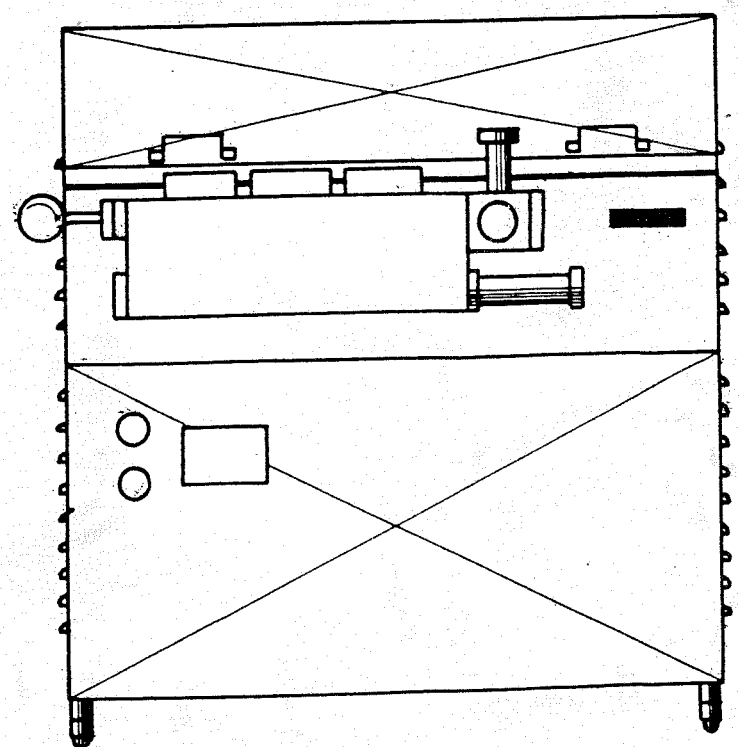
TYPE :SHL 25

MACHINE NO.: 134 217

FOR INFO ONLY.

INSTRUCTION MANUAL

HIGH PRESSURE HOMOGENIZER



ALFA-LAVAL Separationstechnik GmbH, Subdivision S3, HOMOGENIZER DEPT.
D- 2056 GLINDE/b. Hamburg, Telefon: 040/ 727 01-1, Telex: 217 821 alfa d

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INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

C O N T E N T S

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

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GENEREL DESCRIPTION OF THE ALFA-LAVAL HIGH-PRESSURE HOMOGENIZER

The ALFA-LAVAL homogenizing machine is designed as an horizontal three-piston pump, i.e. a high-pressure, positive displacement pump delivering through homogenizing valves.
The high-pressure homogenizer is normally mounted on a frame enclosed by stainless steel panels. The electric motor as well as the electrical and hydraulic systems (except the starter switch) are integral parts of the machine, incorporated within the enclosing panels.
The high-pressure homogenizer is used for dispersion in applications found in dairy, chemopharmazeutical and allied processes.
The products to be processed are emulsions (liquid-in-liquid) or suspensions (solid particles in liquid) with viscosities of up to 15 - 20.000 mPas (c.P.) and a solids content of up to 48 - 50% in the dry phase (T.S.).

The homogenizing process requires that the feed is adequately blended or mixed and that pumping requirements are complied with.

The primary purpose of homogenizing is to break up the particles in suspension and to ensure uniform distribution of particles to improve the physical stability of the product. Depending on the nature of the particles and their readiness to break up, the separation into different phases (sedimentation, creaming-up, coagulation) is prevented or considerably delayed. High-pressure homogenizing also serves to influence viscosity, to enlarge the internal surface thus enhancing the chemical reaction rate, and to obtain cellular disintegration.

Depending on nature and condition of the product as well as on the working pressure and temperature prevailing during homogenization, particles of micron and sub-micron size are obtainable.

The ALFA-LAVAL homogenizer is designed as unit-composed system, allowing for a variety of different versions being available.

These include one- and two-stage homogenizing valves, various pump piston diameters and piston sealing systems, conical and ball valves (depending on the viscosity involved), and various types of material, etc.

All high-pressure homogenizers can be operated aseptically, with appropriate fittings and accessories.

Subsequent changes to other processing rates and pressures are feasible within the scope of the model concerned.

High-pressure homogenizers incorporating positive displacement pumps essentially require that the following operating conditions are maintained throughout, to ensure reliable and safe performance:

- Feed rate should be according to the layout of the machine, and feed should be under pressure appropriate to the product involved (NPHS), at all times, including cleaning periods.

- No free, i.e. non-dissolved air must be contained in the feed and/or cleaning agents.

Further, product properties, operating and cleaning temperatures, cleaning agents, quality of cooling water, operation and maintenance are factors that will greatly influence the service life of the plant and those component parts that are particularly subject to inherent wear.

This manual is to make you familiar with your high-pressure homogenizer, i.e. with its proper operation, maintenance and repair. Based on experience, we also include useful hints on trouble shooting.

Naturally, not every source of failure and every precautionary step can be enumerated. But with thorough knowledge of the manual you will be able to operate your high-pressure homogenizer in a way that will ensure satisfactory service.

It is for this purpose that the manual was issued, and we would recommend reading it from time to time.

For further advice and information please apply to your local ALFA-LAVAL company who will be at your service at all times.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

PREFACE TO THE INSTRUCTION MANUAL

The manual is subdivided in such a way that, apart from giving general information, it also serves to supply advice on the installation, initial/ operation, maintenance and repair, and on ordering spare parts of the homogenizer and/or the high-pressure pump.

SECTION 1, TECHNICAL DATA

This section covers all the essential technical data of the homogenizing device, the high-pressure pump, its drive/driving gear, and lay out. It also includes cooling water and lubricants recommendations.

SECTION 2, DESCRIPTION OF (CONSTRUCTION GROUPS) ASSEMBLIES

This section describes all individual assemblies of the homogenizer. Photographs, diagrams and isometrically drawn control diagrams illustrate the text.

SECTION 3, HOW TO INSTALL THE HOMOGENIZER

This section describes the handling and installing of the homogenizer. Proper mounting work is supported by diagrams showing connections of piping and electric cables.

SECTION 4, INITIAL OPERATION

This section contains check lists covering the various checks and working procedures required to ensure trouble-free operation. A list of possible failures and likely causes serves to find the sources of trouble.

SECTION 5, MAINTENANCE AND REPAIR

Dismantling and reassembling instructions, covering the various assemblies are given in this section.
Under the heading of "Preliminary Work" those jobs are mentioned that are imparative to ensure rational and time-saving maintenance and repairs. Tools required are listed to facilitate the procedure.
The "Time Required" indicates manpower and the period of time necessary to carry out the work involved, e.g.

2 men will require
0.6 hours, i.e.
36 minutes to do
the job.

These guiding values have been established by the MTM - method (METHODS TIME MEASUREMENT).
The "WORKING PROCEDURE" describes, step by step, the required maintenance and repairs to keep the homogenizer and/or high-pressure pump in satisfactory and serviceable condition. Diagrams and photographs serve to illustrate the various jobs. Numerals identifying the various component parts coincide with those mentioned in the descriptions. However, they are not identical with the "Pos.-No." in the spare parts list.

SECTION 6, SPARE PARTS

The spare parts (lists) of the various assemblies are numbered in ascending order and printed on pink paper. Lists consist of a diagram and parts list section. A specimen order form is inserted/as preface to the spare parts lists.

A correctly prepared order form will ensure prompt delivery of the spares required.

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SEPARATIONSTECHNIK GMBH
D-2056 GLINDE/b.Hamburg
Dept.S 3 - H
(Technical Documentation)

SECTION 1

Technical Data

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ALFA-LAVAL

SHEET: 1 of 4

REG.-No.: 01-01.

