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.

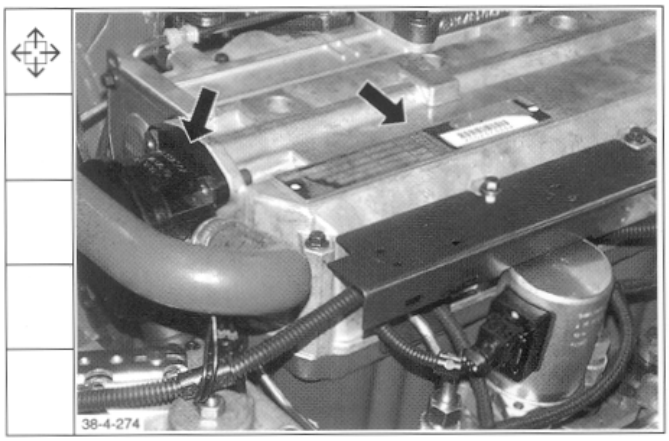
Crankcase, camshaft and plunger remain unchanged.

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

In column „EP“ iit 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.



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TROUBLESHOOTING TRAVEL SYSTEM
BW 161- 4 FAMILY

POSSIBLE CAUSES	SYMPTOMS	Machine does not move (forw. and reverse)	Machine moves to one direction only	Machien drives with travel lever in 'Neutral'	Max. travel speed not reached	Hydraulic oil overheating								
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									

