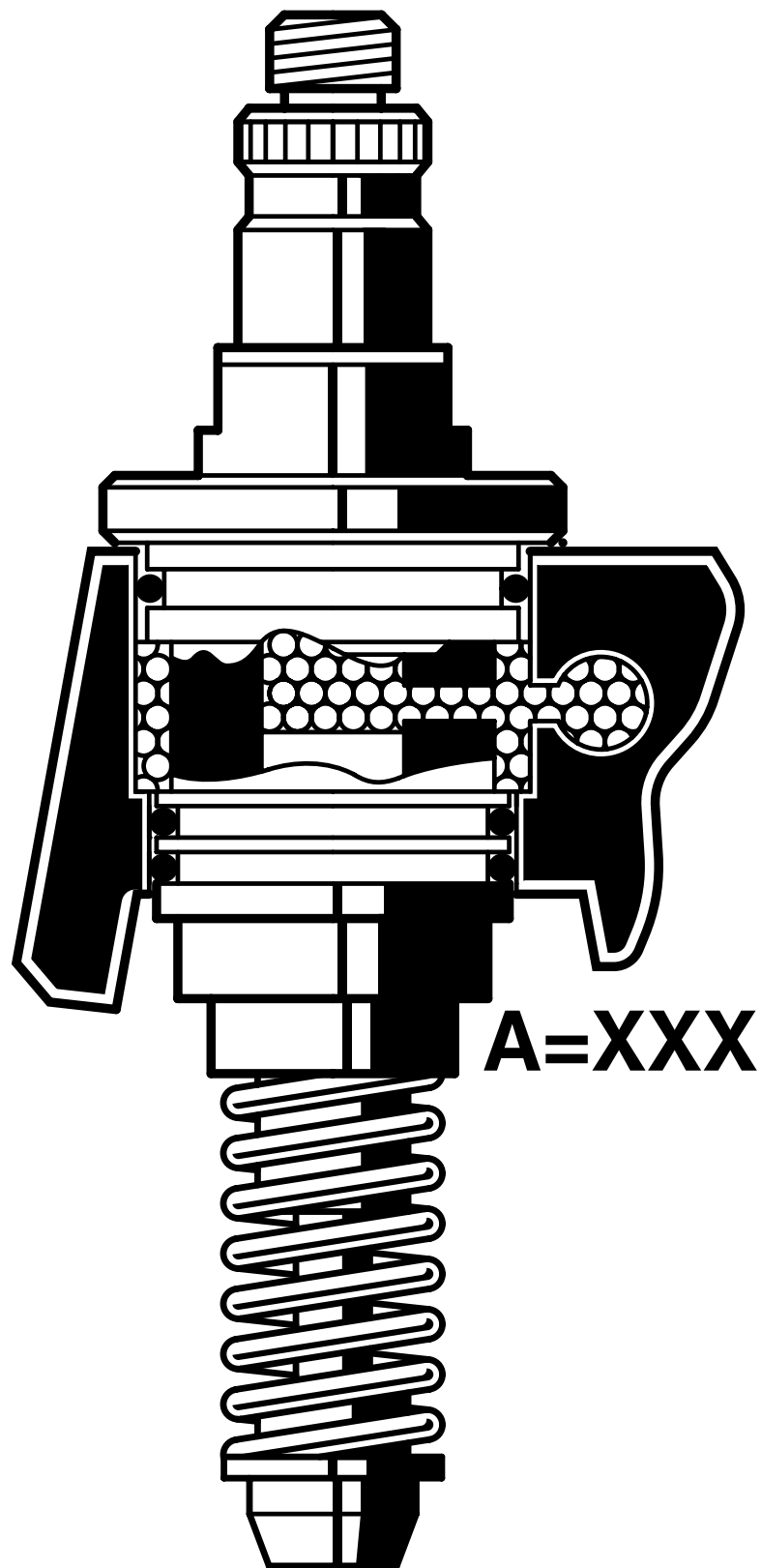


Fig. 20: Individual injection pump

Measurement "A" specifies by how many 1/100 mm the gap between contact area on cylinder crankcase and plunger foot is longer than the hydraulic base measurement L_0 .

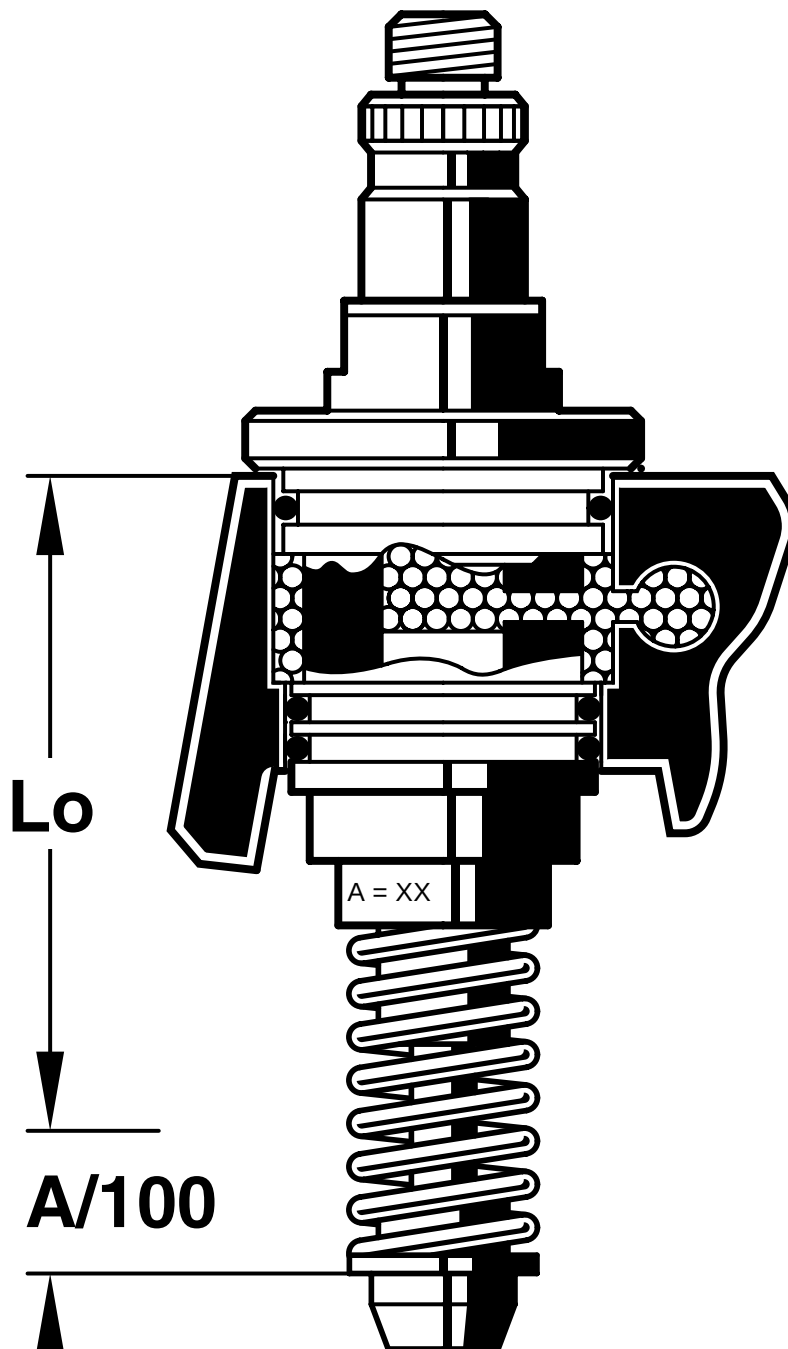


Fig. 21: Presentation of measurement „A“

- $L_0 = 117,5$ mm - BFM 2012

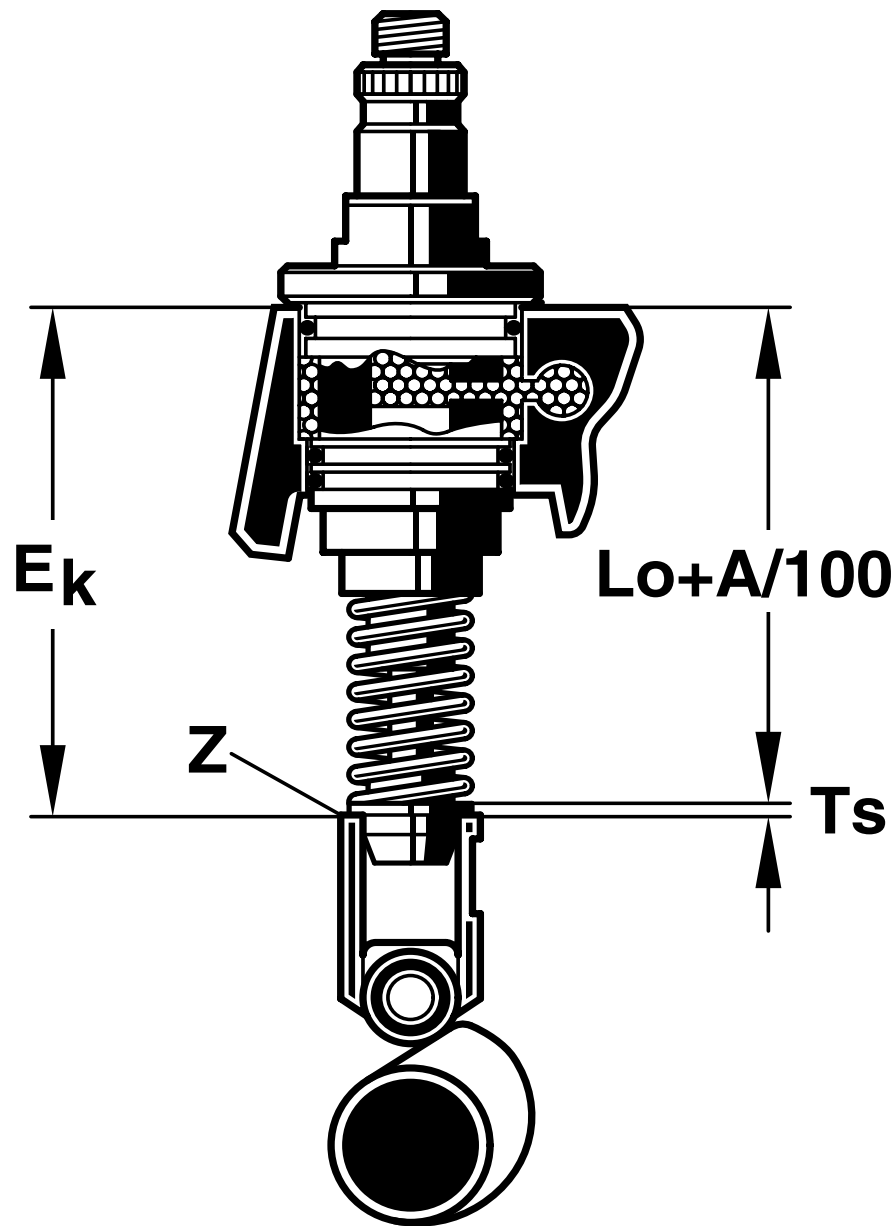


Fig. 22: Drive in start of delivery position after determination of „ T_s “

The plug-in fuel injection pump is now positively connected with the drive, which has been set to start of delivery by inserting a compensation shim "Z" of calibrated thickness..

The illustration explains that according to calculation:

$$(E_k) - (L_o + A/100)$$

there is a gap „ T_s “ between injection pump plunger foot and roller plunger. This gap has to be compensated with a compensation shim "Z" of appropriate (calculated) thickness.

Theoretical thickness „T _s “ (mm)	Compensation shim thickness „S _s “ (mm)	Theoretical thickness „T _s “ (mm)	Compensation shim thickness „S _s “ (mm)
0.95 - 1.049	1.0	2.45 - 2.549	2.5
1.05 - 1.149	1.1	2.55 - 2.649	2.6
1.15 - 1.249	1.2	2.65 - 2.749	2.7
1.25 - 1.349	1.3	2.75 - 2.849	2.8
1.35 - 1.449	1.4	2.85 - 2.949	2.9
1.45 - 1.549	1.5	2.95 - 3.049	3.0
1.55 - 1.649	1.6	3.05 - 3.149	3.1
1.65 - 1.749	1.7	3.15 - 3.249	3.2
1.75 - 1.849	1.8	3.25 - 3.349	3.3
1.85 - 1.949	1.9	3.35 - 3.449	3.4
1.95 - 2.049	2.0	3.45 - 3.549	3.5
2.05 - 2.149	2.1	3.55 - 3.649	3.6
2.15 - 2.249	2.2	3.65 - 3.749	3.7
2.25 - 2.349	2.3	3.75 - 3.850	3.8
2.35 - 2.449	2.4		

Table 1: Shims 2012

For the determination of the theoretical shim thickness „T_s“ it is also necessary to determine measurement L₀ + A/100 of the new fuel injection pump, which must then be subtracted from the corrected injection pump measurement E_k.

$$T_s = E_k - (L_0 + A/100) \text{ [mm]}$$

The real compensation shim thickness „S_s“ is determined with the help of table 2.

Exemplary calculation for BFM 2012

EP-code read off engine type plate: 295

- see table 1

corrected injection pump measurement „E_k“: 120,875 mm

L₀ = 117,5 mm (fixed measurement)

Value for A/100 read off new injection pump A/100 = 42

- $T_s = E_k - (L_0 + A/100)$
 $T_s = 120,875 \text{ mm} - (117,5 + 42/100 \text{ mm})$
 $T_s = 2.995 \text{ mm}$

see also table 1

T_s = 3,0 mm

8. Place the new calculated compensation shim on the roller plunger.

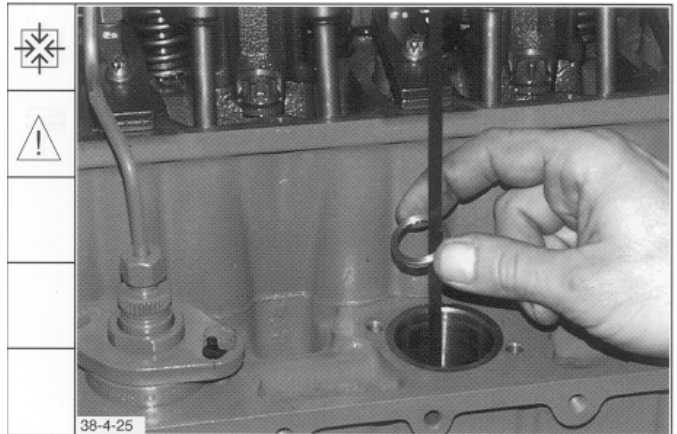


Fig. 23:

9. Turn the injection pump control lever to approx. middle position.

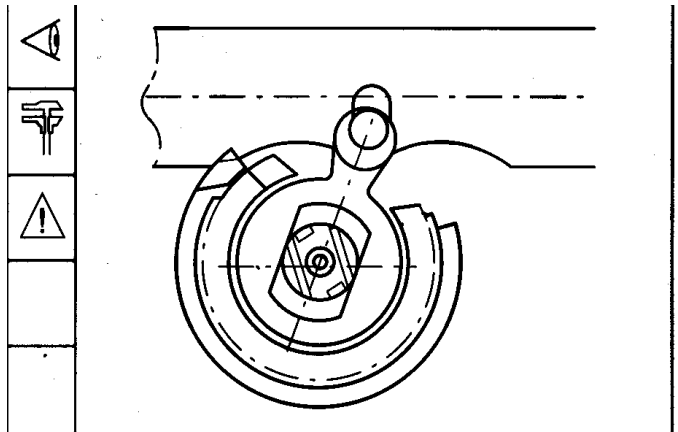


Fig. 24:

10. Apply some oil to the locating bore in the crankcase and the O-rings on the injection pump. Carefully insert the injection pump control lever into the governor rod.



Fig. 25:

11. Attach the flange.

Note:

The chamfer must face towards the injection pump body



Fig. 26:

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



Fig. 27:

13. Loosen the screws again for 60°.

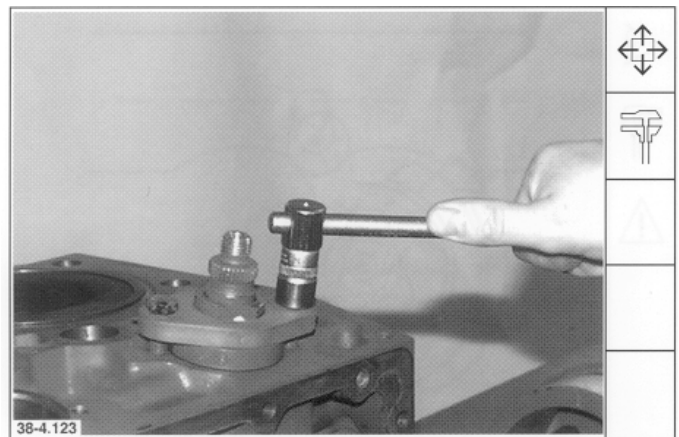


Fig. 28:

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

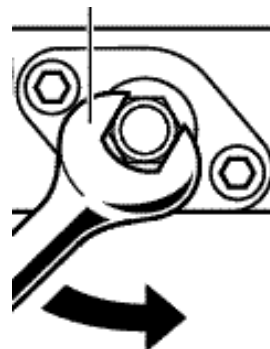


Fig. 29:

15. Tighten the screws again for 60° and continue in stages with tightening torques of **7 Nm**, **10 Nm** and **30 Nm**.

Note:

Start with the outer screw, viewed from the flywheel. (see arrow).



Fig. 30:

16. Back out the knurled screw of the pressing device, remove the pressing device.
17. Reinstall the engine solenoid with a new O-ring.
18. Reinstall the cylinder head cover. Tightening torque: **9 +/- 1 Nm**.

Note:

If necessary replace the gasket.

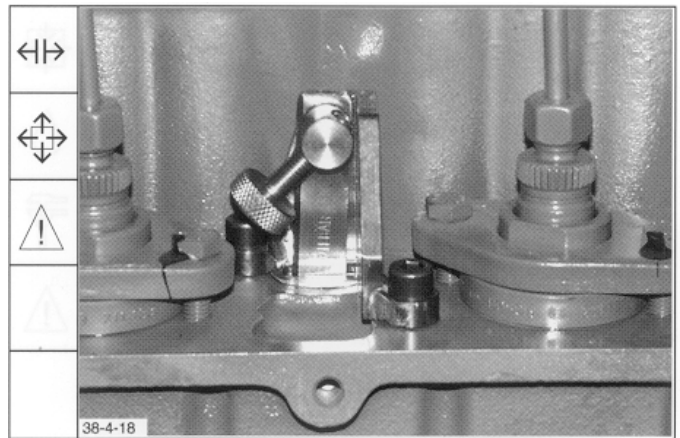


Fig. 31:

19. Slightly oil the O-ring of the crankcase ventilation. Reassemble the crankcase ventilation. Tightening torque **9 +/- 1 Nm**

Note: If necessary replace the gasket.

Tools

The following tools can be ordered from the respective supplier (in brackets) under the stated part-number.

For tools from Hazet and Bosch you should consult your nearest representative, orders to Wilbär should be addressed to:

Co. Wilbär
P.O. box 140580
D - 42826 Remscheid

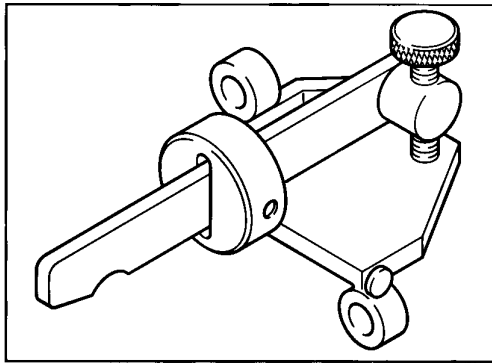


Fig. 32

- Pressing device for governor rod 100 830 (Wilbär)

Electrical components and measuring point on the engine

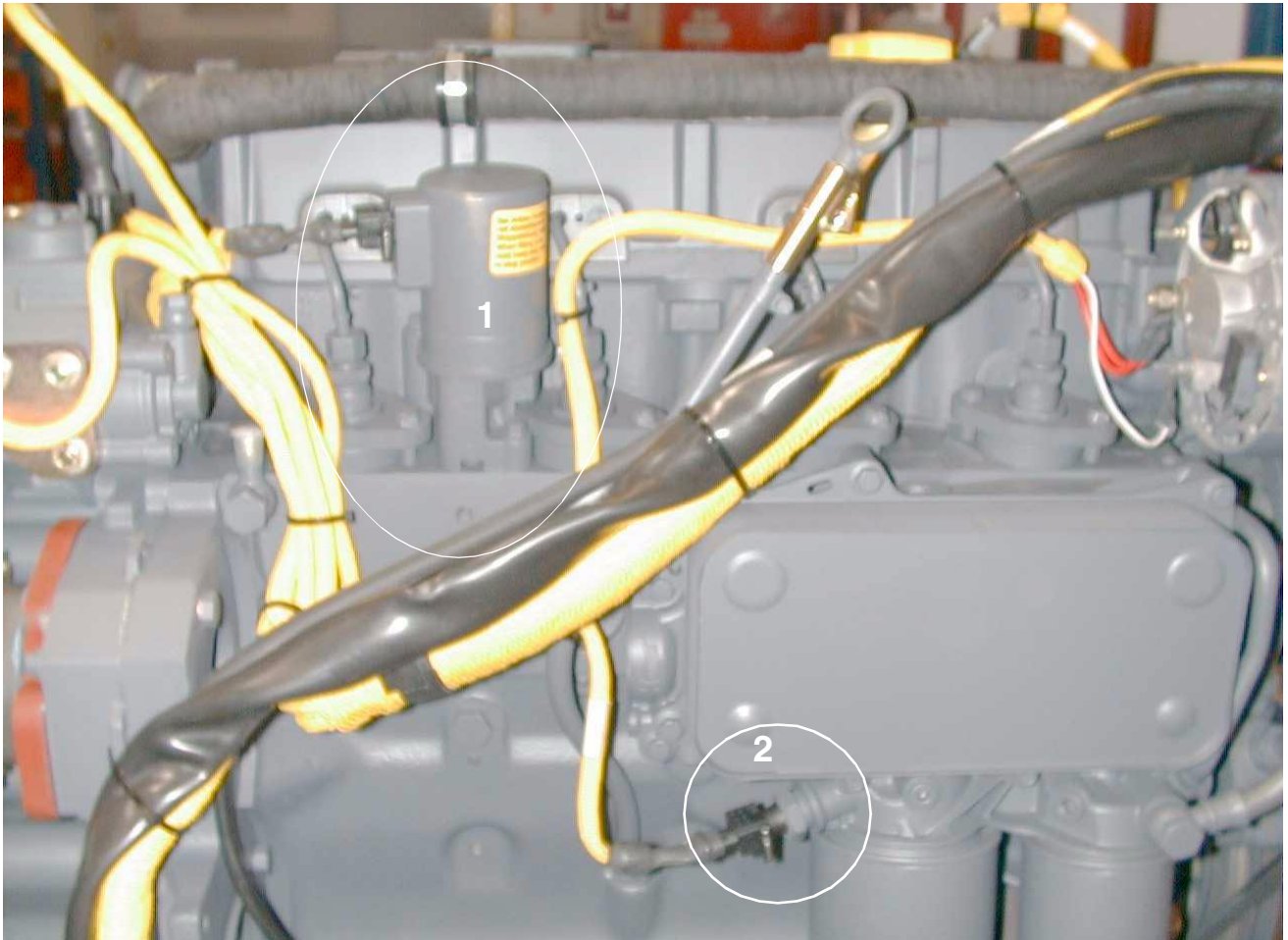


Fig. 33: Diesel engine, right

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Engine solenoid	Y 13		0/12V, approx. 4 Ω
2	Oil pressure switch	B 06		pressureless closed, 0,8 bar

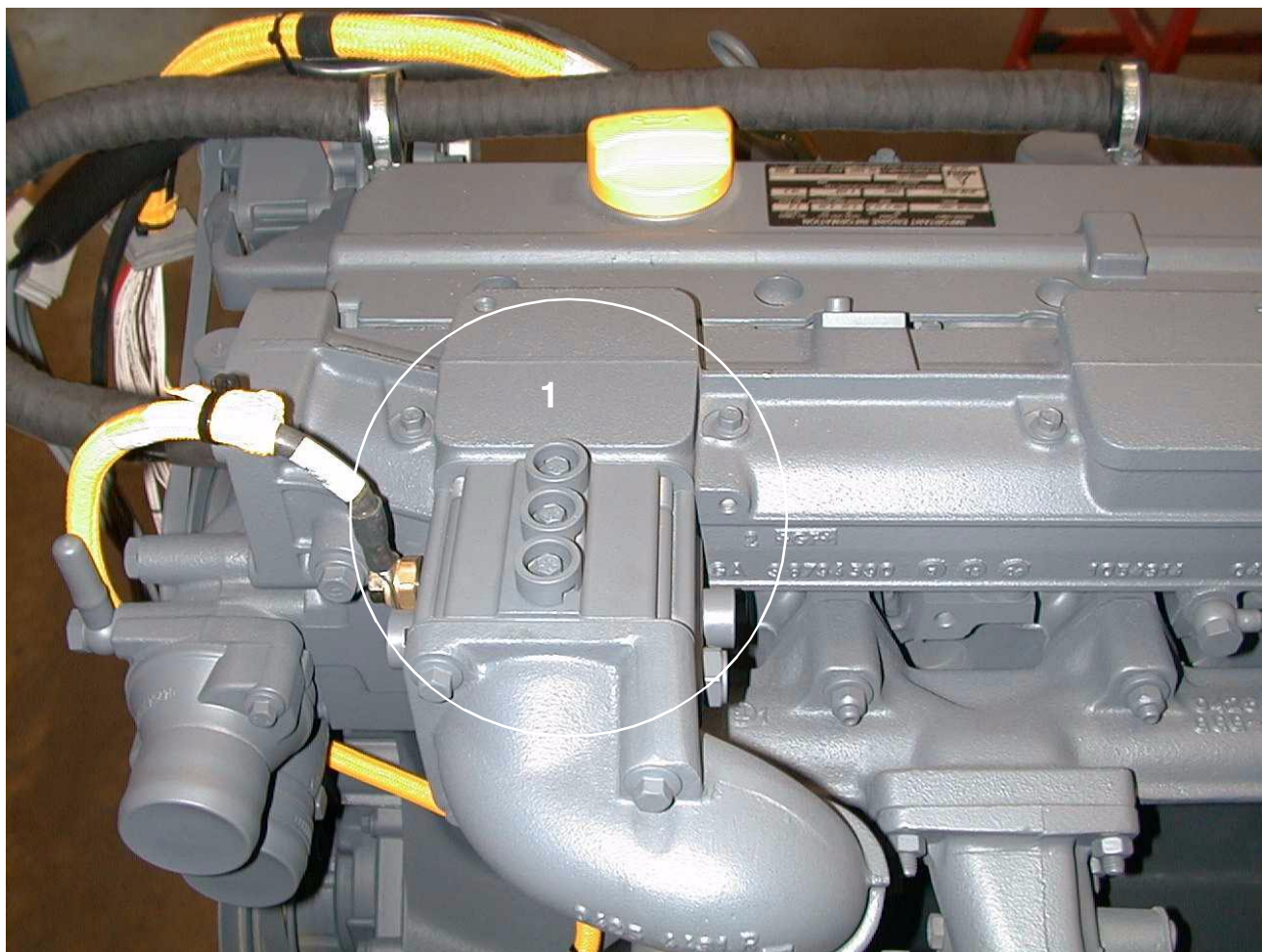


Fig. 34: Top view of diesel engine

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Heating flange	R 19		0/12 V, 167 A, approx. 0,07 Ω

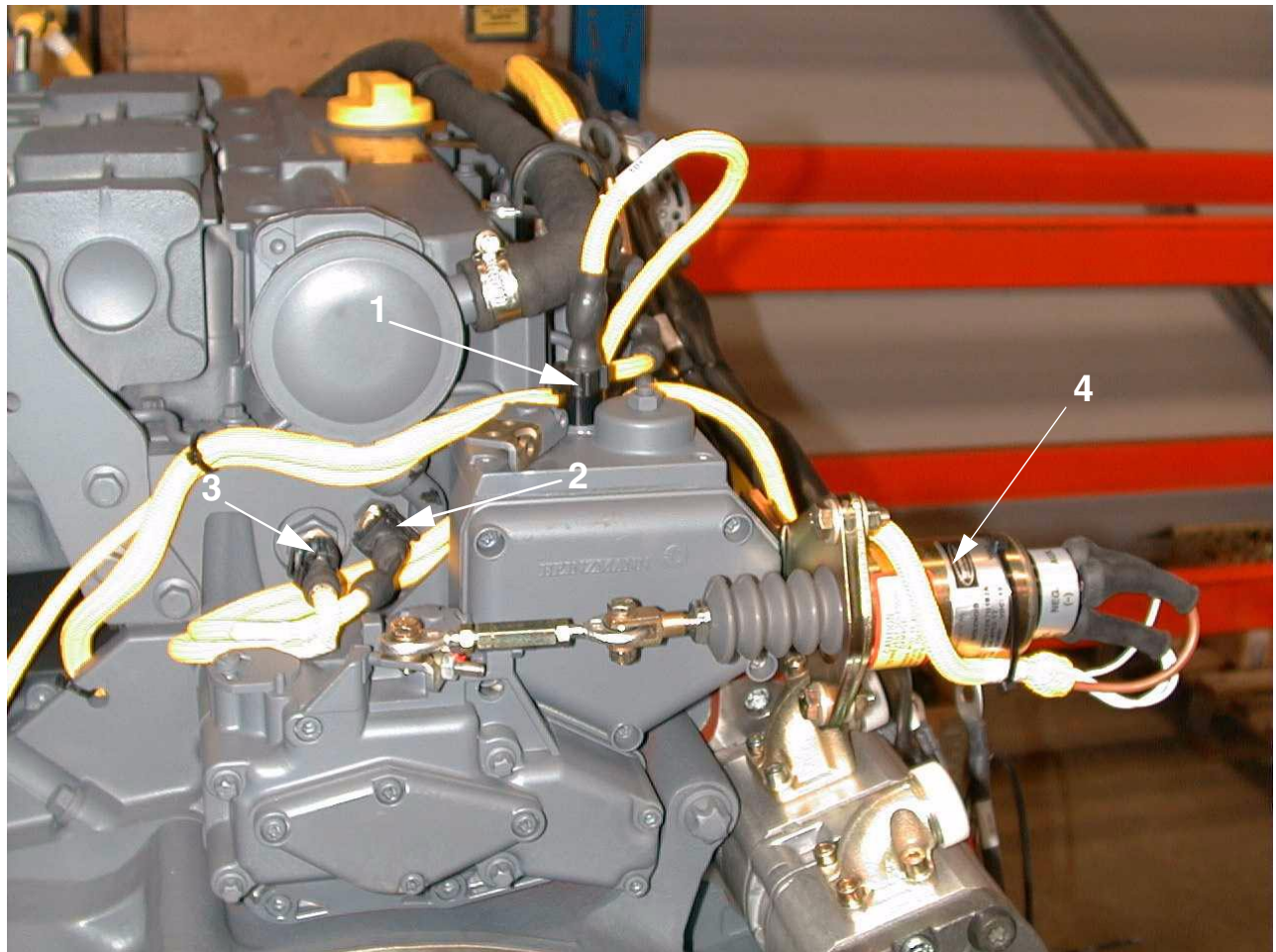


Fig. 35: Diesel engine flywheel end

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Boost fuel valve	Y01		0/12 V
2	Coolant temperature switch with warning light	B30		cold open, approx. 110°C
3	Coolant temperature flange for heating flange	B 53		approx. 2 Ω at 20°C
4	Solenoid, engine speed	Y120		0 / 12V

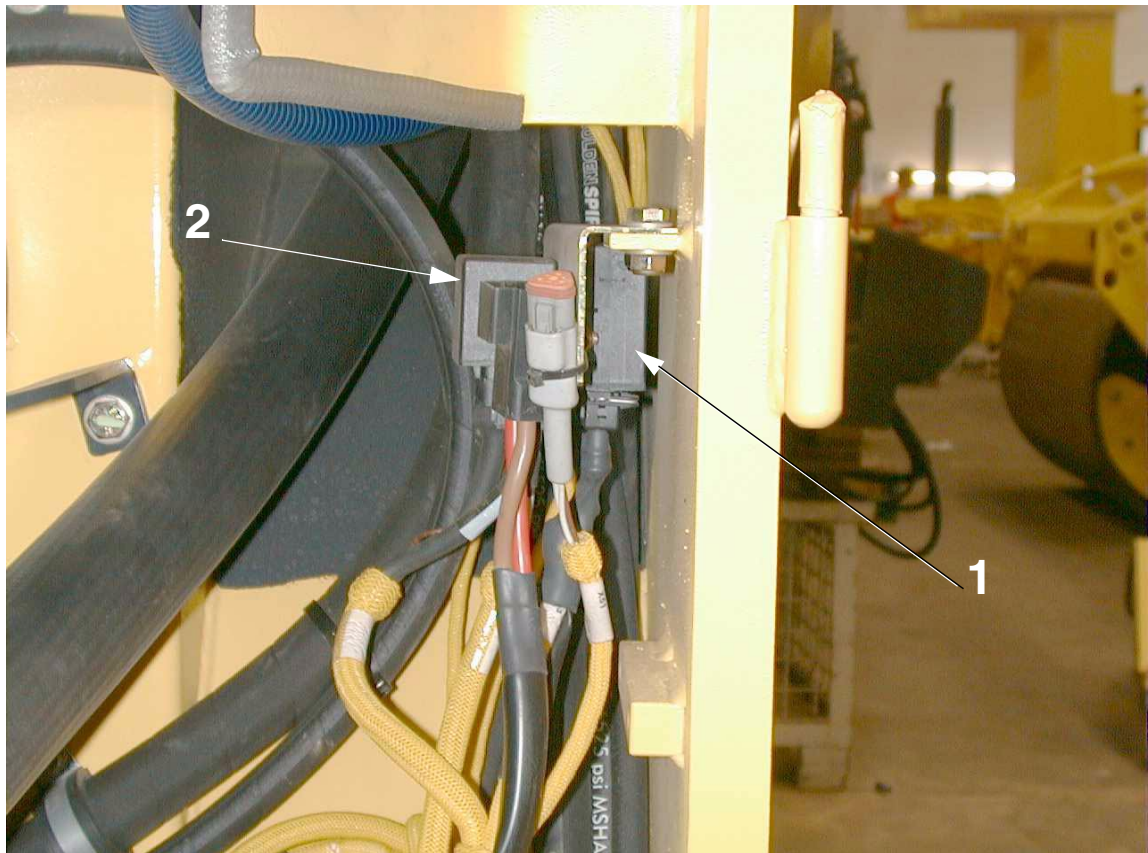


Fig. 36: Engine compartment in travel direction on front right top

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Heating flange module	A 13		
2	High current relay for heating flange	K 14		0/12 V

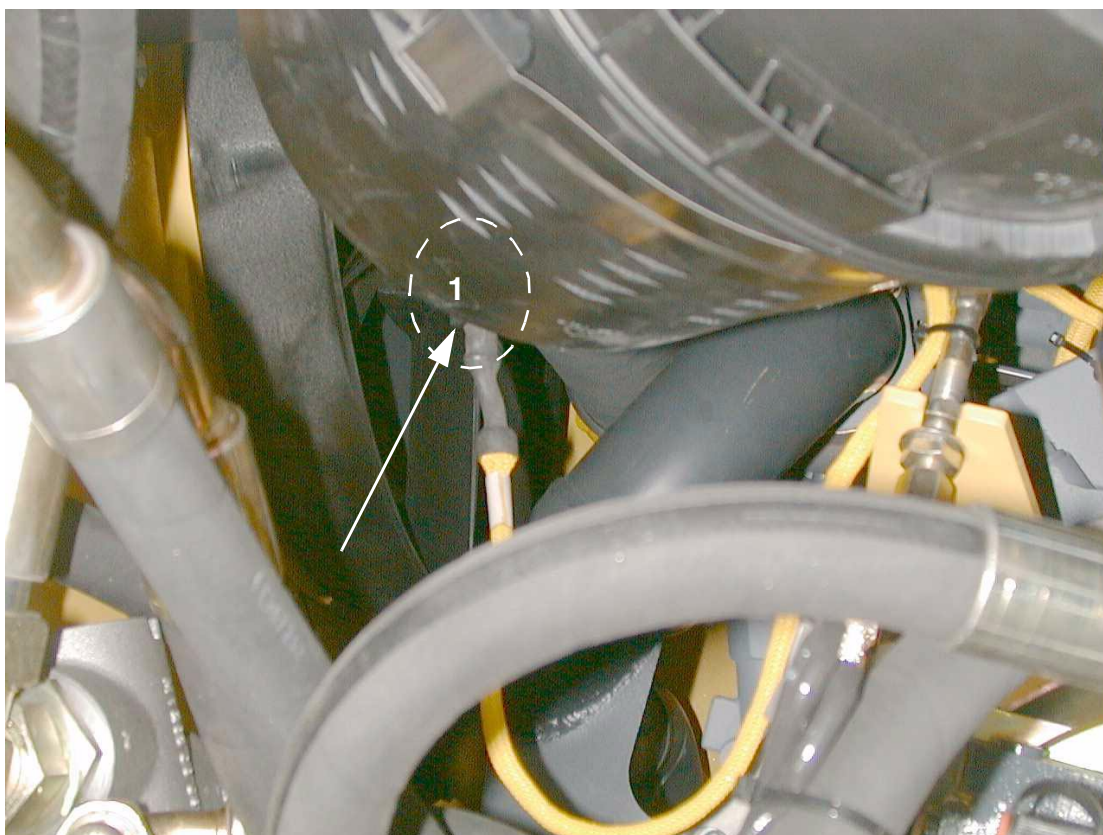


Fig. 37: under air filter

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Pressure differential switch for air filter	B 03		pressureless open, 50 mbar

On the machines described in this training manual the travel system consists of a closed hydraulic circuit. It mainly consists of the travel pump with the integrated safety elements, two travel motors, the hydraulic oil filter and the hydraulic oil cooler.

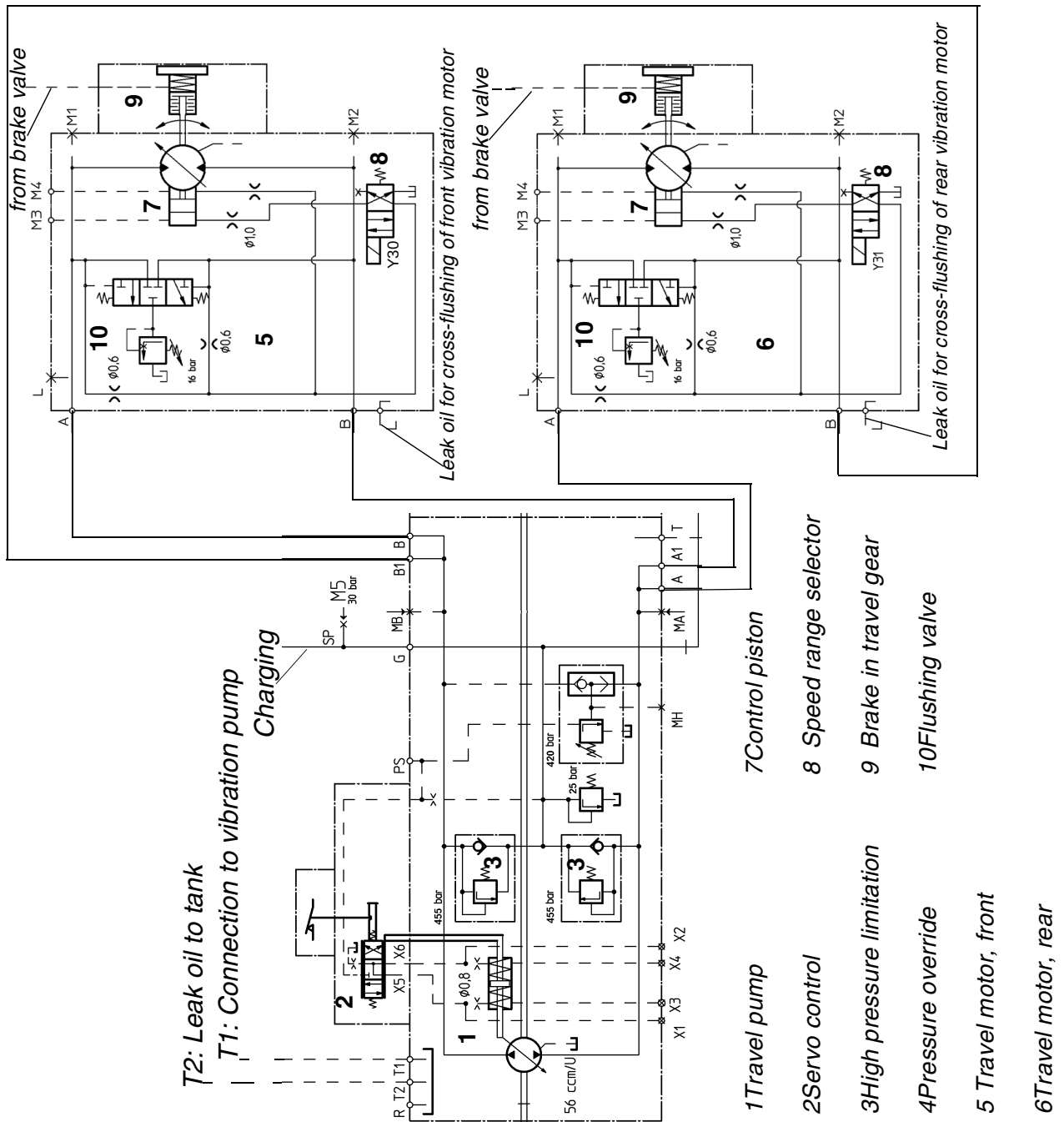


Fig. 1 Hydraulic diagram for travel system

The installation of a hydraulic pump with variable displacement into a closed hydraulic circuit is a perfect solution for a hydrostatic travel system, because with this design the travel direction can be reversed without any problems.

The travel pump is flanged to the flywheel side of the diesel engine. It is directly driven by the engine with constant speed.

In addition to its function of serving the steering and crab walk system as well as auxiliary functions the tandem gear pump driven by the auxiliary drive of the engine has also the function of a double charge pump for the closed hydraulic circuit. The return flow from both the steering valve and the crab walk control valve enters into the travel pump through the charge oil port..

The oil is cleaned by pressure filters, which are hydraulically arranged directly after the gear pumps for steering/charge system.

Besides its function of supplying the closed circuit with cool and filtered oil as replacement for leakage and flushing losses, the oil from the charge circuit is also needed for the following machine functions:

- to control the variable displacement pumps for travel and vibration systems,
- to release the hydraulic multi-disc brakes.

All safety and control elements needed for the operation in a closed hydraulic circuit are integrated in the travel pump. These are:

- High pressure relief valves (455 bar) with integrated boost check valves
- Charge pressure relief valve (25 bar)
- Pressure override (420 bar)
- Servo control

Both drum drive motors are fitted with an additional flushing valve for the closed hydraulic circuit.

The travel motors are hydraulically connected parallel to each other.

Travel pump

The travel pump is a swash plate operated axial piston pump with variable displacement from Bosch Rexroth-Hydromatik, type A4 VG 56 HW.

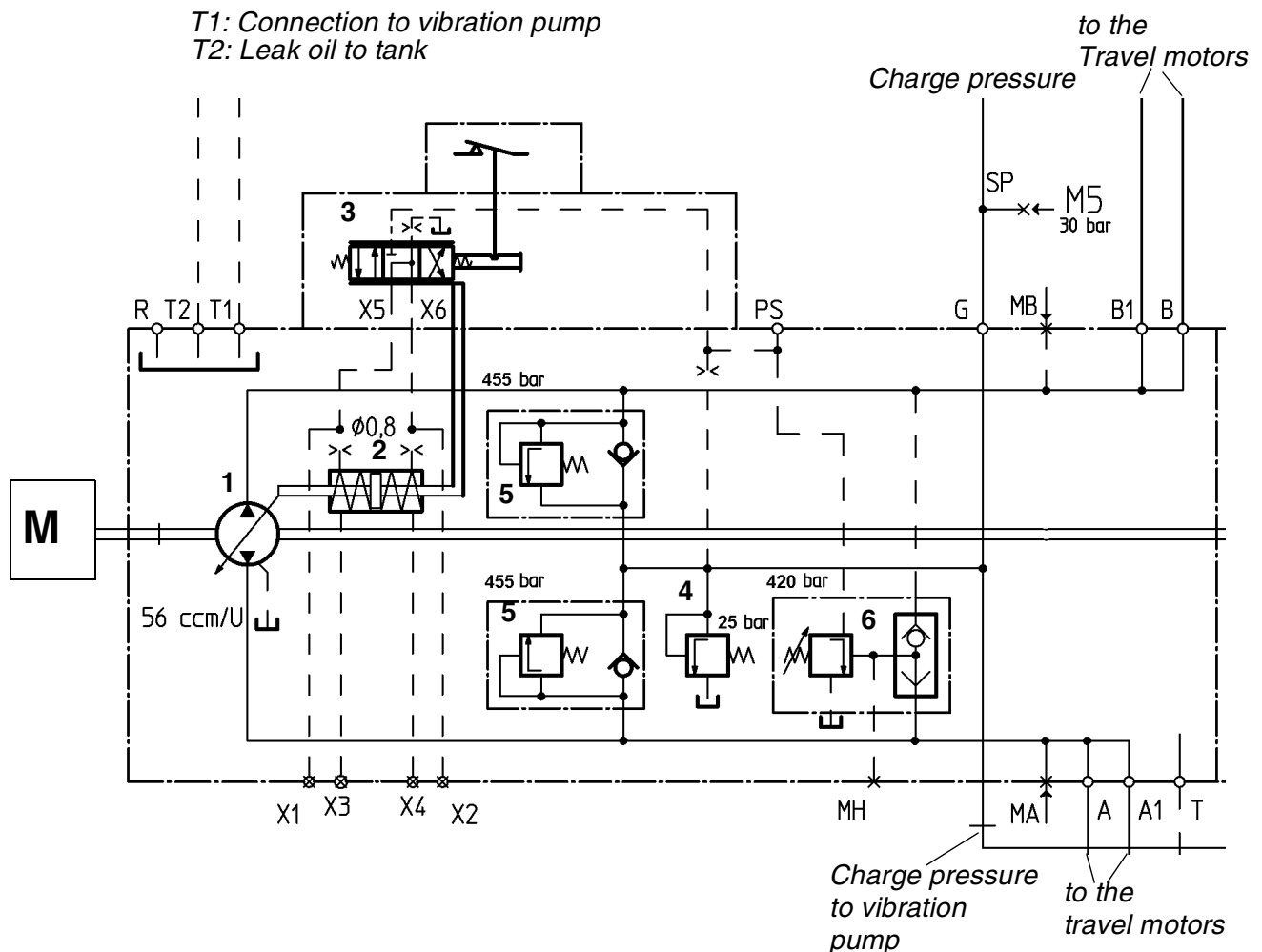


Fig. 2 Hydraulic diagram for travel pump

- 1 Pump drive
- 2 Control piston
- 3 4/3-way servo valve
- 4 Charge pressure relief valve
- 5 High pressure relief valves
- 6 Pressure override

The pump is fitted with all control and safety elements needed for operation in a closed hydraulic circuit. These are:

- Servo control
- High pressure relief valves with integrated boost check valves
- Charge pressure relief valve
- Pressure override

Travel pump and vibration pump are connected to a tandem pump unit.

The travel pump unit is directly driven by the flywheel side of the engine via an elastic coupling. The pump speed is therefore identical with the engine speed.

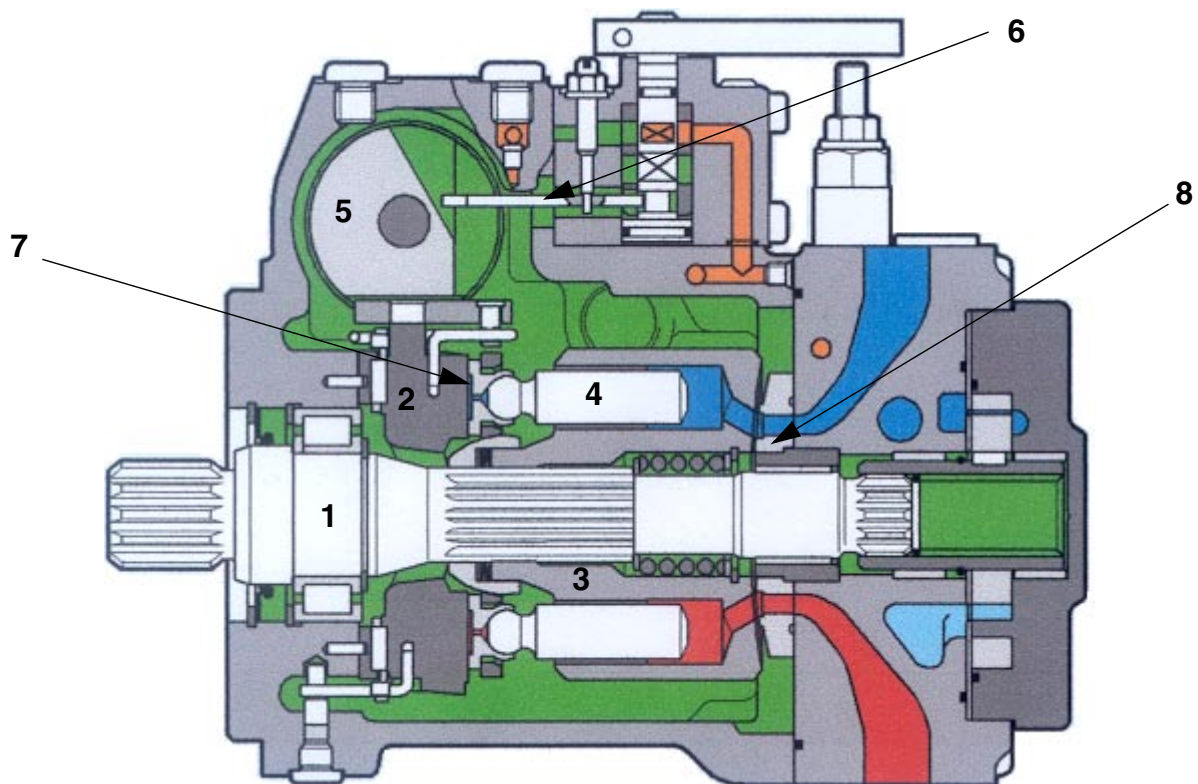


Fig. 3 Travel pump, cross-section

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

Pilot pressure is used to operate the pump out of neutral position to the desired pumping direction (direction of oil flow).

An manually operated 4/3-way valve directs the pilot oil flow (from the charge circuit) to the corresponding control piston side in the servo control. The 4/3-way valve is controlled by the travel lever and the travel cable.

In neutral position both control chambers are loaded with case pressure. When opening the 4/3-way valve pilot oil (from the charge circuit) is directed to one of the control piston sides and moves the control piston to the corresponding direction.

The swashing lever between the control piston and the swash plate transfers the control piston movement to the swash plate. The needle bearing mounted swash plate swivels to the chosen direction. This causes the axial movement of the pistons inside the cylinder block. The axial movement draws oil into the pump and presses it to the travel motors.

All working pistons are drilled through their entire length. Pressure fluid flows through these bores into the areas between the slipper pads and the surface of the swash plate. This forms a hydraulically balanced field, on which the slipper pads can slide without any metal to metal contact between swash plate and slipper pads. The feedback lever on the control piston detects when the swash plate has reached a position that corresponds with the displacement of the travel lever. This feedback lever controls a pilot oil portioning valve which interrupts the pilot oil flow to the control chambers when the swashing angle corresponds with the position of the travel lever. Swashing angle and displacement of the working pistons (oil flow rate) remain constant, until a new control command requires a different swashing angle.

When changing the swashing angle through the neutral position to the opposite side, the flow direction of the oil and the sense of rotation of the travel motors will change. The spherical valve plate centres the cylinder block, which is mounted on the splines of the drive shaft. This avoids the appearance of undesired transverse forces.

The complete drive consisting of

- valve plate
- cylinder block with working pistons and
- swash plate

is held together and preloaded by Belleville springs. This immediately eliminates any appearing wear, increases the efficiency of the pump and prolongs the lifetime considerably.

When controlling the travel pump pressure will build up in the line between pump outlet and motor inlet. This pressure depends on the load acting on the travel motors. This pressure keeps the boost check valve inside the high pressure relief valve for this particular side of the closed hydraulic circuit closed. Cool and filtered oil can now only enter into the closed circuit on the opposite side (low pressure side). The high pressure relief valve limits possibly occurring extreme pressure peaks to the adjusted value. If one of these valves responds, hydraulic oil will flow out of the high pressure side and enter the low pressure side through the corresponding boost check valve.