DRAW-No.:

TYPE: SHL

TECHNICAL DATA

TYPE OF MACHINE	HOMOGENISER SHL 25
SERIAL NO.	134 217
YEAR OF CONSTRUCTION	1979

DESIGNATION		MEASUREMENT
The fluid end / homogenizing head is designed for :	Prod. - l/h	2650/5300
Particles content in product :	vol.-%	
Specific gravity of density :	g/l	
Specific gravity of viscosity :	mm^2/s	
Operating pressure :	bar	
Operating temperature :	°C	
Maximum operating pressure :	bar	250
Maximum operating temperature :	°C	85
TECHNICAL DATA OF HIGH-PRESSURE PUMP		
Type		Horizontale 3- piston-pump
Number of plungers		3
Diameter of plungers	mm	45
Stroke of plungers	mm	105
Type of plunger seals		Grooved sealing ring
Type and size of valves		Cone valve
Valve springs		
Material of cylinder head-seals		Neoprene
Nominal width of suction connection	mm	SMS 51
Nominal width of delivery connection	mm	SMS 38
Feed pressure	bar	1,3 - 1,8
TECHNICAL DATA OF HOMOGENIZING HEAD		
Type of head		Double-stage homogenizing head
Size of homogenizing device	mm	ϕ 30 / ϕ 38
Material of head seal		Perbunan
Type of adjustment of head		Manually controlled
MATERIALS		
Material of pump housing		G. 25
Material of cylinder block		1.4311

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

TECHNICAL DATA

TECHNICAL DATA OF DRIVE

DESIGNATION	MEASURE-MENT	DRIVE MOTOR
Manufacturer		BBC
Motor type		250 M8/4 BF
Voltage	V	415
Frequency	Hz	50
Rated power	KW	32/46
Number of RPM	1/min	750/1500
Type of construction		B3
Type of protection		IP44
Nominal current	A	72/86
PTB - Number		
Motor weight	kg	

DIMENSION OF V - BELT PULLEYS

Effective diameter of V - belt pulley "DRIVE MOTOR" (d_w) : 250 mm

Effective diameter of V - belt pulley "GEAR" (d_w) : 280 mm

Number of belts : 4 piece

Type of V-belts : SPB

Length of V-belts : 2000

TECHNICAL DATA OF GEAR

Manufacturer			Flender
Construction of gear			SCD
Number of stages	(Z)		2
Reduction ratio	(i)	1	6,911
Revolutions at outlet	min.	1/min	70
Revolutions at outlet	max.	1/min	280
Maximum torque output	($M_{t\,max}$)	Nm	6400
Quantity of oil		l	6,3
Grade of oil			See: LUBRICANTS RECOMMENDATIONS

TECHNICAL DATA OF HYDRAULIC CONTROL UNIT

MOTOR

Manufacturer	Siemens	
Type	1LA 3070 4 AB	
Voltage	415	V
Frequency	50	Hz
Nominal current	0,73	A
Rating	0,25	KW
R.p.m.	1305	1/min

HYDRAULIC PUMP

Manufacturer	Hawe	
Type	Pistonpump	
Delivery rating	0,27	l
Operat-pressure	300	bar
Hydr.fluid temp.	40	°C
Filling capacity	7,6	l
Total weight		kg

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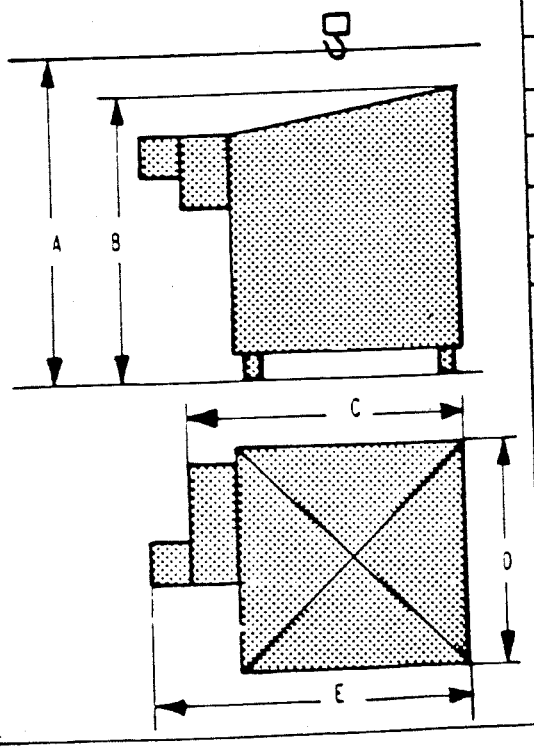
TECHNICAL DATA

DESIGNATION	MEASURING UNIT	MEASUREMENT
OIL COOLING PUMP HOUSING		
Construction of the oil cooler		Gilled pipe cooler
Consumption of cooling water approx	l/h	200 at 15°C with hardness max. 10-12 dGH
RINSING OF PISTONS		
Rinsing medium		☒ water at 15°C / ☐ hot steam condensate
Consumption of rinsing medium approx.	l/h	200
CONDENSATE UNIT		
Consumption of cooling water approx.	l/h	/ at 15°C with hardness max. 10-12 dGH
Steam required approx.	kg/h	/ at 140°C and a pressure of approx. 6 bar
TOTAL CONSUMPTION OF COOLING WATER approx.	l/h	200
TOTAL CONSUMPTION OF STEAM approx.	kg/h	
OIL LUBRICATING PUMP DRIVE		
Method of lubrication		Splash Lubrication
Lubrication oil quantity	l	20,5 kg
Grade of oil		See: Lubricants recommendation
EXTERNAL MEASUREMENT OF HOMOGENISER		*) 1° German Hardness (dGH) = 1.25° British Hardness = 1.79° French Hardness
	mm	A = Installation height : 2600
	mm	B = Total height : 1405
	mm	C = Length without homogenisation head: –
	mm	D = Total length : 1229
	mm	E = Length with homogenisation head : 1670
Total weight of machine	kg	1830
Machine weight without drive motor	kg	1500
Weight of high pressure pump	kg	
Shipping volume of machine (m x m x m)	m^3	1,6 x 1,7 x 1,7



INSTRUCTION MANUAL – BETRIEBSHANDBUCH

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LUBRICANTS – RECOMMENDATIONS

CRANKCASE OIL REQUIREMENTS (in driving gear of pump)

The lubricating oil serves to reduce friction and wear, and to protect bearings against corrosion. The lubricants recommended by us are high-grade, demulsifying mineral oils. They should also dissipate friction heat from bearings, offer satisfactory lubrication at all operating temperatures, suppress noise and ensure optimum/service-free operation by long service/life i.e. extended oil change periods.

GEAR OIL REQUIREMENTS (in reduction gears of pump drive)

The primary task of a gear oil is to control gear tooth wear, which may occur for various reasons, in such a way that full serviceability of gears is ensured over an extended period of operation. Gear oils should also meet the following requirements: Satisfactory demulsifying property, high oxidation and temperature stability, satisfactory corrosion protection, low foaming tendency and compatibility with non-ferrous metals. The gear oils recommended by us meet these requirements.

HYDRAULIC OIL REQUIREMENTS (in hydraulic control system)

Hydraulic oils should show specific properties to meet requirements prevailing in actual practice, viz.: satisfactory lubricating property, oxidation stability, satisfactory flow and shear stability as well as a wide temperature range. The oil should also offer anti-corrosion, anti-waer properties and favourable water and air releasing ability. It should be compatible with sealing materials and show low foaming tendency.

The alphabetical order of lubricants listed hereunder does not imply any superiority of one brand/grade over the other.