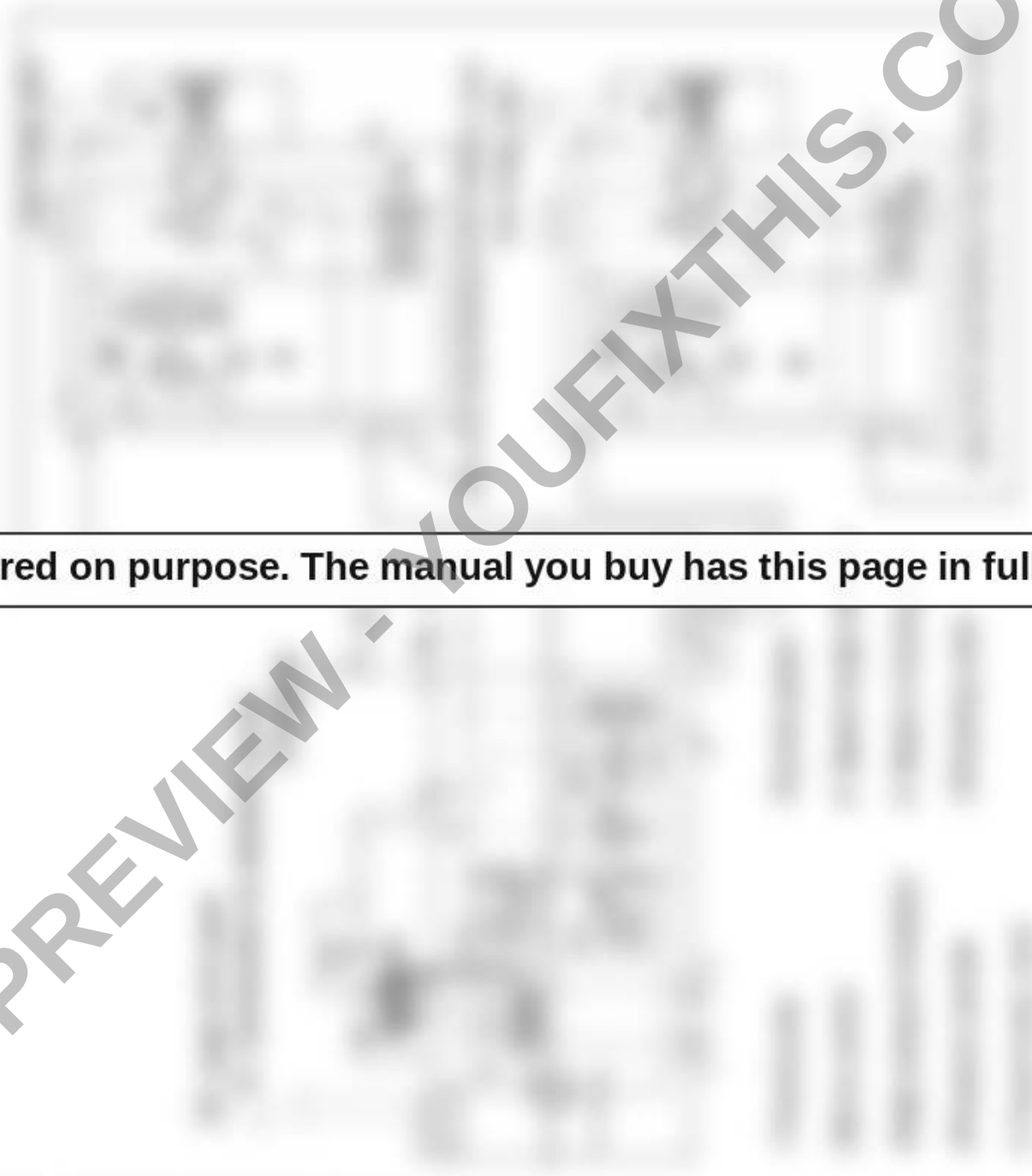
TROUBLESHOOTING

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Travel system

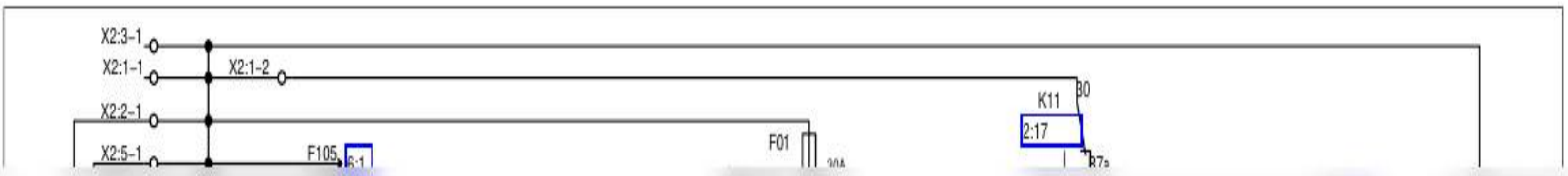
On the machines described in this training manual the travel system consists of a closed hydraulic



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BOMAG GMBH BOPPARD

Gepr.:
Name:

Gez.: 11.11.3
Name: Kneip

Bauteilliste
component listing

Ers.f.:
Replaces:

Seite: 1 von: 11
page: from:

Blatt Nr.: 101
sheet no.:

920 100 01

Name	Bl.	Pf.	Benennung	title	TYP
A01	005	11	Intervallschalter	interval switch	
A02	007	8	Blinkrelais	indicator relay	4/6X21 WATT
A02	018	1	Blinkrelais	indicator relay	
A03	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 Omegameter	Electronic system, Omegameter	
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,frequenzy meter	
A51	017	17	Platine Frequenzanzeige	Circuit board,frequenzy meter	
A66	016	9	Elektronik Steuereinheit	Electronic control unit	
A67	016	15	Eingabeeinheit	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	Naeherungsinitiator 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 Omegameter	Transducer, Omegameter	
B20	004	6	Temperaturschalter Hydraulikoel	Temperature switch, hydraulic oil	97−92_GC
B21	004	13	Differenzdruckschalter Hydr.−Oelfilter	Pressure diff. switch, hydr. oil filter	
B21	004	14	Differenzdruckschalter Hydr.−Oelfilter	Pressure diff. switch, hydr. oil filter	
B30	004	11	Temperaturschalter Motoroel	Temperature switch, engine oil	110_GC
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	
B53	002	12	Temperaturgeber Kuehlmittel	Temperature switch, collant	(R)_t
B55	004	7	Kuehlmittelstand Ausgleichsbehaelter	Coolant charge expansion tank	
B63	003	8	Naeherungsinitiator Bremse	Proximity switch, brake	Max. 300mA
B84	010	10	Aufnehmer Beschleunigung, links	Trancducer, acceleration, left	
B85	010	9	Aufnehmer Beschleunigung, rechts	Trancducer, acceleration, right	
B97	010	7	Aufnehmer Verstellmotor	Sensor, ajustable motor	
B103	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 Omegameter	Illumination, Omegameter	
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	Parkleuchte 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	Parkleuchte 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.	55 WATT
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 Warnblinker	Fuse, hazard light	15A

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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.