Since the cross-sections of these valves are very small and the hydraulic oil enters the low pressure side already inside the pump, the system would very quickly overheat if the pressure in the system would be permanently relieved via the high pressure relief valves. For this reason the pump is fitted with an additional pressure override valve. The pressure override valve interrupts the pilot oil flow to the control piston, thereby maintaining the pressure level at the adjusted value of the pressure override valve. If the pressure drops again, the pressure override valve will open and the pump can swash back to the previously chosen position. This installation prevents overheating of the hydraulic system and overloading of the diesel engine.

Control

The servo control of the pump is an integral part of the pump housing and consists mainly of:

- the manually controlled 4/3-way valve (1)
- the control piston (2)
- the feedback lever (3)
- the pilot oil portioning valve (not visible in illustration) and
- the swashing lever with the swashing cradle (see Fig. 3).

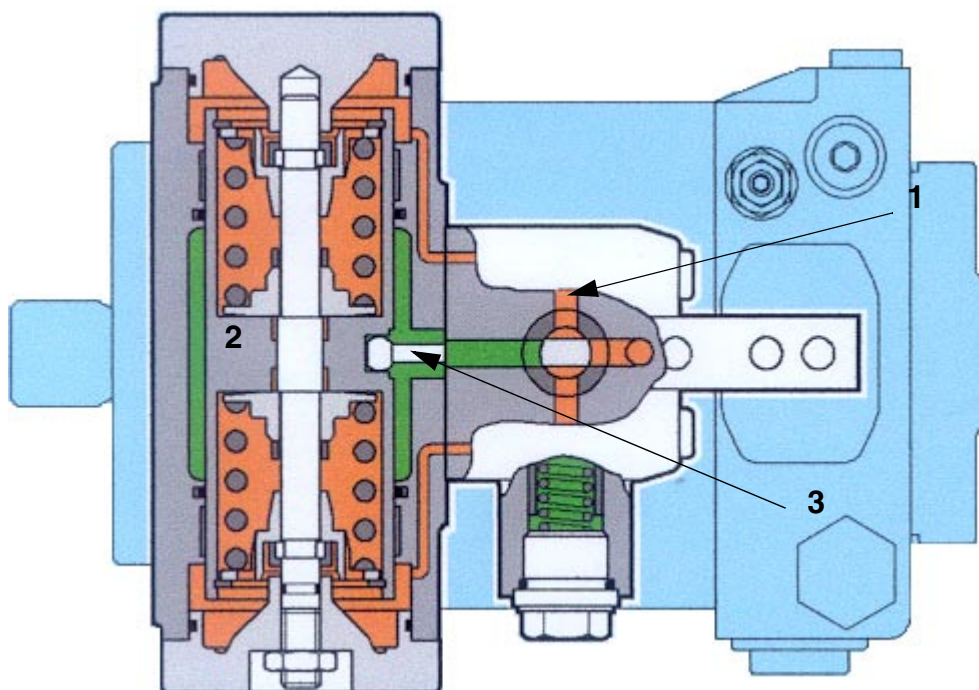


Fig. 4 Travel pump control

When actuating the travel lever the 4/3-way valve moves out of neutral position to the desired direction and guides the pilot oil flow through the pilot oil portioning valve to the corresponding control piston side.

The control piston moves to the corresponding direction and operates the swash plate via the swashing lever accordingly.

The feedback lever, which is mounted with its ball head in the pump control shaft, follows the control piston and interrupts the pilot oil flow when the control piston has reached a position corresponding with the displacement of the travel lever. The pump can now deliver oil to the travel motors.

The oil from the opposite control chamber flows through the 4/3-way valve as leak oil into the pump housing.

The supply bores to both control chamber sides are fitted with nozzles (swashing time nozzles). These nozzles restrict the pilot oil flow and enable a very sensitive control of the pump.

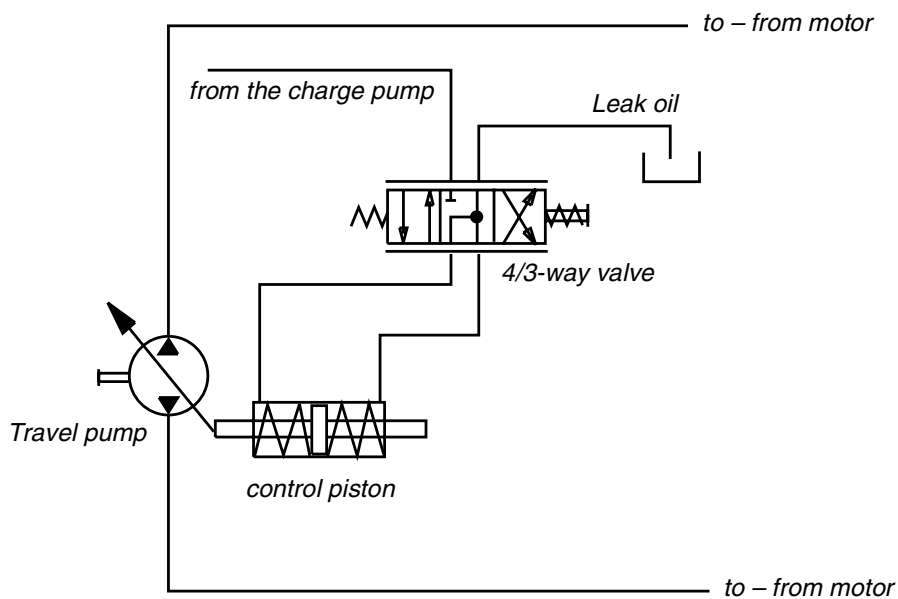


Fig. 5 Control in neutral position

The feedback lever controls the pilot oil portioning valve so that the swashing angle remains unchanged, until the introduction of a new control command.

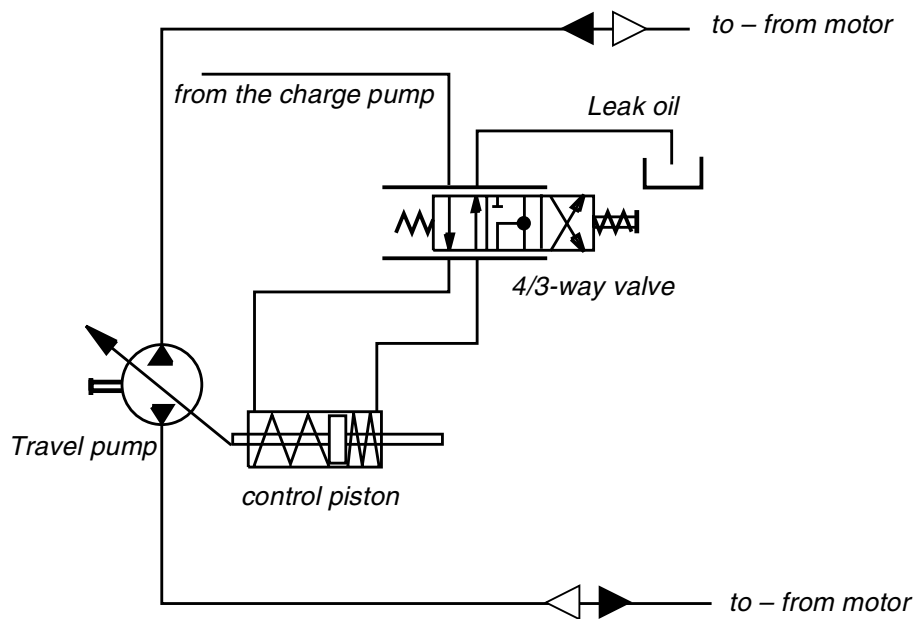


Fig. 6 Control actuated

When the 4/3-way valve is in neutral position, the pressure values in both control chambers are identical (case pressure = max. 3 bar).

Charge pressure relief valve

The charge pressure relief valve belongs to the group of safety elements in a closed hydraulic circuit. This valve limits the pressure in the charge circuit to the adjusted value.

Since the charge pressure relief valve in the vibration pump is blocked, the charge circuit for the vibration drive is also protected by the charge pressure relief valve in the travel pump.

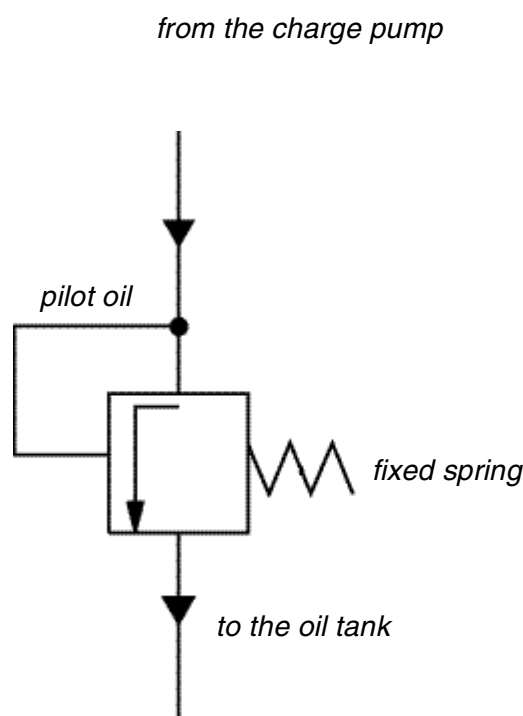


Fig. 7 Charge pressure relief valve

The charge circuit is needed for the compensation of leak oil and flushing quantities in the closed hydraulic circuit. Charge oil is also required to control the pumps, for the speed range selector in the travel motor and to release the parking brake.

Since feeding of cool and filtered oil is only possible on the low pressure side of the closed circuit, the pressure in the low pressure side is identical with charge pressure. If the travel pump is in neutral position, both boost check valves can open and let in oil from the charge circuit. In this case the pressure in both sides of the closed circuit is identical with charge pressure.

High pressure relief valves

High pressure relief valves are safety elements, which are needed in every hydraulic circuit. These valves limit the pressure in the hydraulic circuit to the value determined by the adjustment spring.

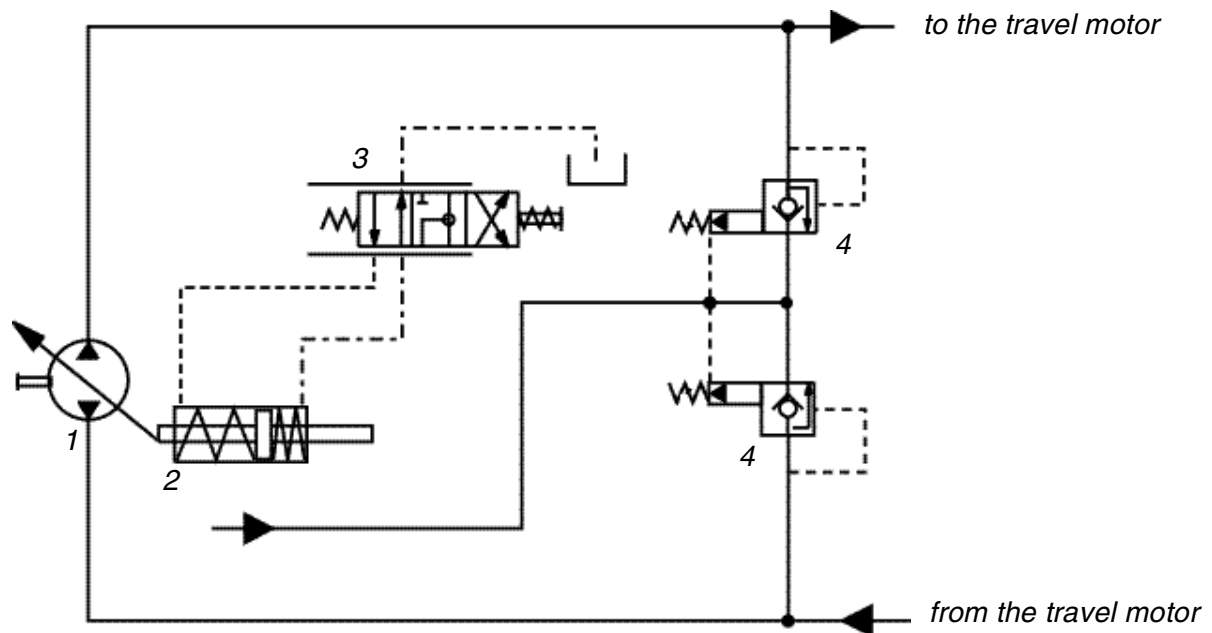


Fig. 8 HPRV, hydraulic diagram

- 1 Travel pump
- 2 Control piston (actuated)
- 3 4/3-way valve (actuated)
- 4 High pressure relief valves, fixed

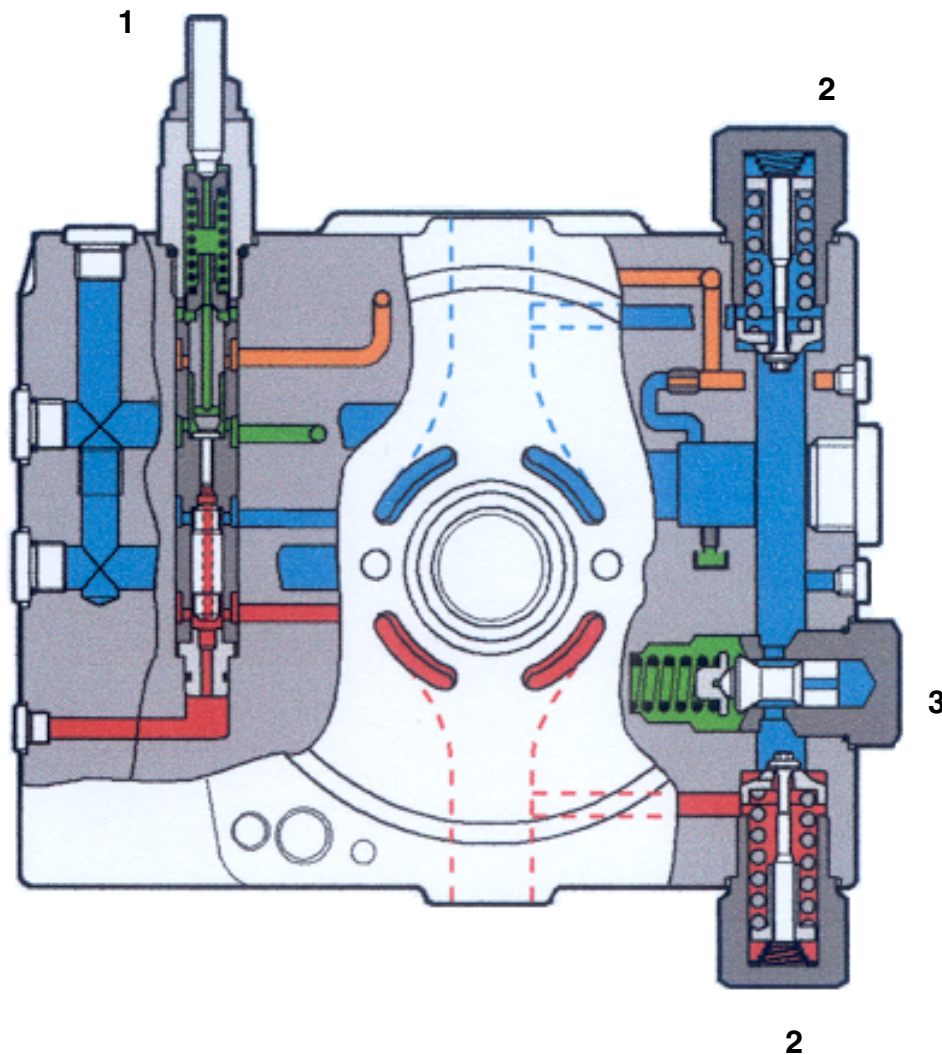


Fig. 9 High pressure relief valves

- 1 *Pressure override*
- 2 *High pressure relief valves, fixed*
- 3 *Charge pressure relief valve, fixed*

The high pressure relief valves in both sides of the hydraulic circuit protect the hydraulic system, the diesel engine and all other machine components against overloads.

The boost check valves are integrated in the high pressure relief valves. These valves open to the low pressure side and let cool and filtered oil flow from the charge oil circuit into the closed hydraulic circuit, in order to compensate leaks and flushing quantities.

Pressure override

Since the cross-sections of the high pressure relief valves are very small, longer responding of these valves would cause very quick overloading of the hydraulic circuit and would subsequently lead to severe damage in pump or other components. In order to avoid this, the travel pump is equipped with another safety device, the pressure override.

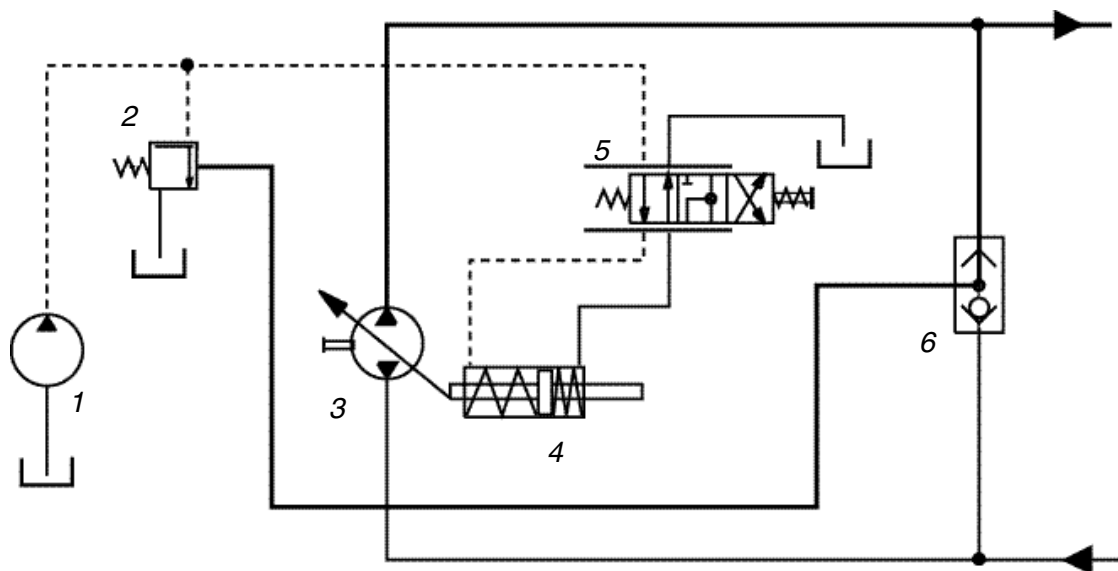


Fig. 10 Pressure override

- 1 Charge pump
- 2 Pressure override
- 3 Travel pump
- 4 Control piston
- 5 3/4-way valve
- 6 Shuttle valve

The pressure override is hydraulically arranged in the pilot oil flow to the pump control before the 4/3-way valve and consists mainly off:

- axial spool with control edges,
- adjustment spring and
- adjustment screw with counter nut.

A shuttle valve ensures that the spool of the pressure override is always subjected to the highest pressure in the closed circuit. As long as the pressure in the closed circuit is lower than the adjustment value of the pressure override, the pilot oil connection via the 4/3-way valve to the corresponding control chamber is released. The pump can now be actuated up to maximum displacement.

If the pressure reaches the setting of the pressure override, the spool inside the valve will move and cut off the pilot oil flow to the control piston. The pump cannot be actuated any further. The system pressure is maintained at the setting of the pressure override, until the resistance causing this high pressure in the system is overcome or the pump is returned to neutral position by the operator.

Should the pressure in the closed circuit drop below the setting of the pressure override, the valve spool will be forced back by spring force, whereby the passage between charge circuit and pump control is opened again. Now pilot oil can flow to the corresponding control piston side again and the pump can be actuated.

The spring force of the pressure override and its reaction value can be adjusted via the adjustment screw.

Due to its design and the hydraulic arrangement of the pressure override, the high pressure relief valves will not respond. This type of pressure limitation does not relieve any oil from the closed hydraulic circuit via the very tight cross-sections of the high pressure relief valves. This avoids overheating of the hydraulic oil.

As a measure to ensure correct function the pressure setting should always be 10% lower than the setting of the high pressure relief valves.

High pressure relief valve	= 455 bar
Pressure override	= 420 bar

Travel motors

The travel motors are swash plate operated axial piston motors from Sauer-Danfoss (series 51 C 060) with variable displacement.

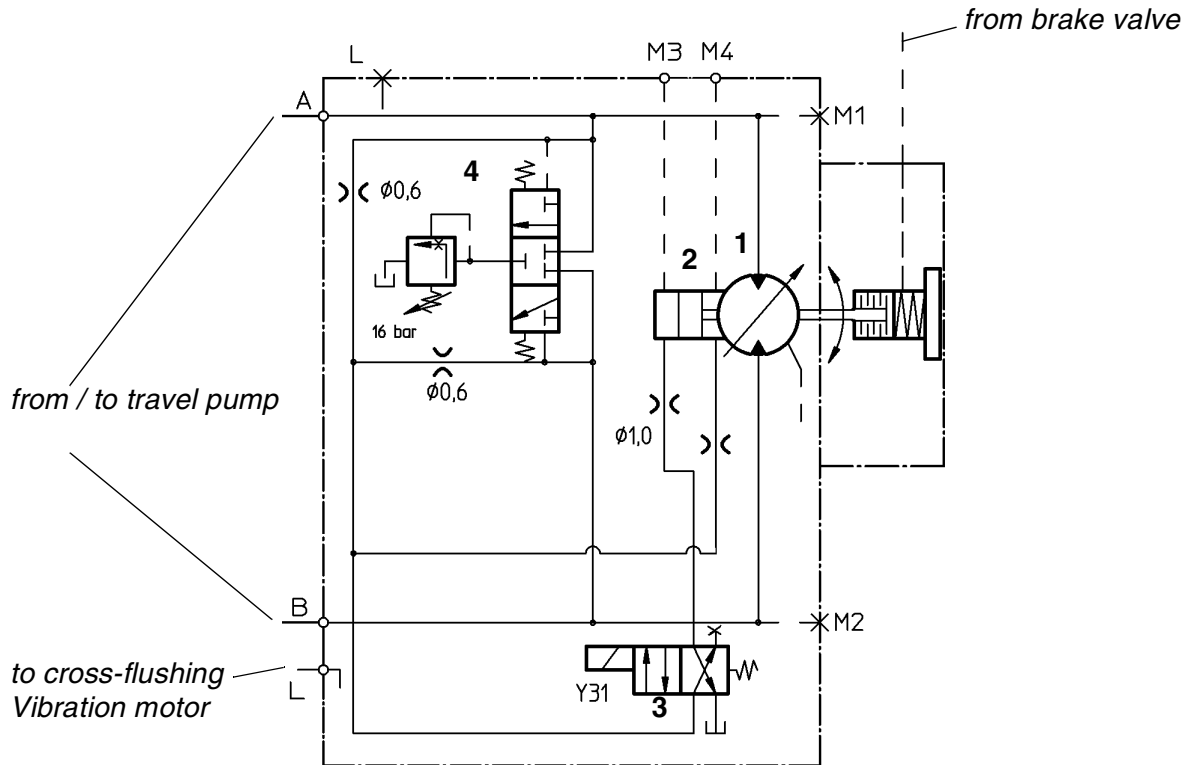


Fig. 11 Hydraulic diagram for travel motor

- 1 Motor drive
- 2 Control piston
- 3 Speed range selector valve with solenoid
- 4 Flushing valve with flushing pressure limitation valve

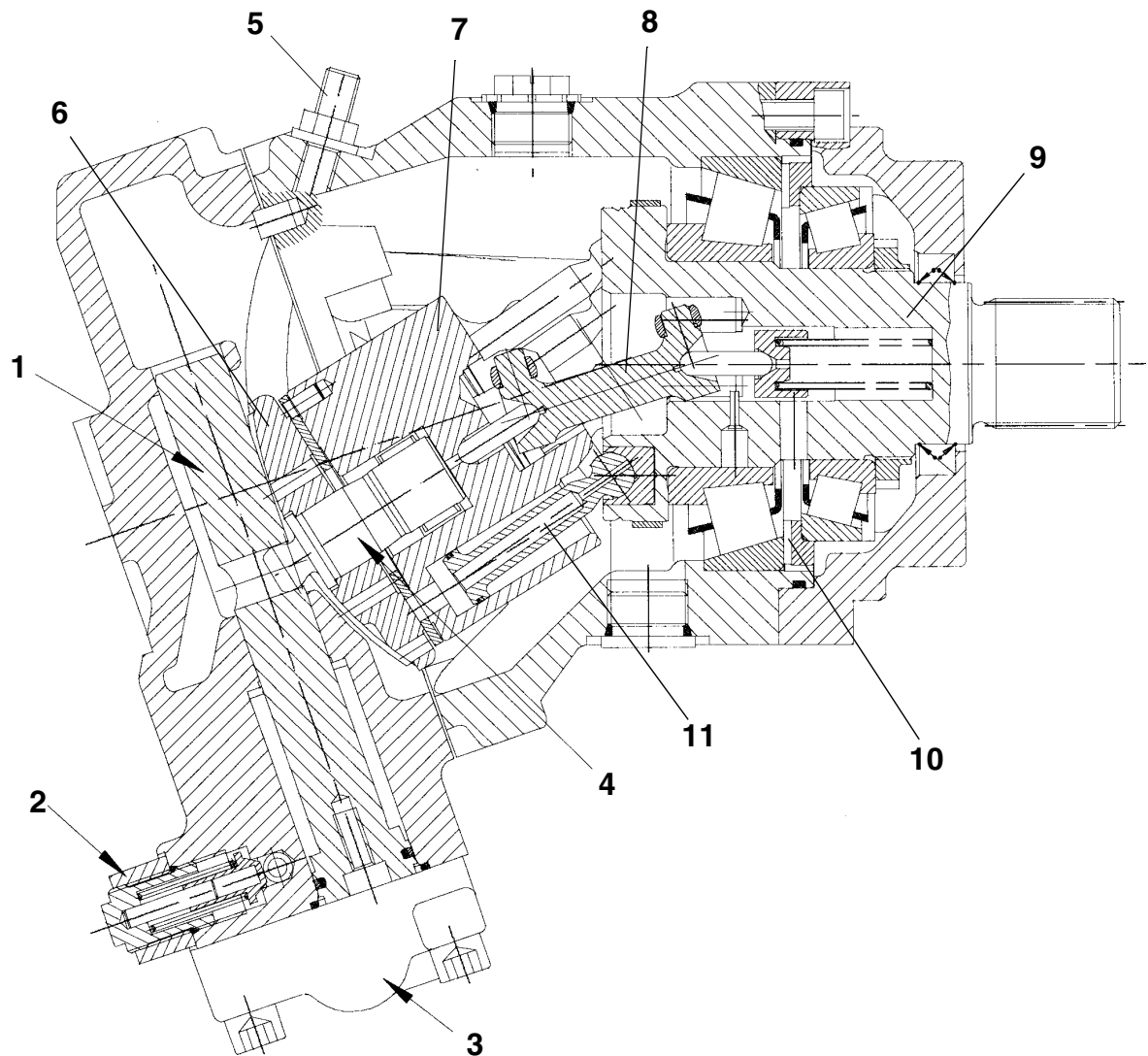


Fig. 12: Drum drive motor

- | | | | |
|---|-------------------------|----|----------------------|
| 1 | Control piston | 7 | Cylinder block |
| 2 | Flushing valve | 8 | Universal joint |
| 3 | Control | 9 | Output shaft |
| 4 | Spindle with ball | 10 | Output shaft bearing |
| 5 | Q _{min} -screw | 11 | Working piston |
| 6 | Valve plate | | |

Function

The motor is connected with the travel pump via the high pressure ports A and B. The hydraulic oil flows under high pressure through the corresponding port to the back of the working pistons. Since the working pistons are arranged under an angle to the output shaft, the pressurized pistons will perform a stroke movement, thereby causing a rotation of the output shaft.

Once the respective piston has passed its dead centre (max. extended position), it will change to the low pressure side. As the rotation progresses, the piston will move back into the cylinder bore. Oil is thereby displaced out of the cylinder chamber through the low pressure side back to the pump.

The synchronizing shaft with roller surfaces ensures uniform rotation of output shaft and cylinder block. The ball joints of the pistons run in journal bearings, which are pressed into the outer shaft. For the connection between output shaft and pistons no other parts are required. The output shaft runs in two tapered roller bearings.

Control

The motor can be adjusted to two fixed displacements. This is accomplished by changing the angle between cylinder block and output shaft.

With a large angle position the motor works with maximum displacement, slow speed and high torque.

When changing the swash plate position to minimal angle the motor works with minimum displacement, high speed and low torque.

The displacement is changed by a control piston, which is tightly connected with the valve segment.

The piston rod side (test port M4) is thereby permanently pressurized with the actual travel pressure. In 1st gear (solenoid de-energized) the piston side (test port M3) is connected with the tank. In the 2nd speed range the solenoids are energized, the valve switches and the piston side is also pressurized with the actual travel pressure. Due to the area differential between piston rod side and piston side and the force resulting therefrom the pilot piston moves to Qmin position.

Drum drive reduction gear

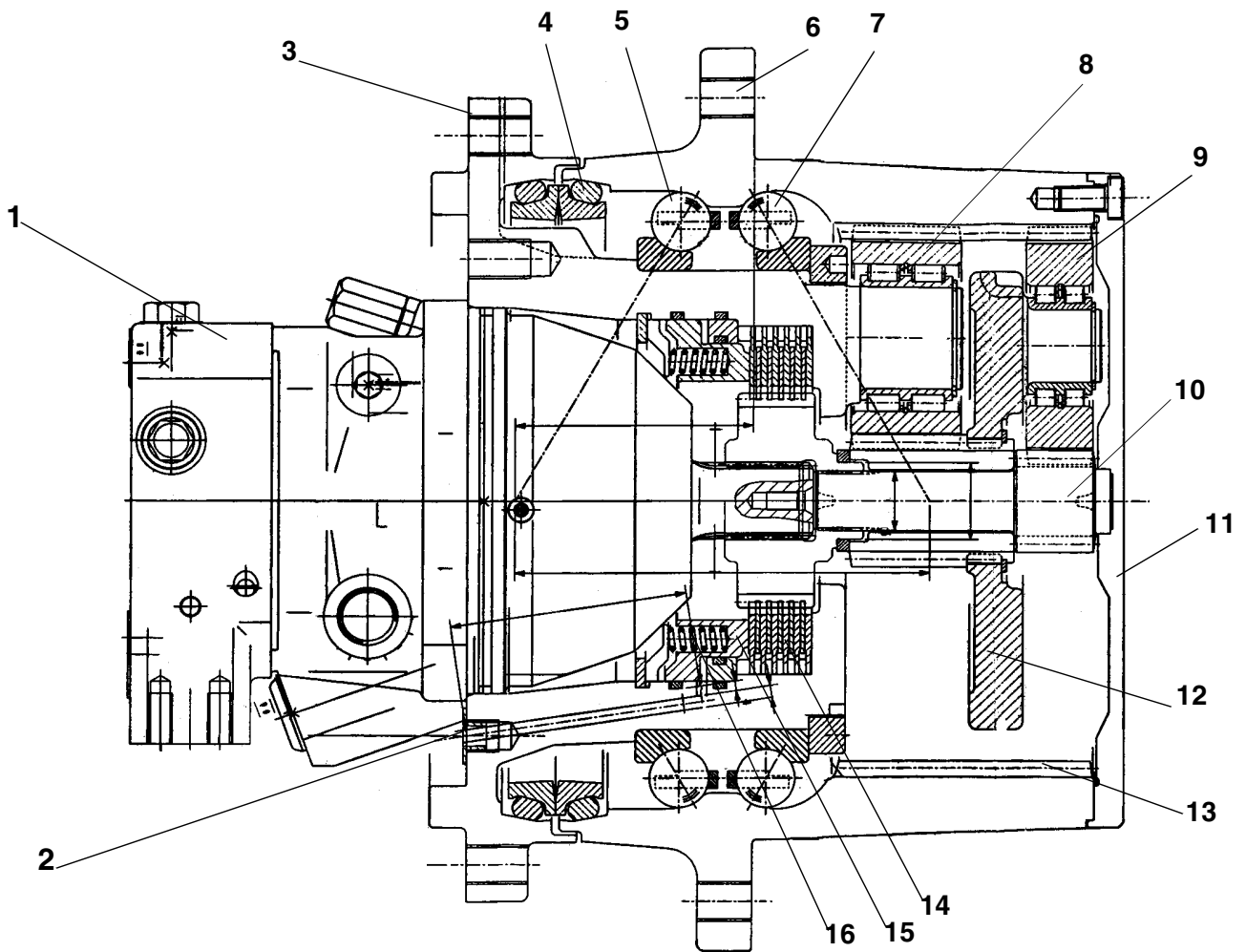


Fig. 13 Planetary gear 706 C2H with plug-in motor (motor only exemplary)

- | | | | |
|---|-----------------------------------|----|--------------------------|
| 1 | Travel motor 51 C 060 (not shown) | 9 | Planet wheel 2nd stage |
| 2 | Brake releasing port | 10 | Sun gear |
| 3 | Fastening on frame | 11 | End cover |
| 4 | Mechanical seal | 12 | Planet carrier 2nd stage |
| 5 | Ball bearing | 13 | Hollow wheel |
| 6 | Housing and fastening on drum | 14 | Brake discs |
| 7 | Ball | 15 | Brake piston |
| 8 | Planet gear 1st stage | 16 | Brake spring |

Test and adjustment points, travel system

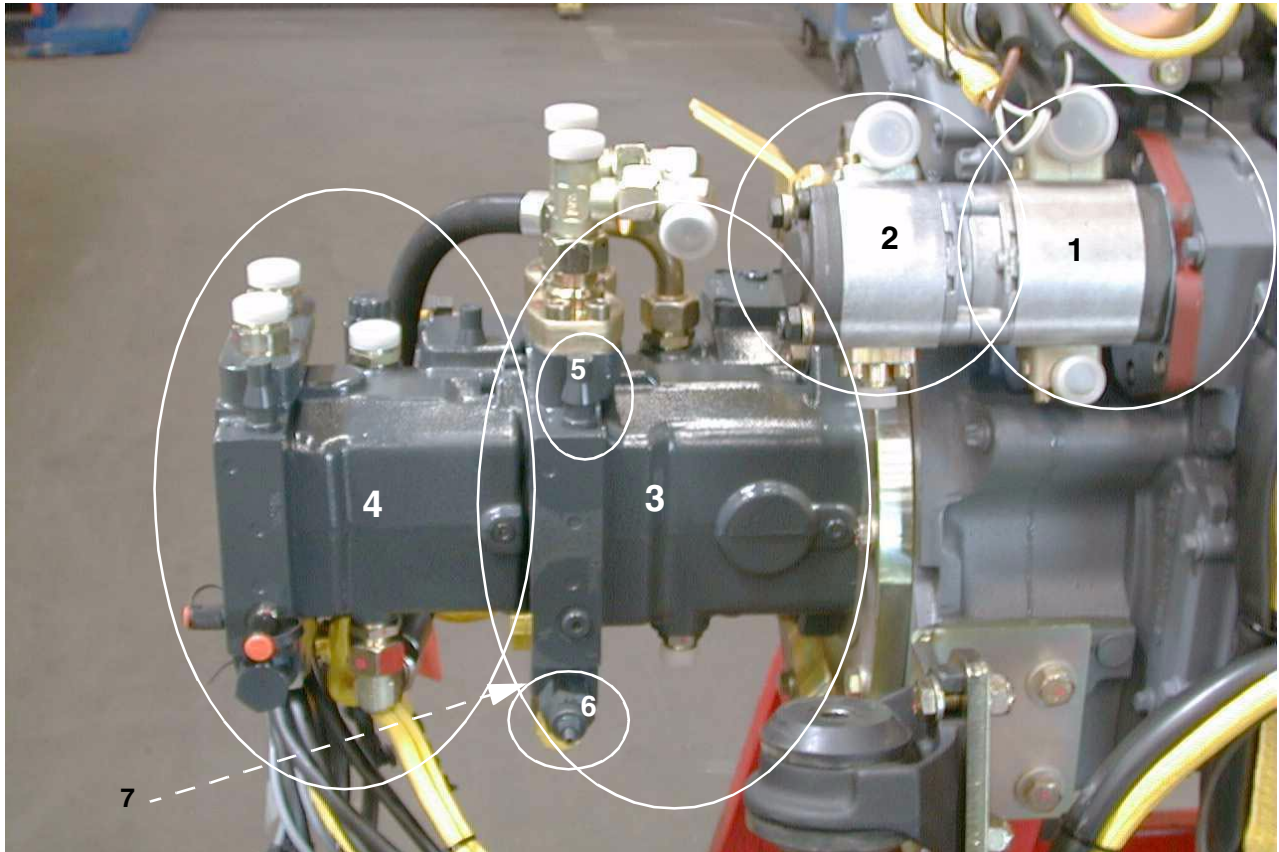


Fig. 14: Pump assembly

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering/charge pump		002, 16 ccm	205 +/-15 bar on steering pressure test port on filter
2	Pump for blower/crab-walk/charge pump		002, 8ccm	205 +/-10 bar on fan test port on filter
3	Travel pump		005	420 +/- 10 bar
4	Vibration pump		006	380 +/-40 bar
5	Pressure override travel pump			420 +/- 10 bar
6	High pressure relief valve forward travel (reverse on opposite side)			455 bar abs.
7	Charge pressure relief valve, bottom of travel pump		in 005	25 bar

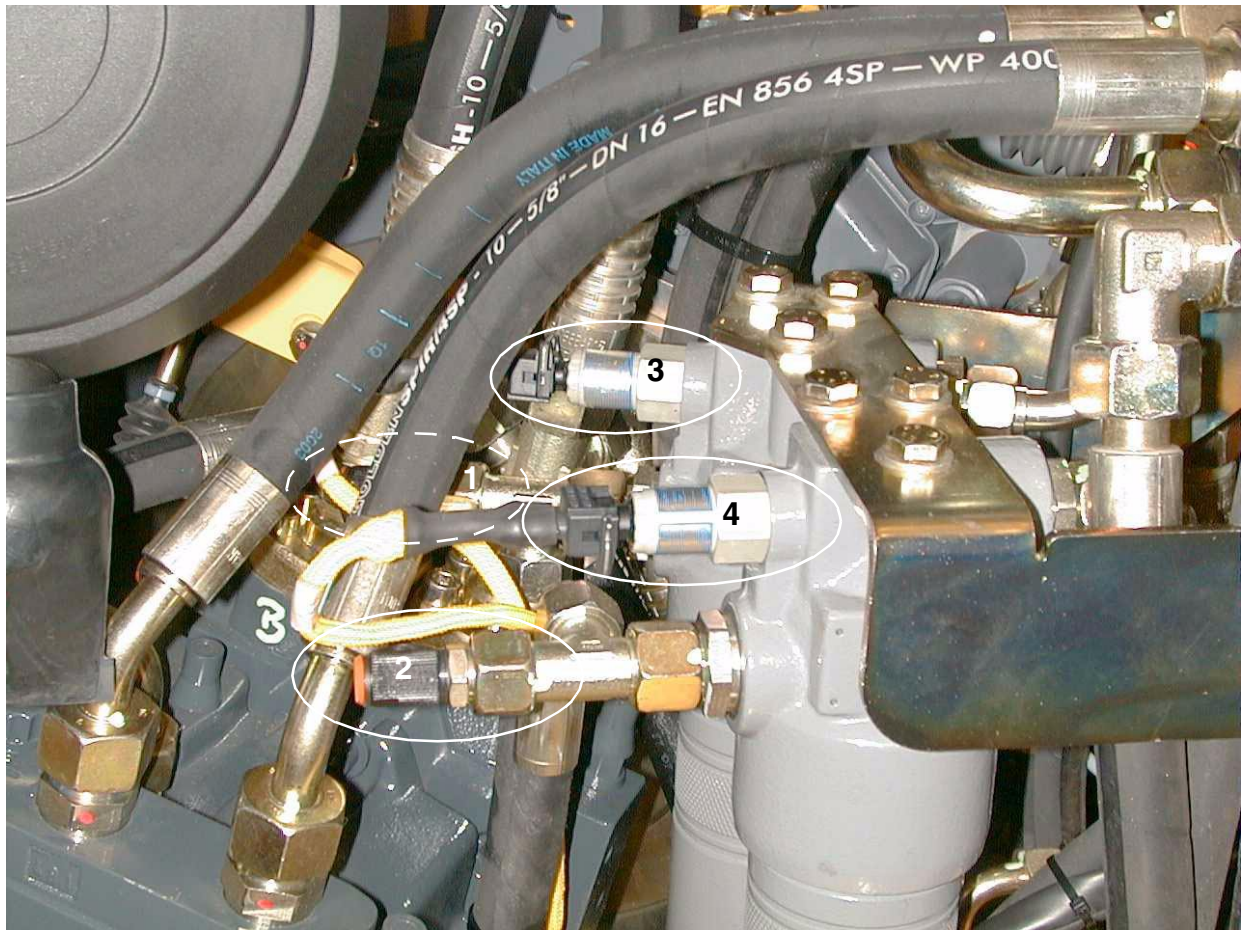


Fig. 15 Hydraulic pressure filter

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering pressure test port			approx. 170 bar
2	Fan test port			205 +/-15 bar
3	Pressure differential switch	B21	008	Δp 3,5 bar
4	Pressure differential switch		008	Δp 3,5 bar

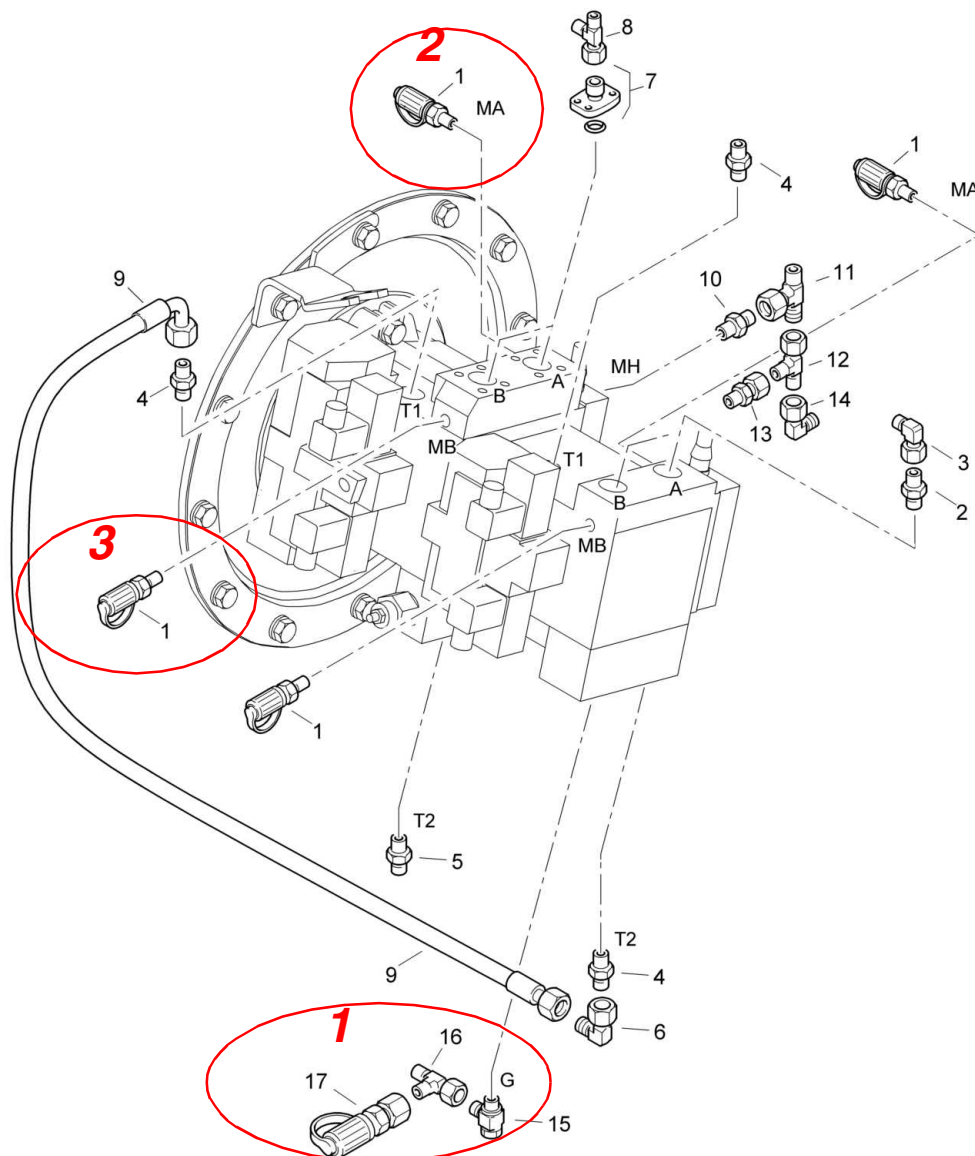


Fig. 16 Pressure test ports, travel system tandem pump

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Pressure test port, charge pressure		M5, SP, G	26 +/- 2bar
2	Pressure test port, forward travel		M6, MA	420 +/- 10 bar
3	Pressure test port, reverse travel		M7, MB	420 +/- 10 bar

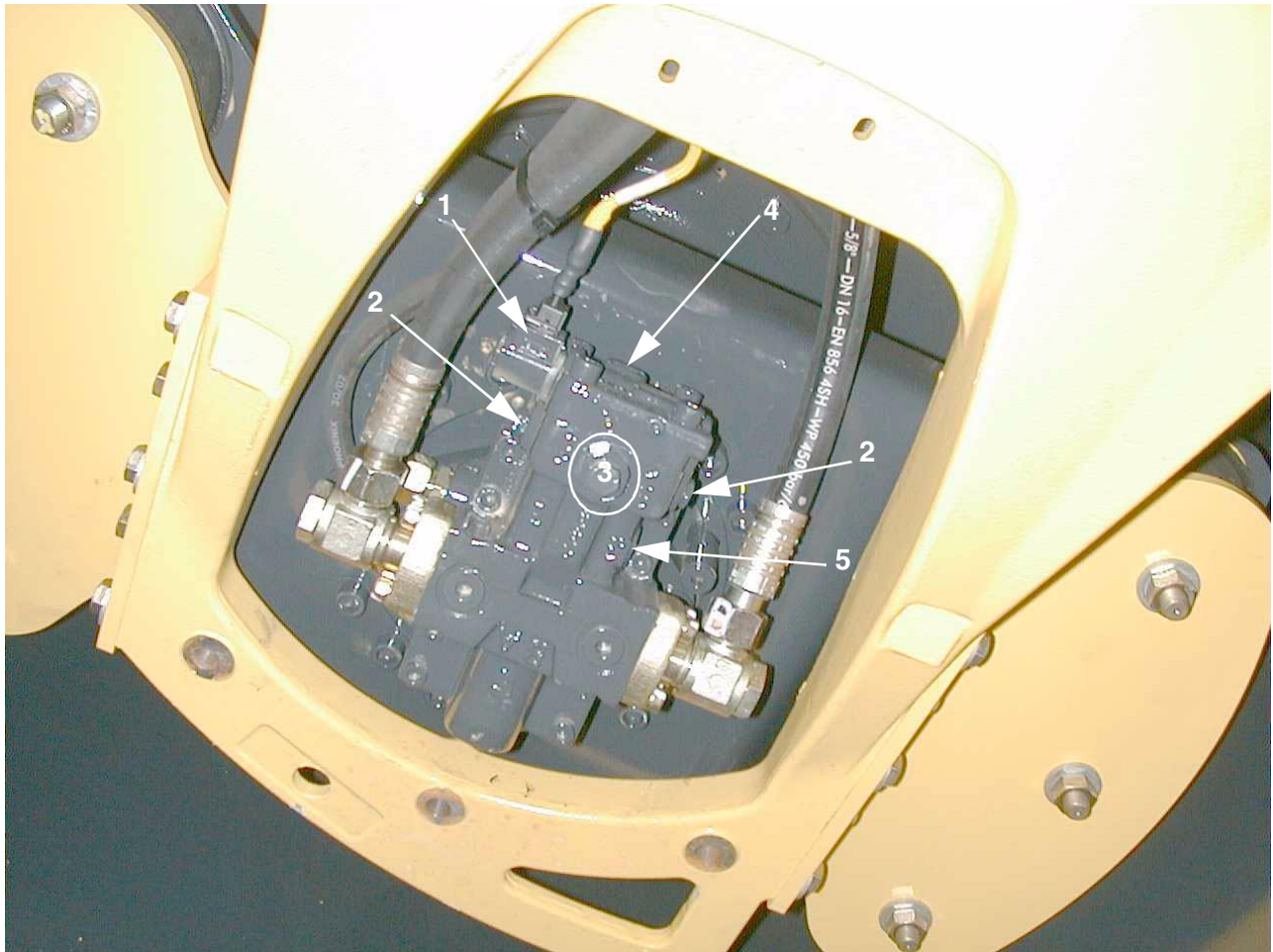


Fig. 17 Travel motor front/rear

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Solenoid for speed range selector valve	Y30 / Y31	Y30 / Y31	1. Gear 0V 2. Gear 12V, de-energized Qmax
2	Flushing spool			
3	Flushing valve/flushing pressure limitation			
4	Pressure test port, control piston, piston side		M3	1. Gear 0 bar 2. Gear, current high pressure
5	Pressure test port, control piston, piston rod side		M4	always current travel pressure

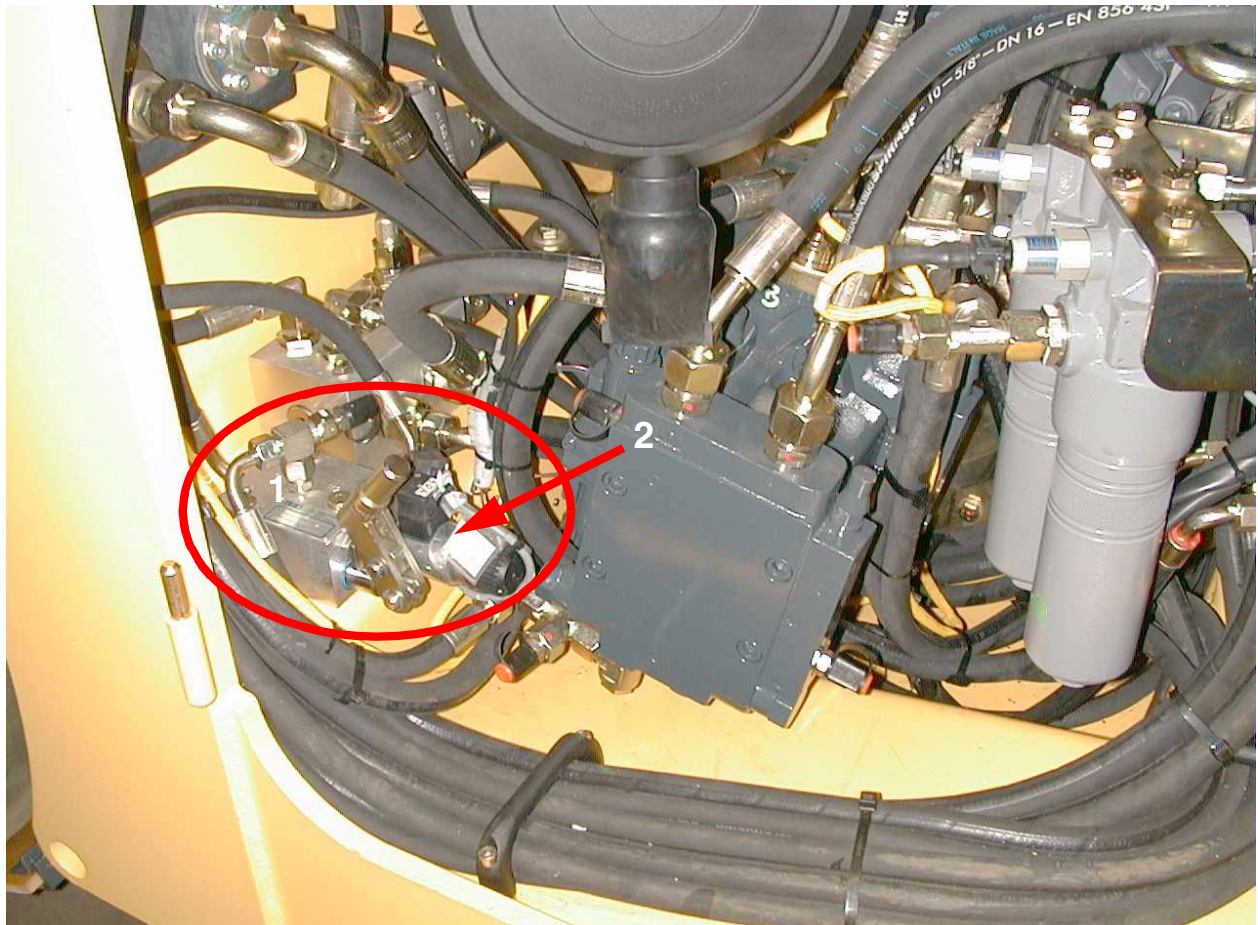


Fig. 18 Brake valve in engine compartment

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Brake valve	Y04	010	Pressure relief valve 30 bar
2	Solenoid valve	Y04	Y04	0V closed/12V open

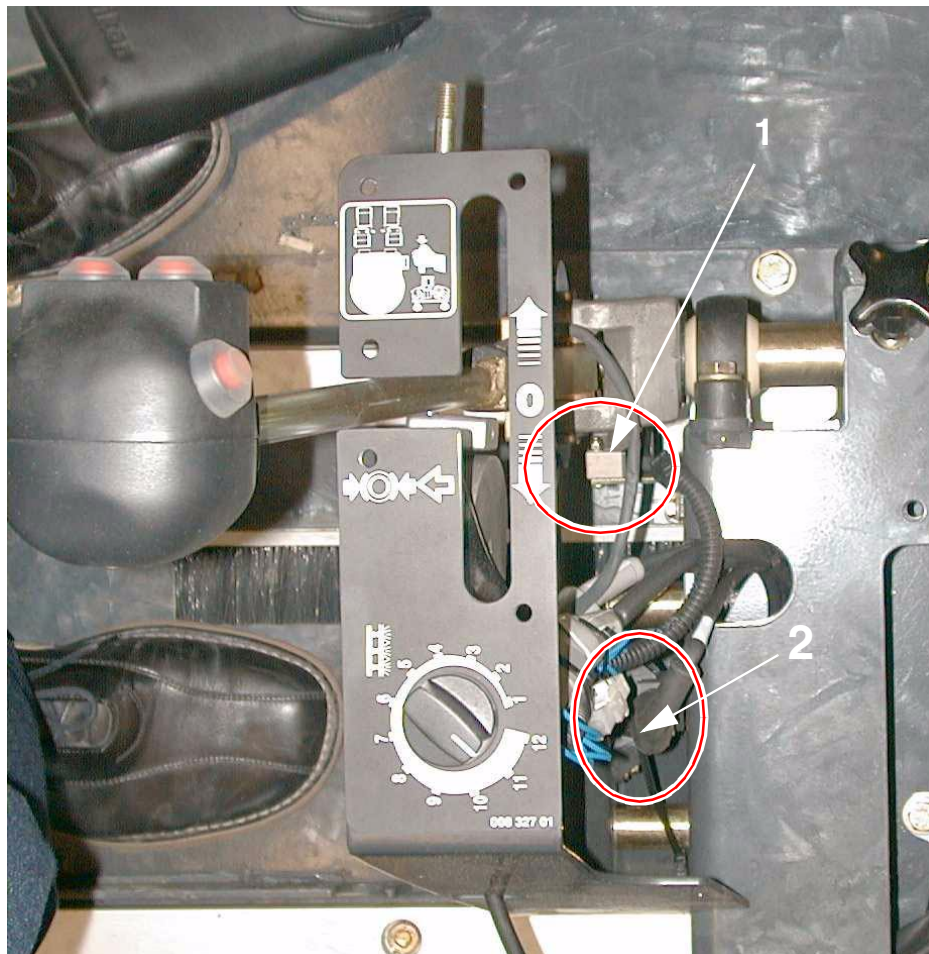


Fig. 19 Travel lever, left

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Proximity switch, brake	B63		Normally closed, 0 / 12V
2	Potentiometer for travel lever position	B39		Ground X 93:1 Supply: 8.5 V an X93:2 4-20 mA output on X93:3

Trouble shooting

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.