BRANDS	CRANKCASE OIL (in driving gear of pump)	VISCOSITY RATE in mm^2 (cS) at 40° C ++	GEAR OIL (in reduction gear of pump drive)	VISCOSITY RATE in mm^2 (cS) at 40° C ++	HYDRAULIC OIL (in hydraulic control system)	VISCOSITY RATE in mm^2 (cS) at 40° C ++
ARAL	MOTANOL HK 100 MOTANOL HK 150	100 150	DEGOL BG	460	VITAN DE 46 VITAM GP 46	46 46
BP	ENERGOL GS 100 ENERGOL CS 150	110 150	GR XP 460	425	ENERGOL HPL 46	46
Esso	TERESSO 100 TERESSO 150	100 150	SPARTAN 460	440	NUTO H46	46
Mobil	MOBILD. T. E. EXTRA MOBIL DTE, 8B (HEAVY	140 204	MOBILGEAR 634	433	D.T.E. 25	46
SHELL	VITREA 100 VITREA 150	100 150	OMALA 460	460	TELLUS 46	46

++) The ISO-Viscosity classifacation for industrial lubricants is effective since June, 1976. It is essentially identical with ISO standard specification 3448 and ensures internationally uniform viscosity ratings in mm^2/s (cS) at 40° C.

IDENTIFICATION OF HOMOGENIZER

The name plate is fixed to the driving gear housing, and it is visible when the cover plate is lifted. The name plate shows the type designation and serial number.
When ordering spares, please verify that the serial number on the plate coincides with the number in your instruction manual.

YOU ARE OPERATING A

HIGH-PRESSURE PUMP
TYPE: SHL
FOR USE AS

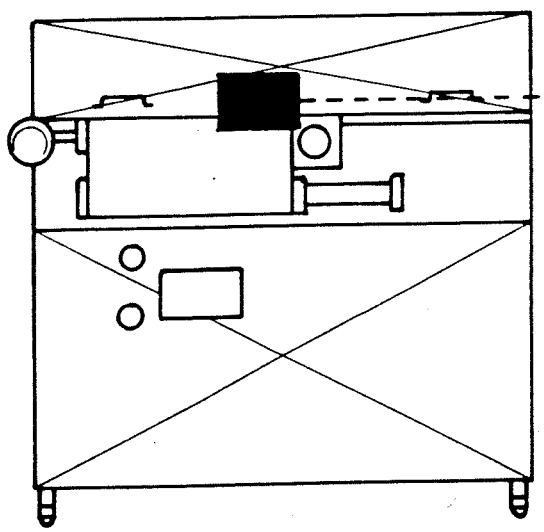
☐ HOMOGENIZING MACHINE ☐ HIGH-PRESSURE PUMP

ALFA-LAVAL
SEPARATIONSTECHNIK GMBH
D 2056 GLINDE BEI HAMBURG

TYPE : SHL 15

MACHINE NO.: Manuf.-Year :

MADE IN WESTERN GERMANY



SECTION 2

Assembly Group Description

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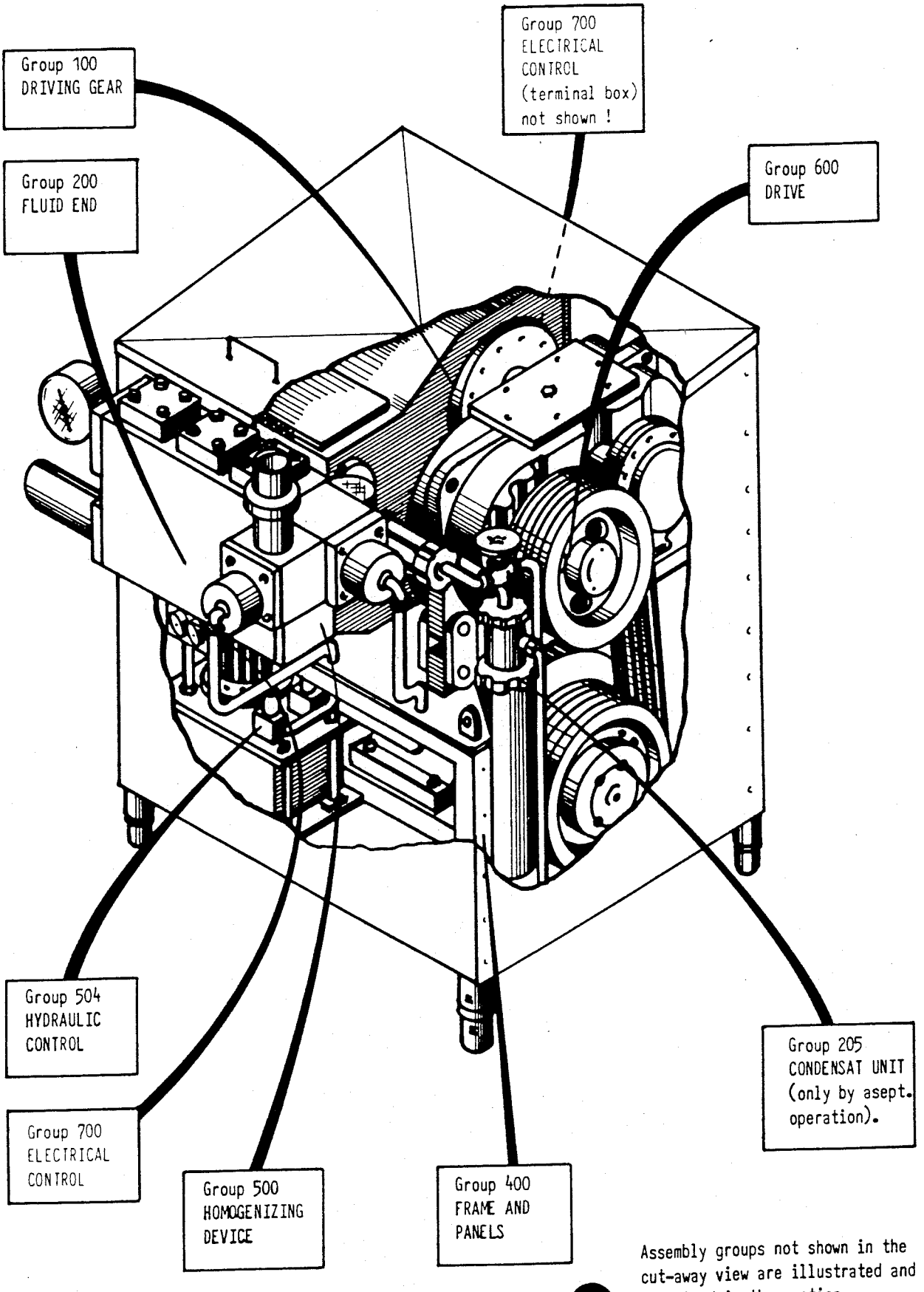
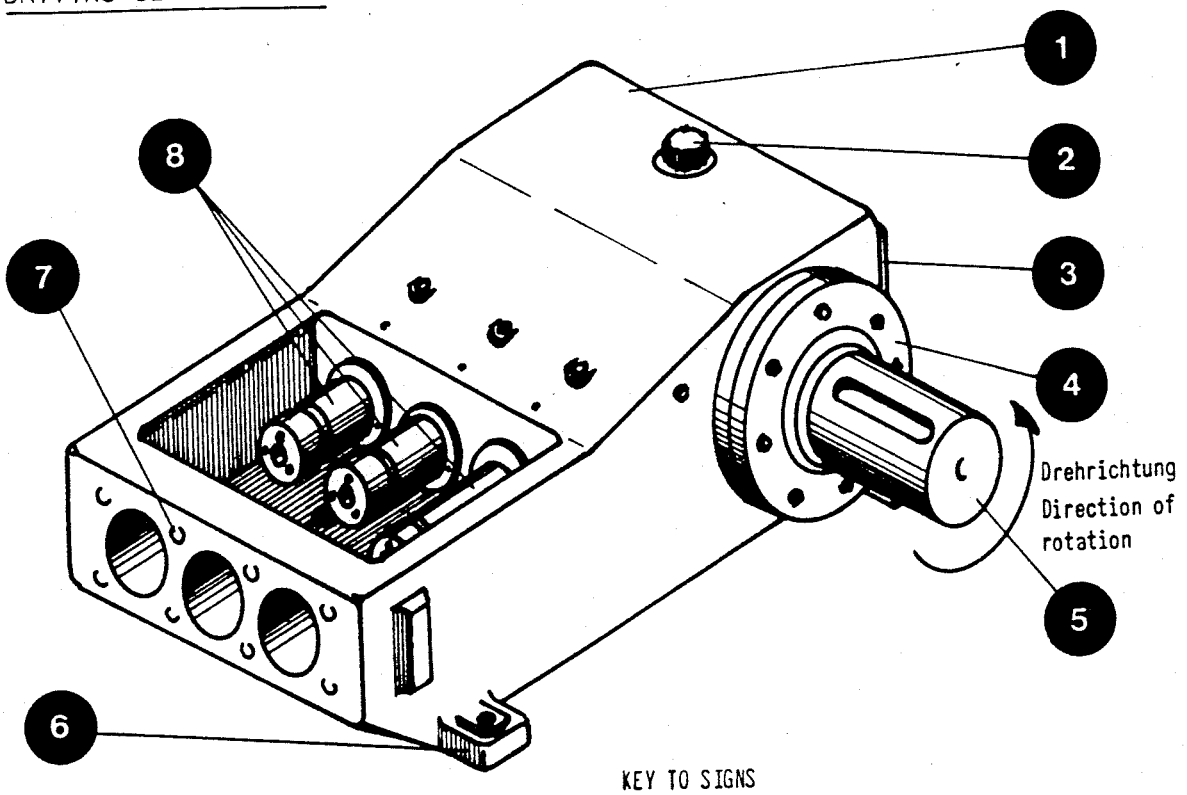
ASSEMBLY GROUPS - GENERAL ARRANGEMENT