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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

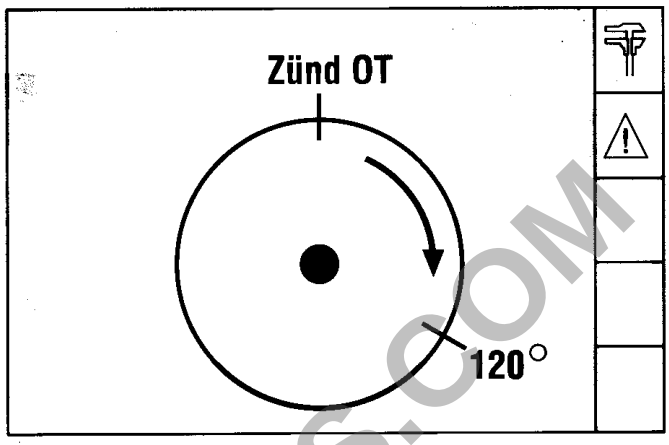


Fig. 14:

6. Remove injection line and injection pump.

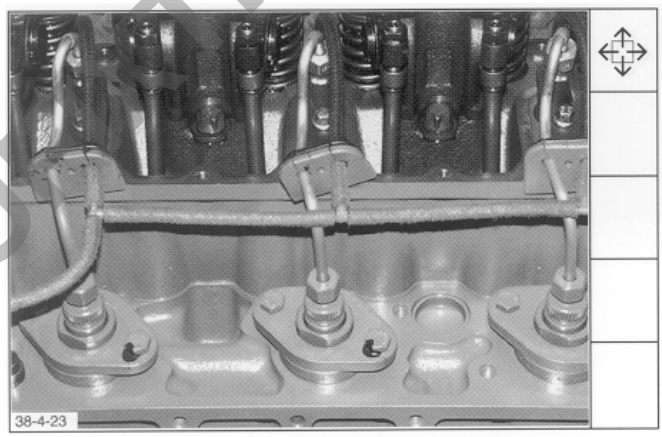


Fig. 15:

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

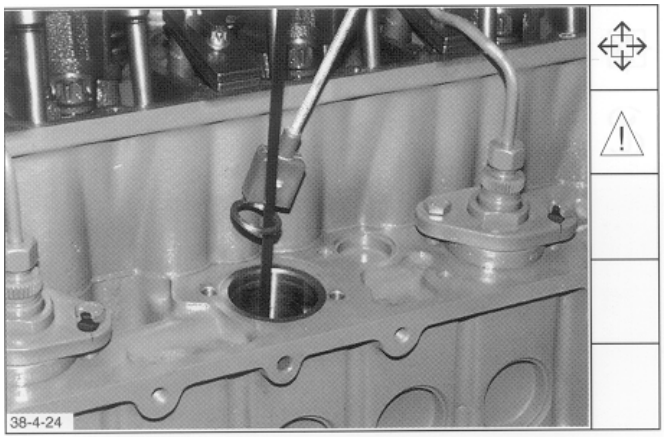


Fig. 16:

Determine the thickness of the new compensation shim:

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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.