TROUBLESHOOTING TRAVEL SYSTEM BW 161- 4 FAMILY

	SYMPTOMS	Machine does not move (forw. and reverse)	Machine moves to one direction only	Machine drives with travel lever in 'Neutral'	Max. travel speed not reached	Hydraulic oil overheating														
POSSIBLE CAUSES																				
Brake valve (elektrisch/mechanisch/hydraulisch)		1																		
Brake in drum drive gear (mechanical/hydraulic)		2			2	3														
Speed range selector switch position / defective / wiring					1															
Charge pump / charge pressure relief valve(s) dirty / defective		2			3															
Pump control (servo control)		2	1	2	3															
Pressure override / travel pump high pressure relief dirty / deadjusted / defective		3	2		3	3														
Adjustment of travel cable				1	2															
mech. Neutral position of travel pump				3	3															
Travel pump(s) defective		3		3	2															
Valve for travel pump(s) (electric / mechanic / hydraulic)					1	2														
Travel motor flushing valve stuck			3																	
Travel motor(s) defective		3			3															
Drum drive gear defective		3																		
Hydraulic oil cooler soiled (internally/externally)						1														
Thermostat (hydraulic) soiled/jammed/defective						2														
Coupling between engine and pump		2																		
Diesel engine					1															
TROUBLESHOOTING																				

Vibration

The vibration circuit is also a closed hydraulic circuit, similar to the travel circuit.

The main components of this circuit are

- vibration pump,
- vibration motors
- vibration shut-off valve to shut off both vibration motors
- and the pressure resistant hydraulic hoses.

Vibration pump and travel pump are joined to a tandem unit, which is driven by the flywheel end of the diesel engine.

When operating a 4/3 way solenoid valve, pilot oil is guided to one of the control piston sides. This actuates the pump from neutral position to one of the two possible maximum displacement positions. If the vibration shut-off valve is not activated the pump now pumps oil to the vibration motors, which are connected in series mode.

When changing the swashing angle through the neutral position to the opposite side, the flow direction of the oil and the sense of rotation of the vibration motors will change.

Since the displacements are different to both pumping directions, the speed of the vibration motors to the two directions of rotation is also different.

The vibration motor output shafts are joined with the exciter shafts in the drums via Bowex coupling. The rotation of the exciter shaft with the bolted on eccentric weights causes the vibration of the elastically suspended drums.

The eccentric weights on the vibrator shaft are fitted with additional change-over weights.

Depending on the sense of rotation of the vibrator shaft these change-over weights add to or subtract from the basic weights.

- Basic weight + change-over weight = high amplitude
- Basic weight - change-over weight = low amplitude

The displacement of the pump is different to both flow directions. This results in different exciter shaft speeds in dependence on the sense of rotation of the vibration motors.

The vibration system is designed in such a way, that the high exciter shaft speed (frequency) is coupled with the low amplitude and the low exciter shaft speed (frequency) with the high amplitude.

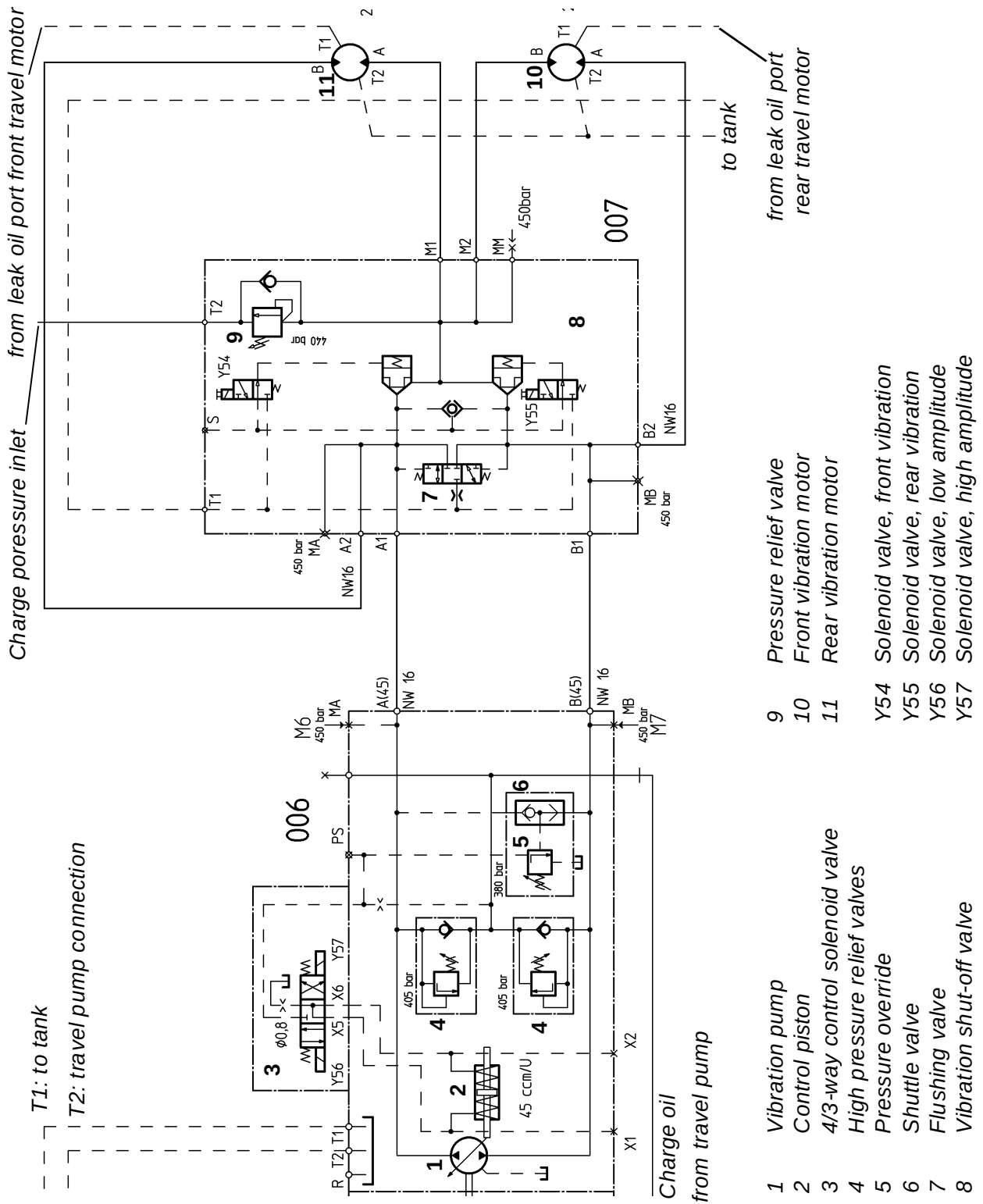


Fig. 1 Vibration circuit BW 161/202 AD-4

Vibration pump

The vibration pump is a swash plate operated axial piston pump with variable displacement of type A10 VG 45 EZ from Hydroamtkik. The pump is fitted with all control and safety elements needed for operation in a closed hydraulic circuit. These are:

- servo control
- High pressure relief valves with integrated boost check valves
- Pressure override

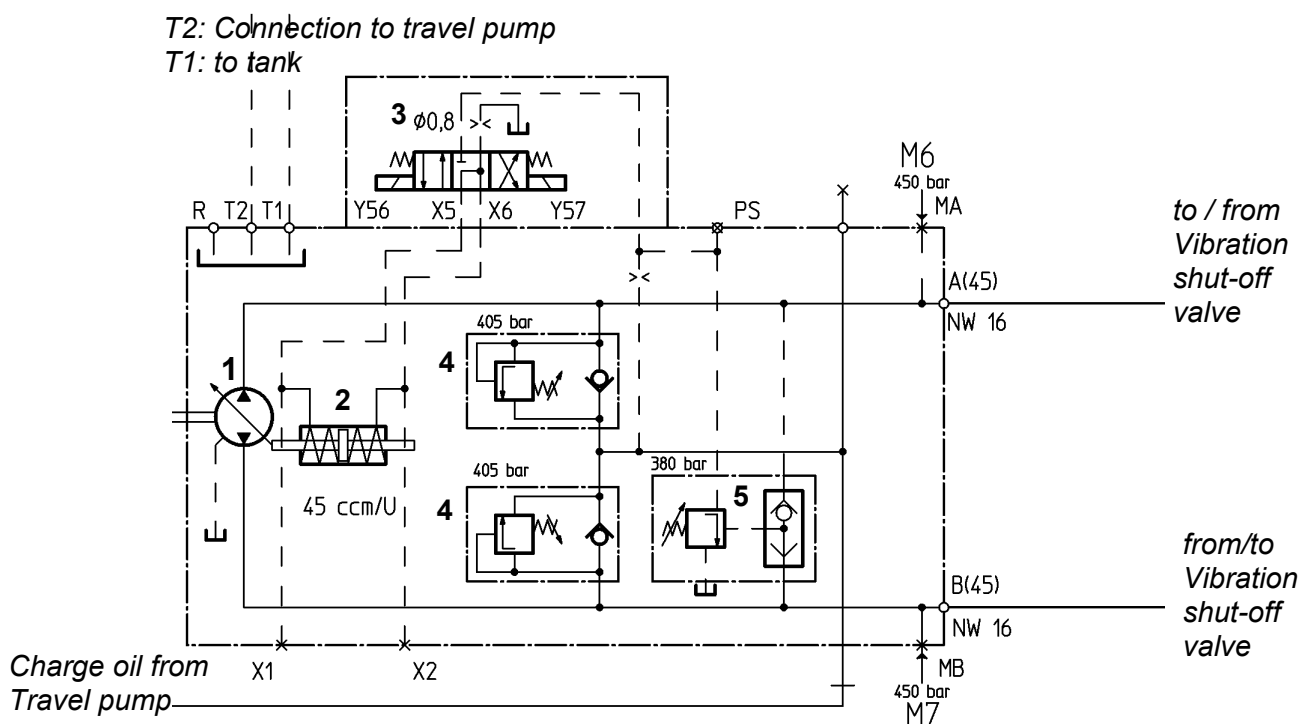


Fig. 2 Vibration pump, hydraulic diagram

- 1 Pump drive
- 2 Control piston
- 3 Solenoid valve
- 4 High pressure relief valves (405 bar abs.)
- 5 Pressure override (380 bar)

The spherical valve plate centers the cylinder block which is driven by the drive shaft via a splined connection. This avoids the appearance of undesired transverse forces.

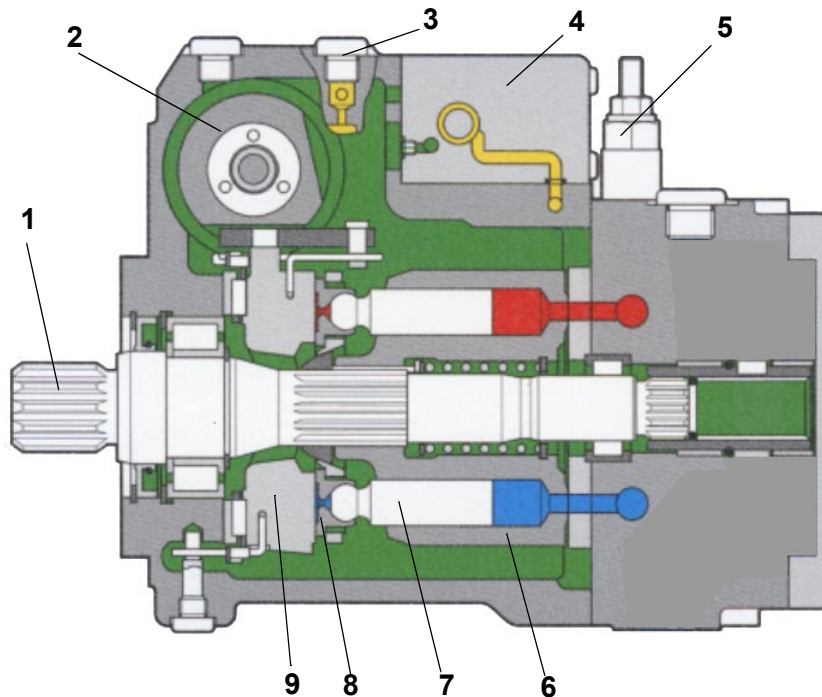


Fig. 3 Vibration pump, hydraulic diagram

- 1 Drive shaft
- 2 Control piston
- 3 Pilot pressure port (X1/X2)
- 4 Servo control
- 5 Pressure override
- 6 Cylinder block
- 7 Working pistons
- 8 Slipper pad
- 9 Swash plate

The complete drive consisting of valve plate, cylinder block and swash plate is held together by Belleville springs. This results in a high efficiency over the entire lifetime of the pump.

Pilot pressure is used to operate the pump out of neutral position to the desired pumping direction (direction of oil flow). A 4/3-way valve guides this pilot oil to the corresponding control piston side in the servo control. Due to the use of a remote control (electrically operated via solenoids) the pump can only be actuated from neutral to one of the two possible maximum displacement positions.

In neutral position both control chambers are loaded with case pressure. When opening the 4/3-way valve pilot oil (from the charge circuit) is directed to one of the control piston sides and moves the control piston to the corresponding direction. The pump swashes to the adjusted maximum displacement.

When changing the swashing angle through the neutral position to the opposite side, the flow direction of the oil and the sense of rotation of the exciter shaft will change.

The displacements to both pumping directions have different adjustments.

This results in different speeds of the vibration motor to both travel directions.

This means:

- High displacement – high speed (frequency).
- Low displacement – low speed (frequency).

The position of the change-over valves depends on the sense of rotation of the exciter shaft. The different positions of the change-over weight in relation to the basic weight results in the following vibration effects:

- High displacement – high frequency – low amplitude
- Low displacement – low frequency – high amplitude

The resistance affecting the rotation of the exciter shaft causes pressure to build up between pump and motor. This pressure closes the boost check valve in the high pressure side of the closed circuit. Feeding of cooled and filtered hydraulic oil can therefore only take place in the low pressure side.

Once the pressure reaches the adjusted value of the pressure override valve the pilot oil flow to the 4/3 way solenoid valve is interrupted. The pressure cannot increase any further.

Sudden pressure peaks are eliminated by high pressure relief valves. In this case hydraulic oil flows from the high pressure side through the boost check valve directly into the opposite side, the low pressure side.

High pressure relief valves

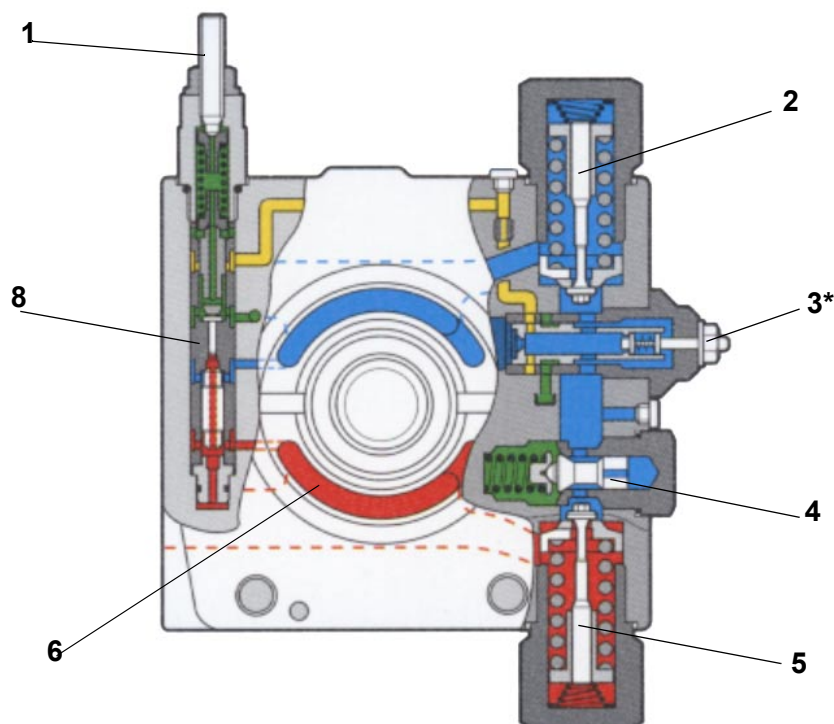


Fig. 4 High pressure relief valves

- 1 Setscrew for pressure override
- 2 High pressure relief valve with integrated boost check valve
- 3 Setscrew for hydraulic neutral position ***(not in vibration pump)**
- 4 Charge pressure relief valve
- 5 High pressure relief 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.

Control

The control is part of the pump and consists mainly of the 4/3-way solenoid valve, the control piston and the swash plate with swashing lever.

If one of the two magnets is energized by actuating the frequency selector switch and the vibration control switch, the 4/3 way solenoid valve is switched to open position. Pilot oil flows now to the corresponding control piston side. The control piston slides to the corresponding direction and moves the swash plate via the swashing lever. The pump delivers oil.

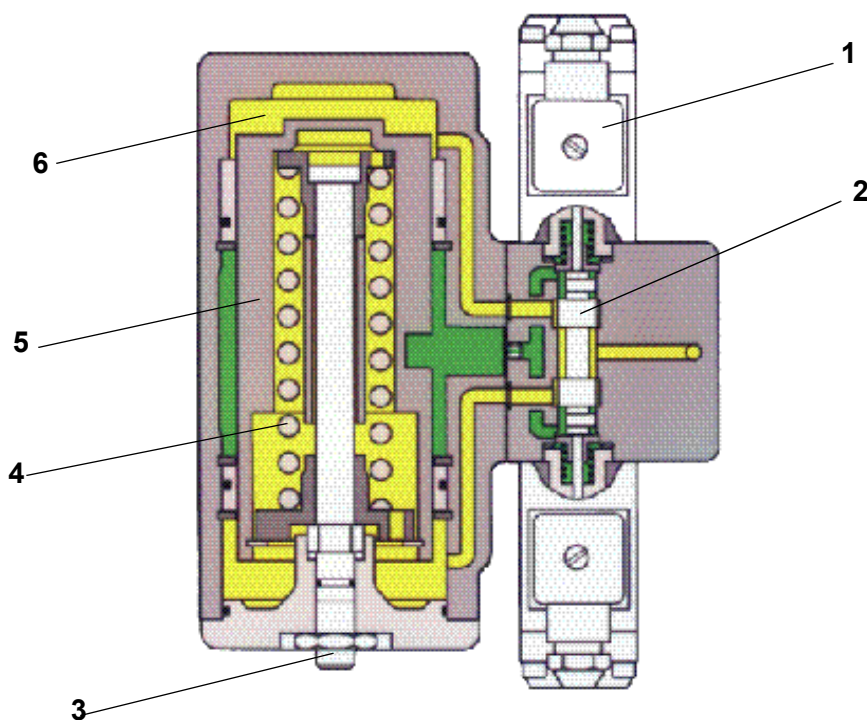


Fig. 5 Pump control

- | | | | |
|---|--|---|------------------------|
| 1 | Solenoid valve | 4 | Neutral setting spring |
| 2 | Valve spool | 5 | Control piston |
| 3 | Setscrew for mechanical neutral position | 6 | Control chamber |

The oil from the opposite control chamber flows through the 4/3-way valve as leak oil into the pump housing.

When the 4/3-way valve is in neutral position, the pressure values in both control chambers are identical (case pressure = max. 3 bar).

vibration motors

The vibration motors are bent axle axial piston motors of type A4 FM 28 with fixed displacement from Hydromatik. These motors are designed for two directions of rotation and can therefore be subjected to pressure from both sides.

The pressure oil provided by the pump flows through the kidney shaped control slots in the valve plate into the cylinder block with the working pistons. The pressure oil causes a stroking movement of the working pistons. Due to the swash plate design this axial movement of the pistons is converted to a radial movement of the motor drive. The output shaft transfers this rotary movement via an elastic Bowex coupling to the exciter shaft with the two eccentric weights.

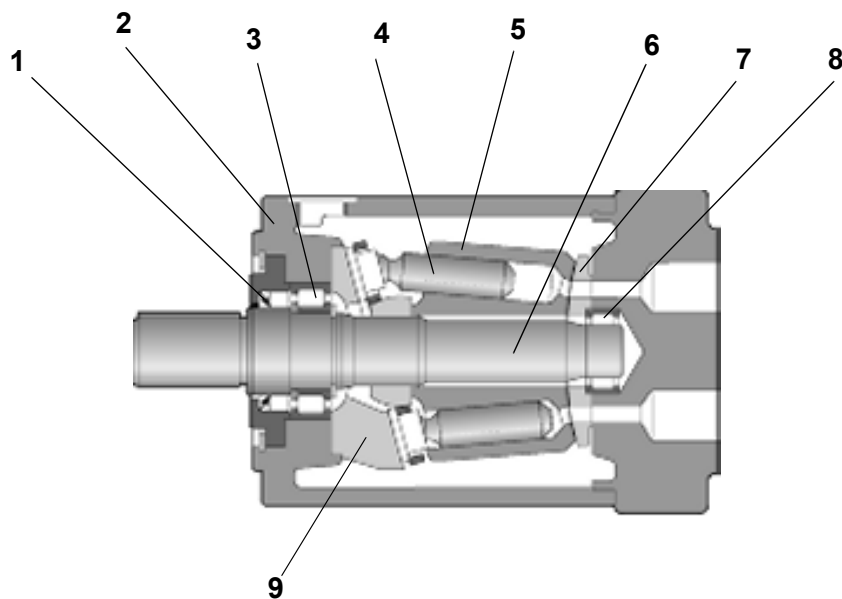


Fig. 6 Vibration motor A4 FM 28

- | | | | |
|---|------------------------------------|---|--------------------------------|
| 1 | <i>Radial seal</i> | 2 | <i>Housing</i> |
| 3 | <i>Cylinder roller bearing</i> | 4 | <i>Working pistons</i> |
| 5 | <i>Cylinder block</i> | 6 | <i>Output shaft</i> |
| 7 | <i>Valve plate</i> | 8 | <i>Cylinder roller bearing</i> |
| 9 | <i>Swash plate, not adjustable</i> | | |

When switching the vibration on the vibration motors must first accelerate the resting exciter shaft up to nominal speed. This resistance causes a hydraulic starting pressure, which is limited to 380 bar by the pressure override valve. Once the vibrator shaft has reached its final speed, the pressure will drop to a value between 40 and 160 bar. This operating pressure depends on the state of compaction of the soil.

Vibration shut-off valve

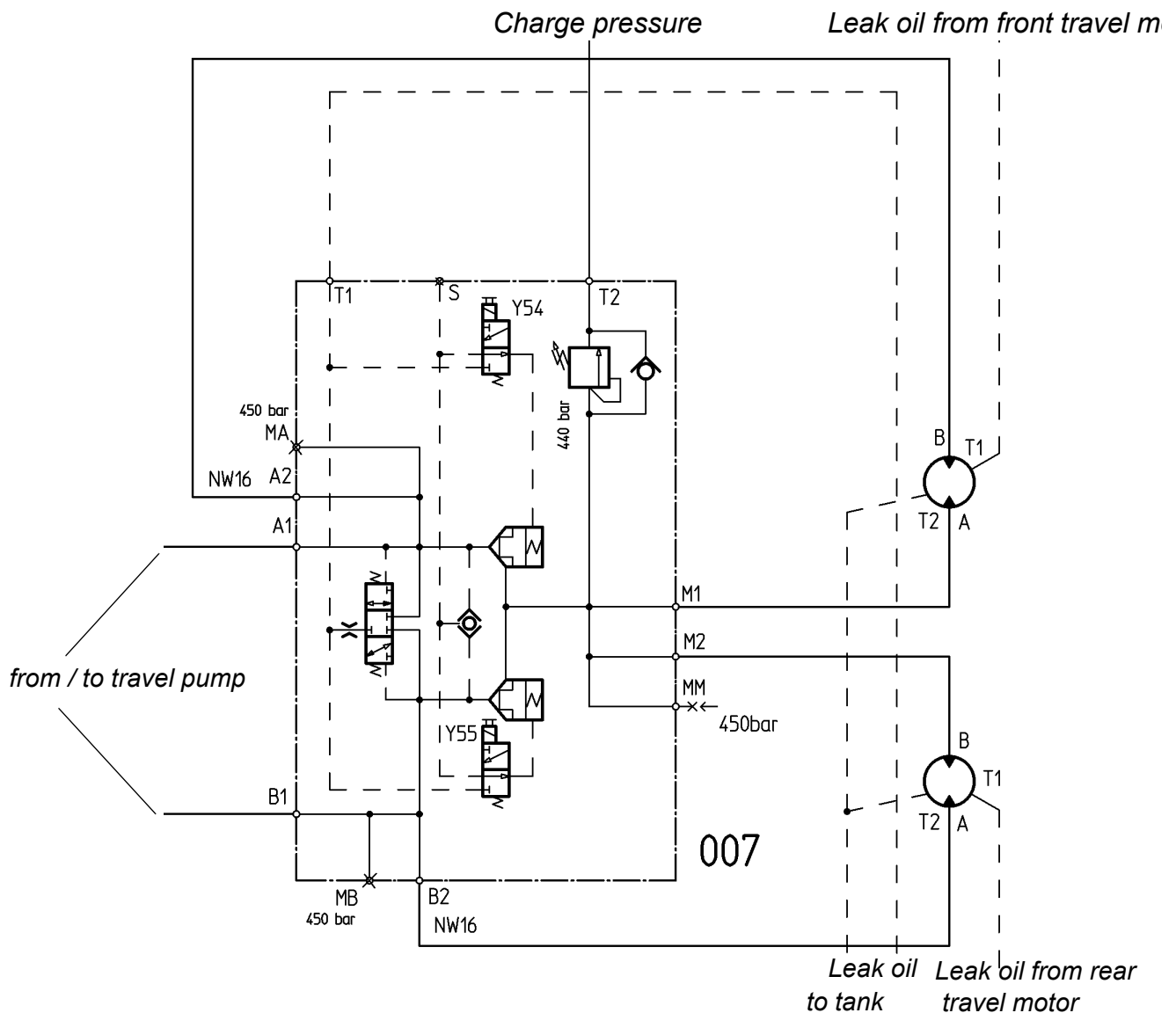


Fig. 7 Vibration shut-off valve

With this vibration shut-off valve the vibration motors can be switched on and off individually.

The vibration shut-off valve is a solenoid operated pilot controlled valve. It controls start, stop of vibration and flow direction of the flow volume.

Flushing valve

The housing of the vibration shut-off valve contains a flushing valve. The flushing valve is connected with both sides of the closed circuit.

When the vibration is switched on the high pressure side of the closed circuit moves the flushing piston and opens a discharge channel for oil from the low pressure side.

Oil flows now from the low pressure side back to the tank. This oil is immediately replaced by fresh, cooled and filtered oil from the charge circuit.

The flushing quantity is limited by the valve piston.

If the flow direction of the oil changes (when changing the vibration frequency), the flushing valve shifts to the other side and opens the discharge channel for the opposite side of the closed circuit (now low pressure side).

If the vibration is not operated the flushing spool is centered in neutral position by two pressure springs.

The flushing valve has the function to maintain the temperature in the hydraulic system at a permissible level.

Drum BW 161 AD-4

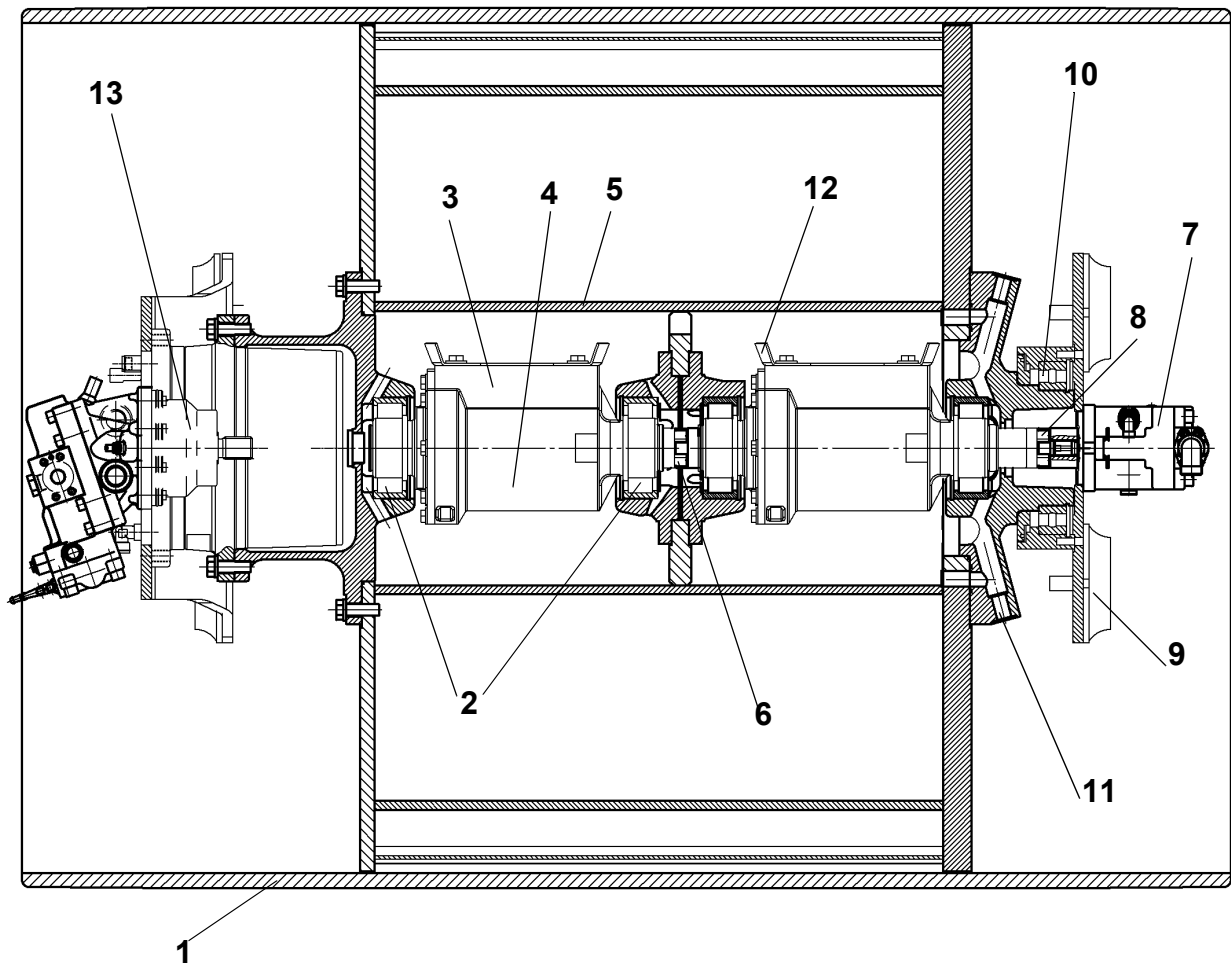


Fig. 8 Drum BW 161 AD-4

- | | | | |
|----|--------------------------|----|--------------------|
| 1 | Drum shell | 2 | Vibration bearing |
| 3 | Basic weight | 4 | Change-over weight |
| 5 | Vibration housing | 6 | Elastic couplings |
| 7 | Vibration motor | 8 | Elastic coupling |
| 9 | Rubber buffer | 10 | Travel bearing |
| 11 | Oil drain / filler bores | 12 | Oil paddles |
| 13 | Travel drive unit | | |

Drum BW 202 AD-4

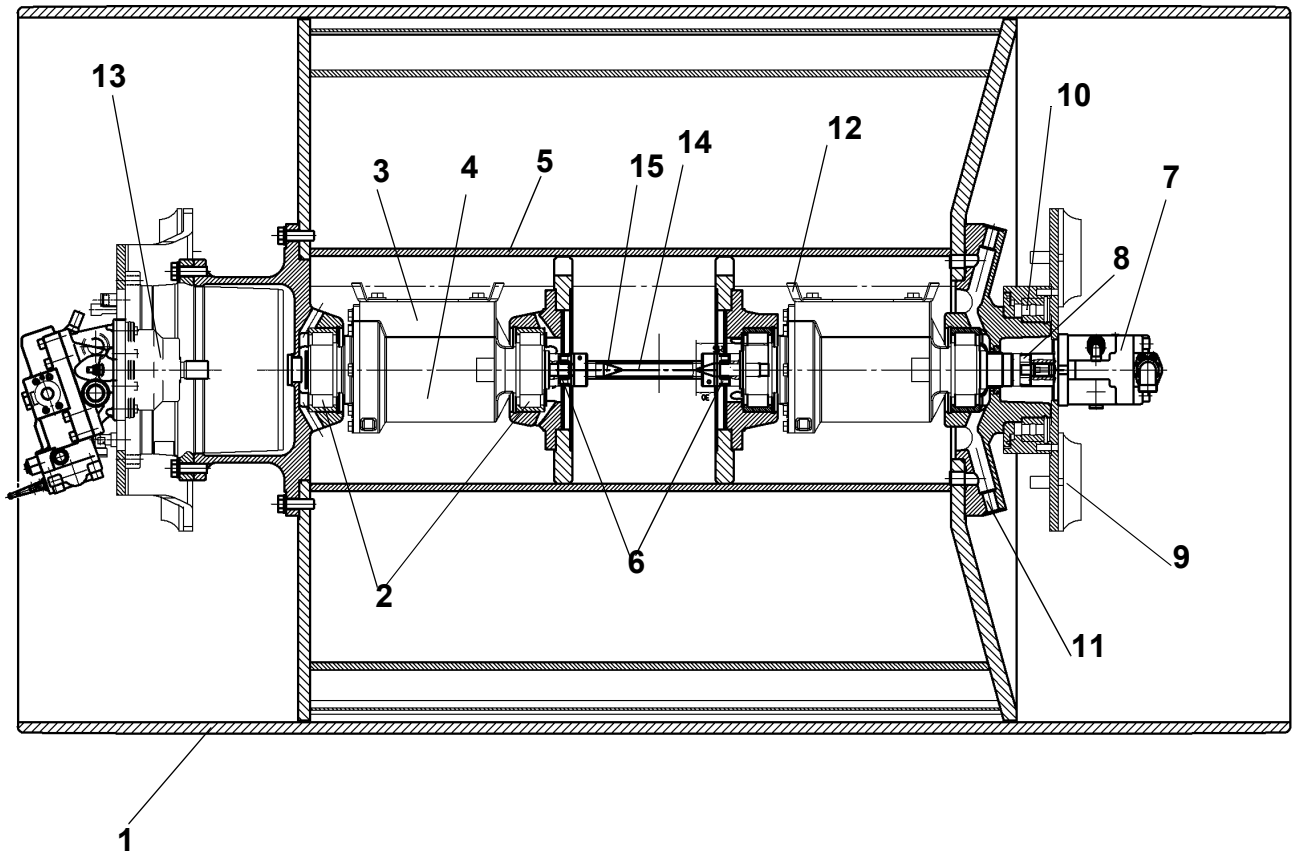


Fig. 9 Drum BW 202 AD-4

- | | | | |
|----|--------------------------|----|--------------------|
| 1 | Drum shell | 2 | Vibration bearing |
| 3 | Basic weight | 4 | Change-over weight |
| 5 | Vibration housing | 6 | Elastic couplings |
| 7 | Vibration motor | 8 | Elastic coupling |
| 9 | Rubber buffer | 10 | Travel bearing |
| 11 | Oil drain / filler bores | 12 | Oil paddles |
| 13 | Travel drive unit | 14 | Connecting shaft |
| 15 | Centring point | | |

3D-cut-away drawing of drum

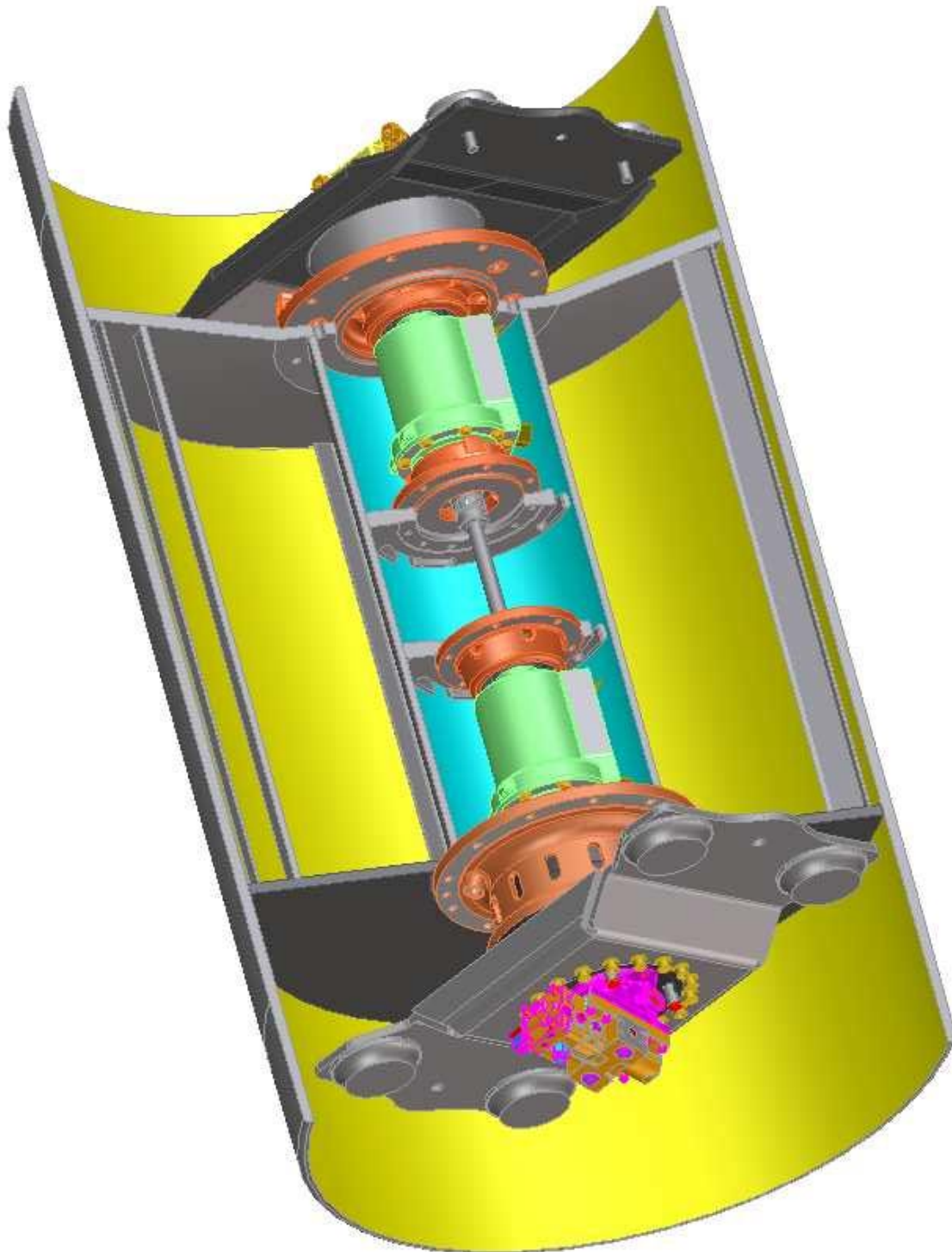


Fig. 10 3D-cut-away drawing of drum BW 202 AD-4

Exciter weights

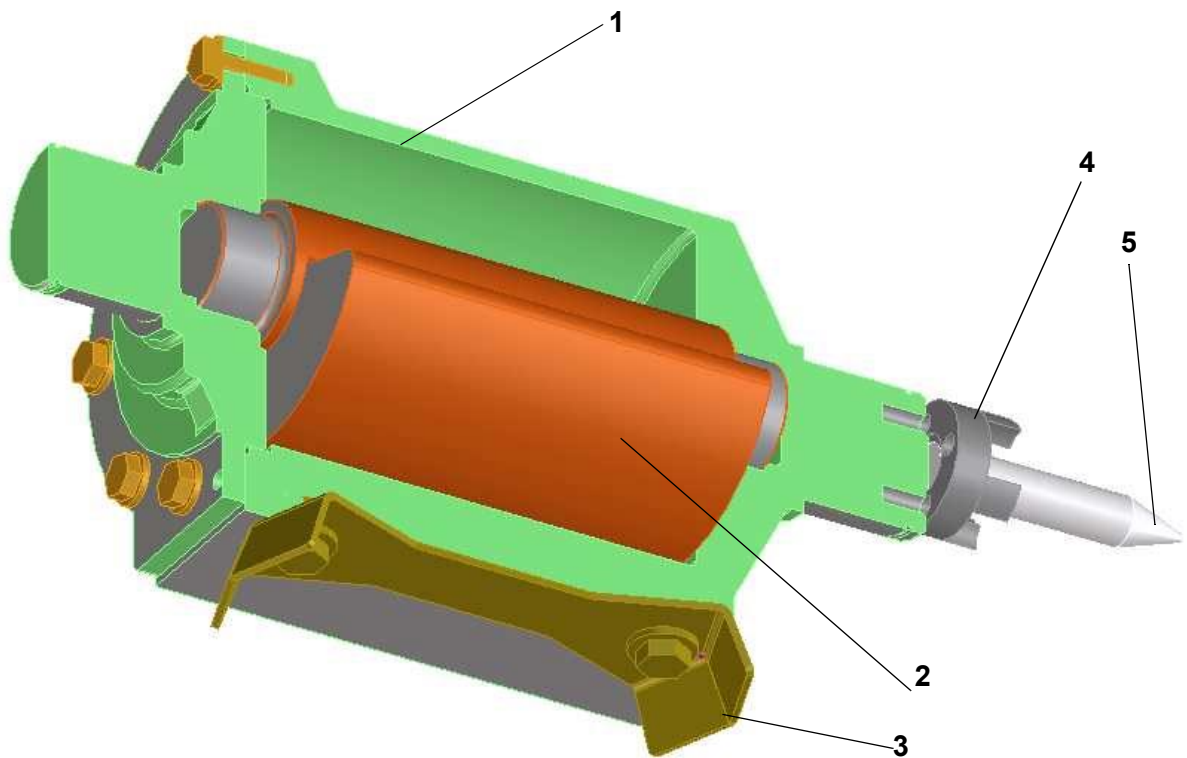


Fig. 11 Exciter unit on travel drive side BW 202 AD-4

- 1 *Basic weight*
- 2 *Change-over weight*
- 3 *Oil paddle*
- 4 *Claw-type coupling (connection to opposite side)*
- 5 *Centring point for assembly*

Test and adjustment points, vibration system

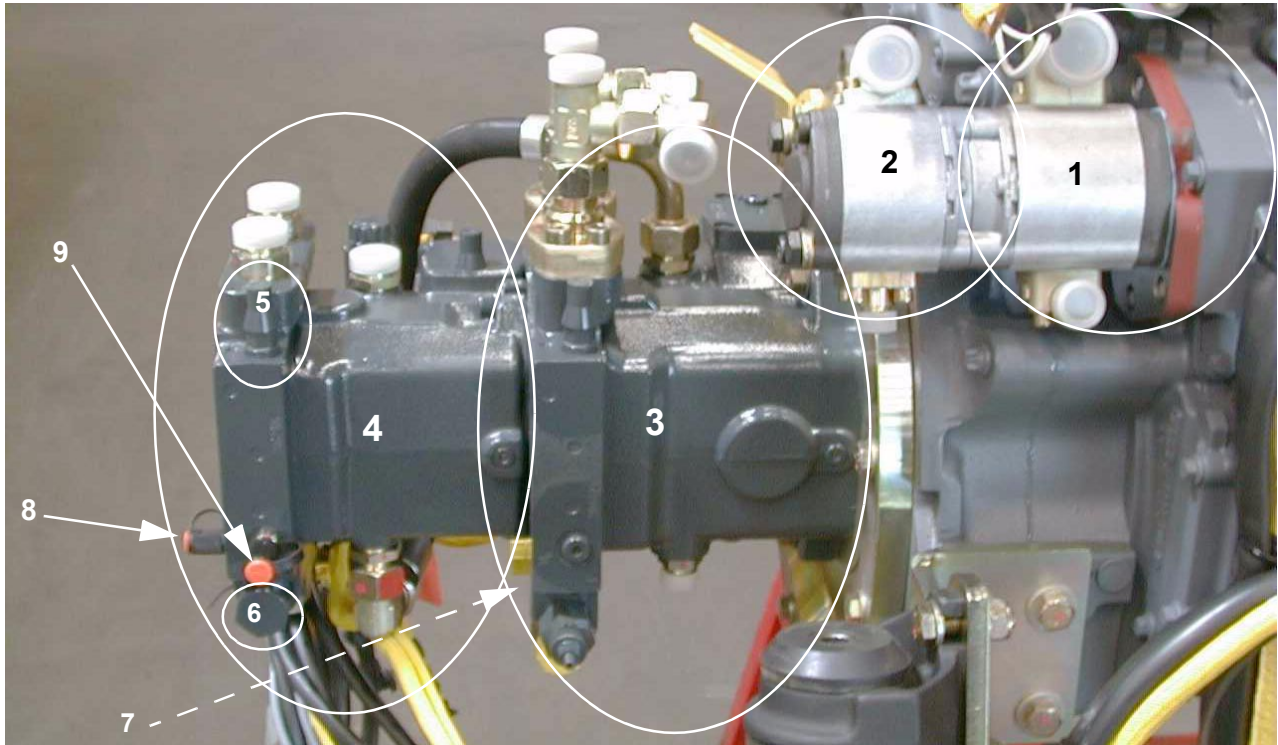


Fig. 12: Pump assembly

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering/charge pump		002, 16 ccm	205 +/-15 bar on steering pressure test port on filter
2	Pump for blower/crab-walk/charge pump		002, 8ccm	205 +/-10 bar on fan test port on filter
3	Travel pump		005	420 +/- 10 bar
4	Vibration pump		006	380 +/-40 bar
5	Pressure override vibration pump			380 +/-40 bar
6	High pressure relief valve, vibration high amplitude (low amplitude opposite)			405 bar abs.
7	Charge pressure relief valve, bottom of travel pump		in 005	25 bar
8	Pressure test port, charge pressure			25 +/-3/-1bar
9	Pressure test port for high amplitude			Starting pressure 340 - 380 bar

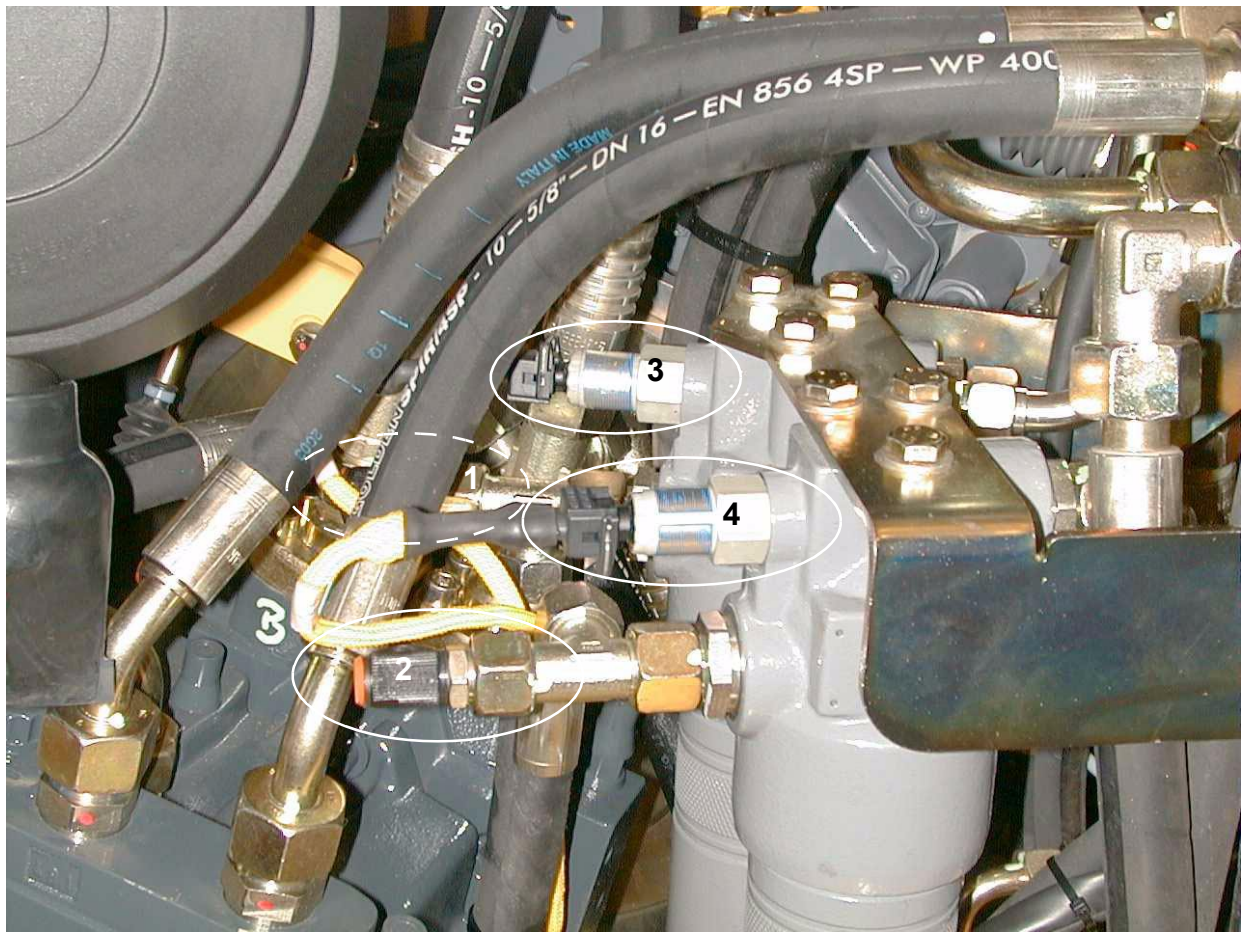


Fig. 13 Hydraulic pressure filter

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering pressure test port			approx. 170 bar
2	Fan test port			205 +/-15 bar
3	Pressure differential switch	B21	008	Δp 3,5 bar
4	Pressure differential switch	B21	008	Δp 3,5 bar