The A L F A - L A V A L Homogenizer, type SHL, consists of the following assembly groups:



Assembly groups not shown in the cut-away view are illustrated and explained in the section DESCRIPTION OF ASSEMBLY GROUPS.

ASSEMBLY 100
DRIVING GEAR HOUSING



KEY TO SIGNS

1 = Driving gear housing
2 = Oil filler
3 = Cover plate, perspex (transparent)
4 = Bearing flange
5 = Crankshaft, drive end (gear box end)
6 = Mounting lugs
7 = Front end surface to connect with pump cylinder block
8 = Crossheads

DESCRIPTION

The driving gear/crankcase is part of the high-pressure positive displacement pump.
To obtain continuous delivery, a three-throw crankshaft is used, with 120o between cranks. Power is supplied from the motor through V-belts and shaft mounted reduction gear.

The three-throw crankshaft (5) rotates in two cylindrical roller bearings fitted in the driving gear (1).
The big-end bearings are of the split type, with dual metal linings.
The wrist pins rest in crossheads (8) and are secured by threaded studs. The wrist pin bushes are of spun-cast bronze.

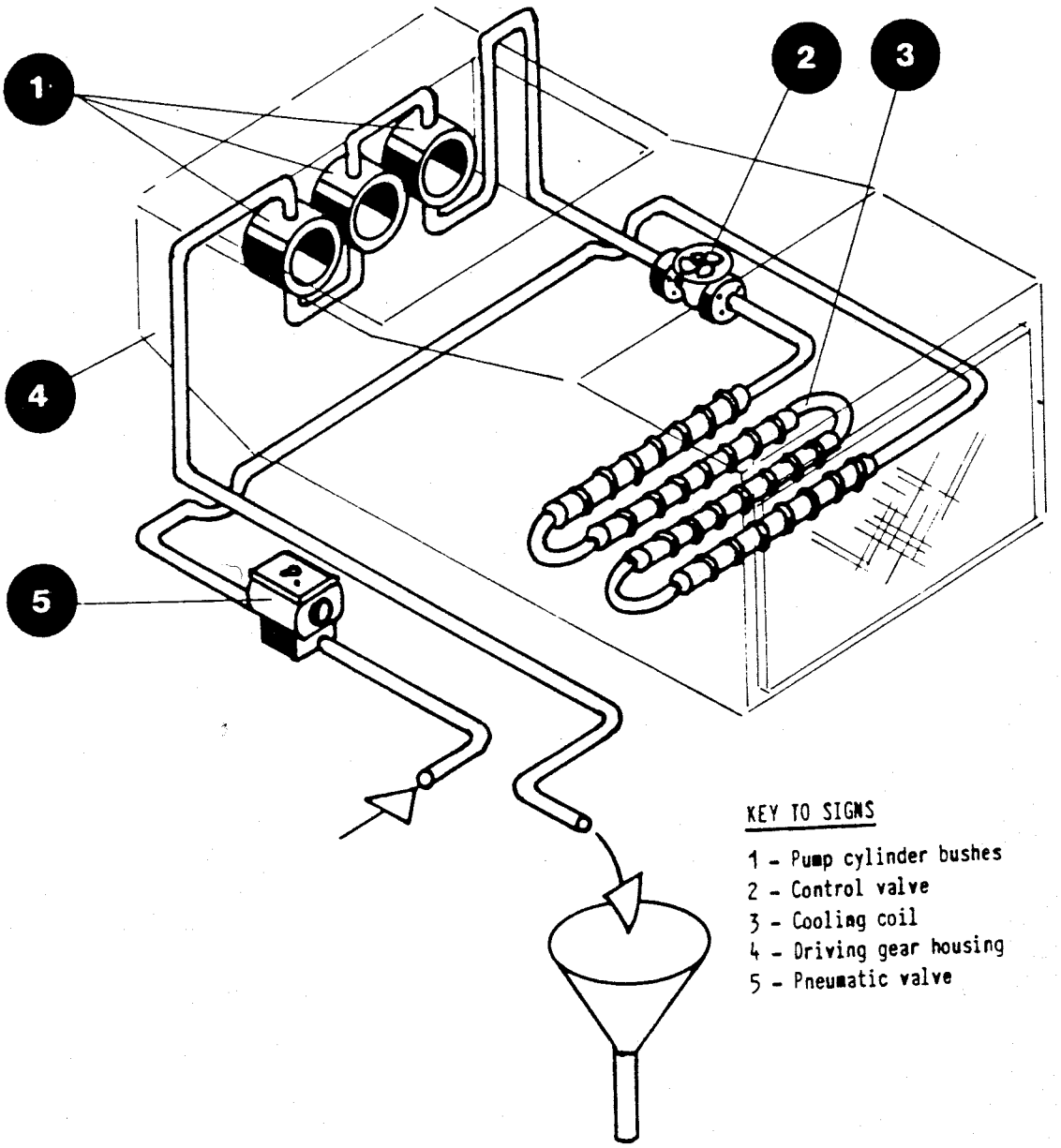
Crankshaft bearings are splash lubricated, the connecting rods scooping up the oil which is fed to the bearings through appropriate drillings. Oil from the crank webs is scraped and fed to crossheads and wrist pins. Crossheads are sealed to prevent oil spillage.

The transparent perspex cover (3) at the rear end of the driving gear housing allows for a constant check of the oil level and condensed water content.
The oil is changed by draining the used oil through sump cock

Fresh oil is poured through the filler (2).

The driving gear housing is bolted to the frame by the four mounting lugs (6).

ASSEMBLY 105
OIL COOLER IN WATER
COOLING SYSTEM



KEY TO SIGNS

1 – Pump cylinder bushes
2 – Control valve
3 – Cooling coil
4 – Driving gear housing
5 – Pneumatic valve

DESCRIPTION

The oil of the driving gear is cooled by a water coil system fitted in the sump of the housing (4). The coil (3) consists of a finned pipe. Water inlet and outlet lines are connected through the sides of the housing by bulkhead screws. The cooler is readily replaceable.

The cooling water is taken from the mains. When starting the homogenizer the pneumatic valve (5) opens. The water flows through the cooling coil (3) thus cooling the oil in the driving gear sump. The warmed-up water circulates through the sealing chambers of the pump cylinder bushes, thus cooling the pump pistons. The cooling water passing through the sealing chambers also ensures boundary lubrication of the front and rear piston seals.
The quantity of the cooling water flow can be regulated by control valve (2).