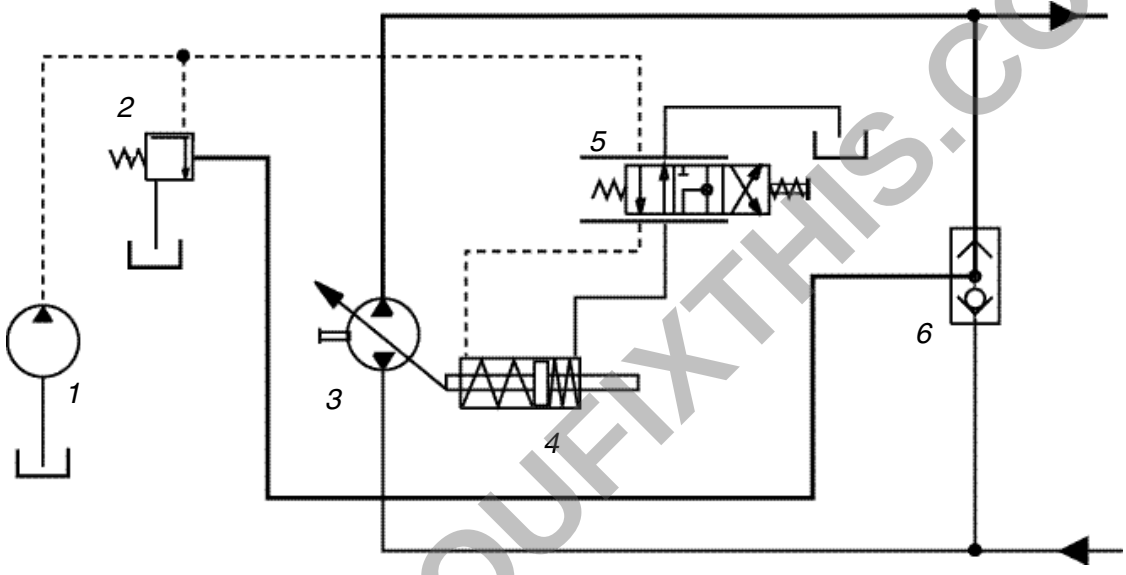


Fig. 10 Pressure override

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.

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Test and adjustment points, vibration system

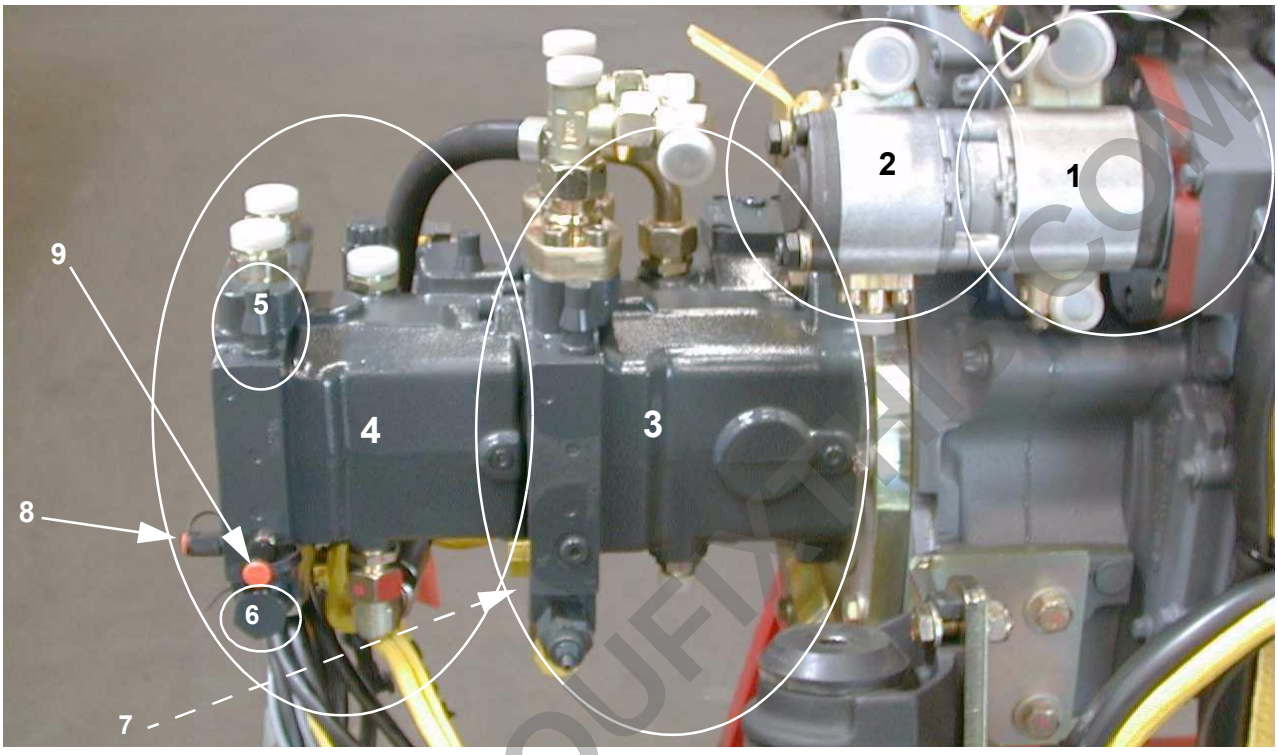


Fig. 12: Pump assembly

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 +0/-40 bar
5	Pressure override vibration pump			380 +0/-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