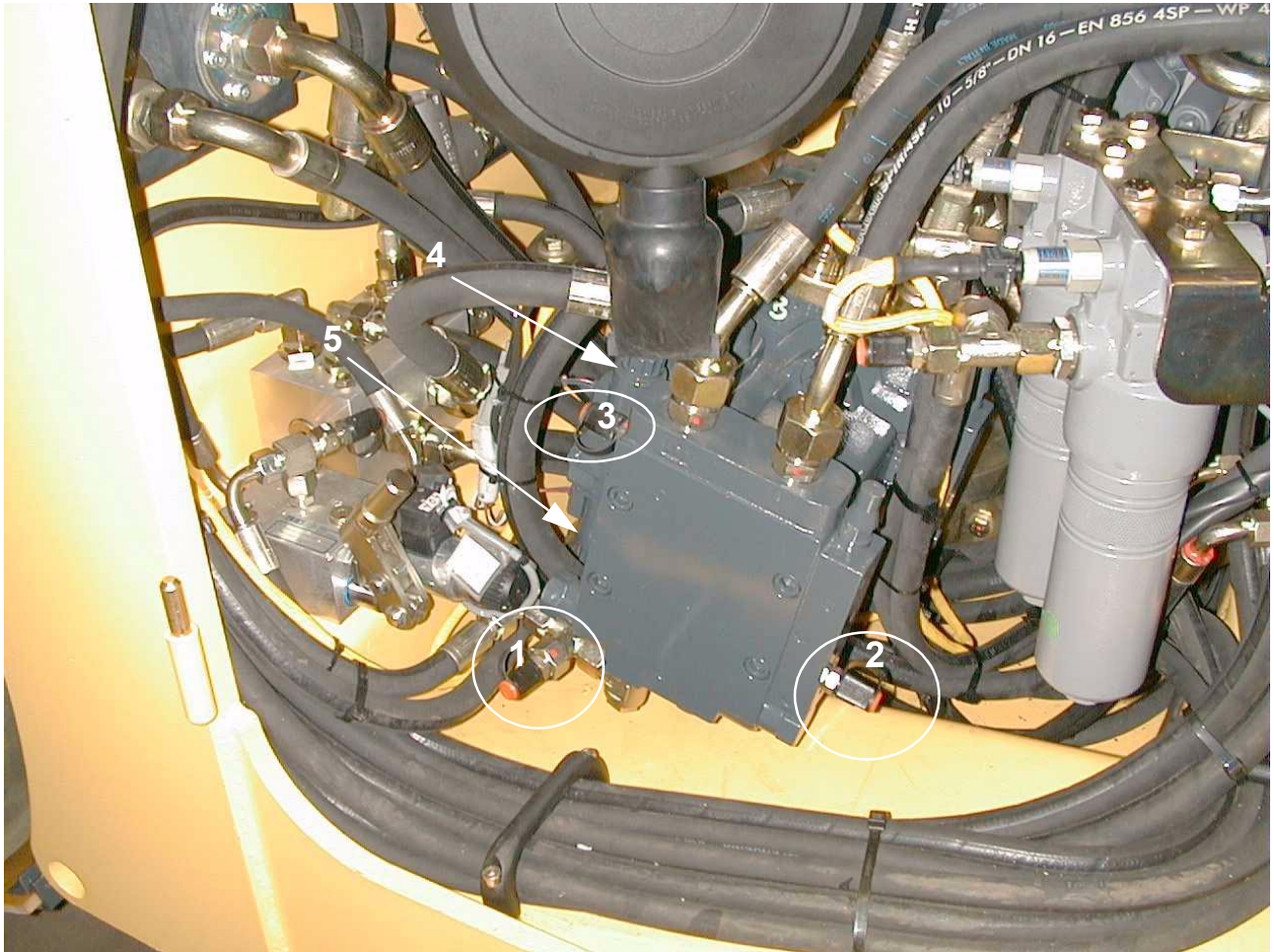


Fig. 14 Vibration test ports on tandem pump

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Pressure test port, charge pressure		M5	25 +3/-1bar
2	Pressure test port for high amplitude		M6	Starting pressure 340 - 380 bar
3	Pressure test port for low amplitude		M7	Starting pressure 340 - 380 bar
4	Solenoid for high amplitude	Y57	Y57	0/12 V
5	Solenoid for low amplitude	Y56	Y56	0/12 V

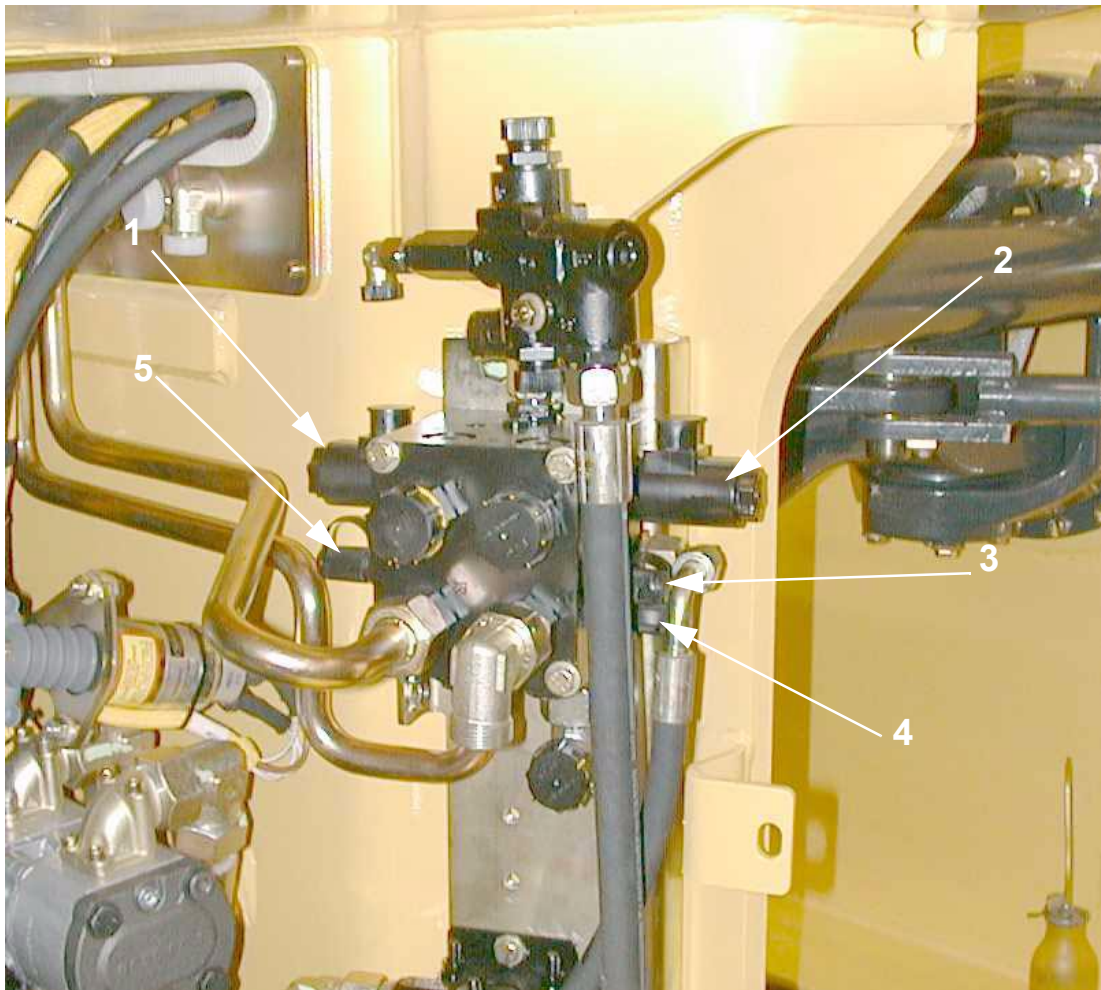


Fig. 15 Vibration shut-off valve

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Solenoid valve, rear vibration	Y 55	Y 55	0 / 12V
2	Solenoid valve, front vibration	Y 54	Y 54	0 / 12V
3	Pressure test port MM (between motors)		007, MM	max. 380 bar
4	Pressure test port MA before/after front vibration motor		007, MA	max. 380 bar
5	Pressure test port MB before/after front vibration motor		007, MB	max. 380 bar



Fig. 16 Vibration motor front/rear

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	High pressure connections			
2	Cross-flushing			



Fig. 17 Travel lever, left

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Proximity switch, brake	B63		Normally closed, 0 / 12V
2	Potentiometer for travel lever position	B39		Ground X 93:1 Supply: 8.5 V an X93:2 4-20 mA output on X93:3

Trouble shooting

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.

TROUBLESHOOTING

Steering

The machines described in this manual are equipped with a hydraulically operated articulated steering.

The steering system consists mainly of:

- the steering/charge pump (1st gear pump on diesel engine),
- the steering valve,
- the priority valve,
- the steering cylinders and
- the pressure resistant connecting hoses

The machines are fitted with two steering wheels, one for each seat. However, the machines are fitted with only one steering valve arranged between the steering wheels. Both steering wheels and the steering valve are therefore connected by two endless chains.

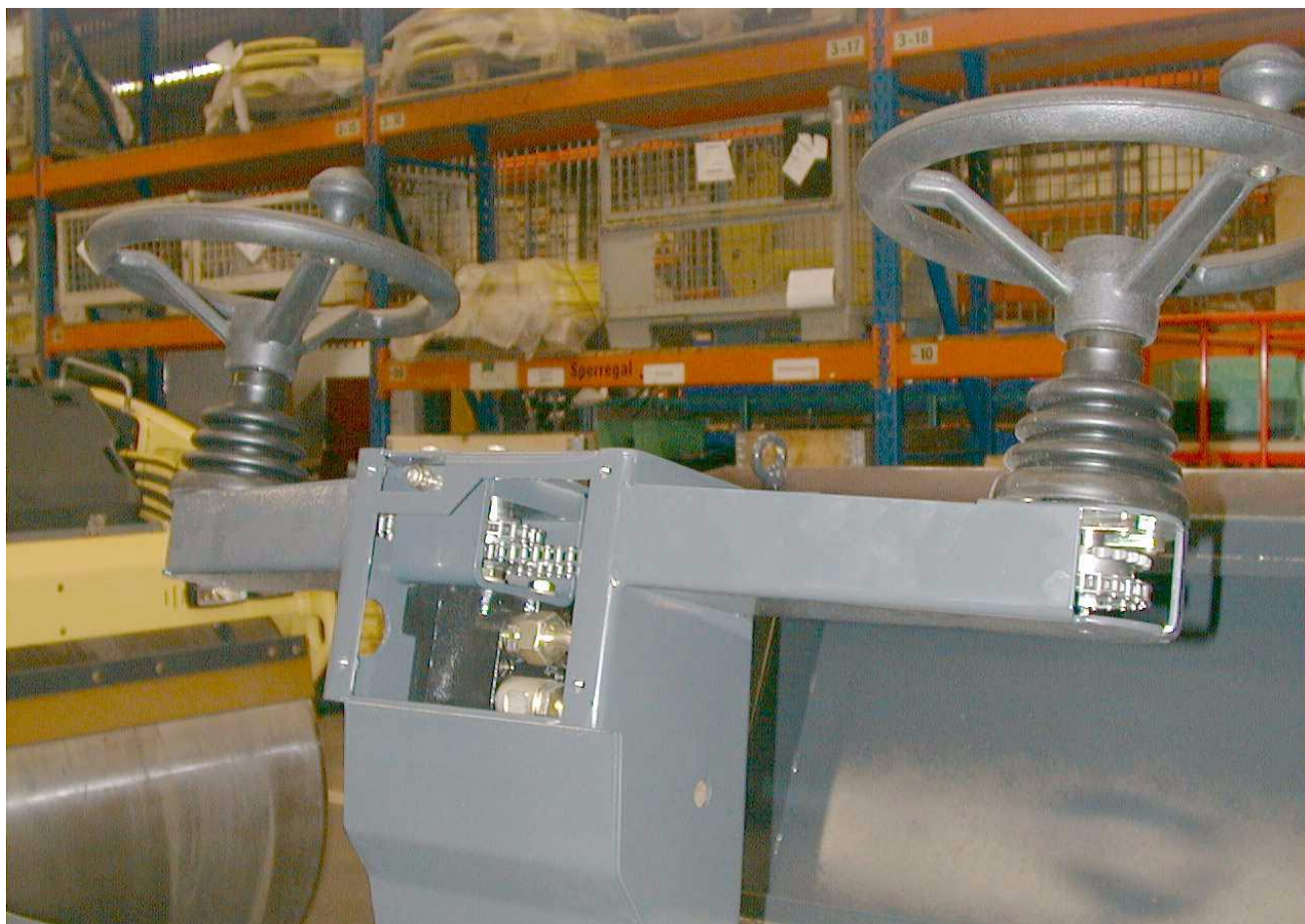


Fig. 1: Steering column with steering valve and steering wheels

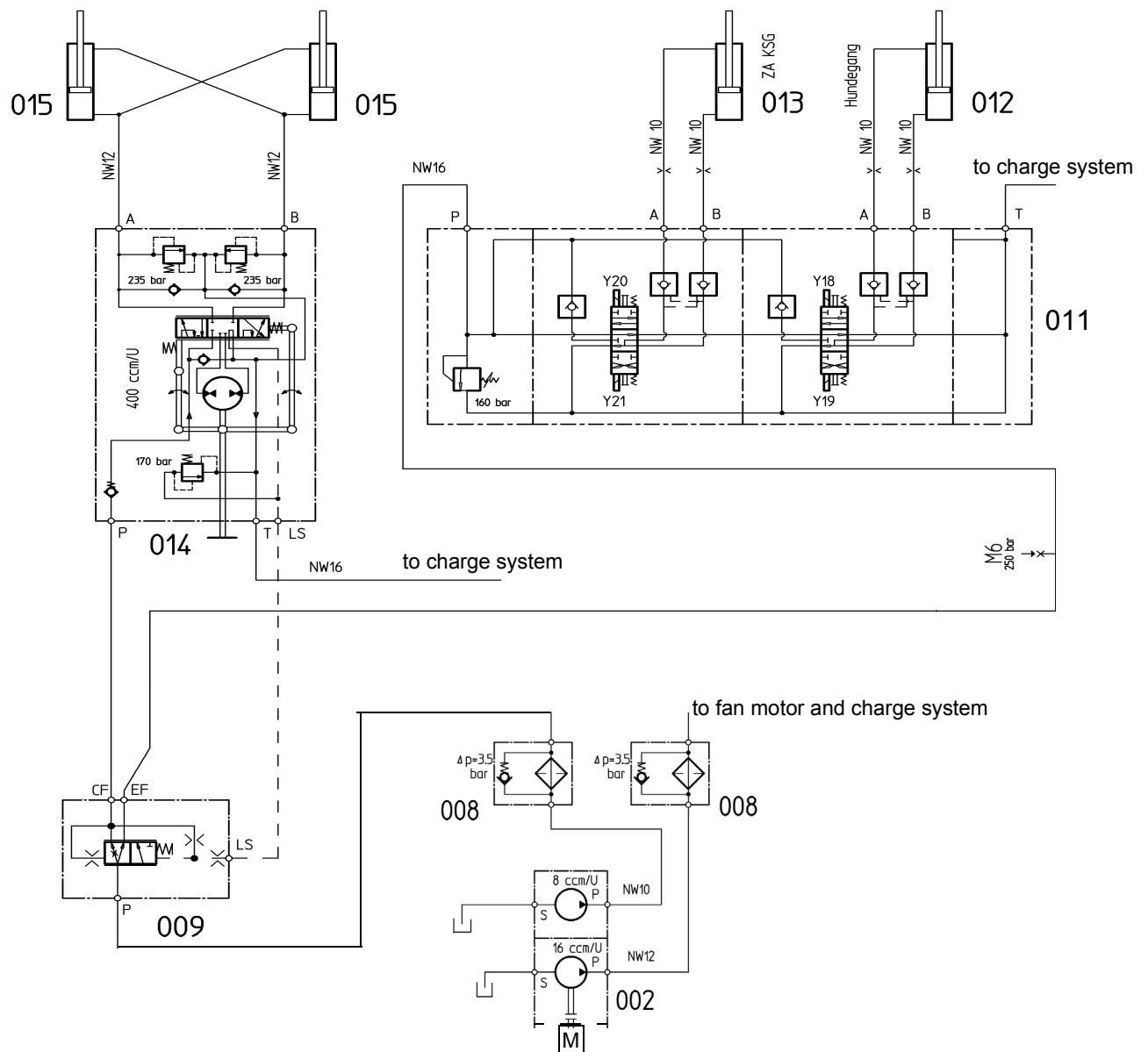


Fig. 2: Hydraulic diagram of steering system

- | | |
|----------------------------------|-----------------------------------|
| 002 tandem steering-/charge pump | 008 pressure filter |
| 009 priority valve | 014 steering valve |
| 015 steering cylinder | 011 crab-walk valve |
| 012 crab-walk cylinder | 013 cylinder edge cutter (option) |

As the steering pump also supplies the hydraulic oil for the charge circuit for travel and vibration drives as well as the crab walk facility besides the steering, the system is equipped with a priority valve. The priority valve ensures that the steering will always be prioritized under any condition. The priority valve is triggered by the steering valve through the LS-line. This valve restricts the oil flow to charge circuit and crab-walk whenever oil is needed for the steering. However, this does not mean that in such a case there would be a lack of oil for the charge circuit, because the return flow from the steering is directly fed into the charge circuit.

The steering pump supplies the hydraulic oil from the hydraulic oil tank through the pressure filter and the priority valve to the steering valve. If the steering is not operated, the complete oil flow will flow via the crab-walk valve to the charge ports for the travel and vibration circuits.

When operating the steering the steering valve will generate a load signal „LS“, informing the priority valve that more oil should be directed to the steering.

When turning the steering wheel the distributor valve guides the oil flow to the corresponding steering cylinder sides.

A rating pump inside the steering unit measures the exact oil quantity corresponding with the turning angle of the steering wheel and delivers the oil to the steering cylinders.

The steering cylinders extend or retract and articulate the machine.

The steering valve contains also a pressure relief valve. This valve limits the steering pressure to 170 bar. Since the oil is available for the charge circuit after it as left the steering unit, the charge pressure of 25 bar must be added to this value. The maximum steering pressure is therefore approx. 195 bar.

Sudden pressure peaks, which may be caused by e.g. external effects, are compensated by two 235 bar shock valves in the high pressure lines to the steering cylinders.

Steering/charge pump

The steering/charge pump is a tandem gear pump with fixed displacement. Pump section 1, which is directly mounted to the engine (16 ccm), supplies the steering and the crab-walk valve, the second 8 ccm pump unit serves the fan motor. After serving the above mentioned functions both pump flows are united for the charge oil supply.

The tandem pump is driven by the auxiliary drive of the diesel engine and draws the hydraulic oil directly out of the oil tank. The oil then flows through a pressure filter to the steering valve or the fan motor and from there to the charge system, or, if a steering wheel is actuated, to the steering cylinders.

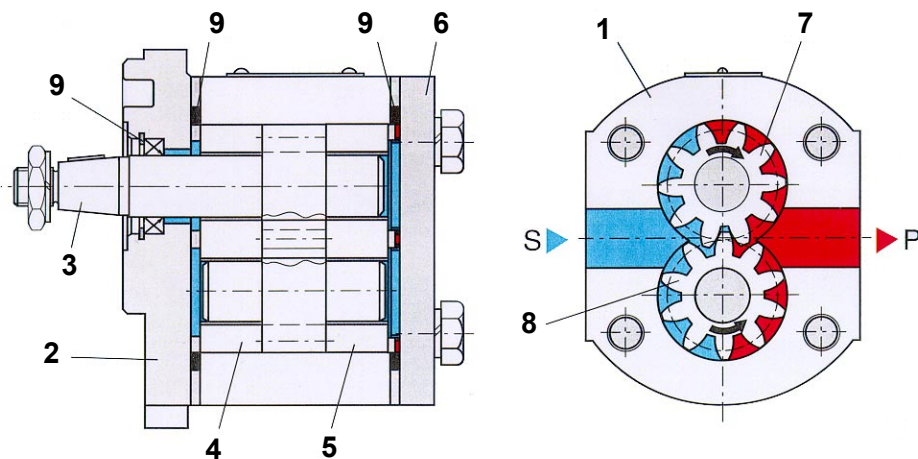


Fig. 3: Steering pump, individual

1	Housing	4, 5	Bearing plates	9	Seals
2	Flange	6	Cover		
3	Shaft	7, 8	Pinions		

Function of the gear pump

The drive gear of the steering pump is connected with the auxiliary drive of the diesel engine via a coupling. Drive gear and driven gear are positioned by a bearing plate in such a way, that the teeth of both gears mesh with minimum clearance when rotating.

The displacement chambers are formed between the tooth flanks, the inside wall of the housing and the faces of the bearing plates. The chambers transport the hydraulic oil from the suction side to the pressure side. This generates a vacuum in the suction line, which draws the hydraulic oil out of the tank. These tooth chambers transport the hydraulic oil along the inside wall of the housing from the suction side to the pressure side, from where it is pressed to the consumers. To ensure a safe function of the pump the tooth chambers must be so tightly sealed that the hydraulic fluid can be transported from the suction side to the pressure side without any losses.

Outer gear pumps are fitted with gap seals. This results in pressure level dependent fluid losses from the pressure side to the suction side. An axial pressure field presses the bearing plate on the cover side

against the front face of the gears, making sure that only a very little quantity of oil will leak from the pressure side to the suction side when the pressure increases during operation.

The pressure field is always under system pressure.

Steering valve

The steering valve consists mainly of:

- the distributor valve,
- the rating pump,
- the steering pressure relief valve and
- the shock valves.

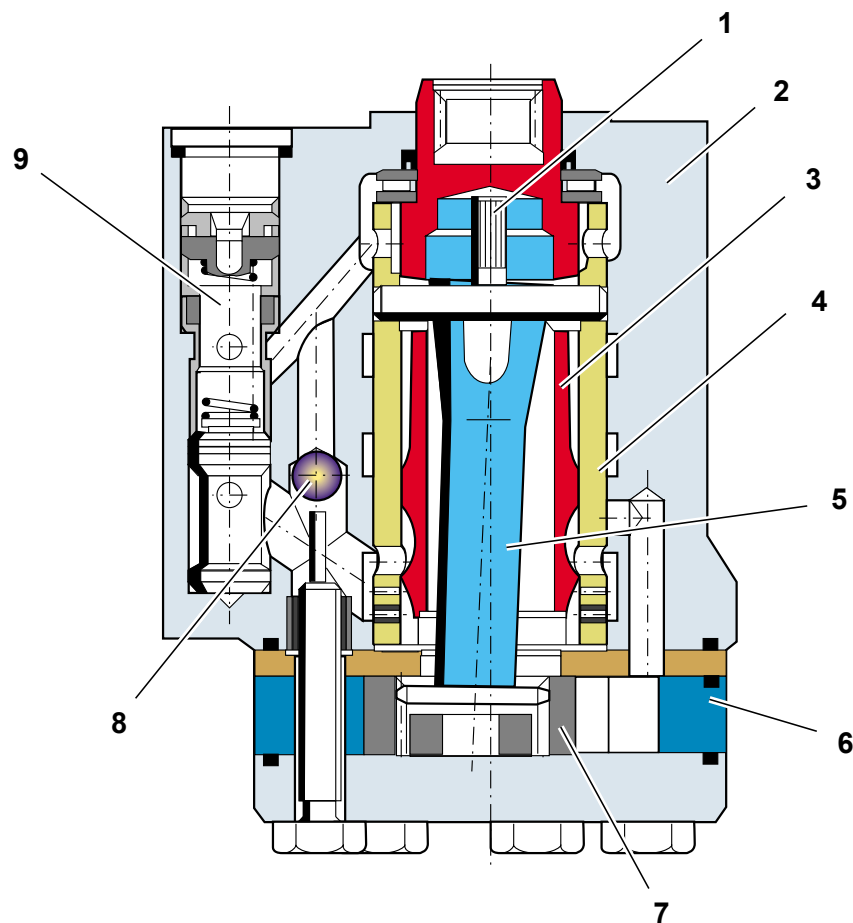


Fig. 4: Steering unit

- | | | | |
|---|-------------------------|---|-----------------------|
| 1 | Neutral setting springs | 6 | Ring gear |
| 2 | Housing | 7 | Gear |
| 3 | Inner spool | 8 | Check valve |
| 4 | Outer spool | 9 | Pressure relief valve |
| 5 | Universal shaft | | |

When turning the steering wheel the oil flow from the pump is guided through the distributor valve to the rating pump and from there to the respective sides of the steering cylinders.

The rating pump determines the exact oil quantity in dependence on the turning angle of the steering wheel.

The high pressure relief valve in the steering unit limits the pressure in the steering system to 170 bar + charge pressure.

The steering unit is equipped with so-called shock valves for both pressure sides to the steering cylinder. These valves are adjusted to 235 bar. They compensate extreme pressure peaks, which can be introduced from outside, e.g. when driving over obstacles. The system is thereby protected against overloads.

Each of these shock valves is fitted with an additional anti-cavitation valve. These anti-cavitation valves protect the system against cavitation which could be caused by the reaction of the shock valves.

A check valve inside the steering unit makes sure that the hydraulic oil cannot flow to the steering pump if forces are introduced from outside. In such a case the steering cylinders would act as pumps and press the oil back to the pump.

Priority valve

Since the pressure oil from the steering pump is also needed for the charge system, the machine is fitted with a priority valve. This valve ensures that the steering will always be prioritized under any condition. The priority valve guides the oil to the following consumers:

- to the steering valve (port CF)
- to the crab-walk valve and from there to the charge circuit (port EF)

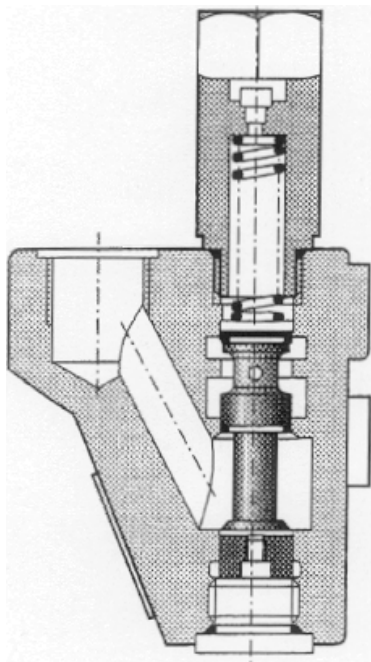


Fig. 5: Priority valve

Distribution of the oil is determined by the switching position of the valve spool. This position depends on the following values:

- the requirements caused by the steering load (LS-signal)
- the oil flow from the steering pump
- the load (pressure) in the steering system (max. 195 bar)
- the load (pressure) in the charge circuit (max. 25 bar)

The load signal (LS) from the steering valve controls the position of the valve spool in the steering angle in such a way, that the oil flow is at any time determined by the steering speed.

Crabwalk

With the crab-walk facility the front frame can be offset to the rear frame for 170 mm to either side. This is of special advantage if the machine is used to compact along the kerb in very tight bends.

The crab-walk control valve consists of the actual electro-magnetically operated valve, the 160 bar (pressure differential) pressure relief valve and the two unlockable non-return valves (pressure retaining valves).

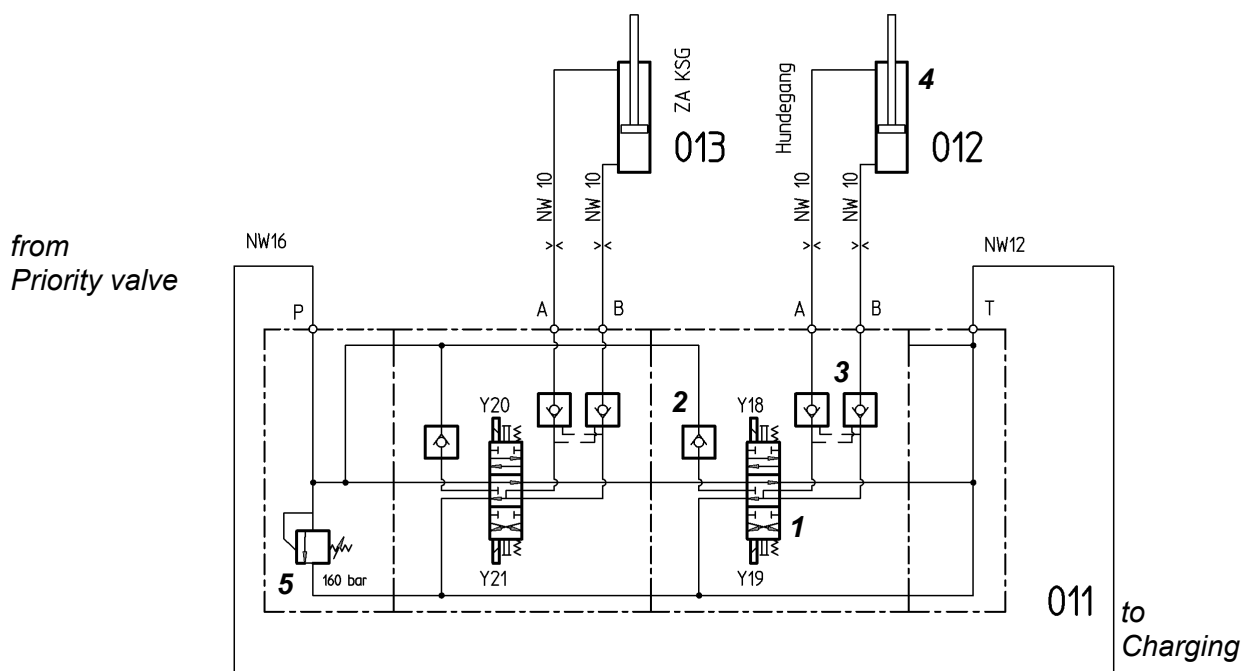


Fig. 6: Circuit diagram crab-walk valve with edge cutter option

- 1 4/3-way solenoid valve for crab-walk
- 2 Check valve
- 3 Pressure retaining valves
- 4 Crab-walk cylinder
- 5 Primary pressure relief valve

If the crab-walk is not operated, the complete oil flow is directed through the open channel in the closed valve to outlet T and from there to the charge circuit.

If the control valve is actuated out of neutral to one of the two active positions, the open oil flow passage is closed and the oil flows through the valve to the corresponding side of the crab-walk cylinder. The unlockable non-return valves lock the oil in the cylinder chambers, until a new control command opens these valves and allows the oil to flow out.

Articulated joint

The articulated joint is the connecting link between the front frame with the drum and the rear frame with operator's stand, diesel engine and drive wheels.

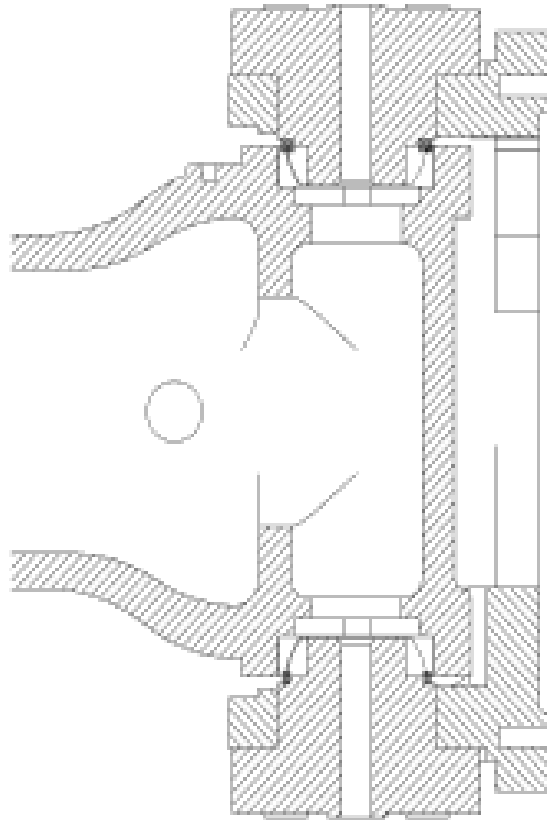


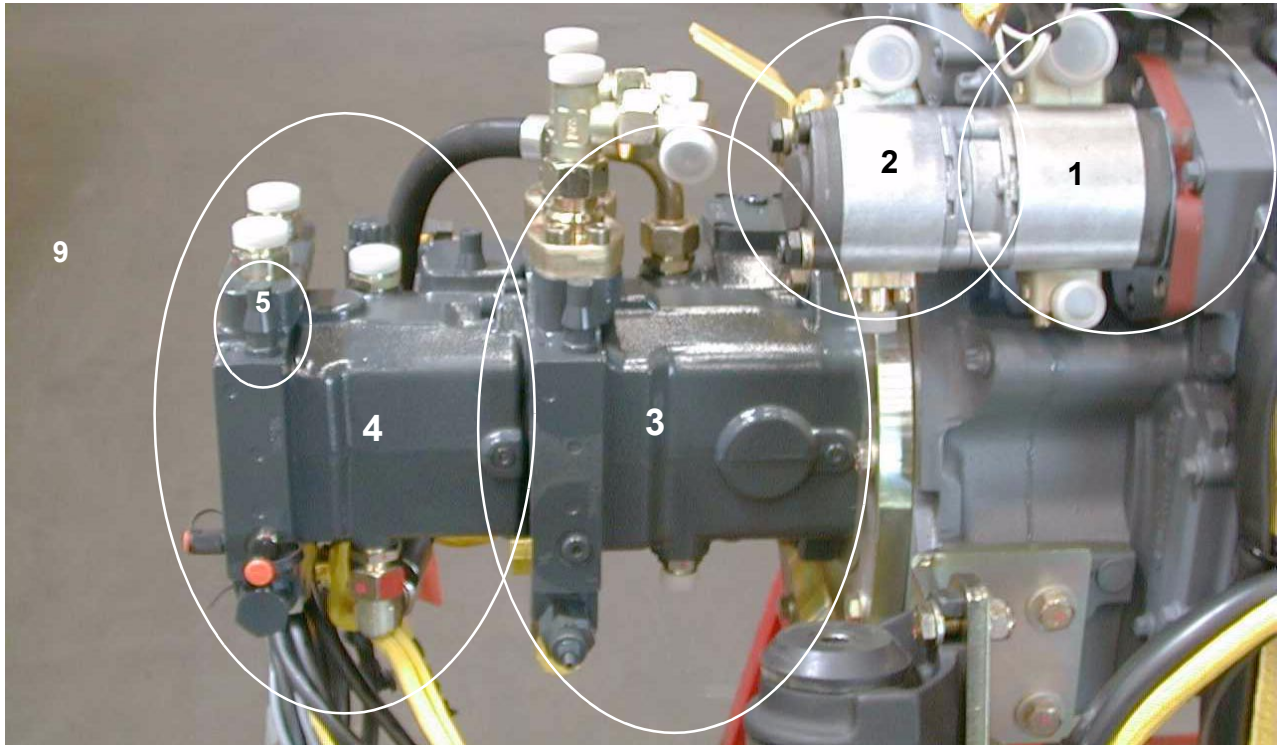
Fig. 7 Articulated joint

The rear console is tightly bolted to the rear frame.

The front console is fastened with screws to the rear cross-member of the front frame. The front console is additionally fitted with the welded on bearings eyelets for the steering cylinders.

When turning the steering wheel the steering will extend or retract. The piston rods swivel the front console around the vertical bolts. The machine articulates and steers.

All bearing points on the articulated joint are maintenance free, lubrication is not required.

Test and adjustment points in the steering system*Fig. 8: Pump assembly*

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering/charge pump		002, 16 ccm	205 +/-15 bar on steering pressure test port on filter
2	Pump for blower/crab-walk/charge pump		002, 8ccm	205 +/-10 bar on fan test port on filter
3	Travel pump		005	420 +/- 10 bar
4	Vibration pump		006	380 +0/-40 bar

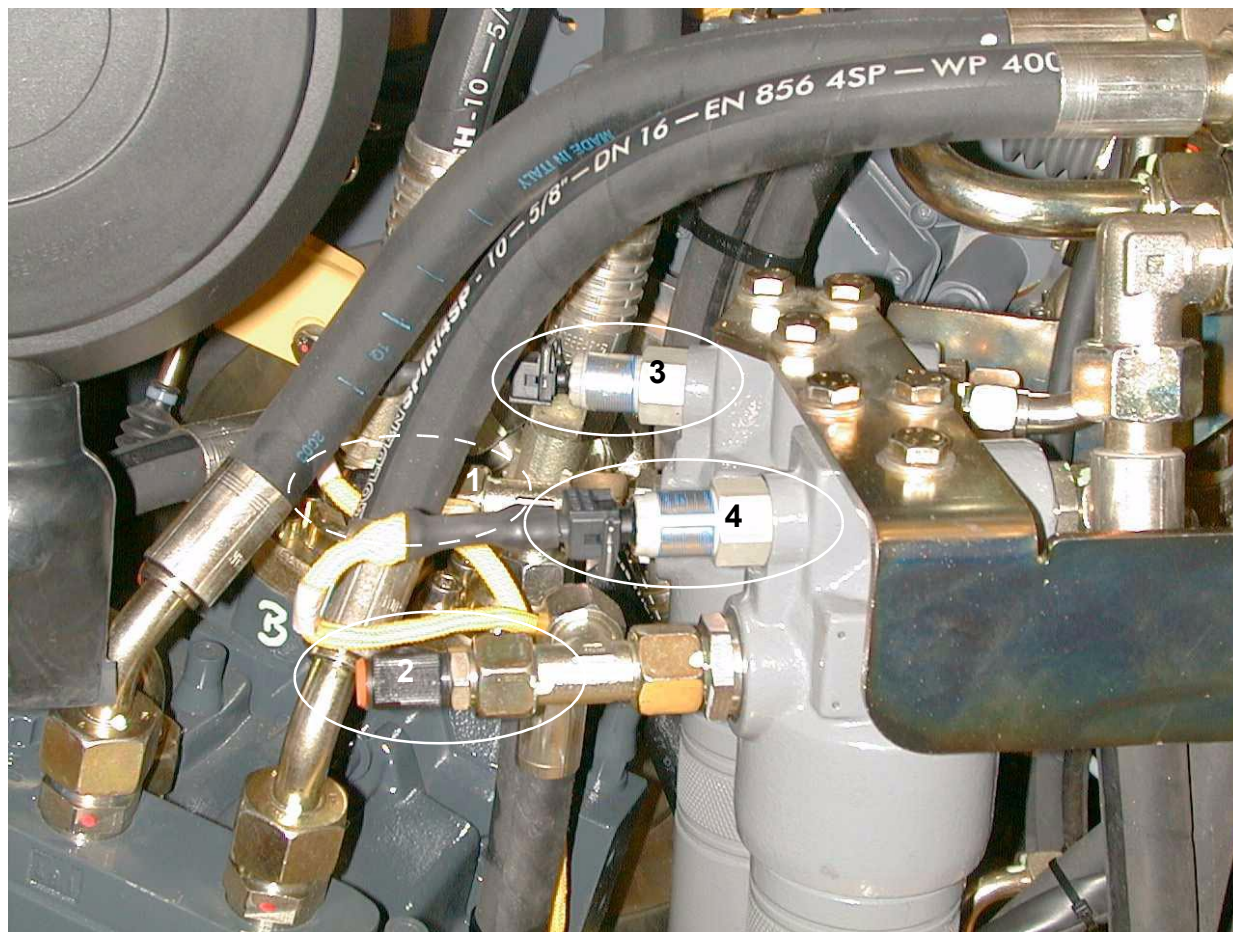


Fig. 9 Hydraulic pressure filter

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Steering pressure test port			approx. 170 bar
2	Fan test port			205 +/-15 bar
3	Pressure differential switch	B21	008	Δp 3,5 bar
4	Pressure differential switch	B21	008	Δp 3,5 bar

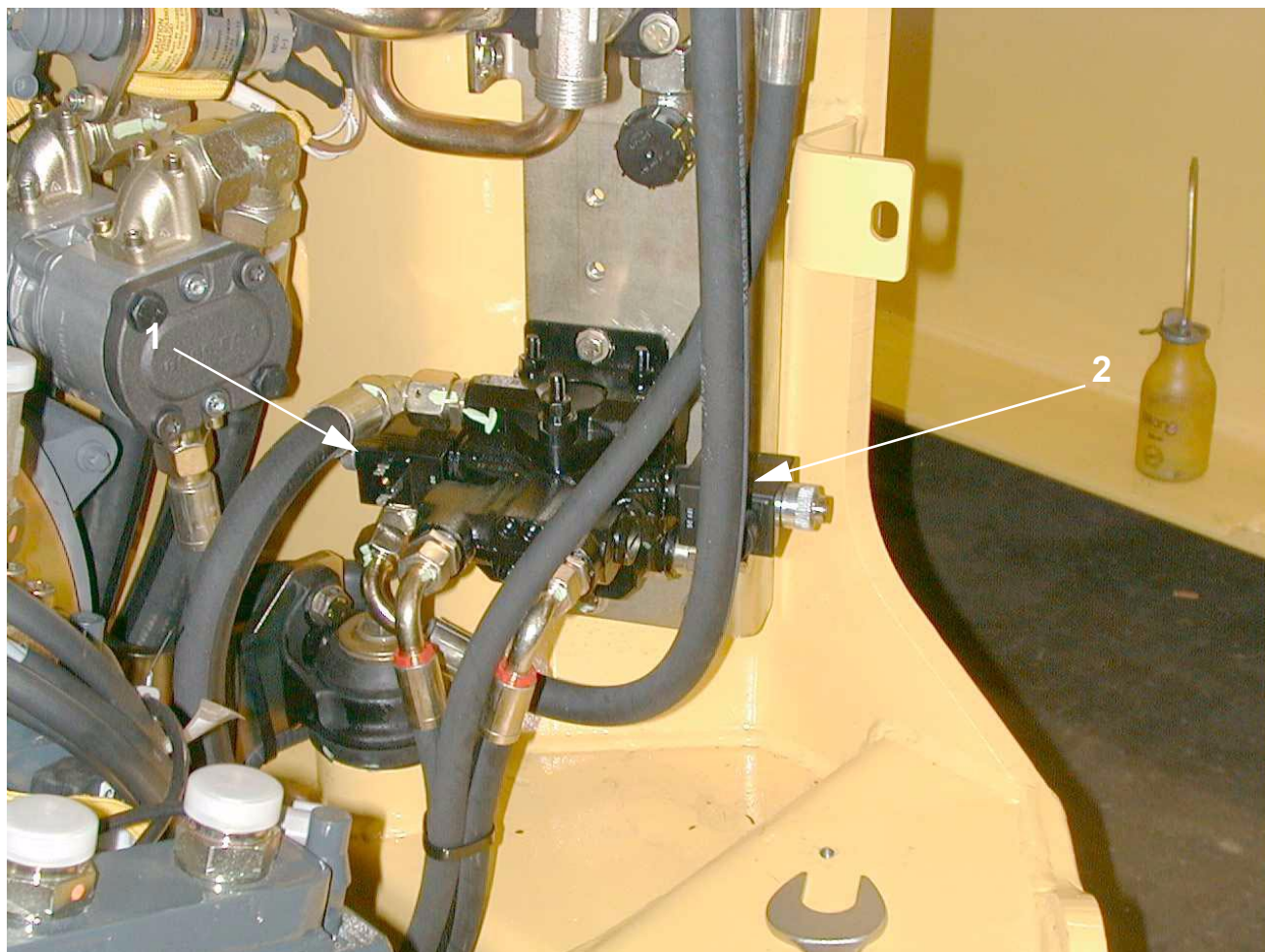


Fig. 10: Crab-walk valve

Pos.	Designation	Pos. in wiring diagram	Pos. in hydraulic diagram	Measuring values
1	Solenoid valve for crab-walk, left	Y 19	Y 19	0/12 V
2	Solenoid valve for crab-walk, right	Y 18	Y 18	0/12 V

Trouble shooting

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.

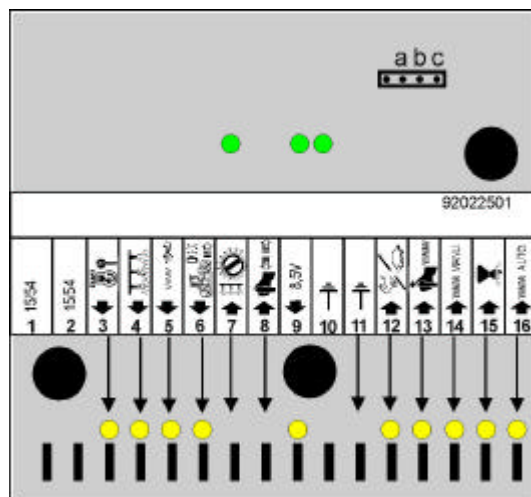
The number specified in the table indicate the probability of the fault cause and thereby the recommended trouble shooting sequence, based on our latest field experience.

TROUBLESHOOTING STEERING BW 161-4 FAMILY

BOMAG

Description UPF04

Travel Lever Monitoring Module / A 03



Version 1.10 dated 23.05.2003

Table of Contents

0	Version History	3
1	Hardware Description	4
1.1	Pin assignment of digital inputs	4
1.2	Pinbelegung analogue Eingänge	4
1.3	Pin assignment for outputs.....	4
2	Description of function	7
2.1	Switching on	7
2.2	Travel lever adjustment and neutral setting	7
2.3	Constant voltage monitoring	8
2.4	Defect on angle sensor.....	8
2.5	Vibration control.....	8
2.6	Sprinkler control.....	11
3	Software version history	14

0 Version History

No.	Version	Date	Description of version	Responsible
1	1.0	18.10.02	Introduction of version 1	Kochhan
2	1.02	05.12.02	Inclusion of sprinkler switch	Kochhan
3	1.10	23.05.03	Revision ADC functions	Fondel

1 Hardware Description

The inputs were designed in such a way, that the following table is applicable:

<i>Input</i>	<i>Performance</i>	<i>Comment</i>
Input PIN12	HIGH -active	LED lights when applying positive voltage!
Input PIN13	LOW -active	LED lights when applying ground potential!
Input PIN14	HIGH -active	LED lights when applying positive voltage!
Input PIN15	HIGH -active	LED lights when applying positive voltage!
Input PIN16	HIGH -active	LED lights when applying positive voltage!

1.1 Pin assignment of digital inputs

Signal name	Module pin	Description
Speed range switch	12	HIGH = High sped range, LED on LOW = Low speed range LED off
Button vibration on	13	LOW = Push button function LED on HIGH = normal state LED off
Switch position vibration manual	14	HIGH = manual vibration set on, LED on LOW = manual vibration set off LED off
Chip spreader signal	15	HIGH = Chip spreader act. on, LED on LOW = Chip spreader act. off LED off
Switch position vibration automatic	16	HIGH = automat. vibr. set on, LED on LOW = automat. vibr. set off LED off

1.2 Pinbelegung analogue Eingänge

Signal name	Module pin	Description
8.5 Volt Voltage output	9	Output 8.5 V for voltage supply of angle sensor. Function o.k. => LED on
Analogue input 1	8	Input for signal 4-20mA Connection for travel lever angle sensor
Analogue input 2	7	Input for signal 0-8.5V 12-stage switch

1.3 Pin assignment for outputs

Signal name	Module pin	Description
Start interlock	3	HIGH = Prevention of starting, LED on LOW = Starting possible LED off
Sprinkling interval	4	HIGH = Sprinkling valve open LED on LOW = Sprinkling valve closed LED off
Vibration on	5	HIGH = Vibration on, LED on LOW = Vibration off LED off

Hardware Description

BOMAG

Backup alarm buzzer	6	HIGH = Buzzer on, LOW = Buzzer off	LED on LED off
---------------------	---	---	---------------------------------

The hardware is available under BOMAG part-no. 959 223 13.

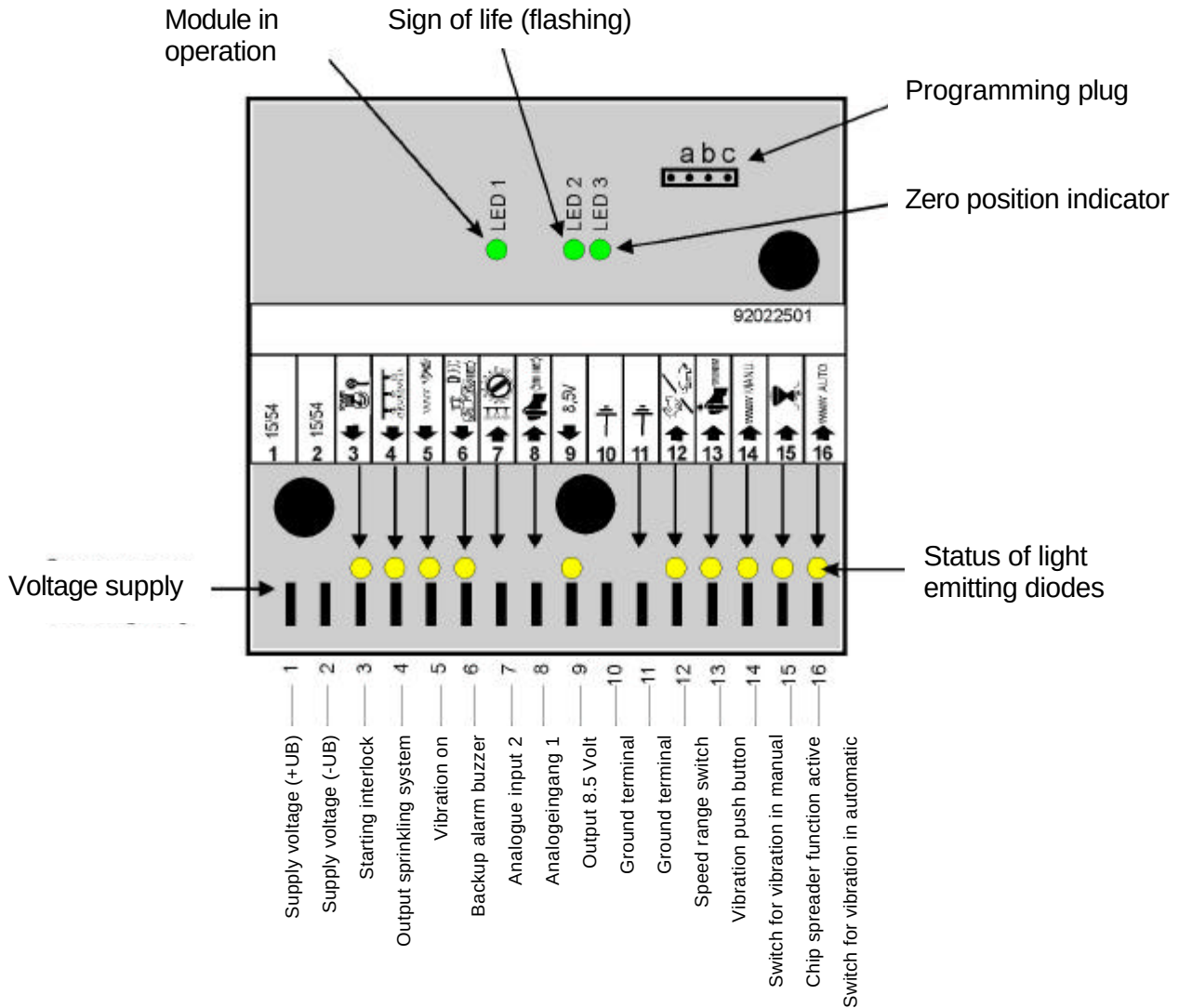


Fig. 1: Module

The complete module (including the specific software) is available under BOMAG part-no. 920 225 01.