The used water is run to the sewage system.

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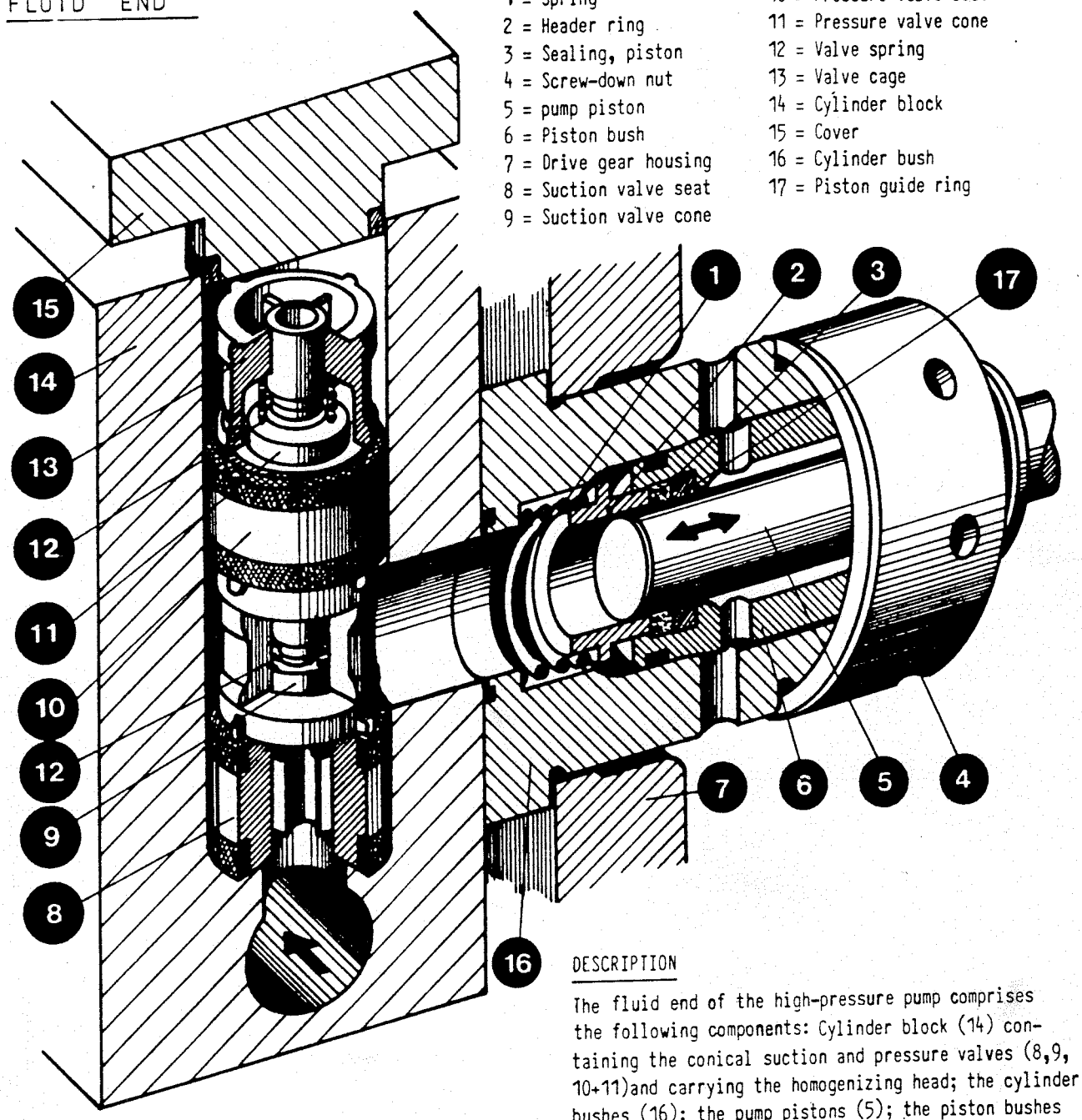
ASSEMBLY 200
FLUID END

KEY TO SIGNS

1 = Spring
2 = Header ring
3 = Sealing, piston
4 = Screw-down nut
5 = pump piston
6 = Piston bush
7 = Drive gear housing
8 = Suction valve seat
9 = Suction valve cone
10 = Pressure valve seat
11 = Pressure valve cone
12 = Valve spring
13 = Valve cage
14 = Cylinder block
15 = Cover
16 = Cylinder bush
17 = Piston guide ring



DESCRIPTION

The fluid end of the high-pressure pump comprises the following components: Cylinder block (14) containing the conical suction and pressure valves (8,9, 10+11)and carrying the homogenizing head; the cylinder bushes (16); the pump pistons (5); the piston bushes (6) with their seals (3) and the screw-down nuts (4). In the diagram, the piston seals at the cylinder block end are visible only; the piston seals at the opposite end are obscured by the screw-down nut.

The cylinder bushes are inserted through the drillings in the face of the drive gear housing (7). The cylinder block, which is forged in one piece, is set against the cylinder bushes and tightened up by expansion screws from the inside of the drive gear housing. The pump pistons are bolted to the crossheads, via couplings, and are guided in the piston guide rings (17), in aligment with the drive gear. The pump pistons are sealed by special sealings compatible with the substances to be homogenized. The front and rear end seals are standard equipment. The annulus between the seals provides a chamber for water cooling of the pistons and boundary lubrication of the seals. In aseptic operation, this chamber is fed with steam condensate, so that it serves as a sterilizing seal.

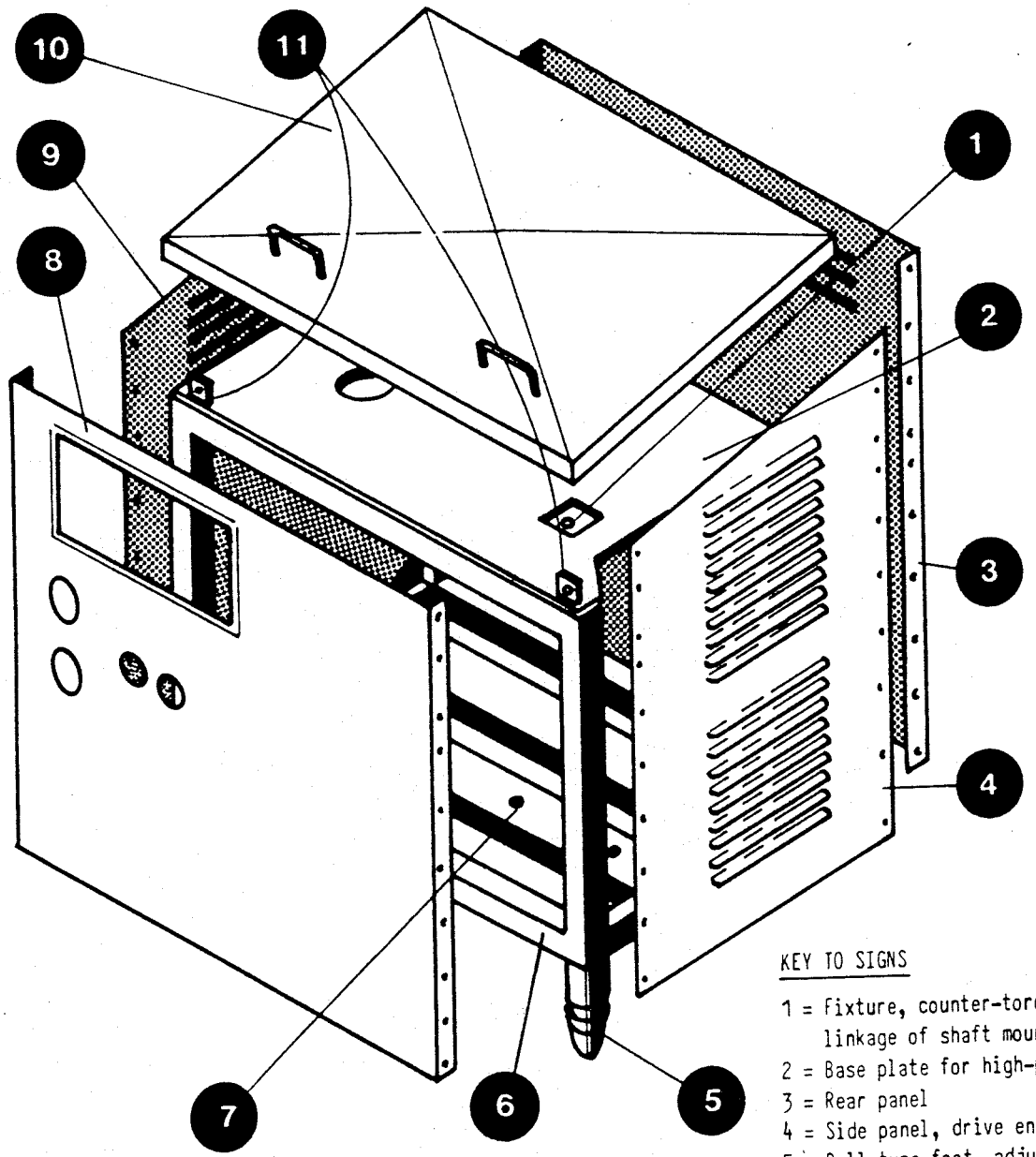
The piston bushes (6) together with the pistons (5) and seals (3) form a readily replaceable self-contained unit.