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2 Description of function

2.1 Switching on

When applying operating voltage to the module (PIN1/2 U_B, PIN10/11 ground), LED1 will ligh up to indicate operation. LED2 flashes as Stay-Allive-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) :

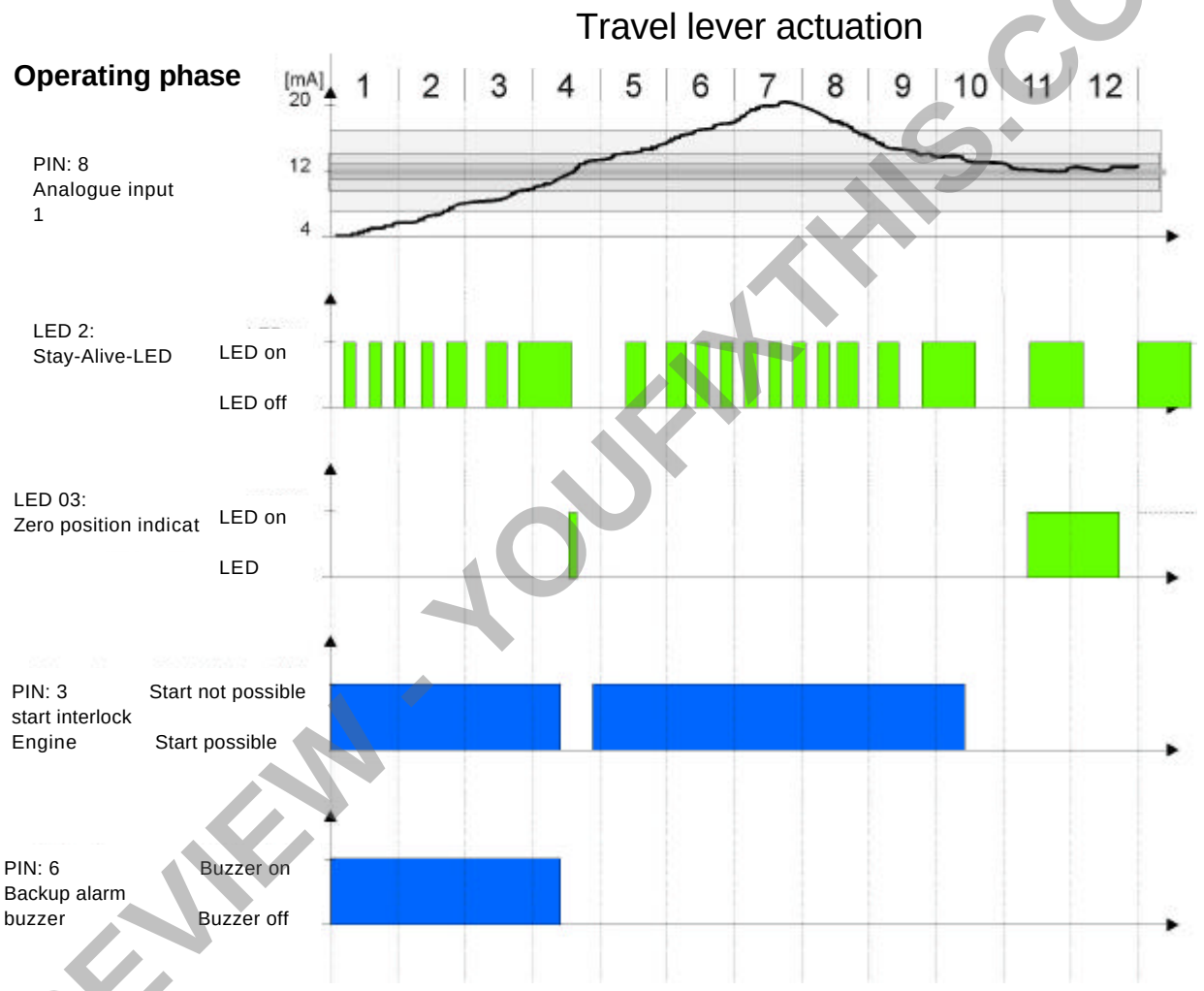