The following applies when measuring the signal levels:

PIN	Potential with LED on	Potential with LED off
digital inputs in general	Operating voltage U_B	Voltage $< 1V$
digital input PIN 13 (Vibration button)	Ground 0V	Input open
analogue inputs PIN 7.8	no LED, Voltage between input and ground: $0.35V < U_{PIN} < 2.6V$	

Outputs in general	$\approx$ operating voltage ($U_B - 0.7V$)	Ground 0V ($\ll 1V$)
--------------------	--	------------------------

2 Description of function

2.1 Switching on

When applying operating voltage to the module (PIN1/2 U_B , PIN10/11 ground), LED1 will light up to indicate operation. LED2 flashes as Stay-Alive-Indicator, however, with a flashing frequency which depends on the current at the input PIN8 (analogue input 1). In case of sufficient supply voltage (higher than 9.5 Volt) the reaction of the module is as follows):

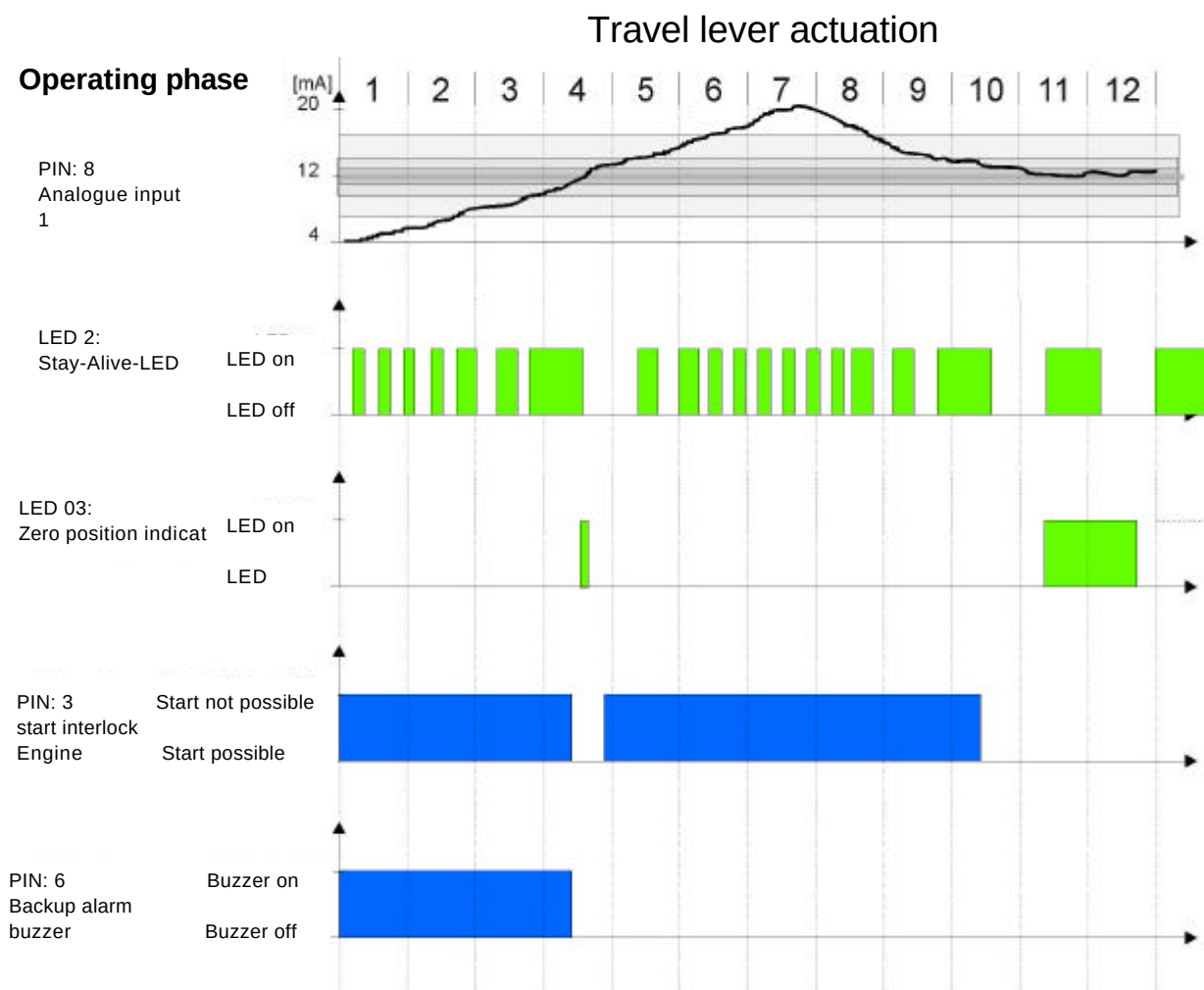


Fig. 2: Effect of the analogue signal on PIN8

If the analogue signal on PIN8 is not within the range of $12\text{mA} \pm 0.4\text{mA}$, the travel lever is in an actuated position and starting of the engine is prevented by application of voltage to PIN3 of the output for *starting interlock* (LED on PIN 3 lights).

2.2 Travel lever adjustment and neutral setting

LED3 serves for the adjustment of the neutral position of the travel lever.

For this adjustment the travel lever should be returned to middle position (as accurately as possible). After this the fastening of the angle sensor must be slackened and the sensor turned, until LED3 in the module lights up.

Description of function

In this case LED2 is used as an adjustment aid. If the flashing frequency of LED2 increases while turning, you are turning in the wrong direction.

If it flashes in intervals of a second, the setting is close to the intended neutral position.

Once LED2 flashes in one second intervals and LED3 lights permanently the sensor should be locked in currently adjusted position.

In order to check the setting the travel lever must be moved in parking position as far as possible forward and backward. The LED on PIN 4 of outlet *start interlock* must not light up while doing so. Otherwise the adjustment procedure must be repeated.

If the sensor adjustment range is not big enough you should change the length of the travel lever connecting link as required.

2.3 Constant voltage monitoring

The flashing frequency of LED 2 indicates whether the 8.5V output voltage of PIN9 is beyond the specified tolerance. If this tolerance is insufficient, the angle sensor is unable to work correctly and the sensor output signal is undefined.

For this reason the flashing frequency of LED2 is set to 80 Hz and LED3 is switched on if the voltage is not sufficient. At the same time output PIN3 is connected to ground (LED on PIN3 is off), independent from the input signal on the analogue input 1 (PIN8), thus enabling starting of the engine even with low battery voltage.

This always takes place in case of a low voltage level on PIN9, which may be caused by a low supply voltage for the complete module (at $U_B < 9.5V$ the voltage of 8.5V on PIN9 can no longer be maintained) or by a defect.

Since the condition of insufficient voltage will generally be passed through when starting (at the moment of switching), LED2 and LED3 will light up for a moment, until the voltage is stable.

The complete module works from a minimum voltage of $U_B = 6.5V$. However, the analogue inputs are only fully functional beyond a supply voltage of 9.5V, because the sensor supply voltage of 8.5V can only be generated if this input voltage is available.

The internal monitoring of the 8.5V voltage ensures a defined start-up performance of the module, even in case of an extreme drop in supply voltage (e.g. start of machine, starting).

2.4 Defect on angle sensor

The current of the intact angle sensor is in the range from 4mA to 20mA.

If the current flowing through PIN8 on the module $I < 2mA$ or $I > 22mA$, the system assumes that there is a sensor fault (defective sensor, short-circuit or sensor not connected, etc.). LED2 and LED3 are then used as indicating elements.

LED2 flashes with a frequency of 200 Hz, LED3 shows permanent light.

In this case the module behaves as if the travel lever had been actuated (LED on PIN 4 (*starting interlock*) lights), because the travel lever position of the is undefined.

2.5 Vibration control

Activation of the vibration (manually or automatically) is only possible if the travel range selector switch is in slow speed range position ($v < 6 \text{ km/h}$). When switching to high speed range the vibration is always shut down.

2.5.1 Manual vibration

If (e.g. via a throw-over switch) positive voltage is applied to PIN 14 (*manual vibration on*), vibration can be switched on via the push button input (*vibration on*) on PIN 13, independently from the travel lever. Vibration is always switched on or off when a distinct ground potential is detected on PIN13. However, no voltage should at this time be applied to PIN15 (*chip spreader on*) (the LED on PIN 15 must not light), because vibration may only be switched on as long as the chip spreader is deactivated!

Description of function

If vibration is switched on the LED on PIN5 will light up. When switching off manual vibration (voltage applied to PIN 14) or pressing the vibration button again, vibration is switched off.

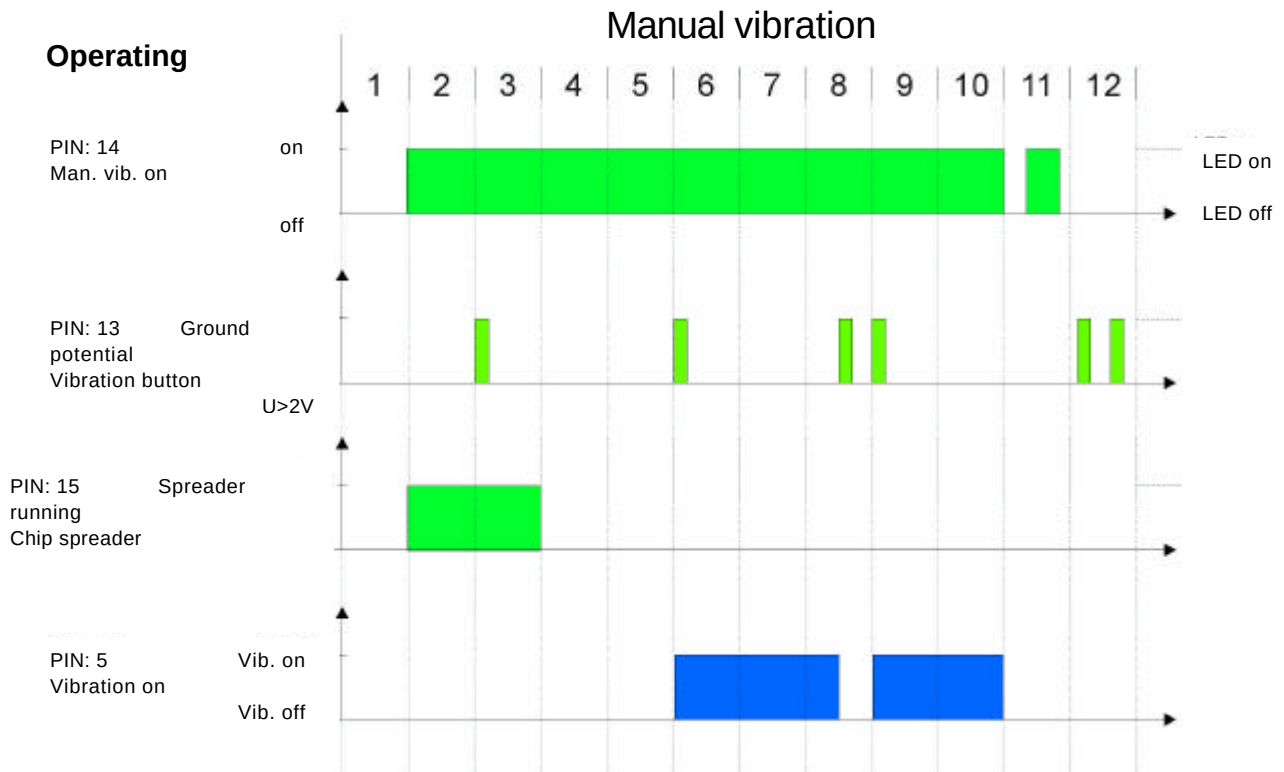


Fig. 3: Manual vibration control

Description of function

2.5.2 Automatic vibration control

If positive voltage is applied to PIN 16 (*automatic vibration on*) the LED on PIN 16 lights up and vibration (PIN 5) is switched on and off in dependence on the travel lever position, but only as long as no voltage is applied to input PIN 15 (*chip spreader*) (LED on PIN 15 off).

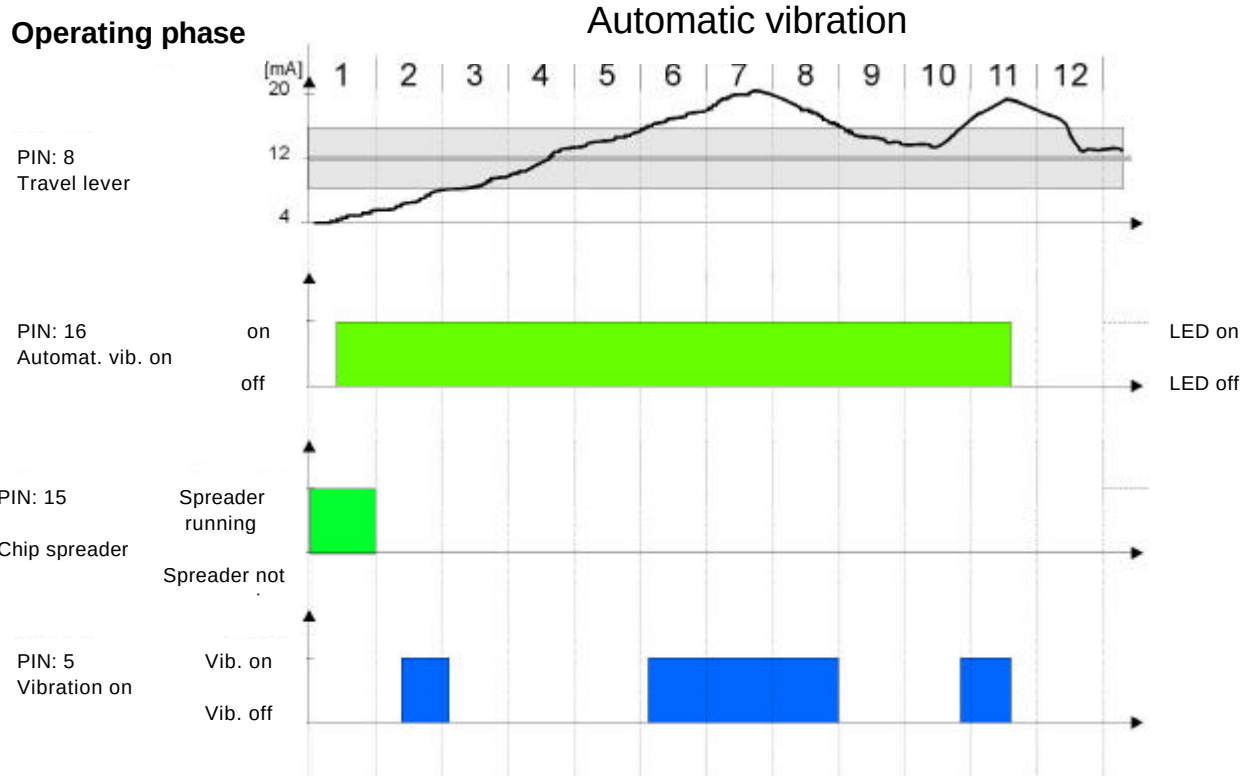


Fig. 4: Automatic vibration control

Description of function

2.6 Sprinkler control

Control of the sprinkling intervals is accomplished by connection of a 12-stage switch to PIN 7. This switch switches resistances in 500 Ω -steps from 500 Ω to 6 k Ω . Similar to the angle sensor, this switch is supplied by the internal 8.5V power supply and an evaluation only takes place if this supply voltage is delivered without any faults (in case of supply faults the last valid value or the start value 50% *Dutycycle* is used).

2.6.1 Sprinkling stages

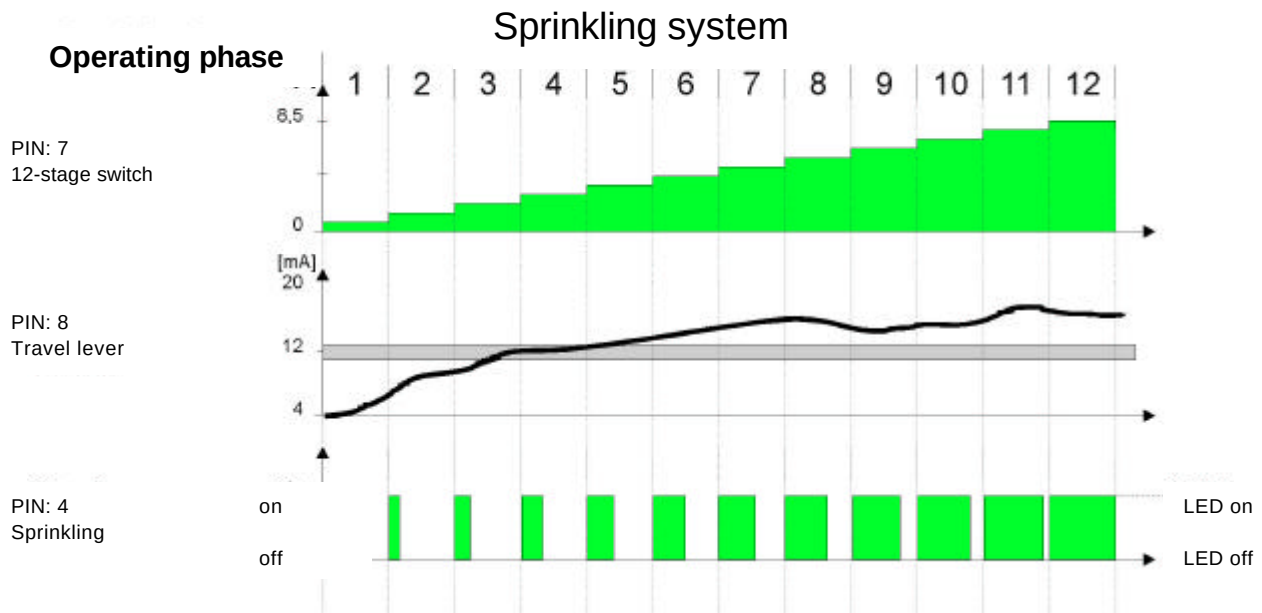


Fig. 5: Sprinkling stages

The total cycle (time for activation and deactivation phase) takes 15 seconds.
The sprinkling intervals are adjusted according to the following table:

Stage	Switch on time	Switch off time	Cycle time
1	0,5 s	14,5 s	15s
2	1,5 s	13,5 s	15s
3	2,5 s	12,5 s	15s
4	3,5 s	11,5 s	15s
5	4,5 s	10,5 s	15s
6	5,25s	9,75s	15s
7	6,0 s	9,0 s	15s
8	7,0 s	8,0 s	15s
9	8,0 s	7,0 s	15s
10	10,0 s	5,0 s	15s
11	12,5 s	2,5 s	15s
12	15,0 s	0,0 s	15s

Description of function

If no switch is connected or the measured voltage value is outside the permissible voltage range, the cycle is set to 50% Duty cycle (meaning the sprinkling is switched on for 7.5 s and switched off for 7.5 s).

Operating

PIN: 7
12-stage switch

PIN: 8
Travel lever

PIN : 4
Sprinkling

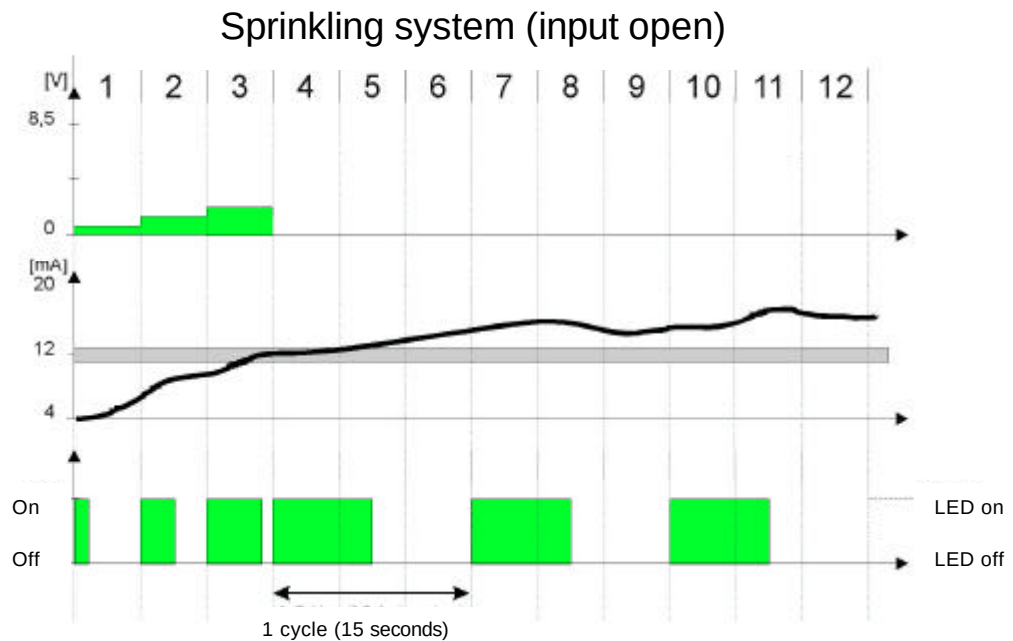


Fig. 6: Sprinkler system switch disconnected

2.6.2 Operation of sprinkler system with machine at rest

When the machine is standing (travel lever in neutral, evaluation of analogue signal on PIN8) sprinkling continues for 30 seconds with the adjusted interval. Once this time has elapsed sprinkling will only restart after actuating the travel lever.

If the switch is in position 12 (permanent sprinkling), sprinkling will continue without time limit, even after the 30 seconds have elapsed!

Operating

Sprinkling at standstill

PIN: 7
12-stage switch

PIN: 8
Travel lever

PIN: 4
Sprinkling

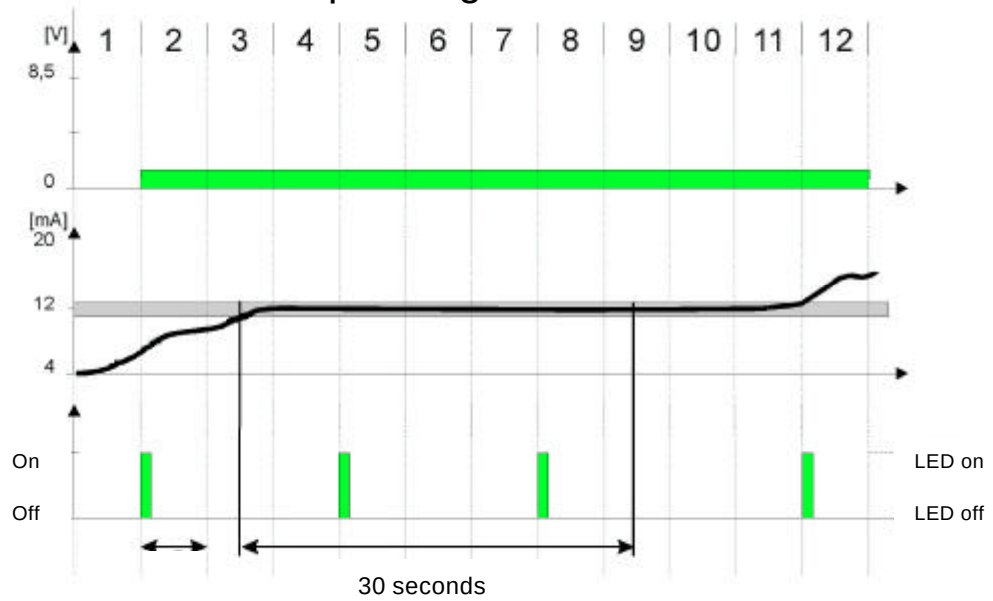


Fig. 7: Example sprinkling at standstill

3 Software version history

Version management:	BOMAG travel lever position monitoring BW 161/202
Module:	BM UPF4
Controller:	PIC16F876

Version 1.01 dated 19.08.2002:

Checksum: 33C7
Creation of version 1.

Version 1.02 dated 04.12.2002:

Checksum: 2A22
Integration of sprinkling interval switch

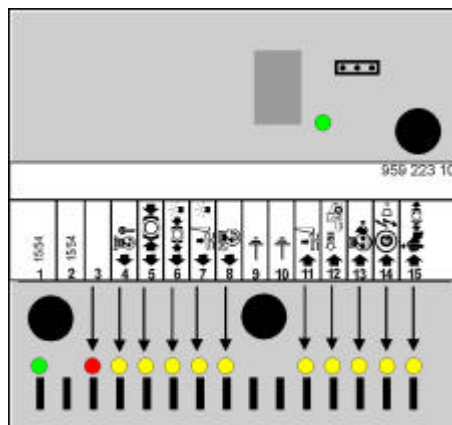
Version 1.10 dated 23.05.03

Checksumme: e4e5
General revision of ADC-handling
Evaluation of analogue values changed

BOMAG

Description UPM03

Seat occupation monitoring module / A 68



Version 1.1 dated 16.06.03

Table of Contents

0	Version history.....	3
1	Hardware description.....	4
1.1	Pin assignment of inputs	4
1.2	Pin assignment of outputs	4
1.3	Emergency operation	5
2	Description of function	7
2.1	Switching on	7
2.2	Engine start	9
2.3	Driving the machine	10
2.4	Engine protection	12
3	Software version history	13

0 Version history

No.	Version	Date	Version description	Responsible
1	1.0	22.08.02	Creation of version 1	Kochhan
2	1.01	05.12.02	Software change (enable starting only via brake switch)	Kochhan
3	1.1	05.06.03	Software change in the area of the seat contact circuitry, introduction of engine shut-down warning	Fondel

1 Hardware description

The seat occupation monitoring module consists of the modified UPM2-module.
The inputs were designed in such a way, that the following table is applicable:

<i>Input</i>	<i>Performance</i>	<i>Comment</i>
Input PIN11	HIGH-active	LED lights when applying operating voltage (+U_B)!
Input PIN12	HIGH-active	LED lights when applying operating voltage (+U_B)!
Input PIN13	LOW-active	LED lights when applying ground potential (0V)!
Input PIN14	HIGH-active	LED lights when applying operating voltage (+U_B)!
Input PIN15	HIGH-active	LED lights when applying operating voltage (+U_B)!

1.1 Pin assignment of inputs

Signal name	Module pin	Signal at input
Seat occupied switch	11	+U _B = driver sitting, LED on 0V = driver standing, LED off
Travel lever	12	+U _B = actuated, roller driving, LED on 0V = 0-position, roller standing LED off
Oil pressure	13	0V = NOT OK, LED on +U _B = OK, LED off
MD+	14	+U _B = ON, LED on 0V = OFF, LED off
Brake lock (contact in travel lever)	15	+U _B = brake closed, LED on 0V = brake released, LED off

1.2 Pin assignment of outputs

Signal name	Module pin	Signal at output
Inrush coil* diesel engine	4	+U _B = energized, LED on 0V = not energized LED off
hydr. brake brake valve	5	+U _B = brake released, LED on 0V = brake applied, LED off
Signal facility brake	6	+U _B = On, LED on 0V = Off, LED off
Warning buzzer seat occupation sensor	7	+U _B = Driver standing Travel lever actuated LED on 0V = Driver sitting LED off
Bias coil diesel engine	8	+U _B = not energized, eng. running LED off 0V = energized, engine off LED an

Hardware description

* Presently not used (PIN without assignment, however, function is implemented), because it is not needed on the presently installed engine!
However, this description also includes a description of this function.

The hardware is available under BOMAG part-no. 05766768.

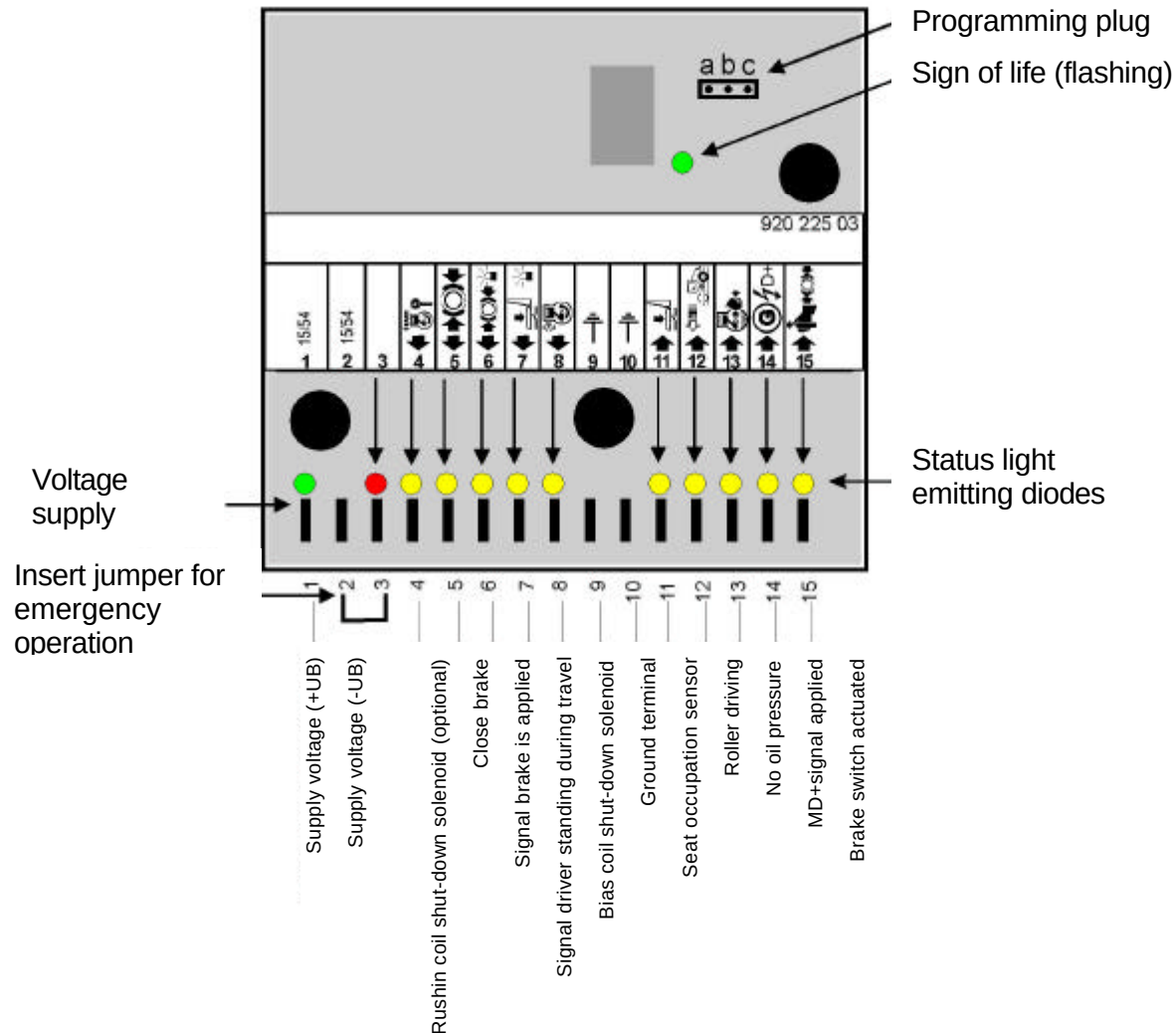


Fig. 1: Module

The complete module (including the specific software) is available under BOMAG part-no. 920 225 03.

The following applied when measuring the signal level:

PIN	Potential with LED on	Potential with LED off
Inputs in general	Operating voltage U_B	Voltage < 1V
Input PIN 13 (oil pressure)	Ground 0V	Input open
Output PIN8	Ground 0V	Output open
Outputs in general	$\approx$ Operating voltage ($U_B - 0,7V$)	Ground 0V ($\ll 1V$)

1.3 Emergency operation

If a jumper is inserted between PIN2 and PIN3, the outputs PIN4, "inrush coil diesel engine" (presently not used) and PIN5 "brake valve for hydraulic brake" are set to HIGH potential, and the corresponding LED and the rd LED on PIN3 light up.

Hardware description

For the machine this means that the brake is permanently open and cannot be closed as long as the jumper remains in position!

This function can be used in events of emergency (defect) to release the hydraulic brake.

2 Description of function

2.1 Switching on

When operating voltage is applied to the module the Stay-Alive LED will first read out version number and revision number by means of a flashing code (at present 1.02). This is followed by the Stay-Alive LED flashing in one second intervals.

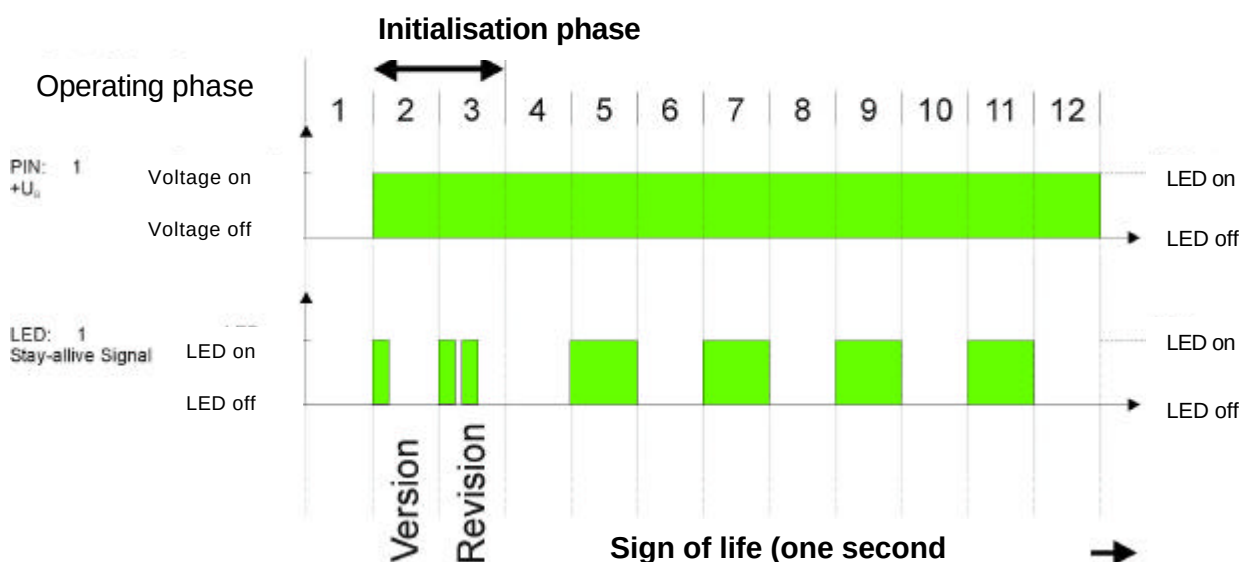


Fig. 2: Starting the module

The output signals of the module are now switched in dependence on the inputs.

Input PIN 4 *indication for driver standing* always has 12 Volt applied (LED lights), if the LED on PIN 11 *input seat occupation sensor* is off or 12 Volt is not applied.

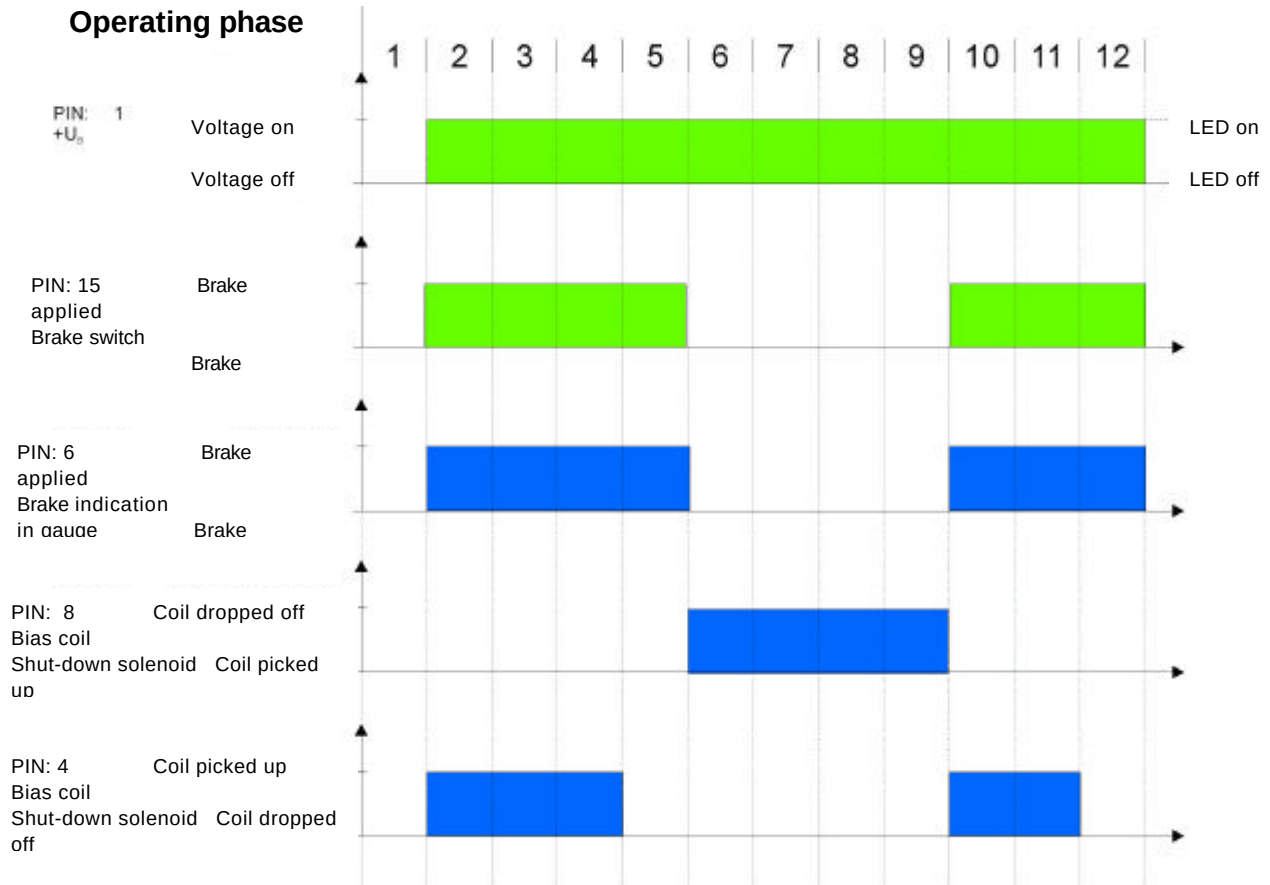
Output PIN 5 *brake valve* and PIN 6 *signal brake applied* also work inverted to each other (brake is applied as long as the brake valve is not energized).

If no 12V voltage is applied to PIN 14 *D+* when switching on the module (meaning that LED on PIN 14 does not light), but ground is applied to PIN 13 *oil pressure* (LED on PIN 13 lights), it is assumed that the engine is stopped and the brake is applied independently from PIN 15 *brake switch*, to prevent the machine from rolling when parked on a slope.

Figure 3 shows the switching on sequence. PIN 11 *input seat occupation sensor* has in this case no effect, because the engine is stopped.

If PIN 15 *brake switch* is opened (PIN 15 connected to ground, the LED on PIN 15 is off), the bias coil of the shut-off solenoid is deactivated (0V on output PIN 8 *bias coil*, LED on PIN 8 lights). This has the effect of preventing starting of the engine while the brake is released (however, the starter motor would be able to turn if this is not avoided by an external circuitry).

Description of function

**Fig. 3: Signals after starting of module**

This all occurs independently from the fact of whether the driver is sitting down!
 If the travel lever is in neutral position (LED on PIN 12 is off) the engine can be started.

Description of function

2.2 Engine start

If starting of the engine is detected on the D+ signal (LED on PIN 14 lights), the bias coil of the shut-down solenoid is activated agains for 2 seconds (the LED on PIN4 lights during this time).

The brake valve is now switched in dependence on the input PIN15 (brake switch). If the brake switch is closed (LED on PIN 15 lights), the brake valve closes (LED on PIN 5 is off), the brake is applied and the signal lamp *brake* lights up (LED on PIN 6 lights). When the switch is open (LED off) the brake is opened (LED on PIN 5 lights) and the signal lamp is off (LED on PIN 6 off).

If no D+ is sensed the brake is applied independently from the input PIN15!

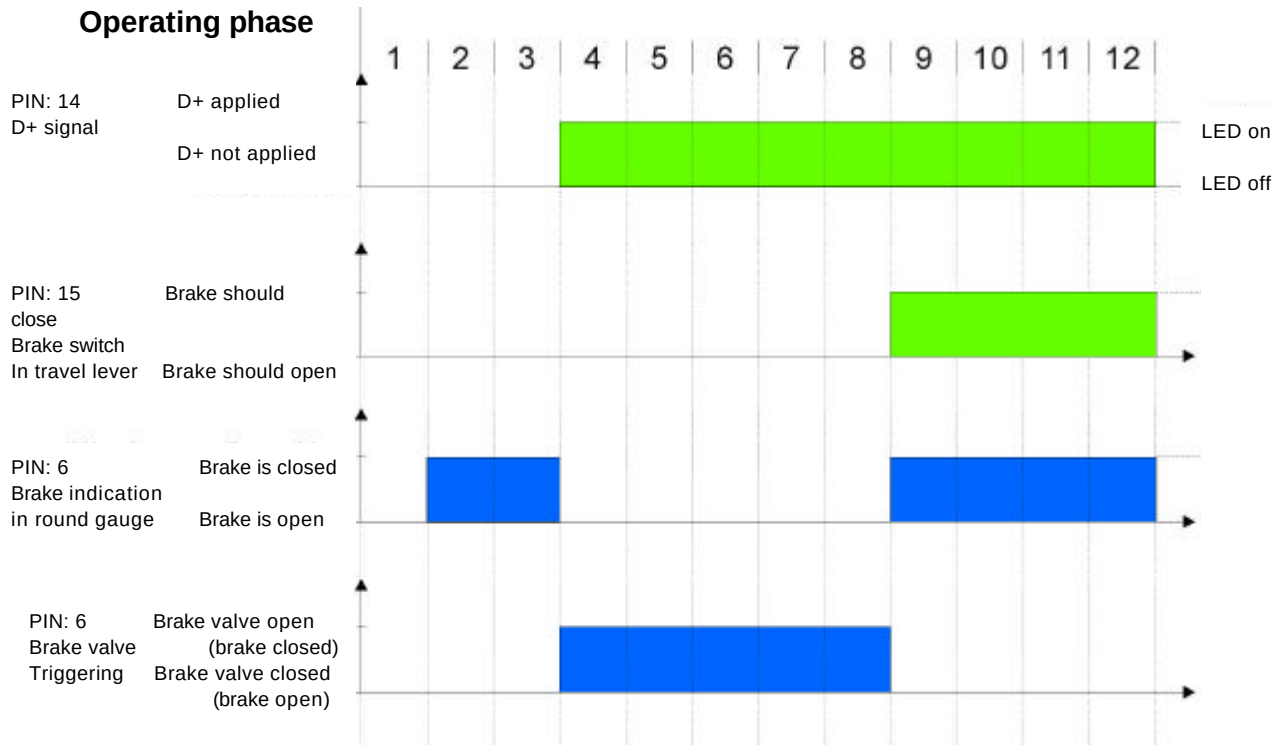


Fig. 4: Performance of the brake in dependence on D+

Description of function

If the travel lever is actuated while the engine is running (D+ on PIN 14, LED lights), and the driver is **not sitting down** (LED on PIN 11 is off), PIN 8 *bias coil* is energized (LED on) and the engine shuts down immediately.

Operating phase

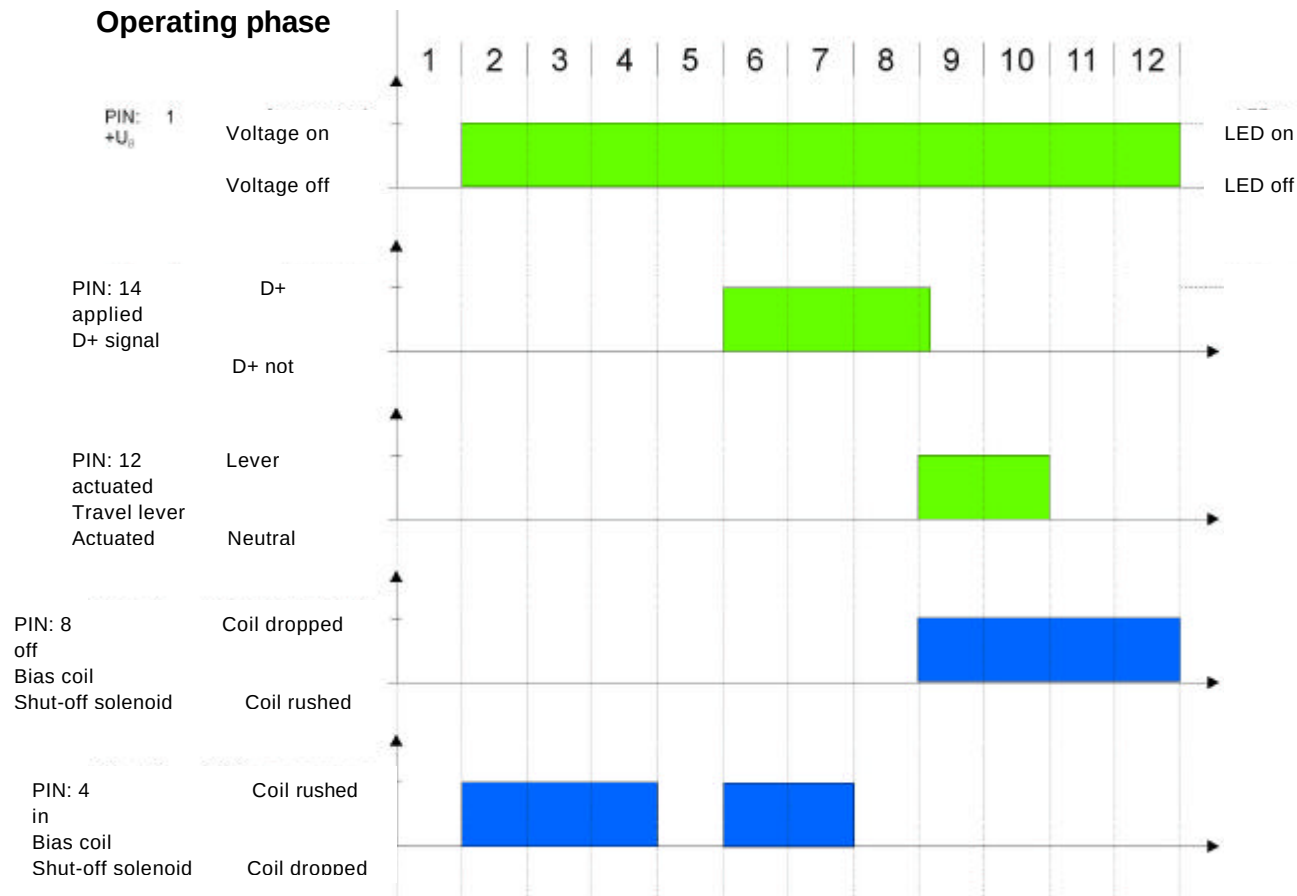


Fig. 5: Influence of travel lever when engine is running (driver standing)

If the driver is sitting while the travel lever is actuated, none of the features will be disabled and the machine will drive.

2.3 Driving the machine

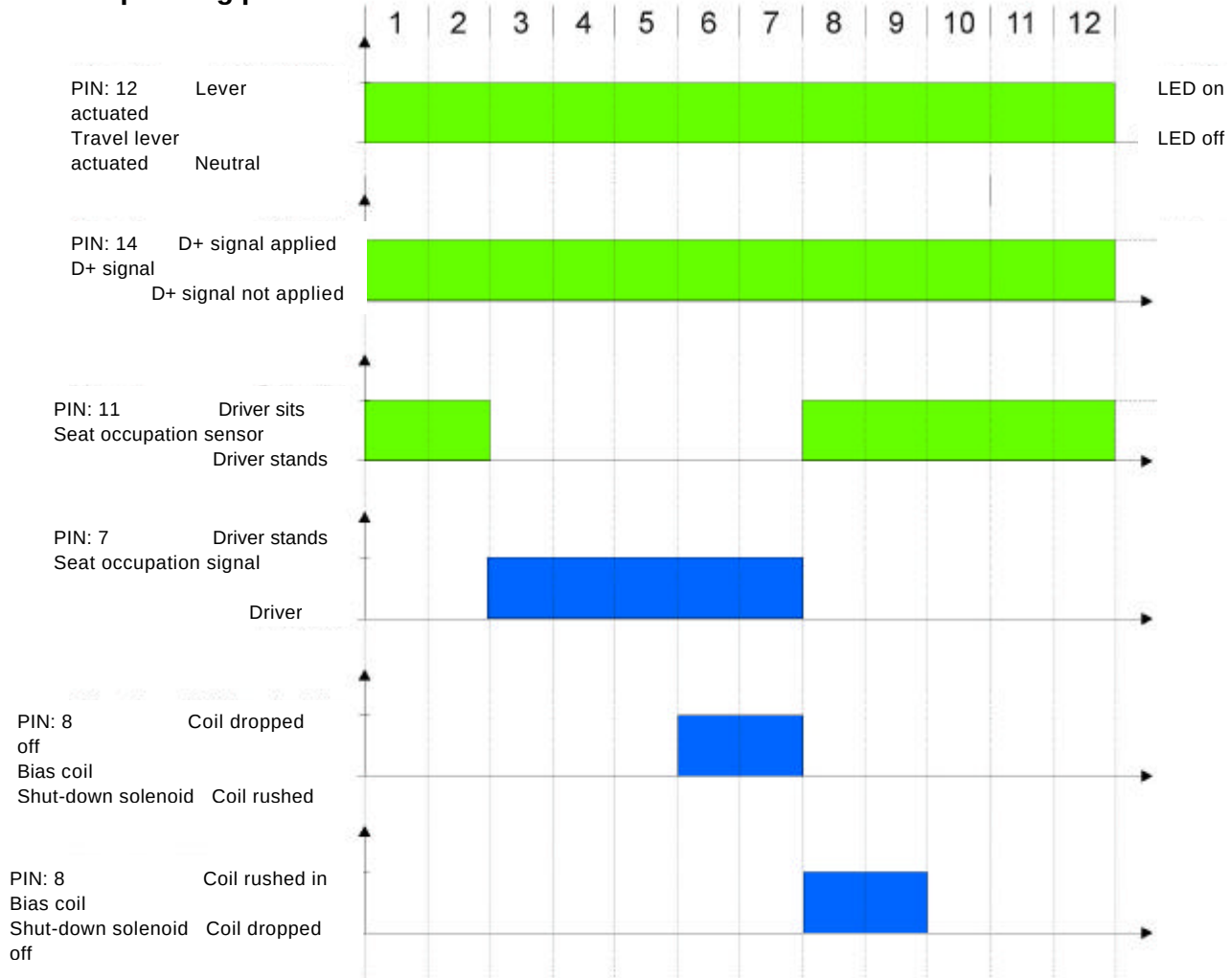
If the driver sits down (LED on input PIN 11 lights), the oil pressure is correct (LED on input PIN 13 is off) and D+ is applied (LED on PIN 14 lights), the machine is ready for operation without any limitations.

After actuating the travel lever the LED on PIN12 will also light up.

If the driver gets up from his seat in this state of operation (LED on input PIN 11 goes out, LED on PIN 7 lights up), the bias coil of the shut-down solenoid will be switched off after approx. 3 seconds by energizing output PIN8 (the LED on PIN8 lights).

The engine decelerates until it comes to a halt. If the driver sits down again before the engine has come to halt (engine shut-down is sensed by switching off of D+ on PIN 14, the LED goes out), the shut-down solenoid is switched on again (*bias coil*, LED on PIN8 goes out) and the bias coil is additionally switched on for approx. 2 seconds (the LED on PIN 4 lights during this period), enabling the engine to rev up again.

Description of function

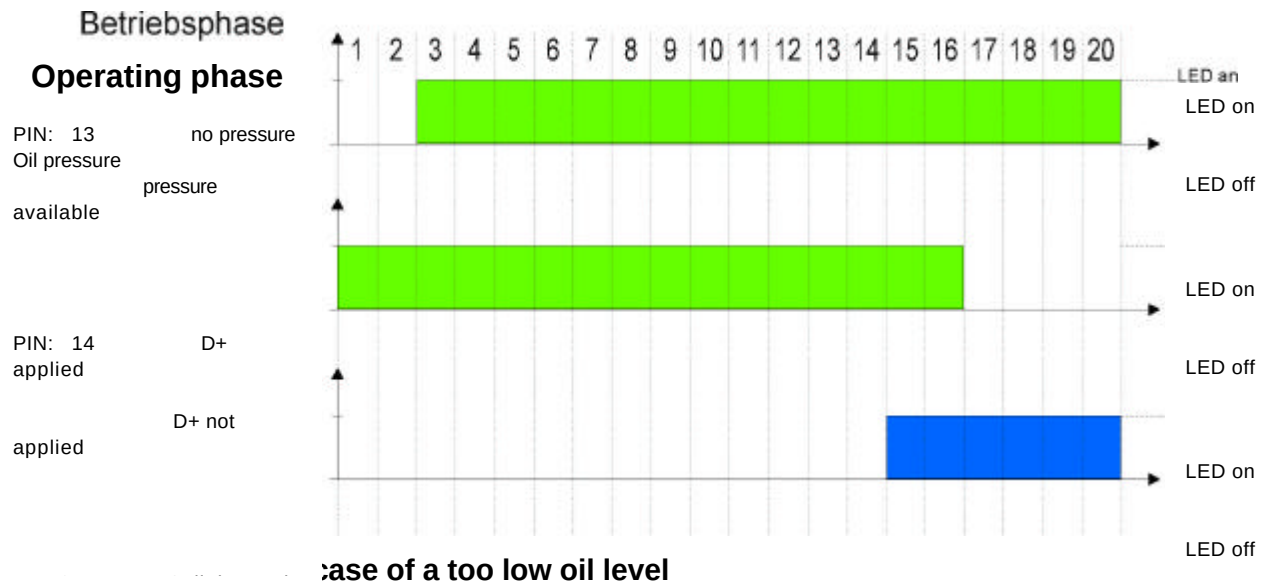
Operating phase**Fig. 6: Standing up while driving**

If the engine stops before the driver has sat down again (D+ switches off, the LED on PIN14 goes out), the brake is closed (LED on PIN 5 is off, LED on PIN 6 lights). This state remains even if the driver sits down.