The pistons consist of high-grade, high-tensile stainless steel or are chromium-hardened, alternatively.

The readily exchangeable conical valves consist of stellite.

Depending on the layout of the pump, delivery pressures of up to 630 bar are obtainable.

ASSEMBLY 400
STAINLESS STEEL PANELS



KEY TO SIGNS

1 = Fixture, counter-torque linkage of shaft mounted gear
2 = Base plate for high-pressure pump
3 = Rear panel
4 = Side panel, drive end
5 = Ball-type foot, adjustable
6 = Frame
7 = Motor carrier
8 = Front panel
9 = Side panel
10 = Cover, top
11 = Lifting lugs

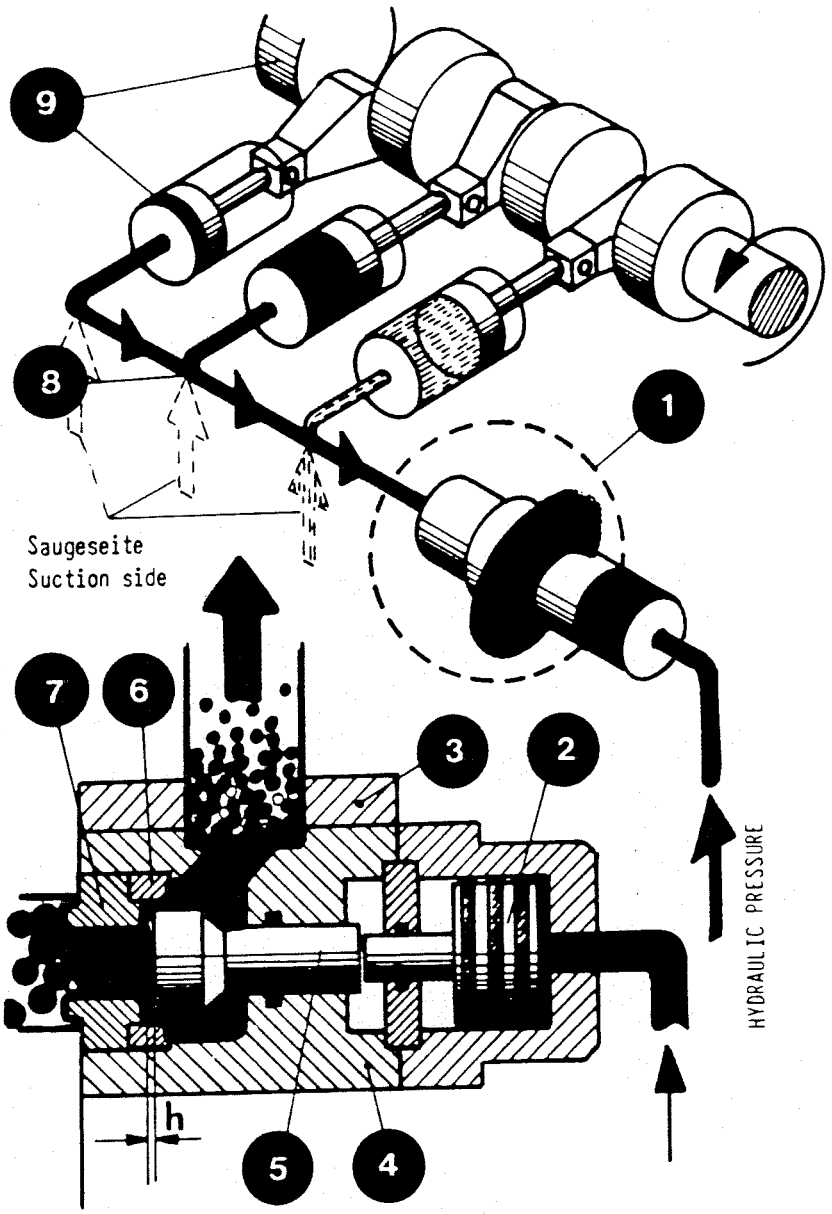
DESCRIPTION

The frame (6) consists of welded box sections. The base plate (2) is welded to the frame and carries the high-pressure pump with shaft mounted reduction gear. The gear box is linked to the fixture (1), to take up the torque.
The motor carrier (7) is located in the lower part of the frame.
Another plate carries the hydraulic unit controlling the pressure in the homogenizing heads. The frame rests on ball-type feet (5) which are vertically adjustable. On removal of the top cover (10), the machine can be lifted by the four lugs (11).
The frame is enclosed by stainless steel panels (3, 4, 8 and 9), which are bolted to the frame. The cover (10) is detachable. The electric and hydraulic controls are positioned in the front panel (8). Side and rear panels are provided with louvres for ventilation. The frame has a multi-coat protective finish. The stainless steel panels are glass-bead blasted.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

ASSEMBLY 500
HOMOGENIZING DEVICE



KEY TO SIGNS

1 = Homogenizing device
2 = Hydraulic control system
3 = Product flange discharge
4 = Homogenizing head
5 = Homo device cone
6 = Impact ring
7 = Homo device seat
8 = High-pressure manifold in cylinder block
9 = Three-piston high-pressure pump

DESCRIPTION

The homogenizing head (4), incorporating the homogenizing system (1) is fed by the three-piston high-pressure pump (9), i.e. the head is flanged to the cylinder block of the pump. The homogenizing device represents a throttle valve which is closed by hydraulic pressure. To avoid excessive pump pressures, the machine must always be started up with opened i.e. pressureless homogenizing valve.

The product, i.e. the feed, is delivered under initial pressure to the suction side of the pump. The pump pistons force the product into the manifold (8) and via the open homogenizing valve and discharge flange (3) into the discharge line.

To start the homogenizing process the desired homogenizing valve pressure is set with the aid of the hydraulic control system (2) while the pump is delivering. The homo device cone (5) is pressed by the hydraulic piston (2) against the product flow discharged through the seat (7). An annulus or ring gap is thus obtained, amounting to the dimension " h " shown in the diagram. The product is forced through the gap and depressurized in the process. This release causes a high velocity of flow. The product impinges against the inner surface of the impact ring (6) with this high velocity and is released through the discharge flange (3) of the homogenizing head (4).