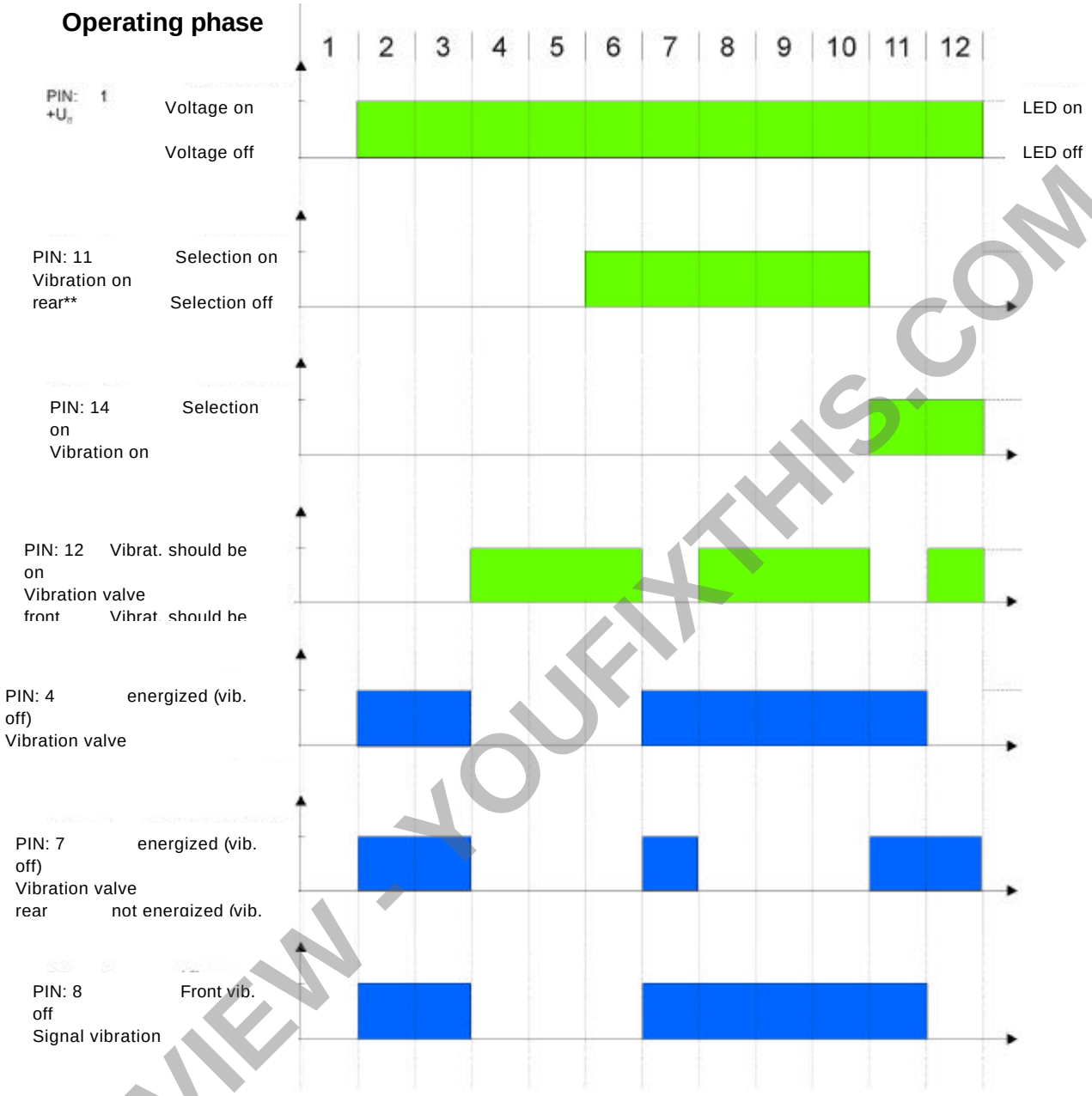
Fig. 2: Effect of the analogue signal on PIN8

If the analogue signal on PIN8 is not within the range of 12mA ±0.4mA, 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.

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**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).

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