Description of function

2.4 Engine protection

If too low oil pressure is detected (ground signal on PIN 13, the LED on PIN 13 lights) while D+ is applied (LED on PIN 14 lights), the engine will be shut down after approx. 12 seconds.



3 Software version history

Version management:	BOMAG seat occupation monitoring for Bw161/202
Module:	BMUPM 3
Controller:	PIC16F84A

Version 1.01 dated 10.05.2002:

Checksum: 671C
Creation of version 1.

Version 1.02 dated 14.05.2002:

Checksum: 76D2
Creation of version 2 without oil pressure monitoring.
Checksum: D089
Creation of version 1 with oil pressure monitoring.
Switching over via Define before Compilation!

Version 1.02a dated 20.06.2002:

Checksum: 816A
Rectification of problems with Stay-alive LED (stayed on because of the new processor)
by use of a different triggering routine.

Version 1.02b dated 20.08.2002:

Checksum: 94C5
Polarity of signal "Brake applied" reversed (BW161-3)

Version 1.02c dated 04.12.2002:

Checksum: F42E
Polarity of shut –down solenoid bias coil reversed

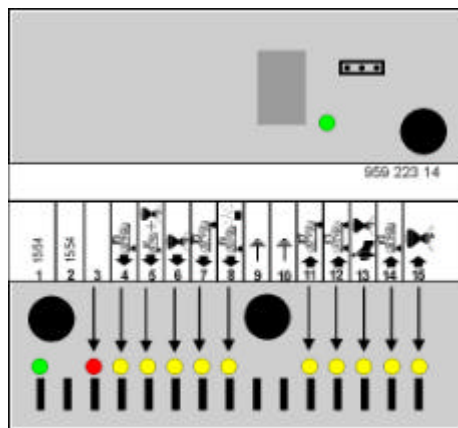
Version 1.03 dated 22.04.2003:

Checksum: 888A
Due to the new IVEKA instrument a denial and output of the seat occupied signal is no longer necessary.
When the seat is occupied, the engine running and the travel lever actuated a separate warning buzzer is triggered instead.

BOMAG

Description UPM03

Vibration Interlock Module / A71



Version 1.1 dated 16.06.03

Table of Contents

1	Versionshistorie	3
2	Beschreibung Hardware	4
2.1	Pinbelegung Eingänge..... Fehler! Textmarke nicht definiert.	
2.2	Pinbelegung Ausgänge	4
	Notbetrieb.....	6
3	Funktionsbeschreibung.....	Fehler! Textmarke nicht definiert.
3.1	Einschaltvorgang.....	Fehler! Textmarke nicht definiert.
3.2	Einschalten der Vibration.....	Fehler! Textmarke nicht definiert.
3.3	Einschalten des Splittstreuers	Fehler! Textmarke nicht definiert.
4	Versionshistorie Software	10

1 Version history

No.	Version	Date	Version description	Responsible
1	1.0	30.08.02	Creation of version 1	Kochhan

2 Hardware description

The vibration interlock module consists of the modified UPM2 module.
The inputs were designed in such a way, that the following table is applicable:

<i>Input</i>	<i>Performance</i>	<i>Comment</i>
Input PIN11	HIGH -active	LED lights when applying positive voltage!
Input PIN12	HIGH -active	LED lights when applying positive voltage!
Input PIN13	LOW -active	LED lights when applying ground potential!
Input PIN14	HIGH -active	LED lights when applying positive voltage!
Input PIN15	HIGH -active	LED lights when applying positive voltage!

2.1 Pin assignment of inputs

Signal name	Module pin	Description.
Switch for rear vibration	11	HIGH = vibration should be on LED on LOW = vibration should be off LED off
Vibration switch	12	HIGH = vibration on, LED on LOW = vibration off LED off
Push button chip spreader on	13	LOW = push button function LED on HIGH = normal condition LED off
Switch for front vibration	14	HIGH = vibration should be on LED on LOW = vibration should be off LED off
Push button for chip spreader	15	HIGH = chip spreader should be on LED on LOW = chip spreader should be off LED off

2.2 Pin assignment of outputs

Signal name	Module pin	Beschr.
Vibration valve front	4	HIGH = energized (vib. off), LED on LOW = not energized (vib. on) LED off
Chip spreader on (also vib. high amplif.)	5	HIGH = chip spreader on, LED on LOW = chip spreader off LED off
Chip spreader valve on	6	HIGH = valve on, LED on LOW = off LED off
Vibration valve rear	7	HIGH = energized (vib. off), LED on LOW = not energized (vib. on) LED off
Signal front vibration switched on	8	HIGH = front vibration off, LED on LOW = front vibration on LED off

The hardware is available under BOMAG part-no. 05766768.

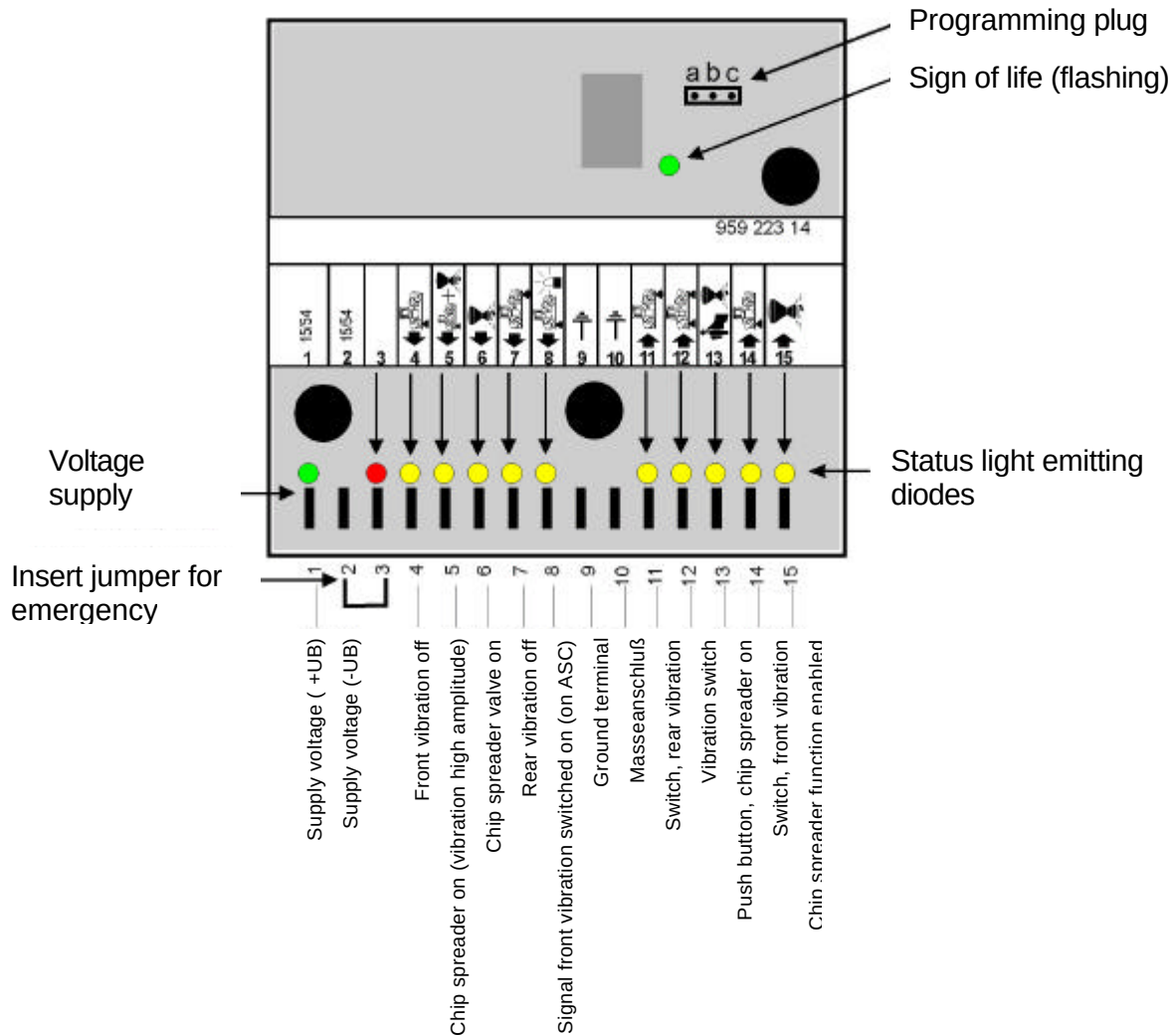


Fig. 1: Module

The complete module (including the specific software) is available under BOMAG part-no.920 225 02.

The following applied when measuring the signal level:

PIN	Potential with LED on	Potential with LED off
Inputs in general	Operating voltage U_B	Voltage < 1V
Input PIN 13 (<i>vibration push button</i>)	Ground 0V	Input open
Outputs in general	$\approx$ Operating voltage ($U_B - 0,7V$)	Ground 0V ($\ll 1V$)

2.3 Emergency operation

If a jumper is inserted between PIN2 and PIN3, the outputs PIN4 „*high amplitude*“ and PIN5 „*front vibration off*“ are set to HIGH potential and the corresponding LED as well as the red LED on PIN3 light up.

With this application this function does not realize a relevant emergency function and should therefore not be used.

Abbildung: Modul

3 Description of function

3.1 Switching on

When operating voltage is applied to the module the Stay-Alive LED will first read out version number and revision number by means of a flashing code (at present 1.01). This is followed by the Stay-Alive LED flashing in one second intervals.



Fig. 2: Starting the module

The output signals of the module are now switched in dependence on the inputs.

3.2 Switching the vibration on

Vibration can only be switched on when the chip spreader (input on PIN 15 "chip spreader activation" open, LED on PIN 15 is off) is switched off.

If this is the case, vibration can be switched on (LED on, voltage applied to PIN12) or off (LED off, no voltage applied to input PIN12), in dependence on input PIN12 „vibration switch”.

The vibration selector switch is connected to PIN11 and PIN14.

The type of vibration (front, rear) to be activated therefore depends on the states of inputs PIN11 and PIN14.

Dependence of vibration from the switch position of the vibration selector switch:

Potential PIN 11	Potential PIN 14	Rear vibration	Front vibration
12V / LED on	open / LED off	ON	OFF
open / LED off	12V / LED on	OFF	ON
open / LED off	open / LED off	ON	ON

Switching over on these inputs only leads to changes at the outputs when input PIN12 „vibration switch“ is switched off (LED on PIN 12 off)!



**If both switches are switched to „selection off“, both types of vibration should be switched on!
Reason for this: A double switch for switching positions „left on“ / „off“ / „right on“ is used for the setting.

Fig. 3: Vibration selection

The signal „front vibration on“ applied to PIN 8 is required to inform other machine components when „front vibration“ is switched on.
Unfortunately direct tapping of the valve signal (PIN4) for this purpose is not possible, because this signal is switched accordingly also when using the chip spreader.

3.3 Switching on the chip spreader

The chip spreader can only be switched on when the vibration is switched off (input on PIN12 "vibration switch" open, LED on PIN 12 is off).

Description of function

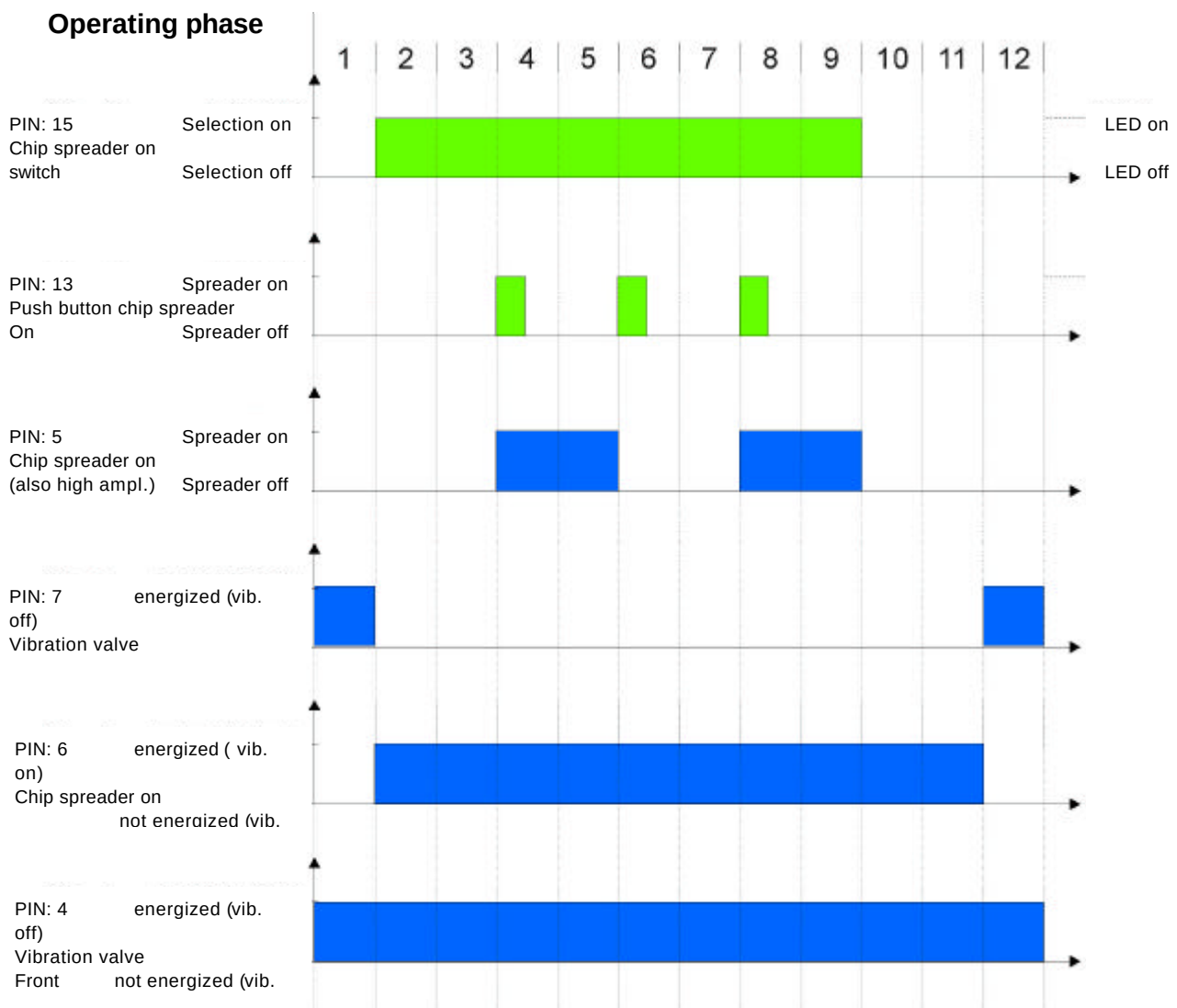
If this is the case the chip spreader can be switched on (LED on, voltage applied to input PIN15) or off (LED off, no voltage applied to input PIN15) in dependence on input PIN15 „chip spreader on“.

If vehicle voltage is applied to PIN 15 (LED lights), PIN7 is immediately deenergized (LED on PIN7 goes out) and PIN6 („chip spreader valve“) is switched on (LED on PIN6 lights up). PIN5 „chip spreader on“ can only be switched on via push button PIN13 „push button chip spreader“ 2 seconds after these outputs have been switched.

If the push button is operated before this period of 2 seconds has elapsed PIN5 will be automatically switched on after 2 seconds.

If the push button is pressed once again, PIN5 is switched off (LED off). Pressing again switches it on again, etc.

If the „chip spreader switch“ is switched off on PIN15 (LED off), PIN 5 will be de-energized immediately (LED off). After a period of 2 seconds PIN7 „vibration valve rear“ is switched on (LED on) and PIN6 „chip spreader valve“ is switched off (LED off).

Operating phase**Fig. : Chip spreader**

When the chip spreader is switched off the system will wait another additional waiting period of approx. 2 seconds, before vibration can be switched on again. This means that, even if the vibration is switched on before the chip spreader has been switched off, a period of at least 4 seconds will pass before the vibration will start.

4 Software version history

Version management:	BOMAG vibration interlock for BW 161/202
Module:	BM UPM 3
Controller:	PIC16F84

Version 1.01 dated 20.06.2002:

Checksum: 4E60
Creation of version 1.

Version 1.01 dated 13.08.2002:

Checksum: 420B
Supplemented by push button for chip spreader

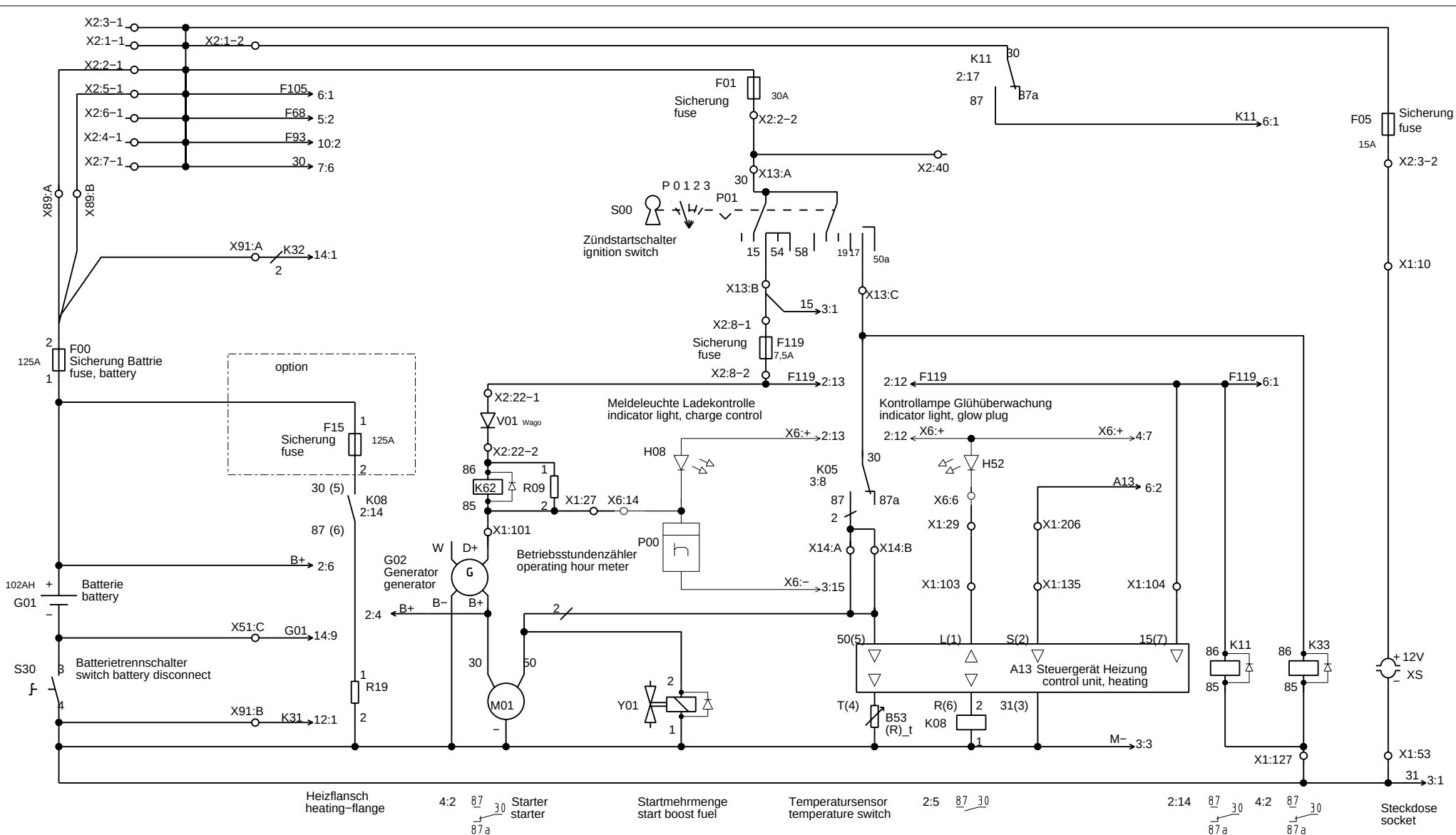
Version 1.01b dated 19.08.2002:

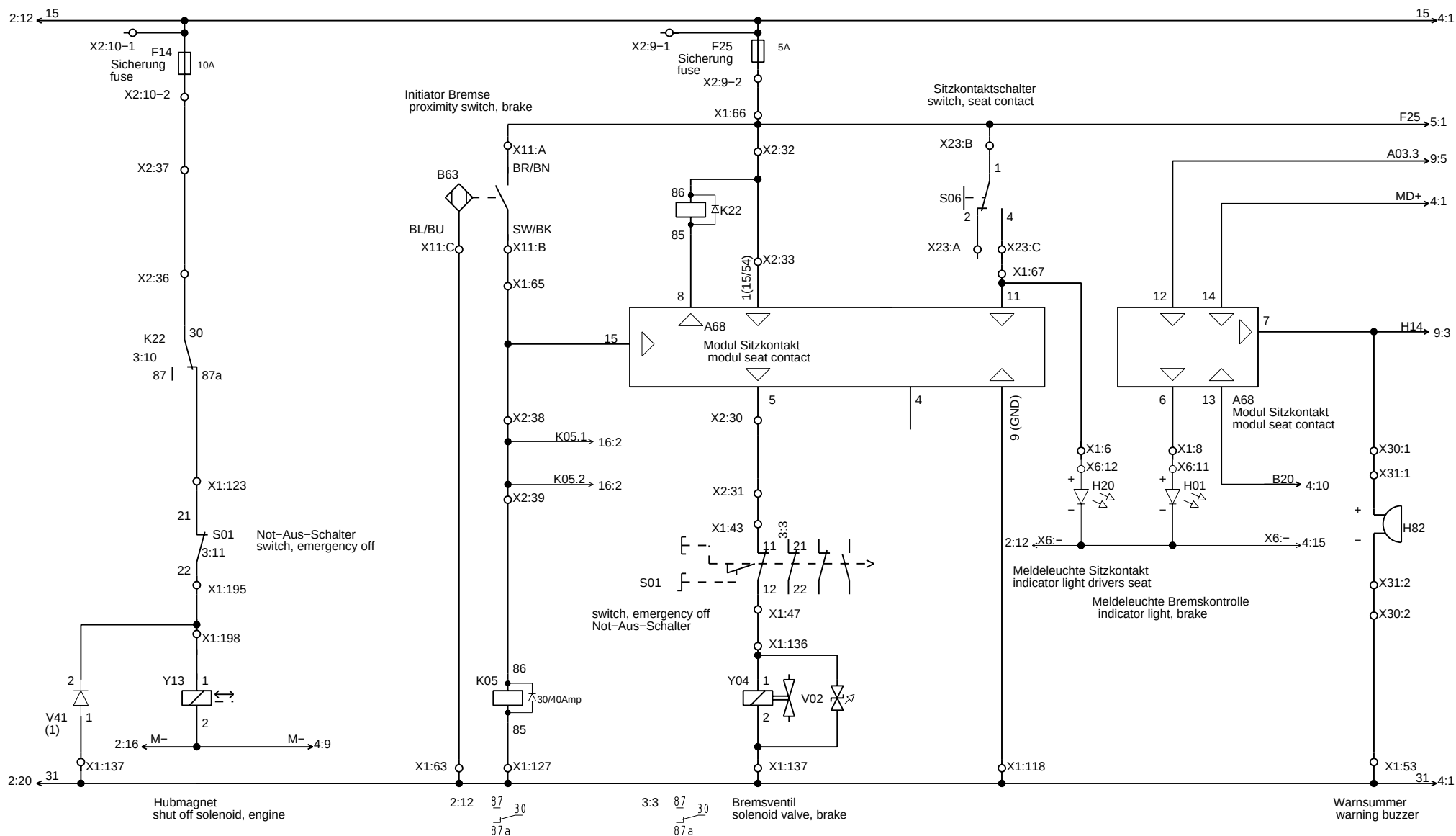
Checksum: 9F34
Fault "Vibration of both" has been rectified (in case of LOW on both vibration selection pins "Vib.beide" should apply).
Triggering threshold for push button reversed (switching now takes place at the transition from HIGH to LOW).

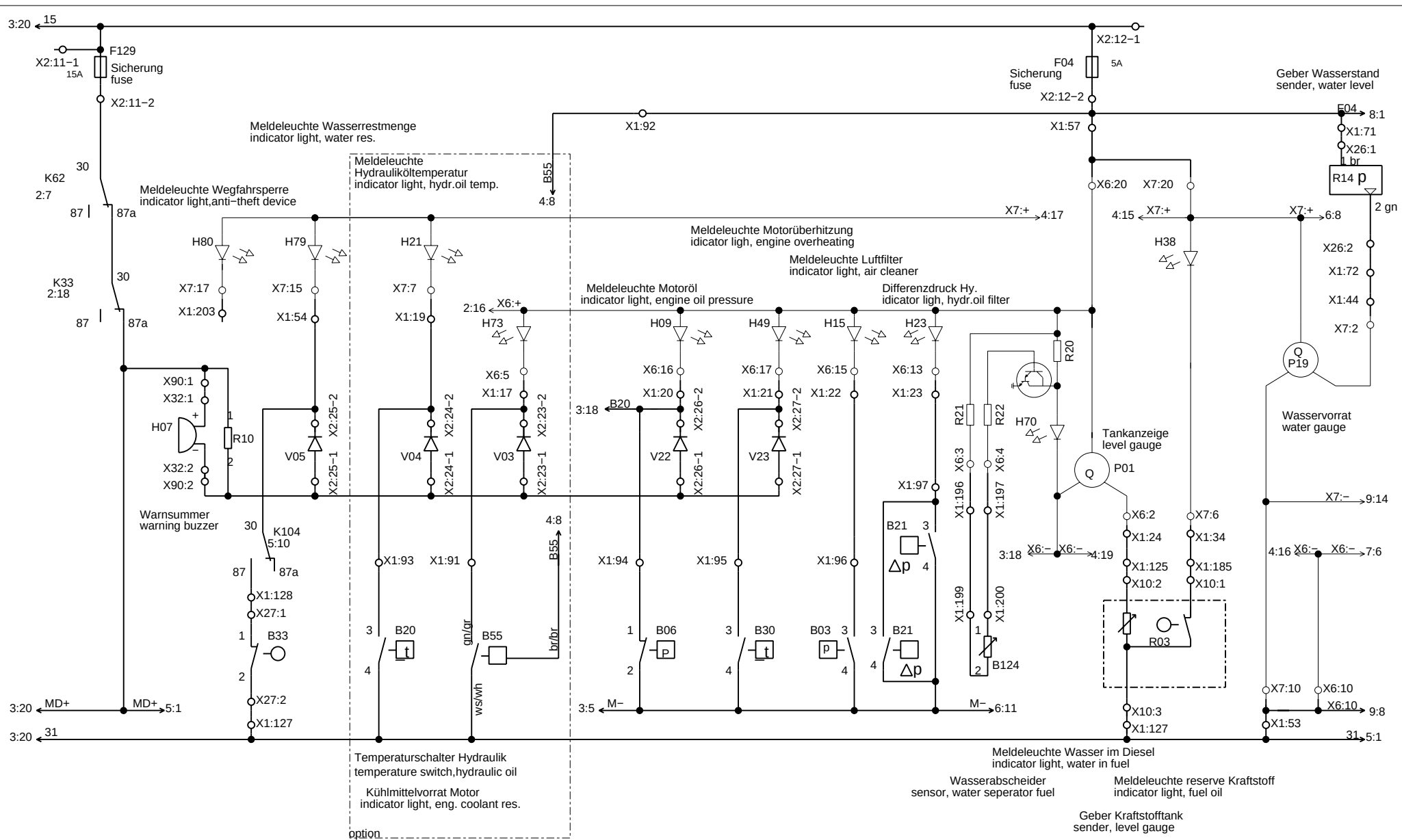
Version 1.01c dated 23.09.2002:

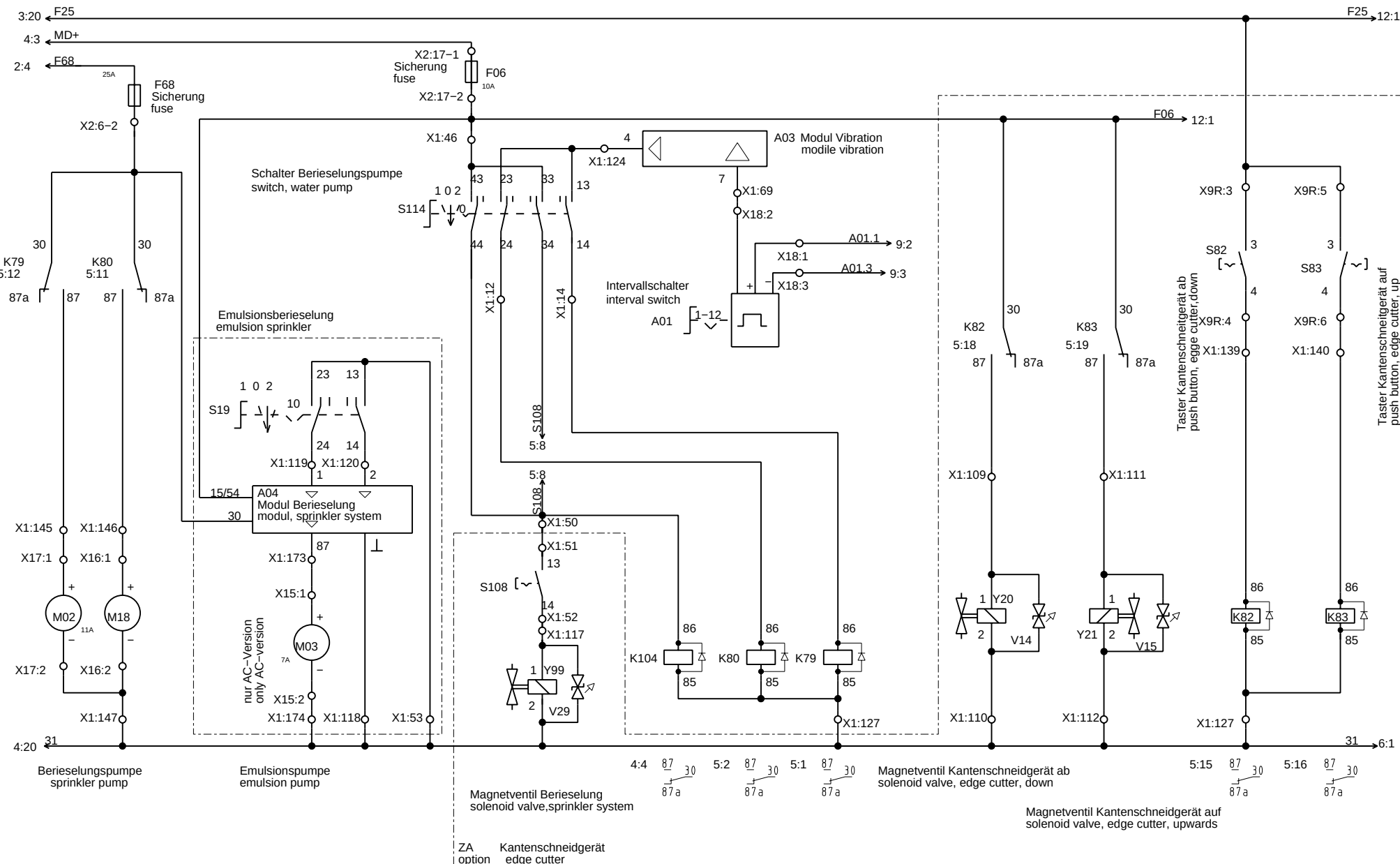
Checksum: 9F57
Fault "With vibration switched off Vib.Hinten and Vib.Vorne are high" has been changed so that signals applied to the vibration switch are switched through independently from the Vib.Einschalter.
However, changes on the selector switch will still only be accepted when the vibration is switched off.
This means:
Vibration signal Front on PIN8 is Low, when front vibration is off and open when it is on.

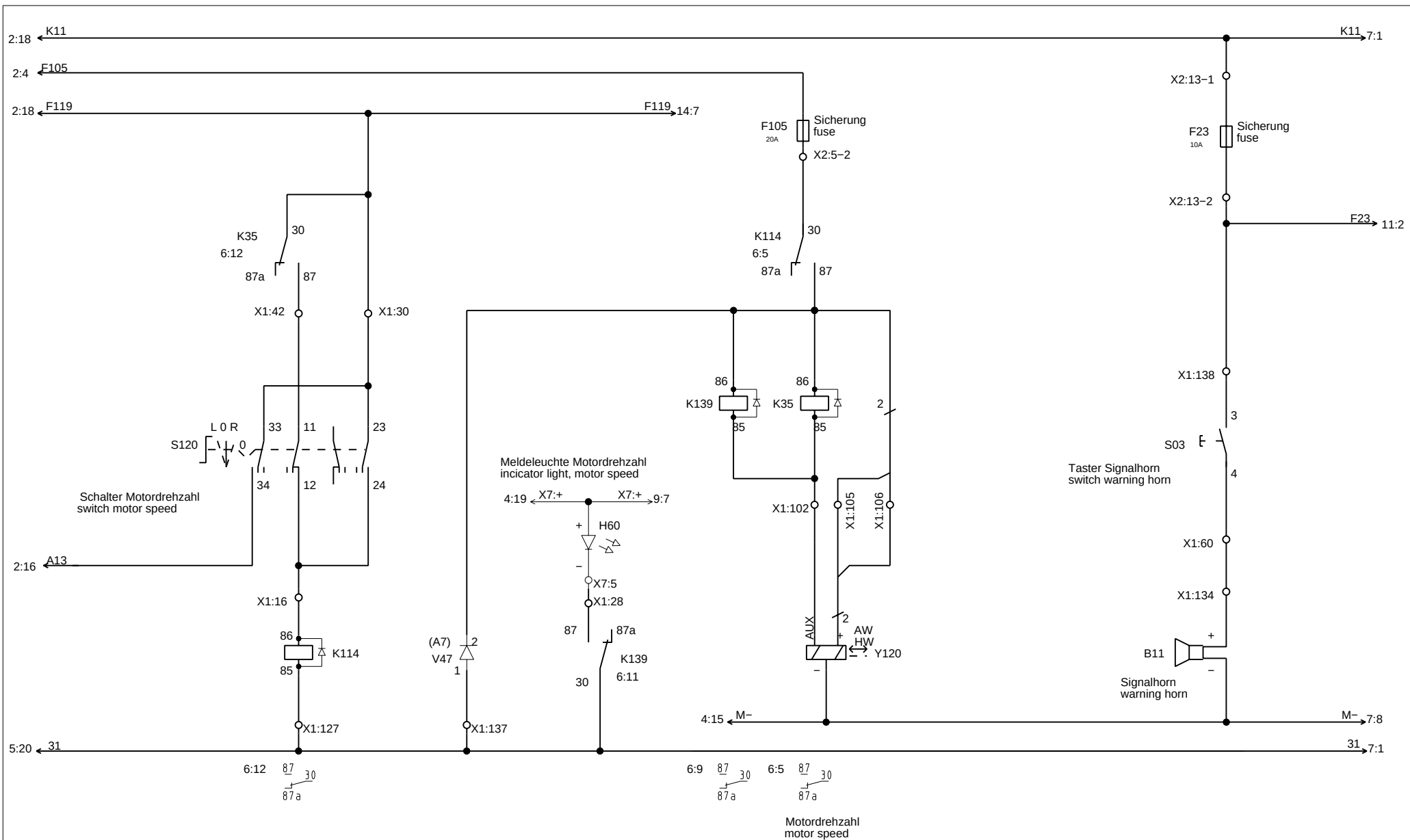
[illegible]