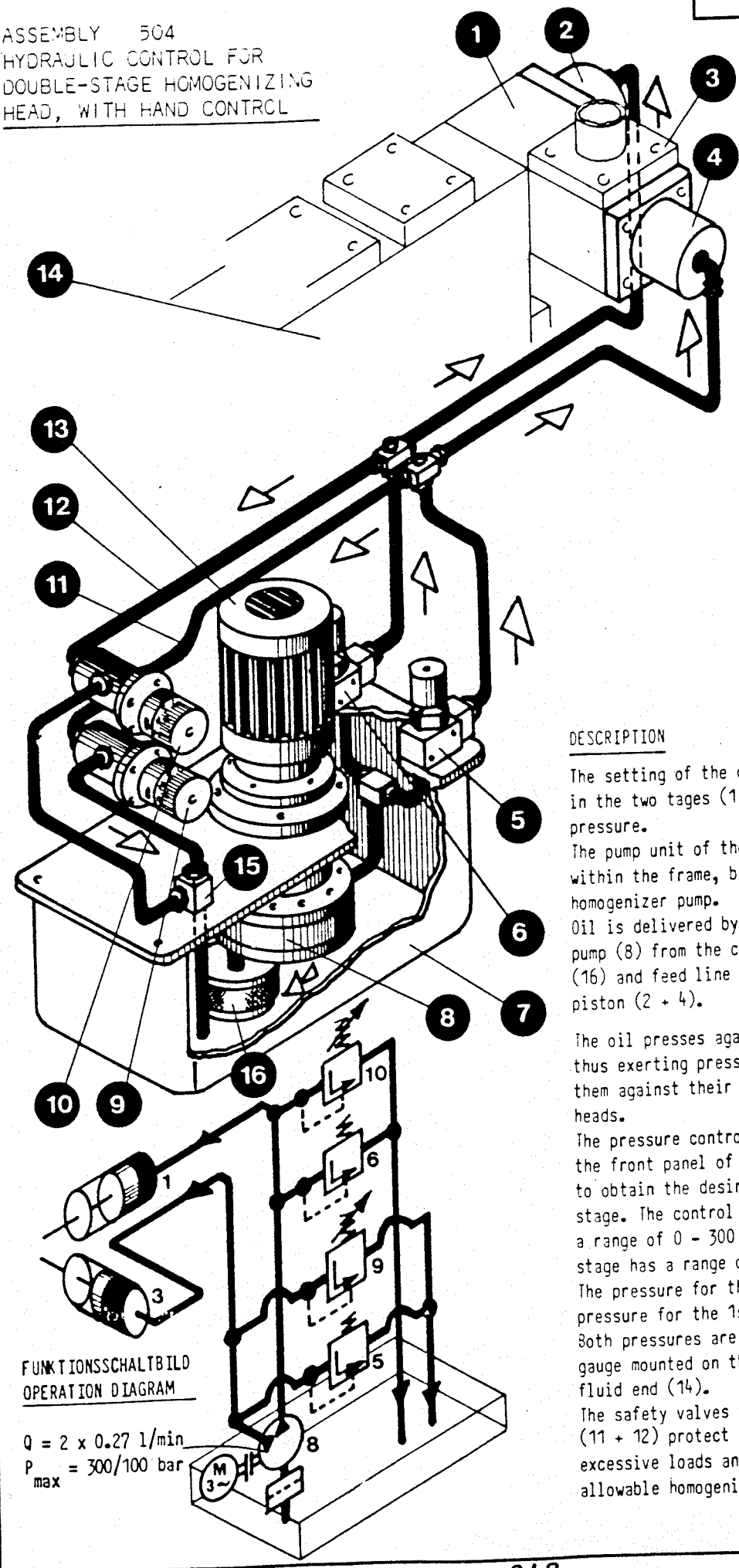
The flash-like energy conversion - from high to low pressure (approx. 1 bar) - will cause shear and impact forces, cavitation (vapour phase effects) and turbulence, which will effect the desired homogenization of the product.

The highly strained components (5,6 and 7) are made of stellite. The homo device seat (7) and the impact ring (6) are purely wear parts which may be reused, in reversed position, for another period of operation, thus obtaining double service life.
The homogenizing process can be effected in one or two stages. The use of a secondary stage can improve the desired effect if a low hydraulic pressure is applied against the primary stage. The power requirements of the pump is not affected thereby. The operating pressure prevailing in the primary stage is the controlling factor.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

ASSEMBLY 504
HYDRAULIC CONTROL FOR
DOUBLE-STAGE HOMOGENIZING
HEAD, WITH HAND CONTROL



FUNKTIONSSCHALTBILD
OPERATION DIAGRAM

Q = 2 x 0.27 l/min
P_{max} = 300/100 bar

KEY TO SIGNS

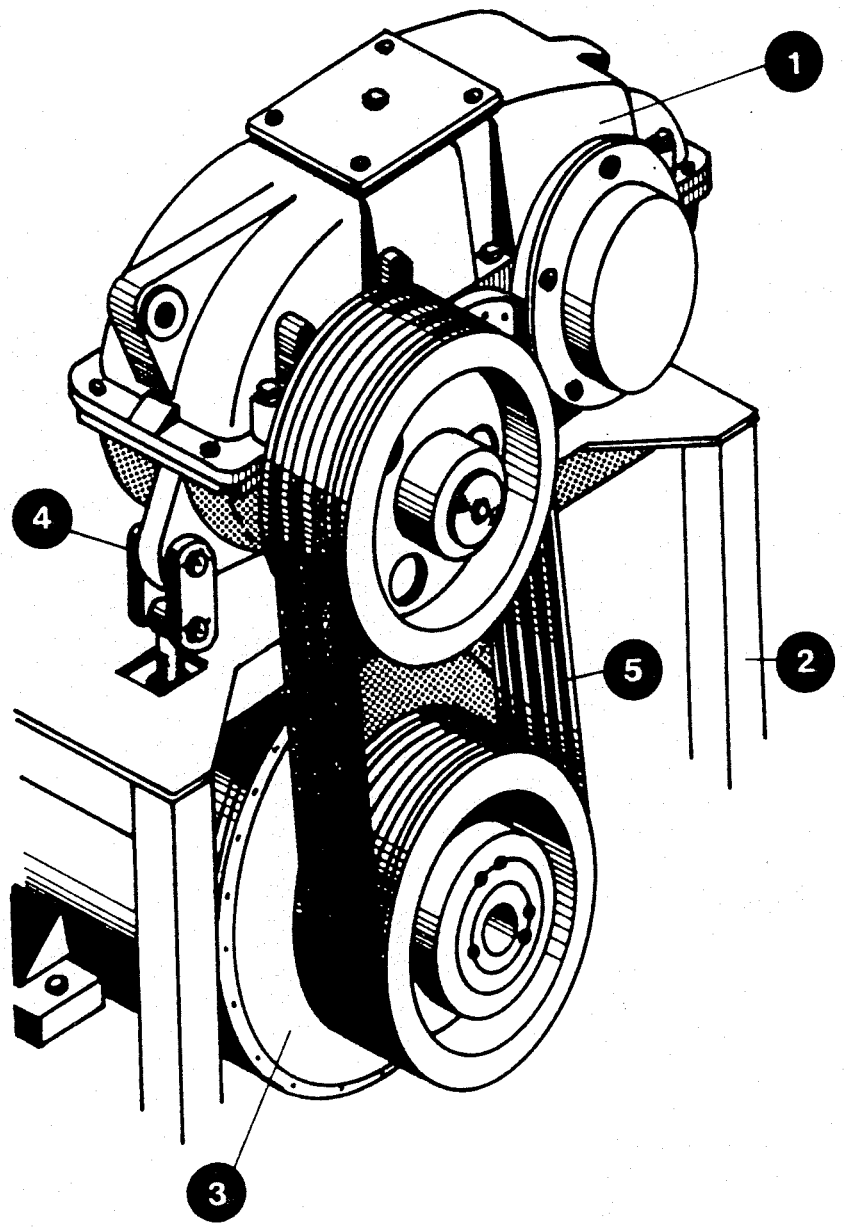
1 = Homogen. head, 1st stage
2 = Hydraulic piston
3 = Homogen. head, 2nd stage
4 = Hydraulic piston
5 = Pressure relief valve
6 = Safety valve
7 = Oil container
8 = Radial piston pump
9 = Pressure control valve, 2nd stage (0 - 100 bar)
10 = Pressure control valve, 1st stage (0 - 300 bar)
11 = Delivery line, 2nd stage
12 = Delivery line, 1st stage
13 = Motor
14 = Fluid end
15 = Common return line
16 = Oil filter

DESCRIPTION

The setting of the desired homogenizing pressures in the two tages (1 + 3) is effected by hydraulic pressure.
The pump unit of the hydraulic system is mounted within the frame, below the high-pressure homogenizer pump.
Oil is delivered by a self priming radial piston pump (8) from the container (7) through a filter (16) and feed line (11 + 12) to the hydraulic piston (2 + 4).