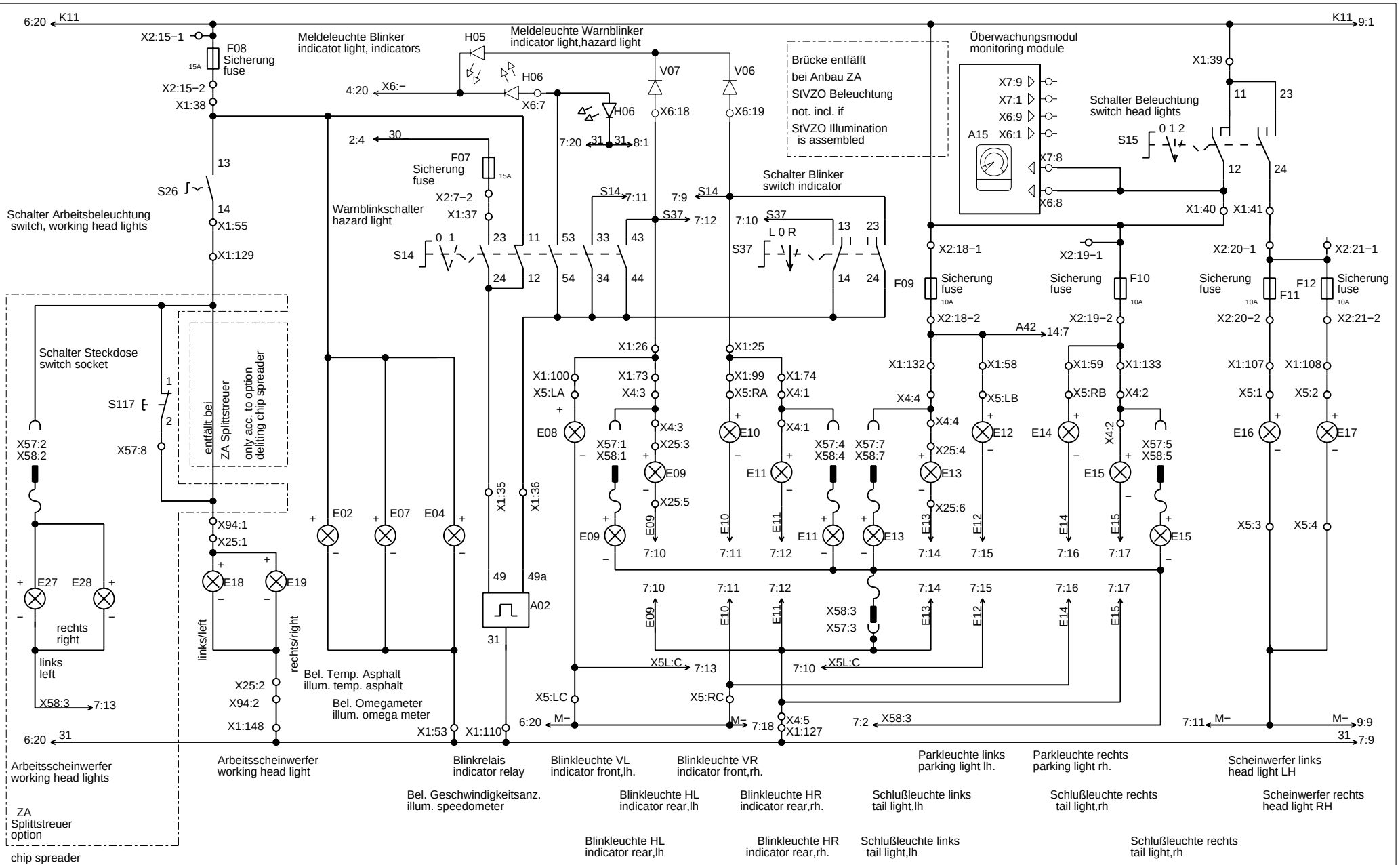


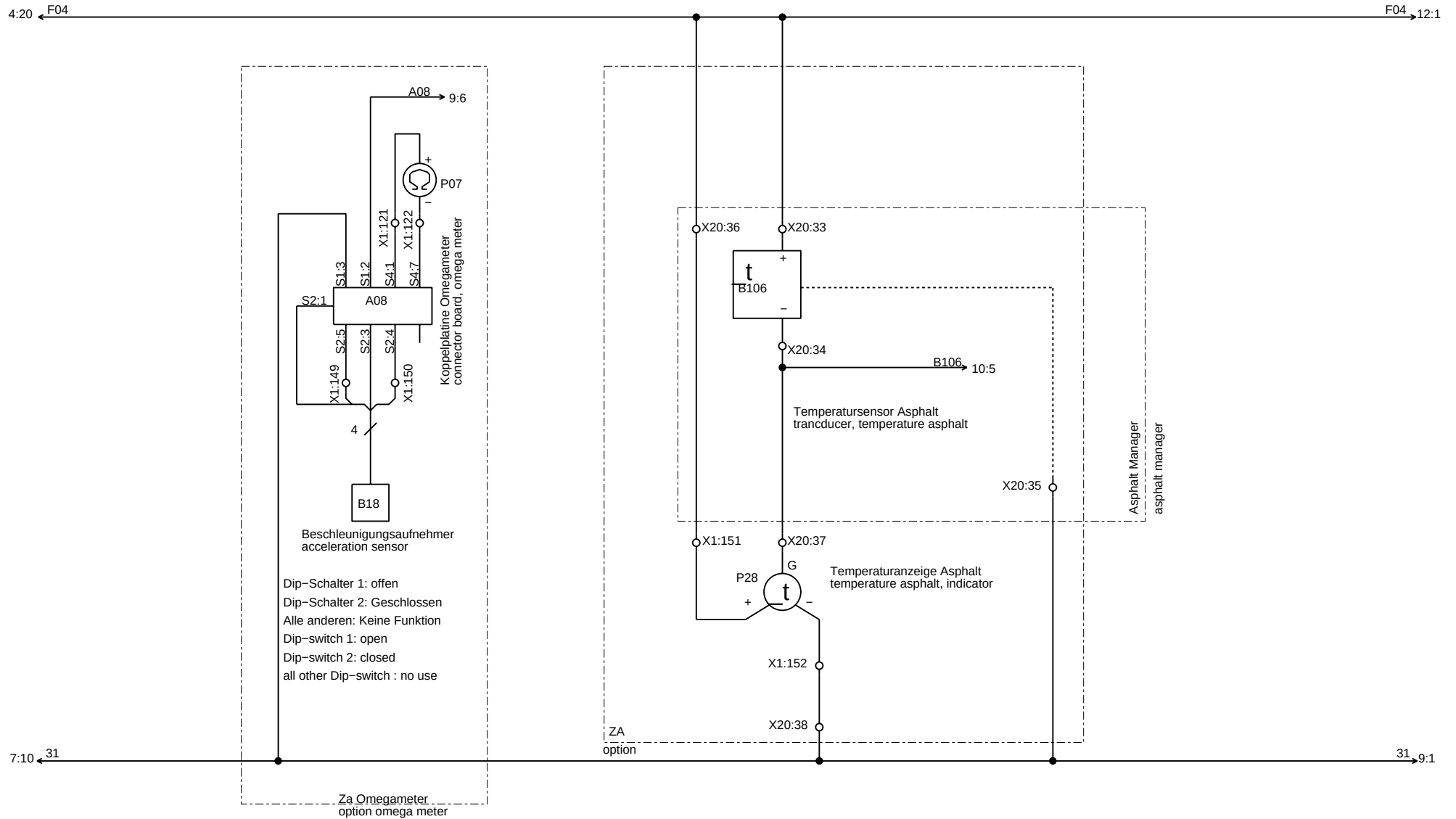


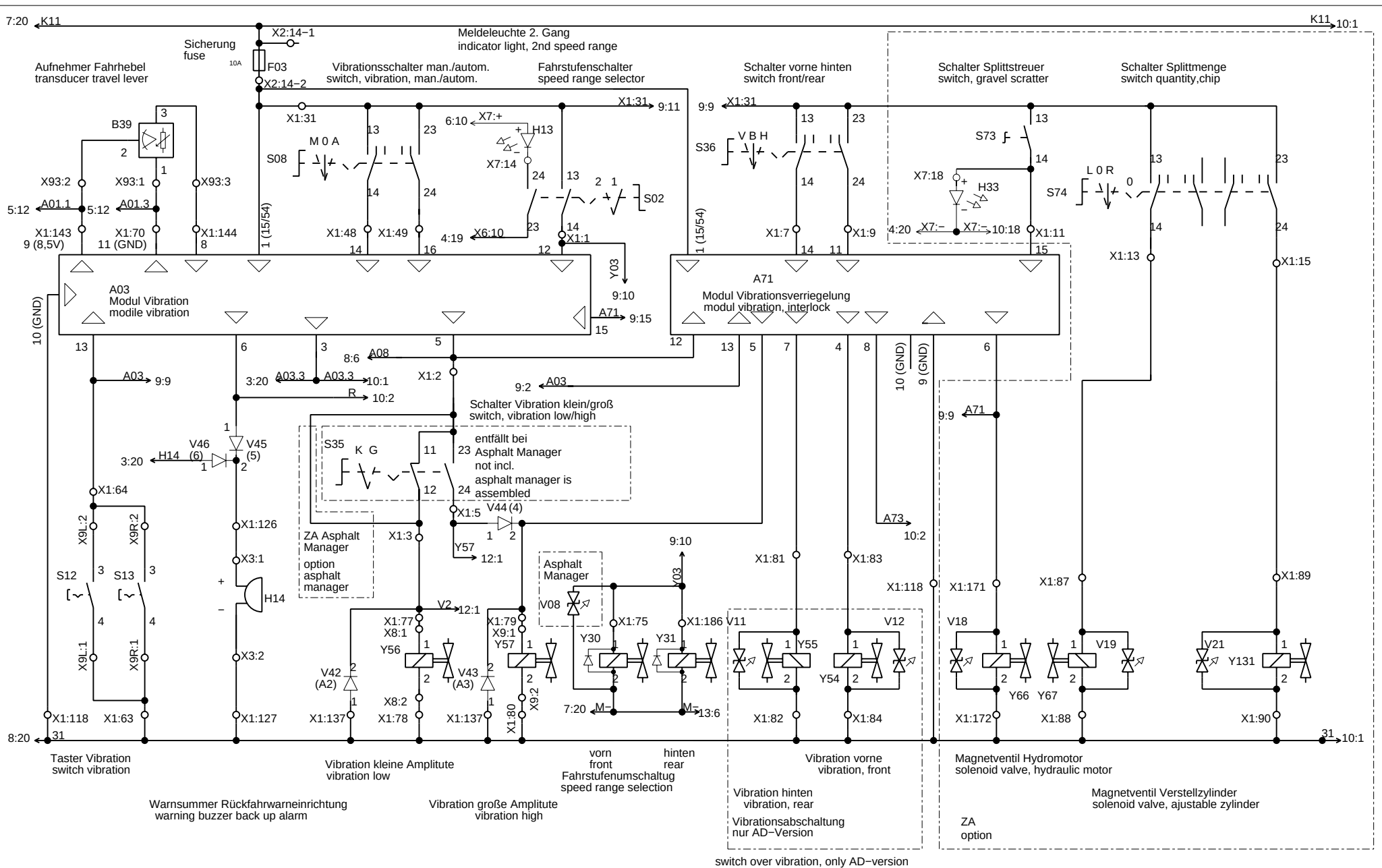




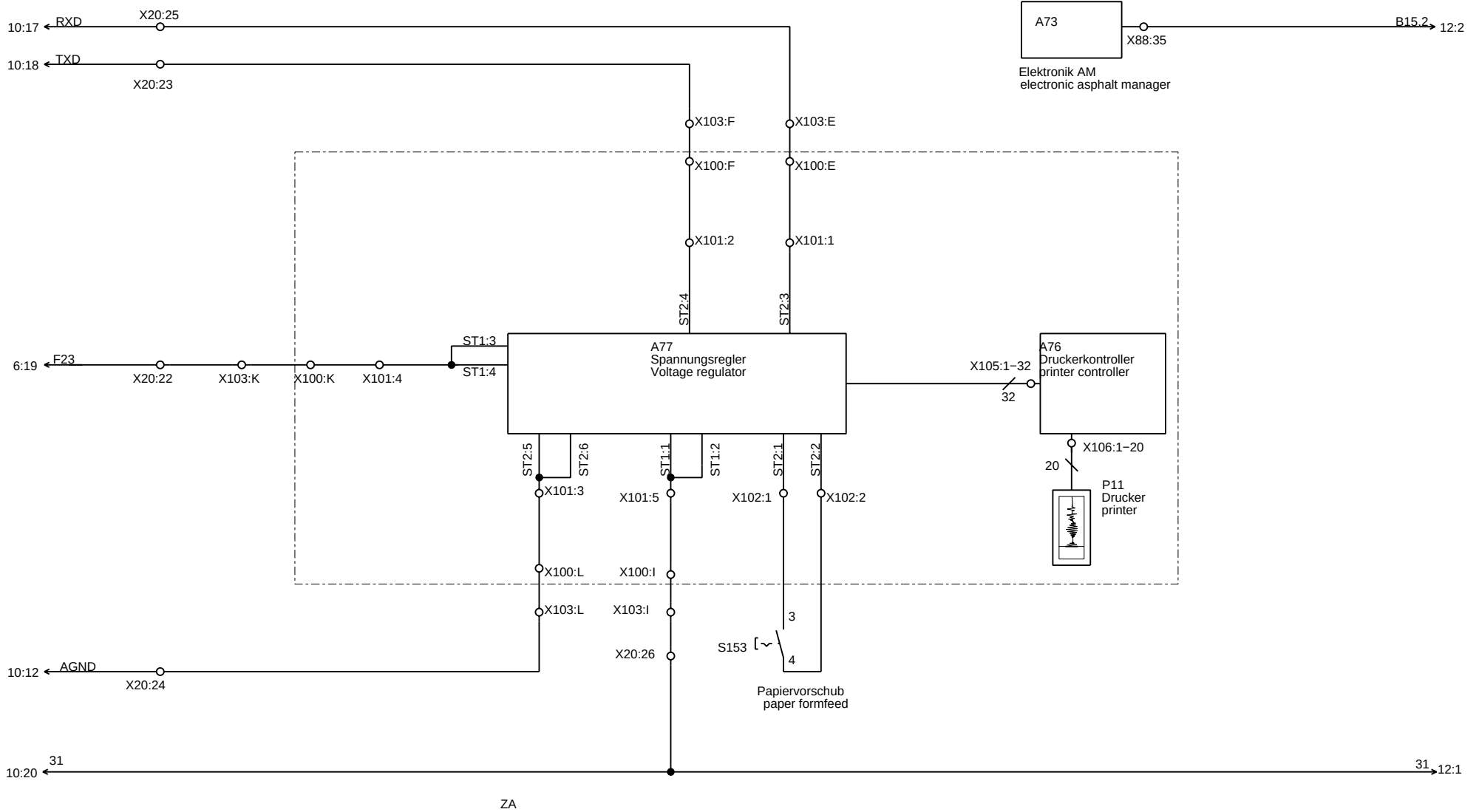


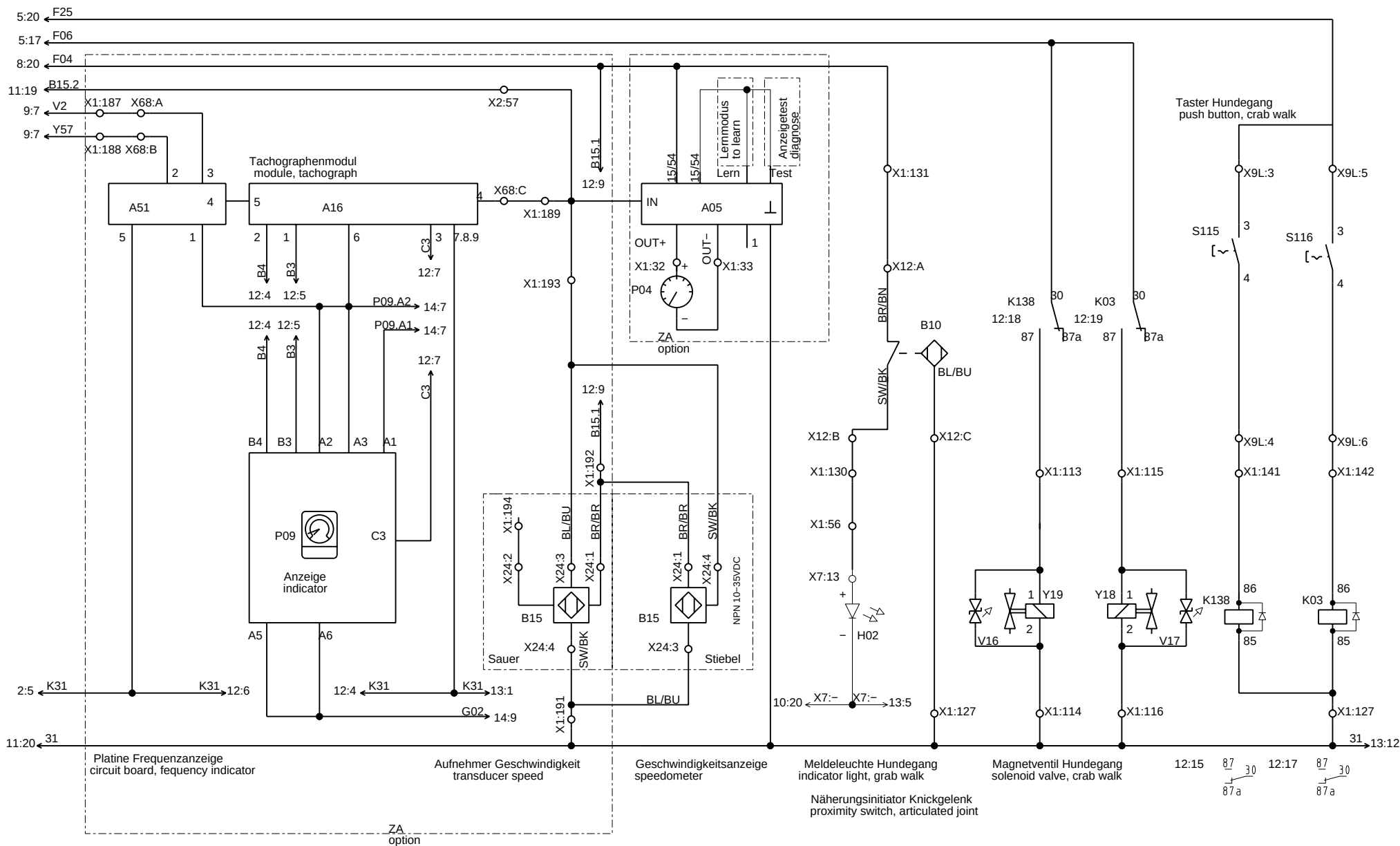


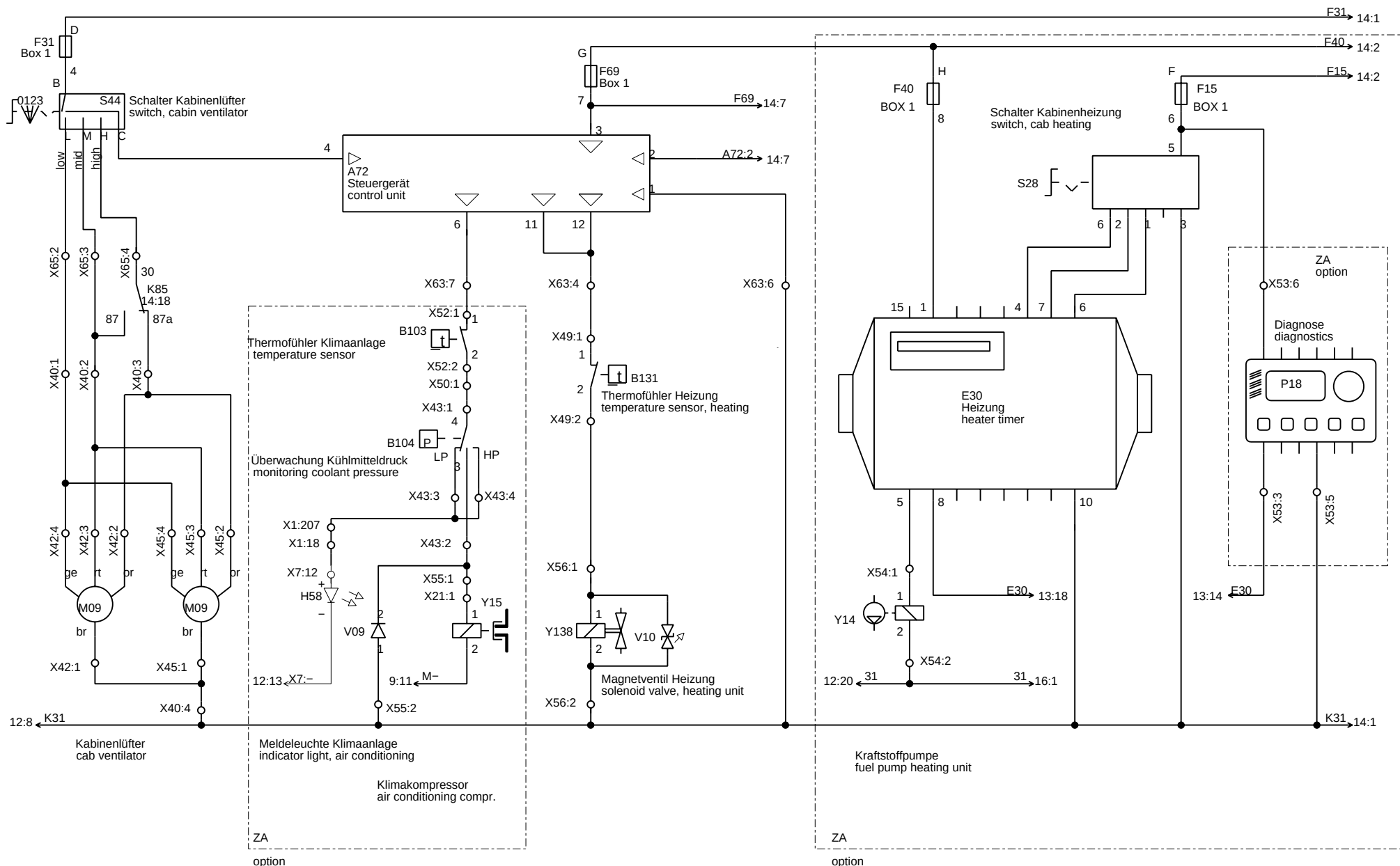


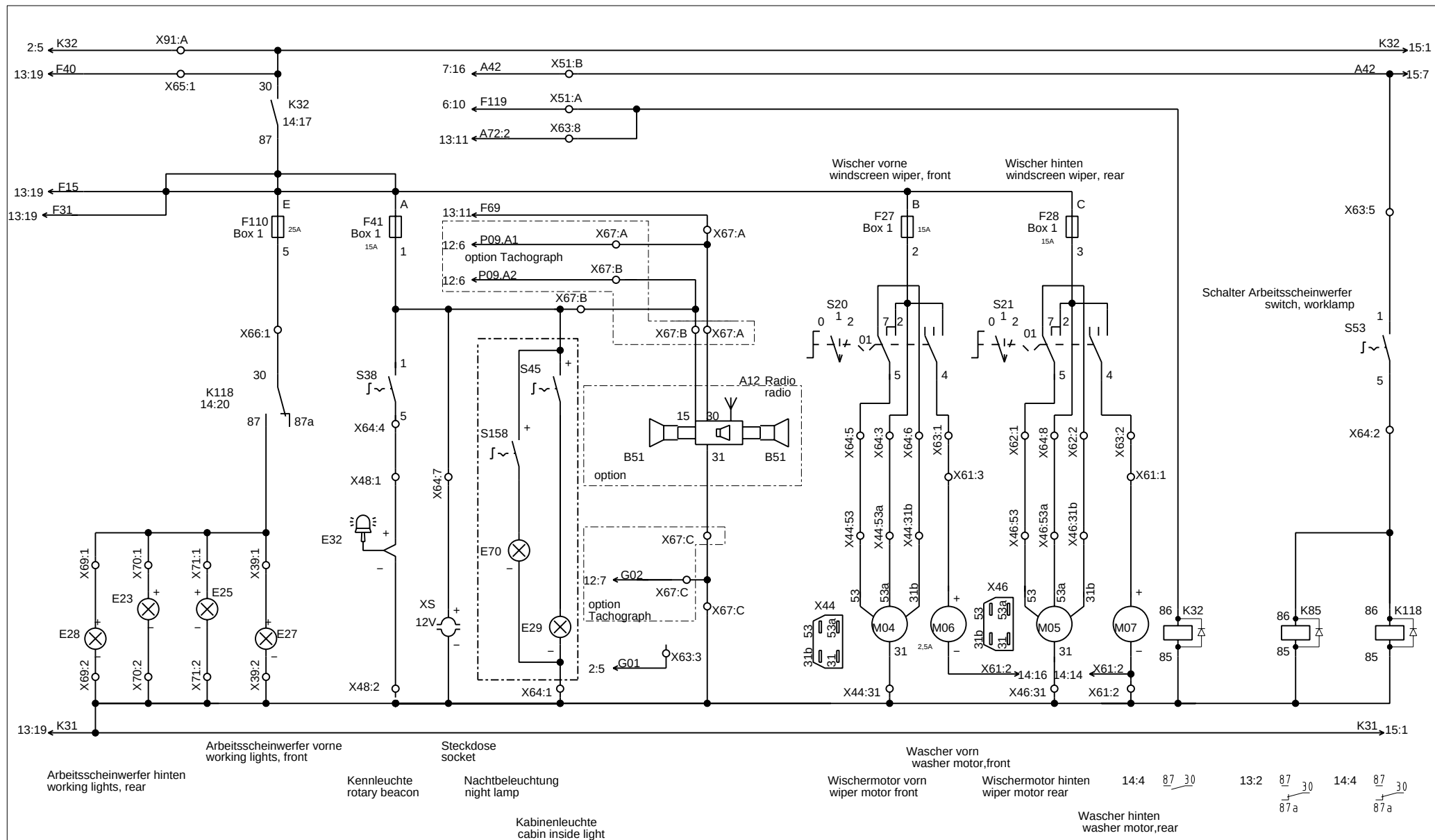


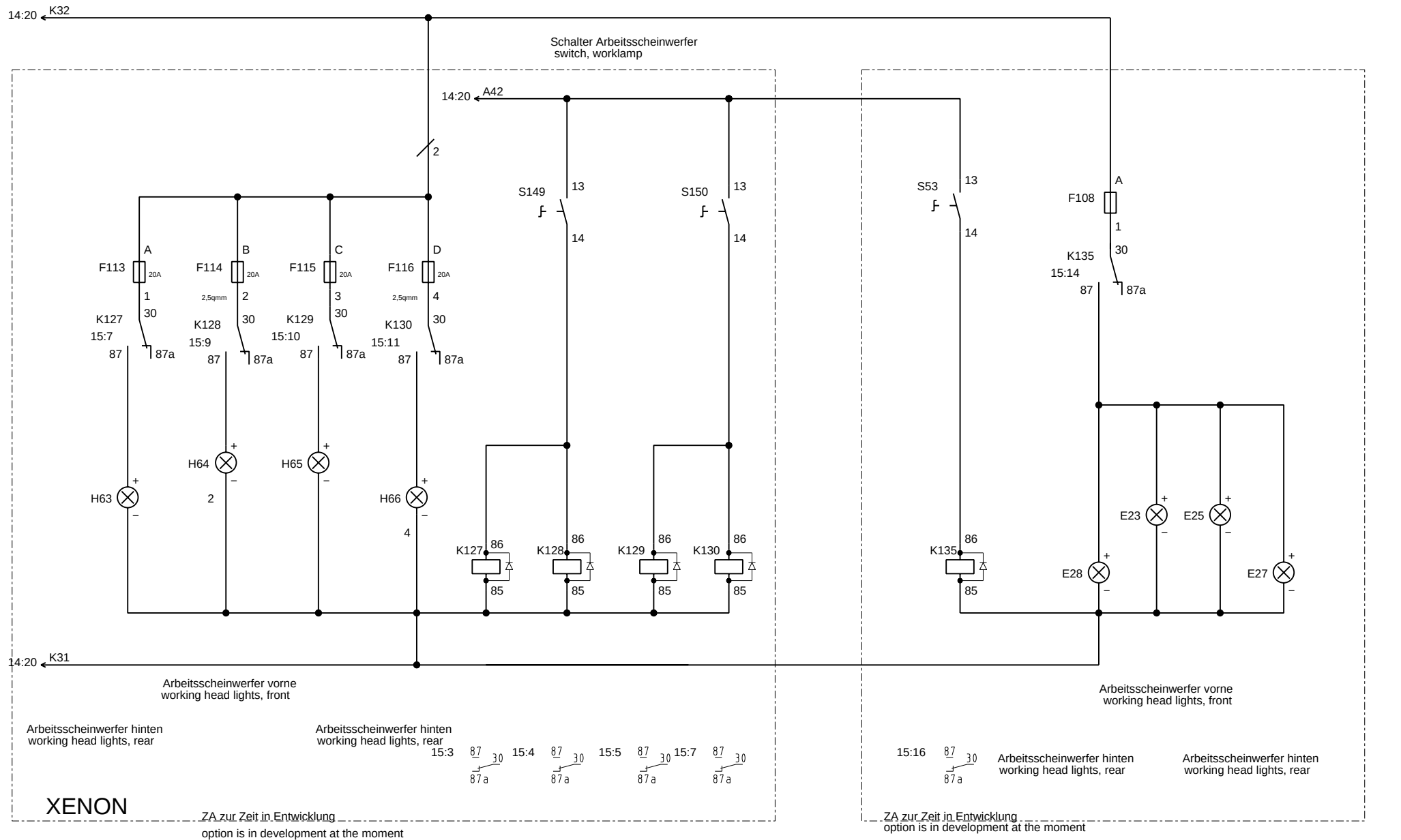


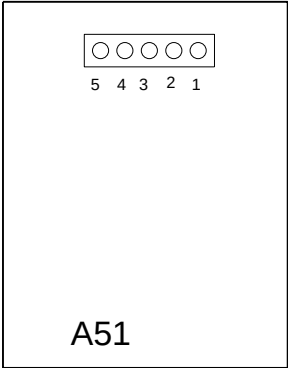
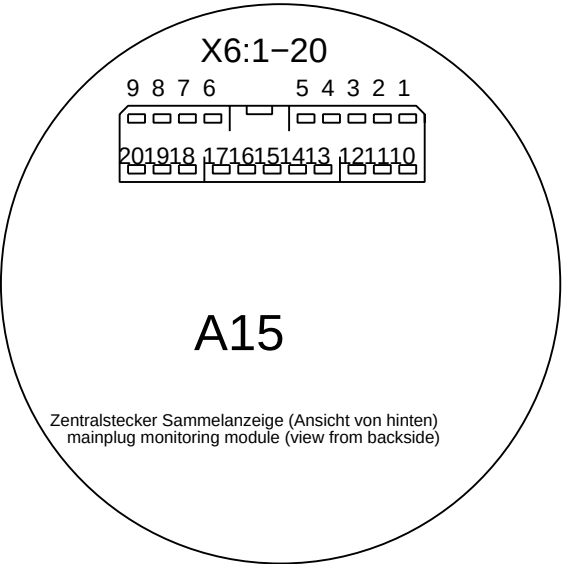
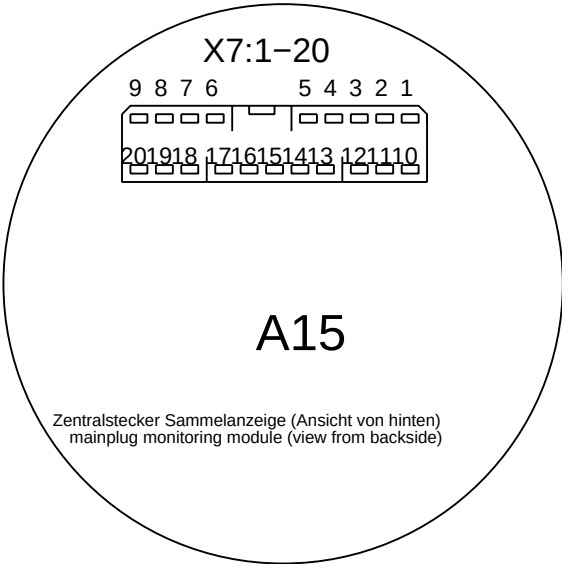




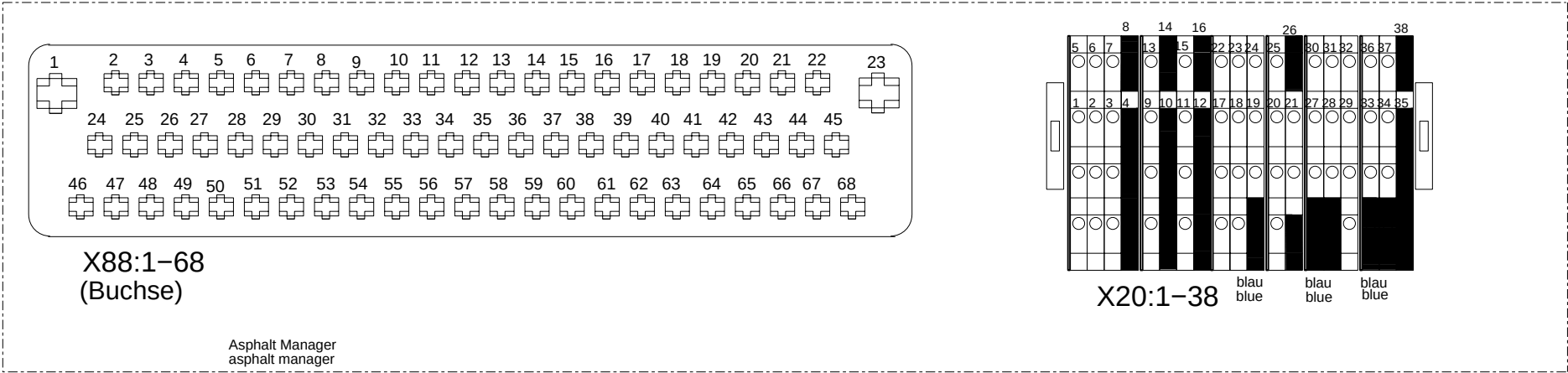


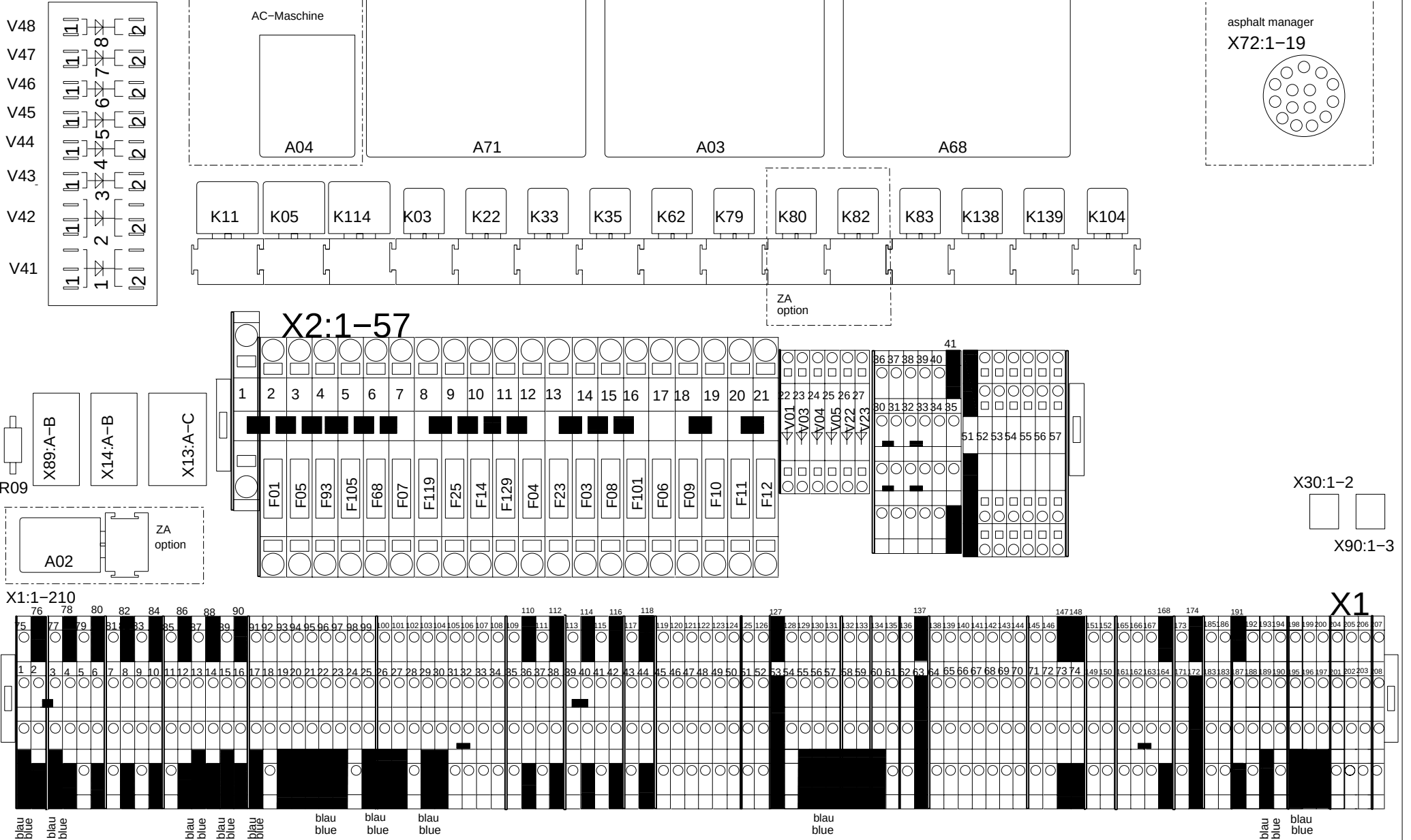






Platine Frequenzanzeige
Printed circuit board,frequency m.





Name	Bl.	Pf.	Benennung	title	TYP
A01	005	11	Intervallschalter	interval switch	
A02	007	8	Blinkrelais	indicator relay	4/6X21 WATT
A03	018	1	Blinkrelais	indicator relay	
A05	005	10	Modul Vibration	modul. vibration	
A03	009	4	Modul Vibration	modul. vibration	
A03	018	11	Modul Vibration	modul. vibration	
A04	005	5	Modul Berieselung	modul. sprinkler system	
A04	018	5	Modul Berieselung	modul. sprinkler system	
A05	012	10	Elektronik Geschwindigkeitsanzeige	Electronic system. speedometer	
A08	008	5	Elektronik Omegetrometer	Electronic system. Omegetrometer	
A12	014	10	Radio	Radio	
A13	002	13	Steuergeraet Heizung	Control unit. heating	
A15	007	15	Platine Ueberwachungsmodul	Printed circuit board. monitoring module	
A15	017	4	Platine Ueberwachungsmodul	Printed circuit board. monitoring module	
A15	017	11	Platine Ueberwachungsmodul	Printed circuit board. monitoring module	
A16	012	6	Elektronik Tachograph	Electronic system. tachograph	
A51	012	3	Platine Frequenzanzeige	Circuit board.frequency meter	
A51	017	17	Platine Frequenzanzeige	Circuit board.frequency meter	
A66	016	9	Elektronik Steuereinheit	Electronic control unit	
A67	016	15	Einabeeinheit	Keyboard	
A68	003	13	Modul Sitzkontakt	Modul seat contact	
A68	003	17	Modul Sitzkontakt	Modul seat contact	
A68	018	14	Modul Sitzkontakt	Modul seat contact	
A71	009	12	Modul Vibrationsverriegelung	Modul vibration interlock	
A71	018	7	Modul Vibrationsverriegelung	Modul vibration interlock	
A72	013	7	Steuergeraet Klimaanlage, Heizung	Control unit.air conditioning, heating	
A73	010	6	Elektronik Asphalt Manager	Elektronic asphalt manager	ESX 9890
A73	011	16	Elektronik Asphalt Manager	Elektronic asphalt manager	ESX 9890
A76	011	15	Druckerkontroller	Printer controller	
A77	011	10	Spannungsregler	Voltage regulator	
B03	004	13	Unterdruckschalter Luftfilter	Vacuum switch. air cleaner	
B06	004	10	Druckschalter Motoroel	Pressure switch. engine oil	
B10	012	13	Naehrungsinitiator Knickgelenk	Proximity switch. articulated joint	MAX 0.3A
B11	006	18	Signalhorn	Warning horn	
B15	012	9	Aufnehmer Geschwindigkeit	Transducer. speed	
B15	012	10	Aufnehmer Geschwindigkeit	Transducer. speed	NPN 10-35VDC
B18	008	6	Aufnehmer Omegetrometer	Transducer. Omegetrometer	
B20	004	6	Temperaturschalter Hydraulikoel	Temperature switch. hydraulic oil	
B21	004	13	Differenzdruckschalter Hydr.-Oelfilter	Pressure diff. switch. hydr. oil filter	
B21	004	14	Differenzdruckschalter Hydr.-Oelfilter	Pressure diff. switch. hydr. oil filter	110_GC
B30	004	11	Temperaturschalter Motoroel	Temperature switch. engine oil	
B33	004	4	Sensor Wassertankrestmenge	Sensor. water tank residual quantity	
B39	009	3	Aufnehmer Fahrhebel	Transducer. travel lever	4-20 mA
B51	014	10	Lautsprecher Radio	Speaker radio	
B51	014	11	Lautsprecher Radio	Speaker radio	(R)_I
B53	002	12	Temperaturreger Kuehlmittel	Temperature switch. collant	
B55	004	7	Kuehlmittelstand Ausgleichsbehaelter	Coolant charge expansion tank	
B63	003	8	Naehrungsinitiator Bremse	Proximity switch. brake	Max. 300mA
B84	010	10	Aufnehmer Beschleunigung. links	Tranducer. acceleration. left	
B85	010	9	Aufnehmer Beschleunigung. rechts	Tranducer. acceleration. right	
B97	010	7	Aufnehmer Verstellmotor	Sensor. adjustable motor	
B93	013	7	Temperaturschalter Klimaanlage	Temperature switch. air conditioning	4_GC
B104	013	7	Druckschalter Klimaanlage	Pressure switch. air conditioning	
B106	008	11	Temperatursensor Asphalt	Transducer. temperature asphalt	
B124	004	15	Geber Wasserstandsabscheider Diesel	Sender. water separator fuel	
B131	013	9	Temperaturschalter Heizung	Temperature switch. heating	110_GC
E02	007	5	Beleuchtung Temperaturanzeige	illumination. temperature gauge	
E04	007	7	Beleuchtung Geschwindigkeitsanzeige	illumination. speedometer	
E07	007	6	Beleuchtung Omegetrometer	illumination. Omegetrometer	
E08	007	9	Blinkleuchte vorne links	Indicator. front. lh.	21W
E09	007	9	Blinkleuchte hinten links	Indicator. rear. lh.	21W
E09	007	10	Blinkleuchte hinten links	Indicator. rear. lh.	21W
E10	007	11	Blinkleuchte vorne rechts	Indicator. front. rh.	21W
E11	007	12	Blinkleuchte hinten rechts	Indicator. rear. rh.	21W
E11	007	12	Blinkleuchte hinten rechts	Indicator. rear. rh.	21W
E12	007	15	Parkeleuchte links	Parking light. lh.	5W
E13	007	13	Schlussleuchte links	Tail light. lh.	5W
E13	007	14	Schlussleuchte links	Tail light. lh.	5W
E14	007	16	Parkeleuchte rechts	Parking light. rh.	5W
E15	007	17	Schlussleuchte rechts	Tail light. rh.	5W
E15	007	17	Schlussleuchte rechts	Tail light. rh.	5W
E16	007	19	Scheinwerfer links	Head light. lh.	55 WATT
E17	007	20	Scheinwerfer rechts	Head light. rh.	55 WATT
E18	007	4	Arbeitsscheinwerfer links	Working head light. lh.	55W
E19	007	5	Arbeitsscheinwerfer rechts	Working head light. rh.	55W
E23	014	2	Arbeitsscheinwerfer vorne links	Working head light. front. lh.	55W
E23	015	17	Arbeitsscheinwerfer vorne links	Working head light. front. lh.	55 WATT
E25	014	3	Arbeitsscheinwerfer vorne rechts	Working head light. front. rh.	55W
E25	015	18	Arbeitsscheinwerfer vorne rechts	Working head light. front. rh.	55 WATT
E27	007	1	Arbeitsscheinwerfer hinten links	Working head light. rear. lh.	55 WATT
E27	014	4	Arbeitsscheinwerfer hinten links	Working head light. rear. lh.	55W
E27	015	19	Arbeitsscheinwerfer hinten links	Working head light. rear. lh.	55 WATT
E28	007	2	Arbeitsscheinwerfer hinten rechts	Working head light. rear. rh.	55 WATT
E28	014	2	Arbeitsscheinwerfer hinten rechts	Working head light. rear. rh.	55W
E28	015	16	Arbeitsscheinwerfer hinten rechts	Working head light. rear. rh.	55 WATT
E29	014	8	Innenleuchte Kabine	Inside light. cabin	21W
E30	013	13	Heizgeraet	Heating unit	
E32	014	6	Kennleuchte	Warning light	55W
E70	014	8	Nachtleuchte	Night lamp	5W
F00	002	1	Hauptsicherung Batterie	Fuse. main. battery	125A
F01	002	11	Hauptsicherung	Fuse. main	30A
F03	009	4	Sicherung Vibration	Fuse. vibration	10A
F04	004	16	Sicherung Instrumente	Fuse. gauges	5A
F05	002	19	Sicherung Steckdose	Fuse. socket	15A
F06	005	7	Sicherung Berieselung	Fuse. sprinkler system	10A
F07	007	8	Sicherung Warndlinker	Fuse. hazard light	15A

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 1

von: 11

page: 1

from: 11

Ers.f.:

Replaces:

920 100 01

Blatt Nr.:

sheet no.:

101

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 2

von: 11

page: 2

from: 11

Ers.f.:

Replaces:

Blatt Nr.:

sheet no.:

920 100 01

102

Name	Bl.	Pf.	Benennung	title	TYP
F08	007 4		Sicherung Blinker u. Arbeitsscheinw.	Fuse, indicators a. work, head light	15A
F09	007 14		Sicherung Park- u. Schlusss.links	Fuse, parking and tail light, lh.	10A
F10	007 17		Sicherung Park- u. Schlusss.rechts	Fuse, parking and tail light, rh.	10A
F11	007 19		Sicherung Scheinwerfer links	Fuse, head light, lh.	10A
F12	007 20		Sicherung Scheinwerfer rechts	Fuse, head light, rh.	10A
F14	003 3		Sicherung Hubmagnet Motor	Fuse, shut off solenoid, engine	10A
F15	002 5		Sicherung Heizgeraet	Fuse, heating unit	125A
F15	013 17		Sicherung Heizgeraet	Fuse, heating unit	5A
F23	006 18		Sicherung Signalhorn	Fuse, warning horn	10A
F25	003 11		Sicherung Magnetv. Fahren u. Bremse	Fuse, sol. valve, travel and brake	5A
F27	014 13		Sicherung Wischer u. Wascher vorne	Fuse, windscr. wiper and washer, fr.	15A
F28	014 15		Sicherung Wischer u. Wascher hinten	Fuse, windscr. wiper and washer, re.	15A
F31	013 1		Sicherung Kabinenluefter	Fuse, cabin ventilator	25A
F40	013 14		Sicherung Kabinenheizung	Fuse, heating unit cab	20A
F41	014 6		Sicherung Rundumkennleuchte	Fuse, rotax beacon	15A
F68	005 2		Sicherung Potential 30	Fuse, potential 30	25A
F69	013 9		Sicherung Steuereinheit	Fuse, scratter unit	10A
F93	010 14		Sicherung Steuerung (Potential 30)	Fuse, controller (pot. 30)	10A
F101	010 2		Sicherung Variomatic (Potential 15)	fuse, variomatic (pot. 15)	10A
F105	006 12		Sicherung Motordrehzahl	Fuse, motor speed	20A
F108	015 16		Sicherung Scheinwerfer mitte	Fuse, head lights middle	25A
F110	014 4		Sicherung Scheinwerfer aussen	Fuse, head lights outside	25A
F113	015 3		Sicherung Xenon Arbeitsscheinwerfer 1	Fuse, xenon worklamp 1	20A
F114	015 4		Sicherung Xenon Arbeitsscheinwerfer 2	Fuse, xenon worklamp 2	20A
F115	015 5		Sicherung Xenon Arbeitsscheinwerfer 3	Fuse, xenon worklamp 3	20A
F116	015 7		Sicherung Xenon Arbeitsscheinwerfer 4	Fuse, xenon worklamp 4	20A
F119	002 11		Sicherung Motor	Fuse, motor	7.5A
F129	004 2		Sicherung, MD+	Fuse, MD+	15A
G01	002 1		Batterie	Battery	102AH
G02	002 7		Generator	Generator	90A
H01	003 17		Meldeleuchte Bremse	Indicator light, brake	
H02	012 13		Meldeleuchte Hundegang	Indicator light, crab walk	
H04	010 19		Meldeleuchte Betriebsstoerung	Indicator light, breakdown	
H05	007 8		Meldeleuchte Blinker	Indicator light, indicators	
H06	007 8		Meldeleuchte Wamblinker	Indicator light, hazard light	
H06	007 9		Meldeleuchte Wamblinker	Indicator light, hazard light	
H07	004 3		Warnsummer Betriebsstoerung	Warning buzzer, breakdown	
H08	002 10		Meldeleuchte Ladekontrolle	Indicator light, charge control	
H09	004 10		Meldeleuchte Oeldruck Motor	Indicator light, engine oil pressure	
H13	009 8		Meldeleuchte 2.Gang	Indicator light, 2nd speed range	
H14	009 4		Warnsummer Rueckwaertsfahrt	Back-up alarm buzzer	
H15	004 13		Meldeleuchte Motorluftfilter	Indicator light, engine air filter	0.7A
H20	003 15		Meldeleuchte Sitzkontaktschalter	Indicator light, drivers seat contact	
H21	004 7		Meldeleuchte Oeltemperatur	Indicator light, oil temperature	
H23	004 14		Meldeleuchte Hydraulikoefiller	Indicator light, hydr. oil filler	
H33	009 14		Meldeleuchte Splittstreuer	Indicator light, gravel scratter	
H38	004 17		Meldeleuchte Kraftstoff	Indicator light, fuel oil	
H49	004 12		Meldeleuchte Motorueberhitzung	Indicator light, engine overheating	
H52	002 14		Anzeipe Gluehueberwachung	Glow plug indicator	
H58	013 5		Meldeleuchte Klimaanlage	Indicator light, air conditioning	
H60	006 9		Meldeleuchte Motordrehzahl	Indicator light, motor speed	
H63	015 2		Xenon Arbeitsscheinwerfer 1	Xenon worklamp 1	3.5A
H64	015 4		Xenon Arbeitsscheinwerfer 2	Xenon worklamp 2	3.5A
H65	015 5		Xenon Arbeitsscheinwerfer 3	Xenon worklamp 3	3.5A
H66	015 6		Xenon Arbeitsscheinwerfer 4	Xenon worklamp 4	3.5A
H70	004 16		Anzeipe Wasser im Diesel	Indicator water in fuel	
H73	004 8		Meldeleuchte Kuelmittevorrat	Indicator light, eng. coolant res.	
H79	004 5		Meldeleuchte Wasserrestmenge	Indicator light, Water res.	
H80	004 4		Meldeleuchte Wegfahrsperr	Indicator light, anti-theft device	
H82	003 19		Warnsummer Sitzkontakt	Warning buzzer, seat contact	
K03	012 19		Relais Hundegang	Relay, crab walk	BOSCHW
K03	018 6		Relais Hundegang	Relay, crab walk	
K05	003 8		Relais Startstrom	Relay, starting current	BOSCHW
K05	018 5		Relais Startstrom	Relay, starting current	
K08	002 14		Relais Heizgeraet	Relay, heating unit	BOSCHL
K11	002 17		Relais Klemme 30 auf 15	Relay, terminal 30 to 15	BOSCHW
K11	018 4		Relais Klemme 30 auf 15	Relay, terminal 30 to 15	
K22	003 10		Relais Hubmagnet Motor	Relay, shut off solenoid, engine	BOSCHW
K22	018 7		Relais Hubmagnet Motor	Relay, shut off solenoid, engine	
K32	014 17		Relais Kabine	Relay, cabin	BOSCHL
K33	002 18		Relais Warnsummer Betriebsstoerung	Relay, warning buzzer, failure indication	BOSCHW
K33	018 8		Relais Warnsummer Betriebsstoerung	Relay, warning buzzer, failure indication	
K35	006 12		Relais Selbsthaltung	Relay, holding contact	BOSCHW
K35	018 9		Relais Selbsthaltung	Relay, holding contact	
K62	002 7		Relais D+	Relay, D+	BOSCHW
K62	018 10		Relais D+	Relay, D+	
K79	005 12		Relais Berieselungspumpe	Relay, sprinkler pump	BOSCHW
K79	018 11		Relais Berieselungspumpe	Relay, sprinkler pump	
K80	005 11		Relais Berieselungspumpe	Relay, sprinkler pump	BOSCHW
K80	018 12		Relais Berieselungspumpe	Relay, sprinkler pump	
K82	005 18		Relais Kantenschneldgeraet ab	Relay, edge cutter, up	BOSCHW
K82	018 13		Relais Kantenschneldgeraet ab	Relay, edge cutter, up	
K83	005 19		Relais Kantenschneldgeraet auf	Relay, edge cutter, down	BOSCHW
K83	018 13		Relais Kantenschneldgeraet auf	Relay, edge cutter, down	
K85	014 18		Unschaltrelais	Relay, switch over	BOSCHW
K104	005 10		Relais, Stoermeldungen	Relay, failure indication	BOSCHW
K104	018 16		Relais, Stoermeldungen	Relay, failure indication	
K114	006 5		Relais Motordrehzahl	Relay, engine rpm	BOSCHW
K114	018 6		Relais Motordrehzahl	Relay, engine rpm	
K118	014 20		Relais Arbeitsscheinwerfer	Relay, working lights	BOSCHW
K127	015 7		Relais Xenon Arbeitsscheinwerfer 1	Relay, xenon worklamp 1	BOSCHW
K128	015 9		Relais Xenon Arbeitsscheinwerfer 2	Relay, xenon worklamp 2	BOSCHW
K129	015 10		Relais Xenon Arbeitsscheinwerfer 3	Relay, xenon worklamp 3	BOSCHW
K130	015 11		Relais Xenon Arbeitsscheinwerfer 4	Relay, xenon worklamp 4	BOSCHW
K135	015 14		Relais Arbeitsscheinwerfer	Relay, working lights	BOSCHW
K138	012 18		Relais Hundegang	Relay, crab walk	BOSCHW

Name				Benennung	title	TYP
1	K138	018 14	Relais Hundegang	Relais Hundegang	Relay, crab walk	BOSCHW
	K139	006 11	Relais Kontrollleuchte Motordrehzahl	Relais Kontrollleuchte Motordrehzahl	Relay,indicator light, engine rpm	
	K139	018 15	Relais Kontrollleuchte Motordrehzahl	Relais Kontrollleuchte Motordrehzahl	Relay,indicator light, engine rpm	
2	M01	002 7	Starter	Starter	Starter	11A
	M02	005 1	Berieselungspumpe	Berieselungspumpe	Sprinkler pump	
	M03	005 5	Emulsionsberieselungspumpe	Emulsionsberieselungspumpe	Emulsion sprinkler pump	
3	M04	014 12	Scheibenwischermotor vorne	Scheibenwischermotor vorne	Windscreen wiper motor, front	7.9A
	M05	014 15	Scheibenwischermotor hinten	Scheibenwischermotor hinten	Windscreen wiper motor, rear	
	M06	014 14	Scheibenwaschermotor vorne	Scheibenwaschermotor vorne	Windscreen washer motor, front	
4	M07	014 16	Scheibenwaschermotor hinten	Scheibenwaschermotor hinten	Windscreen washer motor, rear	2.5A
	M09	013 1	Kabinenluefter	Kabinenluefter	Cabin ventilator	
	M09	013 3	Kabinenluefter	Kabinenluefter	Cabin ventilator	
5	M18	005 2	Wasserpumpe	Wasserpumpe	Water pump	MAX 11A
	M22	009 17	Elektromotor Splittstreuer	Elektromotor Splittstreuer	Electric motor, chip spreader	
	M22	009 17	Elektromotor Splittstreuer	Elektromotor Splittstreuer	Electric motor, chip spreader	
6	P00	002 10	Betriebsstundenzähler	Betriebsstundenzähler	Operating hour meter	6.5A
	P01	004 16	Tankanzeige	Tankanzeige	Level gauge	
	P04	012 10	Geschwindigkeitsanzeige	Geschwindigkeitsanzeige	Speedometer	
7	P07	008 6	Omegameter	Omegameter	Omegameter	82 OHM
	P09	012 5	Frequenz- und Geschwindigkeitsanzeige	Frequenz- und Geschwindigkeitsanzeige	Frequency- and Speedometer	
	P11	011 15	Drucker	Drucker	Printer	
8	P18	013 18	Fehleranzeige Elektronik	Fehleranzeige Elektronik	Fault indication, electric	2.5A
	P19	004 19	Anzeige Wasserstand links	Anzeige Wasserstand links	Water gauge level, lr.	
	P28	008 11	Temperaturanzeige Asphalt	Temperaturanzeige Asphalt	Temperature gauge, asphalt	
9	P33	010 3	Opus 21	Opus 21	Opus 21	MAX 11A
	R03	004 16	Geber Tankanzeige	Geber Tankanzeige	Water pump	
	R03	004 17	Geber Tankanzeige	Geber Tankanzeige	Electric motor, chip spreader	
10	R09	002 8	Vorwiderstand	Vorwiderstand	Sender, level gauge	82 OHM
	R09	018 1	Vorwiderstand	Vorwiderstand	Sender, level gauge	
	R10	004 4	Parallelwiderstand	Parallelwiderstand	Dropping resistor	
11	R14	004 19	Geber Wasserstand, links	Geber Wasserstand, links	Dropping resistor	82 OHM
	R19	002 5	Heizflansch	Heizflansch	Parallel resistor	
	R20	004 16	Widerstand	Widerstand	Sender, water level, lh.	
12	R21	004 14	Widerstand	Widerstand	heater flange	2000 WATT
	R21	010 3	Widerstand	Widerstand	Resistor	
	R22	004 15	Widerstand	Widerstand	Resistor	
13	S00	002 11	Startschalter	Startschalter	Resistor	E 75 OHM
	S01	003 11	Schalter NOT AUS	Schalter NOT AUS	Resistor	
	S02	009 9	Fahrtstufenschalter	Fahrtstufenschalter	Resistor	
14	S03	006 18	Taster Signalhorn	Taster Signalhorn	Starter switch	BOSCHW
	S06	003 14	Sitzkontaktschalter links	Sitzkontaktschalter links	Switch, emergency off	
	S08	009 6	Vibrationsschalter man./autom.	Vibrationsschalter man./autom.	Switch, speed range selector	
15	S12	009 2	Vibrationsschalter Fahrhebel links	Vibrationsschalter Fahrhebel links	Push button, warning horn	MAX 0.2A
	S13	009 3	Vibrationsschalter Fahrhebel rechts	Vibrationsschalter Fahrhebel rechts	Push button, warning horn	
	S14	007 8	Warnblinkschalter	Warnblinkschalter	Switch, seat contact, lh.	
16	S15	007 18	Beleuchtungsschalter STVZO	Beleuchtungsschalter STVZO	Switch, vibration, man./autom.	MAX 0.2A
	S19	005 5	Emulsionsberieselungsschalter	Emulsionsberieselungsschalter	Switch, vibration, travel lever, lh.	
	S20	014 13	Schalter Scheibenwischer vorne	Schalter Scheibenwischer vorne	Switch, vibration, travel lever, rh.	
17	S21	014 15	Schalter Scheibenwischer hinten	Schalter Scheibenwischer hinten	Switch, hazard light	MAX 0.2A
	S26	007 4	Schalter Arbeitsbeleuchtung hinten	Schalter Arbeitsbeleuchtung hinten	Switch, lighting STVZO	
	S28	013 17	Schalter Kabinenheizung	Schalter Kabinenheizung	Switch, emulsion sprinkler system	
18	S30	002 1	Batterietrennschalter	Batterietrennschalter	Switch, windscreen wiper, front	MAX 0.2A
	S35	009 7	Vibrationsschalter klein/gross	Vibrationsschalter klein/gross	Switch, windscreen wiper, rear	
	S36	009 12	Vibrationsschalter	Vibrationsschalter	Switch, working head lights, rear	
19	S37	007 12	Schalter Blinker	Schalter Blinker	Switch, cabin heating	MAX 0.2A
	S38	014 6	Schalter Kennleuchte	Schalter Kennleuchte	Switch, battery disconnect	
	S44	013 1	Schalter Kabinenluefter	Schalter Kabinenluefter	Switch, vibration low/high	
20	S45	014 8	Schalter Kabininnenleuchte	Schalter Kabininnenleuchte	Switch, vibration	MAX 0.2A
	S53	014 20	Schalter Arbeitsbeleuchtung	Schalter Arbeitsbeleuchtung	Switch, indicator	
	S53	015 14	Schalter Arbeitsbeleuchtung	Schalter Arbeitsbeleuchtung	Switch, warning light	
21	S73	009 15	Schalter Splittstreuer	Schalter Splittstreuer	Switch, cabin ventilator	MAX 0.2A
	S74	009 17	Schalter Splittmenge	Schalter Splittmenge	Switch, cabin inside light	
	S82	005 18	Taster Kantenschneidgeraet abwaerts	Taster Kantenschneidgeraet abwaerts	Switch, working lights	
22	S83	005 19	Taster Kantenschneidgeraet auf	Taster Kantenschneidgeraet auf	Switch, working lights	MAX 0.2A
	S108	005 8	Schalter Berieselung Kantenschneidgeraet	Schalter Berieselung Kantenschneidgeraet	Switch, gravel quantity	
	S114	005 7	Schalter Wasserpumpe	Schalter Wasserpumpe	Push button, edge cutter, down	
23	S115	012 18	Taster, Hundehang links	Taster, Hundehang links	Push button, edge cutter, up	MAX 0.2A
	S116	012 19	Taster, Hundehang rechts	Taster, Hundehang rechts	Switch,sprinkler sys edge cutter	
	S117	007 3	Schalter Steckdose	Schalter Steckdose	Switch, water pump	
24	S120	006 4	Schalter Motordrehzahl	Schalter Motordrehzahl	Push button, crab walk, lh.	MAX 0.2A
	S149	015 9	Schalter Arbeitsbeleuchtung links	Schalter Arbeitsbeleuchtung links	Push button, crab walk, rh.	
	S150	015 11	Schalter Arbeitsbeleuchtung rechts	Schalter Arbeitsbeleuchtung rechts	Switch, socket	
25	S153	011 11	Papiervorschub	Papiervorschub	Switch, engine speed	MAX 0.2A
	S158	014 8	Schalter Nachtbeleuchtung	Schalter Nachtbeleuchtung	Switch, working lights lh.	
	S158	014 8	Schalter Nachtbeleuchtung	Schalter Nachtbeleuchtung	Switch, working lights rh.	
26	V01	002 7	Diode	Diode	Paper formfeed	MAX 0.2A
	V01	018 12	Diode	Diode	Switch, cabin night lamp	
	V02	003 12	Diode	Diode	Diode	
27	V03	004 8	Diode	Diode	Diode	UF4004
	V03	018 12	Diode	Diode	Diode	
	V04	004 7	Diode	Diode	Diode	
28	V04	018 12	Diode	Diode	Diode	UF4004
	V05	004 5	Diode	Diode	Diode	
	V05	018 12	Diode	Diode	Diode	
29	V06	007 11	Diode	Diode	Diode	UF4004
	V07	007 10	Diode	Diode	Diode	
	V08	009 9	Diode	Diode	Diode	
30	V09	013 6	Diode	Diode	Diode	STECKER
	V10	013 10	Diode	Diode	Diode	
	V11	009 11	Diode	Diode	Diode	
31	V12	009 13	Diode	Diode	Diode	STECKER
	V14	005 15	Diode	Diode	Diode	
	V15	005 17	Diode	Diode	Diode	
32	V16	012 14	Diode	Diode	Diode	STECKER
	V17	012 17	Diode	Diode	Diode	
	V17	012 17	Diode	Diode	Diode	

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:
Name:

Bauteilliste

component listing

Seite: 3 von: 11

page: 3 from: 11

Ers.f.:
Replaces:

920 100 01

Blatt Nr.: 103

sheet no.:

Name		Bl.	Pf.	Benennung	title	Typ
1	V18	009	14	Diode	Diode	STECKER
	V19	009	17	Diode	Diode	STECKER
	V21	009	18	Diode	Diode	STECKER
	V22	004	10	Diode	Diode	UF4004
2	V22	018	13	Diode	Diode	
	V23	004	12	Diode	Diode	UF4004
	V23	018	13	Diode	Diode	
	V29	005	9	Diode	Diode	STECKER
	V31	010	14	Diode	Diode	STECKER
	V32	010	15	Diode	Diode	STECKER
3	V33	010	17	Diode	Diode	
	V34	010	13	Diode	Diode	
	V41	003	2	Diode (A1)	Diode (A1)	MR756
	V41	018	1	Diode (A1)	Diode (A1)	
4	V42	009	6	Diode (A2)	Diode (A2)	
	V42	018	1	Diode (A2)	Diode (A2)	MR756
	V43	009	8	Diode (A3)	Diode (A3)	
	V43	018	1	Diode (A3)	Diode (A3)	MR756
	V44	009	8	Diode (A4)	Diode (A4)	
	V44	018	1	Diode (A4)	Diode (A4)	MR756
5	V45	009	4	Diode (A5)	Diode (A5)	
	V45	018	1	Diode (A5)	Diode (A5)	MR756
	V46	009	3	Diode (A6)	Diode (A6)	
	V46	018	1	Diode (A6)	Diode (A6)	MR756
	V47	006	7	Diode (A7)	Diode (A7)	
6	V47	018	1	Diode (A7)	Diode (A7)	MR756
	V48	018	1	Diode (A8)	Diode (A8)	
	X1.1	009	9	ELEKTROKASTEN	Cross-bonding box	
	X1.1-210	018	1	ELEKTRONIK VARIOMATIC	Electronic variomatic	
7	X1.2	009	7	ELEKTROKASTEN	Cross-bonding box	
	X1.3	009	7	ELEKTROKASTEN	Cross-bonding box	
	X1.5	009	7	ELEKTROKASTEN	Cross-bonding box	
	X1.6	003	15	ELEKTROKASTEN	Cross-bonding box	
	X1.7	009	12	ELEKTROKASTEN	Cross-bonding box	
8	X1.8	003	17	ELEKTROKASTEN	Cross-bonding box	
	X1.9	009	13	ELEKTROKASTEN	Cross-bonding box	
	X1.10	002	19	ELEKTROKASTEN	Cross-bonding box	
	X1.11	009	15	ELEKTROKASTEN	Cross-bonding box	
	X1.12	005	8	ELEKTROKASTEN	Cross-bonding box	
9	X1.13	009	17	ELEKTROKASTEN	Cross-bonding box	
	X1.14	005	9	ELEKTROKASTEN	Cross-bonding box	
	X1.15	009	19	ELEKTROKASTEN	Cross-bonding box	
	X1.16	006	5	Elektrokasten	Cross-bonding box	
	X1.17	004	8	ELEKTROKASTEN	Cross-bonding box	
10	X1.18	013	5	ELEKTROKASTEN	Cross-bonding box	
	X1.19	004	7	ELEKTROKASTEN	Cross-bonding box	
	X1.20	004	10	ELEKTROKASTEN	Cross-bonding box	
	X1.21	004	12	ELEKTROKASTEN	Cross-bonding box	
	X1.22	004	13	ELEKTROKASTEN	Cross-bonding box	
11	X1.23	004	14	ELEKTROKASTEN	Cross-bonding box	
	X1.24	004	16	ELEKTROKASTEN	Cross-bonding box	
	X1.25	007	11	Elektrokasten	Cross-bonding box	
	X1.26	007	10	Elektrokasten	Cross-bonding box	
	X1.27	002	9	ELEKTROKASTEN	Cross-bonding box	
12	X1.28	006	9	ELEKTROKASTEN	Cross-bonding box	
	X1.29	002	14	ELEKTROKASTEN	Cross-bonding box	
	X1.30	006	6	Elektrokasten	Cross-bonding box	
	X1.31	009	5	ELEKTROKASTEN	Cross-bonding box	
	X1.32	012	10	ELEKTROKASTEN	Cross-bonding box	
13	X1.33	012	11	ELEKTROKASTEN	Cross-bonding box	
	X1.34	004	17	ELEKTROKASTEN	Cross-bonding box	
	X1.35	007	8	Elektrokasten	Cross-bonding box	
	X1.36	007	8	Elektrokasten	Cross-bonding box	
	X1.37	007	8	Elektrokasten	Cross-bonding box	
14	X1.38	007	4	Elektrokasten	Cross-bonding box	
	X1.39	007	18	Elektrokasten	Cross-bonding box	
	X1.40	007	18	Elektrokasten	Cross-bonding box	
	X1.41	007	19	Elektrokasten	Cross-bonding box	
	X1.42	006	5	Elektrokasten	Cross-bonding box	
15	X1.43	003	11	ELEKTROKASTEN	Cross-bonding box	
	X1.44	004	20	ELEKTROKASTEN	Cross-bonding box	
	X1.45	010	19	ELEKTROKASTEN	Cross-bonding box	
	X1.46	005	7	ELEKTROKASTEN	Cross-bonding box	
	X1.47	003	11	ELEKTROKASTEN	Cross-bonding box	
	X1.48	009	6	ELEKTROKASTEN	Cross-bonding box	
16	X1.49	009	7	ELEKTROKASTEN	Cross-bonding box	
	X1.50	005	8	ELEKTROKASTEN	Cross-bonding box	
	X1.51	005	8	ELEKTROKASTEN	Cross-bonding box	
	X1.52	005	8	ELEKTROKASTEN	Cross-bonding box	
	X1.53	002	19	ELEKTROKASTEN	Cross-bonding box	
17	X1.53	003	19	ELEKTROKASTEN	Cross-bonding box	
	X1.53	004	18	ELEKTROKASTEN	Cross-bonding box	
	X1.53	005	7	ELEKTROKASTEN	Cross-bonding box	
	X1.53	007	7	Elektrokasten	Cross-bonding box	
	X1.54	004	5	ELEKTROKASTEN	Cross-bonding box	
18	X1.55	007	4	Elektrokasten	Cross-bonding box	
	X1.56	012	13	ELEKTROKASTEN	Cross-bonding box	
	X1.57	004	16	ELEKTROKASTEN	Cross-bonding box	
	X1.58	007	15	Elektrokasten	Cross-bonding box	
	X1.59	007	16	Elektrokasten	Cross-bonding box	
19	X1.60	006	18	Elektrokasten	Cross-bonding box	
	X1.63	003	7	ELEKTROKASTEN	Cross-bonding box	
	X1.63	009	3	ELEKTROKASTEN	Cross-bonding box	
	X1.64	009	2	ELEKTROKASTEN	Cross-bonding box	
	X1.65	003	8	ELEKTROKASTEN	Cross-bonding box	
	X1.66	003	11	ELEKTROKASTEN	Cross-bonding box	
20	X1.67	003	14	ELEKTROKASTEN	Cross-bonding box	
	X1.69	005	11	ELEKTROKASTEN	Cross-bonding box	

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 4

von: 11

page: from:

920 100 01

Blatt Nr.: 104

sheet no.:

Name				Bl.	Pf.	Benennung	title	TYP
1	X1.70	009 3	ELEKTROKASTEN				Cross-bonding box	
	X1.71	004 20	ELEKTROKASTEN				Cross-bonding box	
	X1.72	004 20	ELEKTROKASTEN				Cross-bonding box	
	X1.73	007 10	Elektrokasten				Cross-bonding box	
2	X1.74	007 12	Elektrokasten				Cross-bonding box	
	X1.75	009 9	ELEKTROKASTEN				Cross-bonding box	
	X1.77	009 7	ELEKTROKASTEN				Cross-bonding box	
	X1.78	009 7	ELEKTROKASTEN				Cross-bonding box	
3	X1.79	009 8	ELEKTROKASTEN				Cross-bonding box	
	X1.80	009 8	ELEKTROKASTEN				Cross-bonding box	
	X1.81	009 12	ELEKTROKASTEN				Cross-bonding box	
	X1.82	009 12	ELEKTROKASTEN				Cross-bonding box	
4	X1.83	009 13	ELEKTROKASTEN				Cross-bonding box	
	X1.84	009 13	ELEKTROKASTEN				Cross-bonding box	
	X1.87	009 16	ELEKTROKASTEN				Cross-bonding box	
	X1.87	009 17	ELEKTROKASTEN				Cross-bonding box	
5	X1.88	009 16	ELEKTROKASTEN				Cross-bonding box	
	X1.89	009 18	ELEKTROKASTEN				Cross-bonding box	
	X1.89	009 19	ELEKTROKASTEN				Cross-bonding box	
	X1.90	009 19	ELEKTROKASTEN				Cross-bonding box	
6	X1.91	004 7	ELEKTROKASTEN				Cross-bonding box	
	X1.92	004 10	ELEKTROKASTEN				Cross-bonding box	
	X1.93	004 6	ELEKTROKASTEN				Cross-bonding box	
	X1.94	004 10	ELEKTROKASTEN				Cross-bonding box	
7	X1.95	004 11	ELEKTROKASTEN				Cross-bonding box	
	X1.96	004 13	ELEKTROKASTEN				Cross-bonding box	
	X1.97	004 14	ELEKTROKASTEN				Cross-bonding box	
	X1.99	007 11	Elektrokasten				Cross-bonding box	
8	X1.100	007 9	Elektrokasten				Cross-bonding box	
	X1.101	002 7	ELEKTROKASTEN				Cross-bonding box	
	X1.102	006 12	Elektrokasten				Cross-bonding box	
	X1.103	002 14	ELEKTROKASTEN				Cross-bonding box	
9	X1.104	002 17	ELEKTROKASTEN				Cross-bonding box	
	X1.105	006 12	Elektrokasten				Cross-bonding box	
	X1.106	006 13	Elektrokasten				Cross-bonding box	
	X1.107	007 19	Elektrokasten				Cross-bonding box	
10	X1.108	007 20	Elektrokasten				Cross-bonding box	
	X1.109	005 14	ELEKTROKASTEN				Cross-bonding box	
	X1.110	005 14	ELEKTROKASTEN				Cross-bonding box	
	X1.110	007 8	Elektrokasten				Cross-bonding box	
11	X1.111	005 16	ELEKTROKASTEN				Cross-bonding box	
	X1.112	005 16	ELEKTROKASTEN				Cross-bonding box	
	X1.113	012 15	ELEKTROKASTEN				Cross-bonding box	
	X1.114	012 15	ELEKTROKASTEN				Cross-bonding box	
12	X1.115	012 16	ELEKTROKASTEN				Cross-bonding box	
	X1.116	012 16	ELEKTROKASTEN				Cross-bonding box	
	X1.117	005 8	ELEKTROKASTEN				Cross-bonding box	
	X1.118	003 14	ELEKTROKASTEN				Cross-bonding box	
13	X1.118	005 6	ELEKTROKASTEN				Cross-bonding box	
	X1.118	009 1	ELEKTROKASTEN				Cross-bonding box	
	X1.118	009 14	ELEKTROKASTEN				Cross-bonding box	
	X1.119	005 5	ELEKTROKASTEN				Cross-bonding box	
14	X1.120	005 6	ELEKTROKASTEN				Cross-bonding box	
	X1.121	008 6	ELEKTROKASTEN				Cross-bonding box	
	X1.122	008 6	ELEKTROKASTEN				Cross-bonding box	
	X1.123	003 3	ELEKTROKASTEN				Cross-bonding box	
15	X1.124	005 9	ELEKTROKASTEN				Cross-bonding box	
	X1.125	004 16	ELEKTROKASTEN				Cross-bonding box	
	X1.126	009 4	ELEKTROKASTEN				Cross-bonding box	
	X1.127	002 18	ELEKTROKASTEN				Cross-bonding box	
16	X1.127	003 8	ELEKTROKASTEN				Cross-bonding box	
	X1.127	004 4	ELEKTROKASTEN				Cross-bonding box	
	X1.127	004 16	ELEKTROKASTEN				Cross-bonding box	
	X1.127	005 12	ELEKTROKASTEN				Cross-bonding box	
17	X1.127	005 18	ELEKTROKASTEN				Cross-bonding box	
	X1.127	006 5	Elektrokasten				Cross-bonding box	
	X1.127	007 12	Elektrokasten				Cross-bonding box	
	X1.127	009 4	ELEKTROKASTEN				Cross-bonding box	
18	X1.127	012 14	ELEKTROKASTEN				Cross-bonding box	
	X1.127	012 19	ELEKTROKASTEN				Cross-bonding box	
	X1.128	004 4	ELEKTROKASTEN				Cross-bonding box	
	X1.129	007 4	Elektrokasten				Cross-bonding box	
19	X1.130	012 13	ELEKTROKASTEN				Cross-bonding box	
	X1.131	012 13	ELEKTROKASTEN				Cross-bonding box	
	X1.132	007 14	Elektrokasten				Cross-bonding box	
	X1.133	007 17	Elektrokasten				Cross-bonding box	
20	X1.134	006 18	Elektrokasten				Cross-bonding box	
	X1.135	002 15	ELEKTROKASTEN				Cross-bonding box	
	X1.136	003 11	ELEKTROKASTEN				Cross-bonding box	
	X1.137	003 2	ELEKTROKASTEN				Cross-bonding box	
21	X1.137	003 11	ELEKTROKASTEN				Cross-bonding box	
	X1.137	006 7	Elektrokasten				Cross-bonding box	
	X1.137	009 6	ELEKTROKASTEN				Cross-bonding box	
	X1.137	009 8	ELEKTROKASTEN				Cross-bonding box	
22	X1.138	006 18	Elektrokasten				Cross-bonding box	
	X1.139	005 18	ELEKTROKASTEN				Cross-bonding box	
	X1.140	005 19	ELEKTROKASTEN				Cross-bonding box	
	X1.141	012 18	ELEKTROKASTEN				Cross-bonding box	
23	X1.142	012 19	ELEKTROKASTEN				Cross-bonding box	
	X1.143	009 2	ELEKTROKASTEN				Cross-bonding box	
	X1.144	009 3	ELEKTROKASTEN				Cross-bonding box	
	X1.145	005 1	ELEKTROKASTEN				Cross-bonding box	
24	X1.146	005 2	ELEKTROKASTEN				Cross-bonding box	
	X1.147	005 2	ELEKTROKASTEN				Cross-bonding box	
	X1.148	007 5	Elektrokasten				Cross-bonding box	
	X1.149	008 5	ELEKTROKASTEN				Cross-bonding box	
25	X1.150	008 6	ELEKTROKASTEN				Cross-bonding box	
	X1.151	008 10	ELEKTROKASTEN				Cross-bonding box	
	X1.152	008 12	ELEKTROKASTEN				Cross-bonding box	

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 5

von: 11

Ers.f.:

Replaces:

Blatt Nr.:

sheet no.: 105

920 100 01

Name			Bl.	Pf.	Benennung	title	TYP
1	X1:171	009 15	ELEKTROKASTEN		Cross-bonding box		
	X1:172	009 15	ELEKTROKASTEN		Cross-bonding box		
	X1:173	005 5	ELEKTROKASTEN		Cross-bonding box		
	X1:174	005 5	ELEKTROKASTEN		Cross-bonding box		
2	X1:185	004 17	ELEKTROKASTEN		Cross-bonding box		
	X1:186	009 10	ELEKTROKASTEN		Cross-bonding box		
	X1:187	012 2	ELEKTROKASTEN		Cross-bonding box		
	X1:188	012 2	ELEKTROKASTEN		Cross-bonding box		
3	X1:189	012 8	ELEKTROKASTEN		Cross-bonding box		
	X1:191	012 9	ELEKTROKASTEN		Cross-bonding box		
	X1:192	012 9	ELEKTROKASTEN		Cross-bonding box		
	X1:193	012 9	ELEKTROKASTEN		Cross-bonding box		
4	X1:194	012 8	ELEKTROKASTEN		Cross-bonding box		
	X1:195	003 3	ELEKTROKASTEN		Cross-bonding box		
	X1:196	004 14	ELEKTROKASTEN		Cross-bonding box		
	X1:197	004 15	ELEKTROKASTEN		Cross-bonding box		
5	X1:198	003 3	ELEKTROKASTEN		Cross-bonding box		
	X1:199	004 14	ELEKTROKASTEN		Cross-bonding box		
	X1:200	004 15	ELEKTROKASTEN		Cross-bonding box		
	X1:203	004 4	ELEKTROKASTEN		Cross-bonding box		
6	X1:206	002 15	ELEKTROKASTEN		Cross-bonding box		
	X1:207	013 5	ELEKTROKASTEN		Cross-bonding box		
	X2:1-1	002 2	ELEKTROKASTEN		Cross-bonding box		
	X2:1-2	002 4	ELEKTROKASTEN		Cross-bonding box		
7	X2:1-57	018 5	ELEKTROKASTEN		Cross-bonding box		
	X2:2-1	002 2	ELEKTROKASTEN		Cross-bonding box		
	X2:2-2	002 11	ELEKTROKASTEN		Cross-bonding box		
	X2:3-1	002 2	ELEKTROKASTEN		Cross-bonding box		
8	X2:3-2	002 19	ELEKTROKASTEN		Cross-bonding box		
	X2:4-1	002 2	ELEKTROKASTEN		Cross-bonding box		
	X2:4-2	010 14	ELEKTROKASTEN		Cross-bonding box		
	X2:5-1	002 2	ELEKTROKASTEN		Cross-bonding box		
9	X2:5-2	006 12	Elektrokasten		Cross-bonding box		
	X2:6-1	002 2	ELEKTROKASTEN		Cross-bonding box		
	X2:6-2	005 2	ELEKTROKASTEN		Cross-bonding box		
	X2:7-1	002 2	ELEKTROKASTEN		Cross-bonding box		
10	X2:7-2	007 8	Elektrokasten		Cross-bonding box		
	X2:8-1	002 11	ELEKTROKASTEN		Cross-bonding box		
	X2:8-2	002 11	ELEKTROKASTEN		Cross-bonding box		
	X2:9-1	003 10	ELEKTROKASTEN		Cross-bonding box		
11	X2:9-2	003 11	ELEKTROKASTEN		Cross-bonding box		
	X2:10-1	003 2	ELEKTROKASTEN		Cross-bonding box		
	X2:10-2	003 3	ELEKTROKASTEN		Cross-bonding box		
	X2:11-1	004 1	ELEKTROKASTEN		Cross-bonding box		
12	X2:11-2	004 2	ELEKTROKASTEN		Cross-bonding box		
	X2:12-1	004 16	ELEKTROKASTEN		Cross-bonding box		
	X2:12-2	004 16	ELEKTROKASTEN		Cross-bonding box		
	X2:13-1	006 18	Elektrokasten		Cross-bonding box		
13	X2:13-2	006 18	Elektrokasten		Cross-bonding box		
	X2:14-1	009 5	ELEKTROKASTEN		Cross-bonding box		
	X2:14-2	009 4	ELEKTROKASTEN		Cross-bonding box		
	X2:15-1	007 3	Elektrokasten		Cross-bonding box		
14	X2:15-2	007 4	Elektrokasten		Cross-bonding box		
	X2:16-1	010 2	ELEKTROKASTEN		Cross-bonding box		
	X2:16-2	010 2	ELEKTROKASTEN		Cross-bonding box		
	X2:17-1	005 7	ELEKTROKASTEN		Cross-bonding box		
15	X2:17-2	005 7	ELEKTROKASTEN		Cross-bonding box		
	X2:18-1	007 14	Elektrokasten		Cross-bonding box		
	X2:18-2	007 14	Elektrokasten		Cross-bonding box		
	X2:19-1	007 16	Elektrokasten		Cross-bonding box		
16	X2:19-2	007 17	Elektrokasten		Cross-bonding box		
	X2:20-1	007 19	Elektrokasten		Cross-bonding box		
	X2:20-2	007 19	Elektrokasten		Cross-bonding box		
	X2:21-1	007 20	Elektrokasten		Cross-bonding box		
17	X2:21-2	007 20	Elektrokasten		Cross-bonding box		
	X2:22-1	002 7	ELEKTROKASTEN		Cross-bonding box		
	X2:22-2	002 7	ELEKTROKASTEN		Cross-bonding box		
	X2:23-1	004 8	ELEKTROKASTEN		Cross-bonding box		
18	X2:23-2	004 8	ELEKTROKASTEN		Cross-bonding box		
	X2:24-1	004 7	ELEKTROKASTEN		Cross-bonding box		
	X2:24-2	004 7	ELEKTROKASTEN		Cross-bonding box		
	X2:25-1	004 5	ELEKTROKASTEN		Cross-bonding box		
19	X2:25-2	004 5	ELEKTROKASTEN		Cross-bonding box		
	X2:26-1	004 10	ELEKTROKASTEN		Cross-bonding box		
	X2:26-2	004 10	ELEKTROKASTEN		Cross-bonding box		
	X2:27-1	004 12	ELEKTROKASTEN		Cross-bonding box		
20	X2:27-2	004 12	ELEKTROKASTEN		Cross-bonding box		
	X2:30	003 11	ELEKTROKASTEN		Cross-bonding box		
	X2:31	003 11	ELEKTROKASTEN		Cross-bonding box		
	X2:32	003 11	ELEKTROKASTEN		Cross-bonding box		
21	X2:33	003 11	ELEKTROKASTEN		Cross-bonding box		
	X2:36	003 3	ELEKTROKASTEN		Cross-bonding box		
	X2:37	003 3	ELEKTROKASTEN		Cross-bonding box		
	X2:38	003 8	ELEKTROKASTEN		Cross-bonding box		
22	X2:39	003 8	ELEKTROKASTEN		Cross-bonding box		
	X2:40	002 13	ELEKTROKASTEN		Cross-bonding box		
	X2:52	010 2	ELEKTROKASTEN		Cross-bonding box		
	X2:53	010 15	ELEKTROKASTEN		Cross-bonding box		
23	X2:54	010 16	ELEKTROKASTEN		Cross-bonding box		
	X2:55	010 11	ELEKTROKASTEN		Cross-bonding box		
	X2:56	010 19	ELEKTROKASTEN		Cross-bonding box		
	X2:57	012 8	ELEKTROKASTEN		Cross-bonding box		
24	X3:1	009 4	RUCKFAHRWARNSUMMER		Back-up alarm buzzer		
	X3:2	009 4	RUCKFAHRWARNSUMMER		Back-up alarm buzzer		
	X4:1	007 12	Blende hinten		Screen rear		
	X4:1	007 12	Blende hinten		Screen rear		
25	X4:2	007 17	Blende vorne		Screen front		
	X4:2	007 17	Blende vorne		Screen front		
	X4:3	007 10	Blende hinten		Screen rear		
	X4:3	007 10	Blende hinten		Screen rear		

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11. 3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 6

von: 11

page: 6

from: 11

Ers.f.:

Replaces:

Blatt Nr.:

sheet no.: 106

920 100 01

Name				Bl.	Pf.	Benennung	title	TYP
1		X4:3	007 10	Blende hinten		Screen rear		
		X4:4	007 14	Blende hinten		Screen rear		
		X4:4	007 14	Blende hinten		Screen rear		
		X4:5	007 12	Blende hinten		Screen rear		
2		X5:1	007 19	Blende vorne		Screen front		
		X5:2	007 20	Blende vorne		Screen front		
		X5:3	007 19	Blende vorne		Screen front		
		X5:4	007 20	Blende vorne		Screen front		
		X5:1A	007 9	Blende vorne		Screen front		
3		X5:1B	007 15	Blende vorne		Screen front		
		X5:1C	007 9	Blende vorne		Screen front		
		X5:1A	007 11	Blende vorne		Screen front		
		X5:1B	007 16	Blende hinten		Screen rear		
		X5:1C	007 11	Blende vorne		Screen front		
4		X6:1	007 16	ARMATURENPULT		Instrument board		
		X6:1-20	017 14					
		X6:2	004 16	ARMATURENPULT		Instrument board		
		X6:3	004 14	ARMATURENPULT		Instrument board		
		X6:4	004 15	ARMATURENPULT		Instrument board		
5		X6:5	004 8	ARMATURENPULT		Instrument board		
		X6:6	002 14	ARMATURENPULT		Instrument board		
		X6:7	007 8	ARMATURENPULT		Instrument board		
		X6:8	007 16	ARMATURENPULT		Instrument board		
		X6:9	007 16	ARMATURENPULT		Instrument board		
		X6:10	004 19	ARMATURENPULT		Instrument board		
6		X6:11	003 17	ARMATURENPULT		Instrument board		
		X6:12	003 15	ARMATURENPULT		Instrument board		
		X6:13	004 14	ARMATURENPULT		Instrument board		
		X6:14	002 9	ARMATURENPULT		Instrument board		
7		X6:15	004 13	ARMATURENPULT		Instrument board		
		X6:16	004 10	ARMATURENPULT		Instrument board		
		X6:17	004 12	ARMATURENPULT		Instrument board		
		X6:18	007 10	ARMATURENPULT		Instrument board		
		X6:19	007 11	ARMATURENPULT		Instrument board		
		X6:20	004 16	ARMATURENPULT		Instrument board		
8		X7:1	007 16	ARMATURENPULT		Instrument board		
		X7:1-20	017 6					
		X7:2	004 20	ARMATURENPULT		Instrument board		
		X7:5	006 9	ARMATURENPULT		Instrument board		
		X7:6	004 17	ARMATURENPULT		Instrument board		
9		X7:7	004 7	ARMATURENPULT		Instrument board		
		X7:8	007 16	ARMATURENPULT		Instrument board		
		X7:9	007 16	ARMATURENPULT		Instrument board		
		X7:10	004 18	ARMATURENPULT		Instrument board		
10		X7:11	010 19	ARMATURENPULT		Instrument board		
		X7:12	013 5	ARMATURENPULT		Instrument board		
		X7:13	012 13	ARMATURENPULT		Instrument board		
		X7:14	009 8	ARMATURENPULT		Instrument board		
		X7:15	004 5	ARMATURENPULT		Instrument board		
		X7:17	004 4	ARMATURENPULT		Instrument board		
11		X7:18	009 14	ARMATURENPULT		Instrument board		
		X7:20	004 17	ARMATURENPULT		Instrument board		
		X8:1	009 7	VIBRATIONSPUMPE		Vibration pump		
		X8:2	009 7	VIBRATIONSPUMPE		Vibration pump		
		X9:1	009 8	VIBRATIONSPUMPE		Vibration pump		
12		X9:2	009 8	VIBRATIONSPUMPE		Vibration pump		
		XS	002 19	Steckdose		Socket		15A
		XS	014 7	Steckdose		Socket		
		X10:1	004 17	KRAFTSTOFFTANK		Fuel tank		
		X10:2	004 16	KRAFTSTOFFTANK		Fuel tank		
13		X10:3	004 16	KRAFTSTOFFTANK		Fuel tank		
		X11:A	003 8	FAHRHEBEL		Travel lever		
		X11:B	003 8	FAHRHEBEL		Travel lever		
		X11:C	003 7	FAHRHEBEL		Travel lever		
		X12:A	012 13	KNICKGELENK		Articulated joint		
14		X12:B	012 13	KNICKGELENK		Articulated joint		
		X12:C	012 14	KNICKGELENK		Articulated joint		
		X13:A	002 11	FAHRERSTAND		Operators platform		
		X13:A-C	018 3	ELEKTRONIK VARIOMATIC		Electronic variomatic		
15		X13:B	002 11	FAHRERSTAND		Operators platform		
		X13:C	002 12	FAHRERSTAND		Operators platform		
		X14:A	002 12	FAHRERSTAND		Operators platform		
		X14:A-B	018 2	ELEKTRONIK VARIOMATIC		Electronic variomatic		
		X14:B	002 12	FAHRERSTAND		Operators platform		
		X15:1	005 5	EMULSIONSPUMPE		Emulsion sprinkler pump		
16		X15:2	005 5	EMULSIONSPUMPE		Emulsion sprinkler pump		
		X16:1	005 2	BERIESELUNGSPUMPE		Sprinkler pump		
		X16:2	005 2	BERIESELUNGSPUMPE		Sprinkler pump		
		X17:1	005 1	BERIESELUNGSPUMPE		Sprinkler pump		
		X17:2	005 1	BERIESELUNGSPUMPE		Sprinkler pump		
17		X18:1	005 12	ARMATURENPULT		Instrument board		
		X18:2	005 11	ARMATURENPULT		Instrument board		
		X18:3	005 12	ARMATURENPULT		Instrument board		
		X19:1	016 5	KEYBOARD		Keyboard		
		X19:2	016 5	KEYBOARD		Keyboard		
18		X19:3	016 5	KEYBOARD		Keyboard		
		X19:4	016 5	KEYBOARD		Keyboard		
		X19:5	016 5	KEYBOARD		Keyboard		
		X19:7	016 5	KEYBOARD		Keyboard		
		X19:8	016 12	KEYBOARD		Keyboard		
		X19:9	016 5	KEYBOARD		Keyboard		
19		X19:10	016 5	KEYBOARD		Keyboard		
		X19:11	016 5	KEYBOARD		Keyboard		
		X19:12	016 5	KEYBOARD		Keyboard		
20		X20:1	010 3	ELEKTROKASTEN		Cross-bonding box		
		X20:1-38	017 16	ELEKTRONIK VARIOMATIC		Electronic variomatic		
		X20:2	010 4	ELEKTROKASTEN		Cross-bonding box		
		X20:3	010 4	ELEKTROKASTEN		Cross-bonding box		
		X20:4	010 3	ELEKTROKASTEN		Cross-bonding box		

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 7

von: 11

page: 7

from: 11

Ers.f.:

Replaces:

Blatt Nr.:

sheet no.: 107

920 100 01

Name				Bl.	Pf.	Benennung	title	TYP
1				X20:5	010 4	ELEKTROKASTEN		
				X20:8	010 3	ELEKTROKASTEN	Cross-bonding box	
				X20:9	010 13	ELEKTROKASTEN	Cross-bonding box	
				X20:10	010 13	ELEKTROKASTEN	Cross-bonding box	
2				X20:11	010 15	ELEKTROKASTEN	Cross-bonding box	
				X20:12	010 15	ELEKTROKASTEN	Cross-bonding box	
				X20:13	010 16	ELEKTROKASTEN	Cross-bonding box	
				X20:14	010 16	ELEKTROKASTEN	Cross-bonding box	
3				X20:15	010 17	ELEKTROKASTEN	Cross-bonding box	
				X20:16	010 17	ELEKTROKASTEN	Cross-bonding box	
				X20:17	010 6	ELEKTROKASTEN	Cross-bonding box	
				X20:18	010 7	ELEKTROKASTEN	Cross-bonding box	
				X20:19	010 7	ELEKTROKASTEN	Cross-bonding box	
				X20:22	011 3	ELEKTROKASTEN	Cross-bonding box	
4				X20:23	011 3	ELEKTROKASTEN	Cross-bonding box	
				X20:24	011 3	ELEKTROKASTEN	Cross-bonding box	
				X20:25	011 3	ELEKTROKASTEN	Cross-bonding box	
				X20:26	011 10	ELEKTROKASTEN	Cross-bonding box	
				X20:27	010 9	ELEKTROKASTEN	Cross-bonding box	
5				X20:28	010 8	ELEKTROKASTEN	Cross-bonding box	
				X20:29	010 9	ELEKTROKASTEN	Cross-bonding box	
				X20:30	010 10	ELEKTROKASTEN	Cross-bonding box	
				X20:31	010 11	ELEKTROKASTEN	Cross-bonding box	
				X20:32	010 11	ELEKTROKASTEN	Cross-bonding box	
6				X20:33	008 11	ELEKTROKASTEN	Cross-bonding box	
				X20:34	008 11	ELEKTROKASTEN	Cross-bonding box	
				X20:35	008 15	ELEKTROKASTEN	Cross-bonding box	
				X20:36	008 10	ELEKTROKASTEN	Cross-bonding box	
				X20:37	008 11	ELEKTROKASTEN	Cross-bonding box	
7				X20:38	008 12	ELEKTROKASTEN	Cross-bonding box	
				X20:51	010 18	ELEKTROKASTEN	Cross-bonding box	
				X20:60	010 1	ELEKTROKASTEN	Cross-bonding box	
				X20:70	010 2	ELEKTROKASTEN	Cross-bonding box	
				X21:1	013 7	KLIMAKOMPRESSOR	Air conditioning compr.	
8				X22:1	016 13	KEYBOARD	Keyboard	
				X22:2	016 13	KEYBOARD	Keyboard	
				X23:A	003 14	SITZKONSOLE	Seating unit	
				X23:B	003 14	SITZKONSOLE	Seating unit	
				X23:C	003 14	SITZKONSOLE	Seating unit	
9				X24:1	012 9	Bandagenmotor v.r.	Drum drive motor, front th.	
				X24:1	012 10	Bandagenmotor v.r.	Drum drive motor, front th.	
				X24:2	012 8	Bandagenmotor v.r.	Drum drive motor, front th.	
				X24:3	012 9	Bandagenmotor v.r.	Drum drive motor, front th.	
				X24:3	012 10	Bandagenmotor v.r.	Drum drive motor, front th.	
10				X24:4	012 9	Bandagenmotor v.r.	Drum drive motor, front th.	
				X24:4	012 11	Bandagenmotor v.r.	Drum drive motor, front th.	
				X25:1	007 4	LENDE HINTEN	Screen rear	
				X25:2	007 5	LENDE HINTEN	Screen rear	
				X25:3	007 10	LENDE HINTEN	Screen rear	
11				X25:4	007 14	LENDE HINTEN	Screen rear	
				X25:5	007 10	LENDE HINTEN	Screen rear	
				X25:6	007 14	LENDE HINTEN	Screen rear	
				X26:1	004 20	WASSERTANK	Water tank	
				X26:2	004 20	WASSERTANK	Water tank	
12				X27:1	004 4	WASSERTANK	Water tank	
				X27:2	004 4	WASSERTANK	Water tank	
				X30:1	003 19	ELEKTROKASTEN	Cross-bonding box	
				X30:1-2	018 19	ELEKTROKASTEN	Electronic variomatic	
				X30:2	003 19	ELEKTROKASTEN	Cross-bonding box	
13				X31:1	003 19	LENKSAEULE	Steering column	
				X31:2	003 19	LENKSAEULE	Steering column	
				X32:1	004 3	LENKSAEULE	Steering column	
				X32:2	004 3	LENKSAEULE	Steering column	
				X39:1	014 4	Kabine	cabin	
14				X39:2	014 4	Kabine	cabin	
				X40:1	013 1	Kabine	cabin	
				X40:2	013 2	Kabine	cabin	
				X40:3	013 3	Kabine	cabin	
				X40:4	013 3	Kabine	cabin	
				X42:1	013 2	Kabine	cabin	
15				X42:2	013 2	Kabine	cabin	
				X42:3	013 2	Kabine	cabin	
				X42:4	013 1	Kabine	cabin	
				X43:1	013 7	FAHRERSTAND	Operators platform	
				X43:2	013 7	FAHRERSTAND	Operators platform	
				X43:3	013 7	FAHRERSTAND	Operators platform	
16				X43:4	013 7	FAHRERSTAND	Operators platform	
				X44:31	014 13	Kabine	cabin	
				X44:53	014 12	Kabine	cabin	
				X44:31b	014 13	Kabine	cabin	
				X44:53a	014 13	Kabine	cabin	
17				X45:1	013 3	Kabine	cabin	
				X45:2	013 4	Kabine	cabin	
				X45:3	013 3	Kabine	cabin	
				X45:4	013 3	Kabine	cabin	
				X46:31	014 15	Kabine	cabin	
18				X46:53	014 15	Kabine	cabin	
				X46:31b	014 16	Kabine	cabin	
				X46:53a	014 15	Kabine	cabin	
				X48:1	014 6	Kabine	cabin	
				X48:2	014 6	Kabine	cabin	
19				X49:1	013 9	FAHRERSTAND	Operators platform	
				X49:2	013 9	FAHRERSTAND	Operators platform	
				X50:1	013 7	FAHRERSTAND	Operators platform	
				X51:A	014 8	FAHRERSTAND	Operators platform	
				X51:B	014 8	FAHRERSTAND	Operators platform	
20				X51:C	002 4	MOTORRAUM	Engine room	
				X52:1	013 7	FAHRERSTAND	Operators platform	
				X52:2	013 7	FAHRERSTAND	Operators platform	

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 8

von: 11

page: 8

from: 11

Ers.f.:

Replaces:

Blatt Nr.:

sheet No.: 108

920 100 01

Name		Bl.	Pf.	Benennung	title	TYP
1	X53.3	013	18	Kabine	cabin	
	X53.5	013	19	Kabine	cabin	
	X53.6	013	18	Kabine	cabin	
2	X54.1	013	13	Kraftstoffpumpe	fuel pump heating unit	
	X54.2	013	13	Kraftstoffpumpe	fuel pump heating unit	
	X55.1	013	7	FAHRERSTAND	Operator's platform	
	X55.2	013	6	FAHRERSTAND	Operator's platform	
	X56.1	013	9	FAHRERSTAND	Operator's platform	
	X56.2	013	9	FAHRERSTAND	Operator's platform	
3	X57.1	007	9	Steckdose Splitstreuer	Socket, chip spreader	
	X57.2	007	1	Steckdose Splitstreuer	Socket, chip spreader	
	X57.3	007	13	Steckdose Splitstreuer	Socket, chip spreader	
	X57.4	007	12	Steckdose Splitstreuer	Socket, chip spreader	
	X57.5	007	17	Steckdose Splitstreuer	Socket, chip spreader	
	X57.7	007	13	Steckdose Splitstreuer	Socket, chip spreader	
4	X57.8	007	3	STECKDOSE SPLITSTREUER	Socket, chip spreader	
	X58.1	007	9	Stecker Splitstreuer	Connector, chip spreader	
	X58.2	007	1	Stecker Splitstreuer	Connector, chip spreader	
	X58.3	007	13	Stecker Splitstreuer	Connector, chip spreader	
	X58.4	007	12	Stecker Splitstreuer	Connector, chip spreader	
	X58.5	007	17	Stecker Splitstreuer	Connector, chip spreader	
5	X58.7	007	13	Stecker Splitstreuer	Connector, chip spreader	
	X59.1	009	17	STECKDOSE SPLITSTREUER	Socket, chip spreader	
	X59.2	009	18	STECKDOSE SPLITSTREUER	Socket, chip spreader	
	X60.1	009	17	STECKER SPLITSTREUER	Connector, chip spreader	
	X60.2	009	18	STECKER SPLITSTREUER	Connector, chip spreader	
	X61.1	014	16	Kabine	cabin	
6	X61.2	014	16	Kabine	cabin	
	X61.3	014	14	Kabine	cabin	
	X62.1	014	15	Kabine	cabin	
7	X62.2	014	16	Kabine	cabin	
	X63.1	014	14	Kabine	cabin	
	X63.2	014	16	Kabine	cabin	
	X63.3	014	10	Kabine	cabin	
	X63.4	013	9	Kabine	cabin	
	X63.5	014	20	Kabine	cabin	
8	X63.6	013	11	Kabine	cabin	
	X63.7	013	7	Kabine	cabin	
	X63.8	014	8	Kabine	cabin	
	X64.1	014	8	Kabine	cabin	
	X64.2	014	20	Kabine	cabin	
	X64.3	014	13	Kabine	cabin	
9	X64.4	014	6	Kabine	cabin	
	X64.5	014	12	Kabine	cabin	
	X64.6	014	13	Kabine	cabin	
	X64.7	014	7	Kabine	cabin	
	X64.8	014	15	Kabine	cabin	
	X65.1	014	3	Kabine	cabin	
10	X65.2	013	1	Kabine	cabin	
	X65.3	013	2	Kabine	cabin	
	X65.4	013	2	Kabine	cabin	
11	X66.1	014	4	Kabine	cabin	
	X67.A	014	9	Kabine	cabin	
	X67.A	014	10	Kabine	cabin	
	X67.A	014	10	Kabine	cabin	
	X67.B	014	9	Kabine	cabin	
	X67.B	014	9	Kabine	cabin	
12	X67.B	014	10	Kabine	cabin	
	X67.C	014	10	Kabine	cabin	
	X67.C	014	10	Kabine	cabin	
	X68.A	012	3	KABINE	Cabin	
	X68.B	012	3	KABINE	Cabin	
	X68.C	012	8	KABINE	Cabin	
13	X69.1	014	2	Kabine	cabin	
	X69.2	014	2	Kabine	cabin	
	X70.1	014	2	Kabine	cabin	
14	X70.2	014	2	Kabine	cabin	
	X71.1	014	3	Kabine	cabin	
	X71.2	014	3	Kabine	cabin	
15	X72.1	010	12	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.1-19	018	19	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.2	010	2	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.3	010	3	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.4	010	17	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.5	010	18	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
16	X72.6	010	2	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.7	010	18	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.8	010	7	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.9	010	8	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.10	010	11	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.11	010	19	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
17	X72.12	010	19	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.13	010	20	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.14	010	14	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.15	010	14	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.16	010	16	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X72.17	010	16	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
18	X72.19	010	11	ELEKTROKASTEN VARIOMA	Cross-bonding box, variomatic	
	X76.A	010	4	ARMATURENPULT	Instrument board	
	X76.B	010	2	ARMATURENPULT	Instrument board	
19	X76.C	010	3	ARMATURENPULT	Instrument board	
	X76.D	010	3	ARMATURENPULT	Instrument board	
	X76.E	010	3	ARMATURENPULT	Instrument board	
	X76.F	010	4	ARMATURENPULT	Instrument board	
	X76.G	010	4	ARMATURENPULT	Instrument board	
	X76.H	010	2	ARMATURENPULT	Instrument board	
20	X78.1	010	6	STÜTZE RECHTS	Support rh.	
	X78.2	010	7	STÜTZE RECHTS	Support rh.	

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 9

page: 9

von: 11

from: 11

920 100 01

Ers.f.:

Replaces:

Blatt Nr.:

sheet no.:

109

Name				Bl.	Pf.	Benennung	title	TYP
1	X78:3	010	7	STÜTZE RECHTS		Support rh.		
	X79:1	010	10	STÜTZE RECHTS		Support rh.		
	X79:2	010	10	STÜTZE RECHTS		Support rh.		
	X79:3	010	11	STÜTZE RECHTS		Support rh.		
2	X79:4	010	11	STÜTZE RECHTS		Support rh.		
	X80:1	010	9	STÜTZE LINKS		Support lh.		
	X80:2	010	9	STÜTZE LINKS		Support lh.		
	X80:3	010	9	STÜTZE LINKS		Support lh.		
	X80:4	010	9	STÜTZE LINKS		Support lh.		
3	X88:1	010	12	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:1-68	017	4	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:2	010	19	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:3	010	4	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:4	010	17	ELEKTRONIK VARIOMATIC		Electronic variomatic		
4	X88:5	010	18	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:6	010	6	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:7	010	5	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:8	010	5	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:9	010	7	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:12	010	11	ELEKTRONIK VARIOMATIC		Electronic variomatic		
5	X88:13	010	5	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:14	010	6	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:15	010	19	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:16	010	19	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:23	010	6	ELEKTRONIK VARIOMATIC		Electronic variomatic		
6	X88:26	010	4	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:27	010	3	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:28	010	4	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:29	010	9	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:30	010	11	ELEKTRONIK VARIOMATIC		Electronic variomatic		
7	X88:35	011	16	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:36	010	15	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:37	010	16	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:47	010	20	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:54	010	3	ELEKTRONIK VARIOMATIC		Electronic variomatic		
8	X88:55	010	18	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:56	010	14	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:57	010	14	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:58	010	14	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:59	010	15	ELEKTRONIK VARIOMATIC		Electronic variomatic		
9	X88:60	010	15	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:61	010	13	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:62	010	15	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:63	010	16	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X88:64	010	17	ELEKTRONIK VARIOMATIC		Electronic variomatic		
10	X89:A	002	1	FAHRERSTAND		Operator's platform		
	X89:A-B	018	1	ELEKTRONIK VARIOMATIC		Electronic variomatic		
	X89:B	002	2	FAHRERSTAND		Operator's platform		
	X90:1	004	3	ELEKTROKASTEN		Cross-bonding box		
	X90:1-3	018	20	ELEKTRONIK VARIOMATIC		Electronic variomatic		
11	X90:2	004	3	ELEKTROKASTEN		Cross-bonding box		
	X91:A	002	4	MOTORRAUM		Engine room		
	X91:A	014	3	MOTORRAUM		Engine room		
	X91:B	002	4	MOTORRAUM		Engine room		
	X93:1	009	3	SITZKONSOLE		Seating unit		
12	X93:2	009	2	SITZKONSOLE		Seating unit		
	X93:3	009	3	SITZKONSOLE		Seating unit		
	X94:1	007	4	Blende hinten		Screen rear		
	X94:2	007	5	Blende hinten		Screen rear		
	X91:1	009	2	SITZKONSOLE		Seating unit		
	X91:2	009	2	SITZKONSOLE		Seating unit		
13	X91:3	012	18	SITZKONSOLE		Seating unit		
	X91:4	012	18	SITZKONSOLE		Seating unit		
	X91:5	012	19	SITZKONSOLE		Seating unit		
	X91:6	012	19	SITZKONSOLE		Seating unit		
	X9R:1	009	3	SITZKONSOLE		Seating unit		
14	X9R:2	009	3	SITZKONSOLE		Seating unit		
	X9R:3	005	18	SITZKONSOLE		Seating unit		
	X9R:4	005	18	SITZKONSOLE		Seating unit		
	X9R:5	005	19	SITZKONSOLE		Seating unit		
	X9R:6	005	19	SITZKONSOLE		Seating unit		
15	X100:E	011	11	DRUCKER		Printer		
	X100:F	011	10	DRUCKER		Printer		
	X100:I	011	10	DRUCKER		Printer		
	X100:K	011	5	DRUCKER		Printer		
	X100:L	011	8	DRUCKER		Printer		
16	X101:1	011	11	DRUCKER		Printer		
	X101:2	011	10	DRUCKER		Printer		
	X101:3	011	8	DRUCKER		Printer		
	X101:4	011	6	DRUCKER		Printer		
	X101:5	011	10	DRUCKER		Printer		
17	X102:1	011	11	DRUCKER		Printer		
	X102:2	011	12	DRUCKER		Printer		
	X103:E	011	11	LENKKONSOLE		Steering box		
	X103:F	011	10	LENKKONSOLE		Steering box		
18	X103:I	011	10	LENKKONSOLE		Steering box		
	X103:K	011	4	LENKKONSOLE		Steering box		
	X103:L	011	8	LENKKONSOLE		Steering box		
	X105:1-32	011	14	DRUCKER		Printer		
	X106:1-20	011	15	DRUCKER		Printer		
19	Y01	002	10	Solenoid valve, start boost fuel		Magnetventil Flammgluehanlage		3.5A
	Y04	003	11	Solenoid valve, brake		Magnetventil Bremse		2.1A
	Y13	003	3	Shut off solenoid, engine		Kraftstoffpumpe Heizgeraet		4A
	Y14	013	13	Fuel pump, heating unit		Magnekupplung Klimakompressor		2A
	Y15	013	7	Magnetic clutch, air conditioning compr.		Magnetventil Fahrtrichtung vorwaerts		3.5A
20	Y18	012	16	Solenoid valve, crab walk		Magnetventil Hundegang		2.5A
	Y19	012	15	Solenoid valve, crab walk		Magnetventil Hundgang		2.5A
	Y20	005	14	Solenoid valve, egde cutter		Magnetventil Kantenschneidgeraet		2.5A

BOMAG

BOMAG GMBH BOPPARD

Gez.: 11.11.3

Name: Kneip

Gepr.:

Name:

Bauteilliste

component listing

Seite: 10

von: 11

Ers.f.:

Replaces:

920 100 01

Blatt Nr.: 110

sheet no.:

[illegible]

Wassersysteme sowie Versorgung dieser. Interfuge, Verfestigung und Mitteleigenschaften sind nicht gegeben, somit nicht auszuordnen. Zustand der Punkte, Änderungen bei der zu Schmelze 2. Alle Punkte auf der Folie. Polarisierung oder Gebirgsbildung. Einfluss auf die Verteilung.

Pos.	Benennung	Description
01	Verbremsmotor n=2300 1/min	Engine
02	Lenk- Saespumppe 16-8 cm	Steering- charge pump
03	Ölkühler	oil cooler
04	Thermostat u. Sammelblock	Thermostat and collecting block
05	Fahrpumpe Vg- 56 cm	Travel pump
06	Vibrationspumpe Vg- 45 cm	Vibration pump
07	Vibrationsventil	Vibration valve
08	Filter	Filter
09	Prioritätsventil	Priority valve
10	Bremsventil	Brake valve
11	Steuerblock	Control block
12	Rundspindelzylinder	Crankshaft cylinder
13	Zylinder Karlsruhneidergerät	Cylinder edge cutter
14	Lenkventil	Steering valve
15	Lenkzylinder	Steering cylinder
16	Lüftermotor	Ventilator motor
17	Druckbegrenzungsventil	Pressure relief valve
18	Winkelventil Vg- 28 cm vorn	Vibration motor front
19	Vibrationsventil Vg- 28 cm hinten	Vibration motor rear
20	Fahrnroler hi Vg- 60 cm	Travel roller hi
21	Fahrgeleite	Travel gear box
22	Fahrnroler vi Vg- 60 cm	Travel roller front
23	Fahrgeleite	Travel gear box
24	Ruckschwenkventil	Check valve
25	Zylinder Splitstreuer	Cylinder Chip spreader
26	Ventil Splitstreuer	Valve Chip spreader
27	Vibrationsmotor Splitstreuer	Vibration motor Chip spreader

Note:
The pressure values on the test locations are maximum values for the selection of the pressure gauges. They may NOT be conform with the measured pressure.

[illegible][illegible]

Copyright of this document and photo is reserved by the author. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without prior written permission from the author.

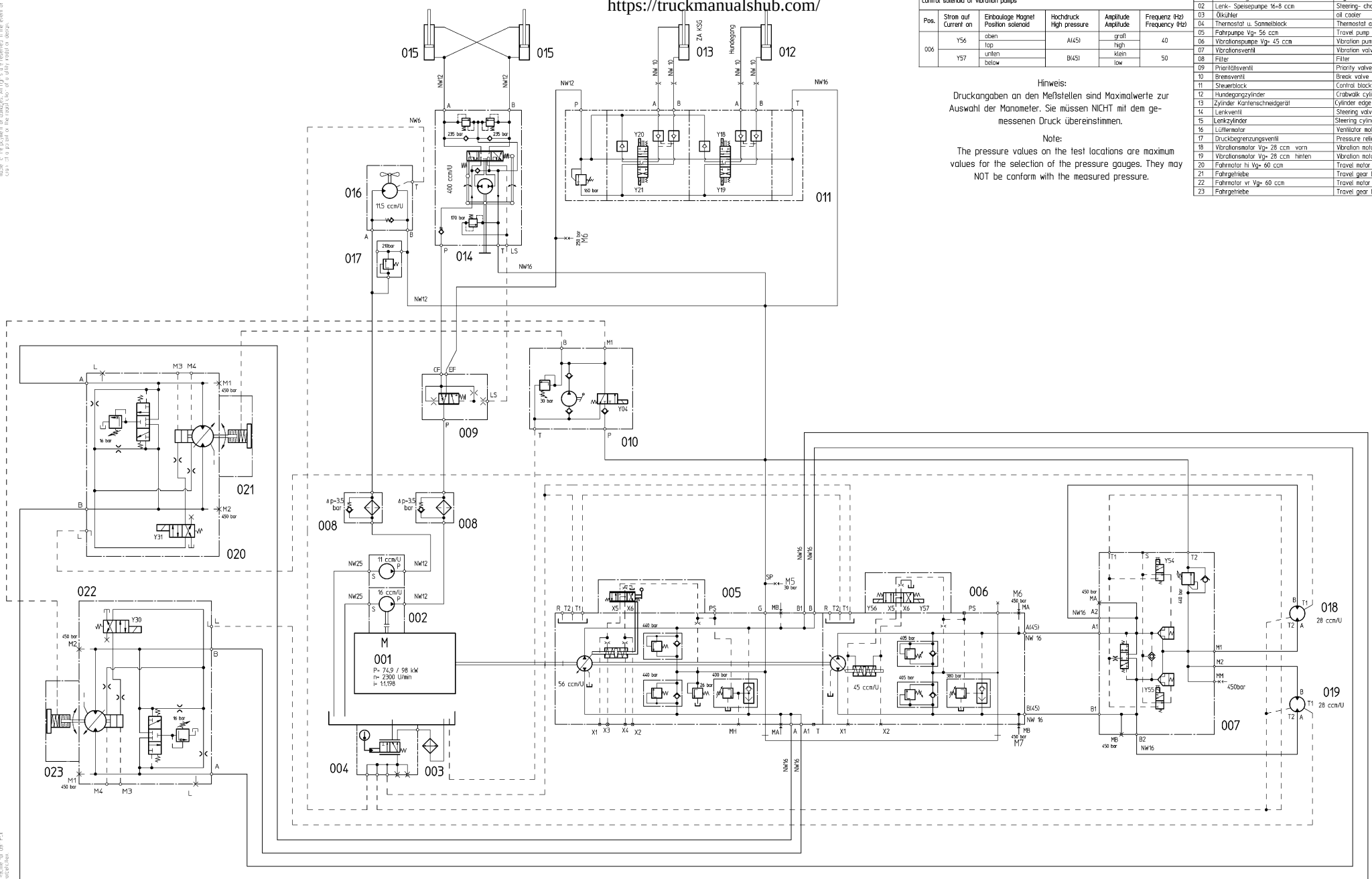
<https://truckmanualshub.com/>

Befüllungs- und Vibrationspumpen Control solenoid of vibration pumps					
Pos.	Strom auf Current on	Einbaulage Magnet Position solenoid	Hochdruck High pressure	Amplitude Amplitude	Frequenz (Hz) Frequency (Hz)
006	Y56	oben top	Al(45)	groß high	40
	Y57	unten bottom	Bl(45)	klein low	50

Hinweis:
Druckangaben an den Meßstellen sind Maximalwerte zur Auswahl der Manometer. Sie müssen NICHT mit dem gemessenen Druck übereinstimmen.

Note:
The pressure values on the test locations are maximum values for the selection of the pressure gauges. They may NOT be conform with the measured pressure.

Pos.	Benennung	Description
01	Verbrennungsmotor n=2300 1/min	Engine
02	Lenk- Spiegepumpe 16-8 ccm	Steering- charge pump
03	Ölkühler	oil cooler
04	Thermostat u. Sammelblock	Thermostat and collecting block
05	Fahrpumpe Vg- 56 ccm	Travel pump
06	Vibrationspumpe Vg- 45 ccm	Vibration pump
07	Vibrationsventil	Vibration valve
08	Filter	Filter
09	Prioritätsventil	Priority valve
10	Bremsventil	Brake valve
11	Steuerblock	Control block
12	Hundsgangzylinder	Crabwalk cylinder
13	Zylinder Kantenschneidgerät	Cylinder edge cutter
14	Lenkventil	Steering valve
15	Lenkzylinder	Steering cylinder
16	Lüftermotor	Ventilator motor
17	Druckbegrenzungsventil	Pressure relief valve
18	Vibrationsmotor Vg- 28 ccm vorn	Vibration motor
19	Vibrationsmotor Vg- 28 ccm hinten	Vibration motor
20	Fahrmotor hi Vg- 60 ccm	Travel motor rear
21	Fahrgelände	Travel gear box
22	Fahrmotor vi Vg- 60 ccm	Travel motor front
23	Fahrgelände	Travel gear box



BW 202-4 AD

Technische Daten		Zusätzliche Informationen		Sonstige Angaben	
Modell	BW 202-4 AD	Version	1.0	Stand	1.0
Hersteller	BOMAG	Produktionsjahr	2024	Standort	1.0
Modell	BW 202-4 AD	Version	1.0	Stand	1.0
Hersteller	BOMAG	Produktionsjahr	2024	Standort	1.0
Modell	BW 202-4 AD	Version	1.0	Stand	1.0
Hersteller	BOMAG	Produktionsjahr	2024	Standort	1.0
Modell	BW 202-4 AD	Version	1.0	Stand	1.0
Hersteller	BOMAG	Produktionsjahr	2024	Standort	1.0
Modell	BW 202-4 AD	Version	1.0	Stand	1.0
Hersteller	BOMAG	Produktionsjahr	2024	Standort	1.0

Copyright of this document and photo is reserved by the author. All rights reserved. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or by any information storage or retrieval system, without prior written permission from the author.