The oil presses against the hydraulic pistons, thus exerting pressure on the cones and holding them against their seats in the homogenizing heads.
The pressure control valves (9 + 10), located at the front panel of the machine, are set by hand to obtain the desired pressure in the 1st and 2nd stage. The control valve for the 1st stage has a range of 0 - 300 bar; the valve for the 2nd stage has a range of 0 - 100 bar.
The pressure for the 2nd stage is set first. The pressure for the 1st stage is set subsequently. Both pressures are indicated by the high-pressure gauge mounted on the cylinder block of the fluid end (14).
The safety valves (5 + 6) in the delivery lines (11 + 12) protect the hydraulic system against excessive loads and is limiting the maximum allowable homogenizing pressure of the machine.

ASSEMBLY 600
DRIVE
(REDUCTION GEAR, FLOATING)



KEY TO SIGNS

1 = Crankshaft mounted, red. gear
2 = Frame
3 = Motor
4 = Torque support
5 = V-belts

DESCRIPTION

The high-pressure pump of the homogenizer is driven by a motor (3) through V-belts (5) and crankshaft mounted reduction gears (1).

The motor is, as a rule, a waterproofed asynchronous motor mounted on the lower base plate.(2).

The hollow shaft of the reduction gear is key-fitted on the crankshaft of the pump. The reactive moment of the driving torque is taken up by the "torque support"(4).

The gears are splash lubricated. The lower part of the gear box serves as a sump. The oil drain plug is provided with a permanent magnet. Narrow V-belts are used for power transmission.

ED: 4/79
SHEET: 9 of 9
REG.-No.: 02-06.01
DRAW-No.:
TYPE: SH.

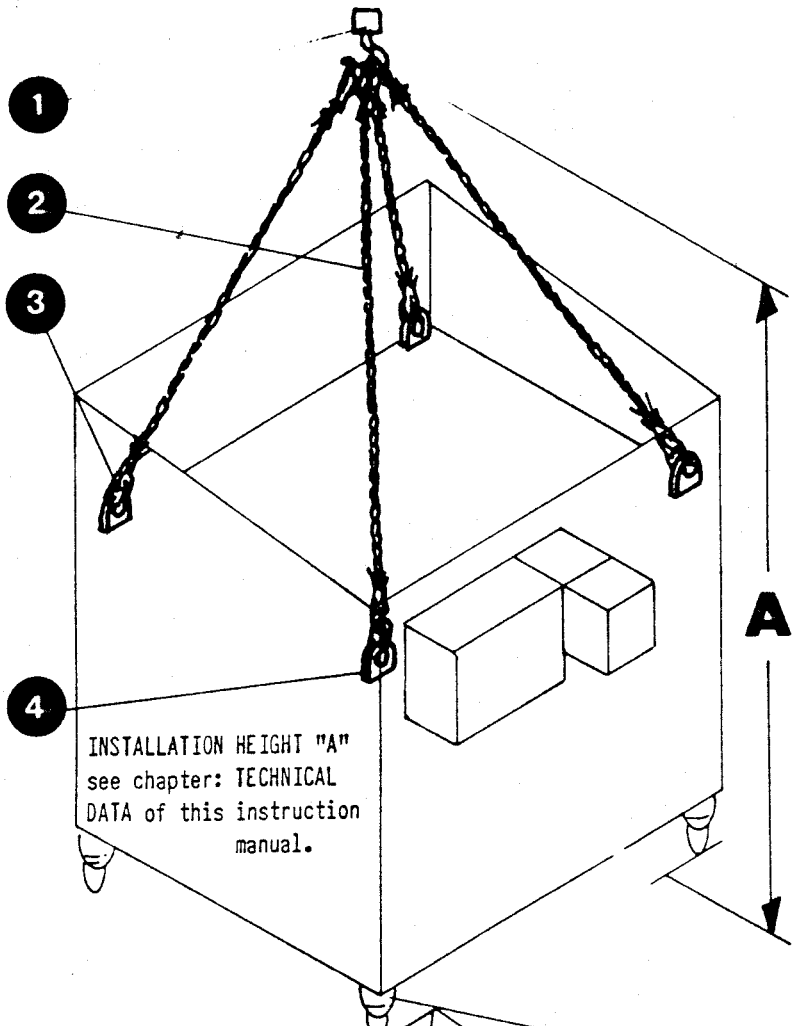
SECTION 3

Installation

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HANDLING AND POSITIONING



KEY TO FIGURE:

1 Hoisting hook
2 = Slings
3 = Shackle
4 = Lifting lugs
5 = Ball-type feet
6 = Spirit level

TOOLS REQUIRED

4 Slings of equal length
4 Shackles, 30 mm bolt dia.
2 Spanners, adjustable
1 Spirit level
1 Crane, mobile

WORKING PROCEDURE

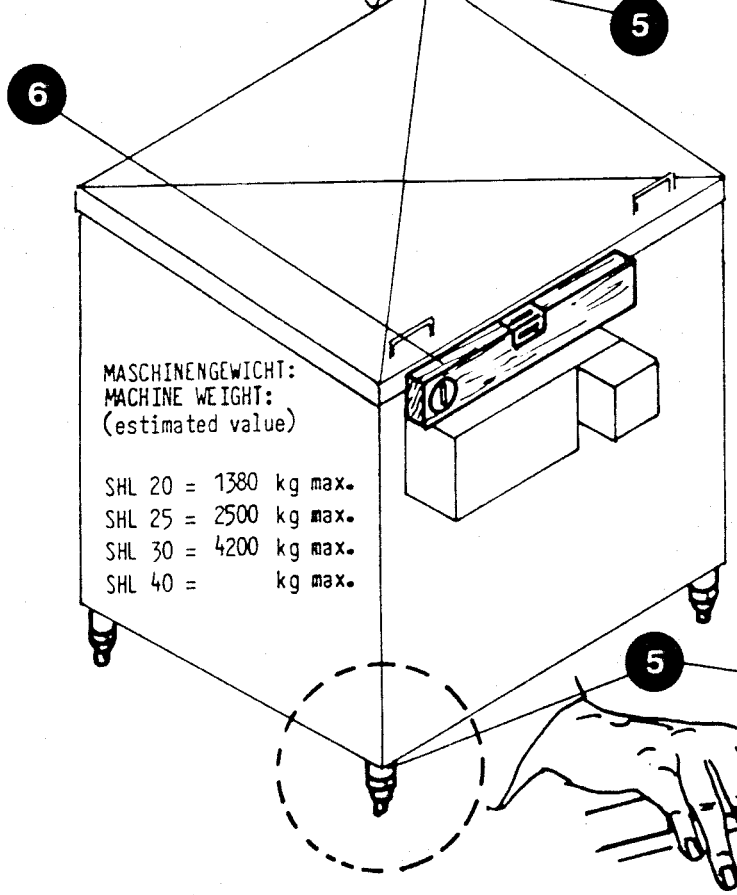
1.0 h TIME REQUIRED

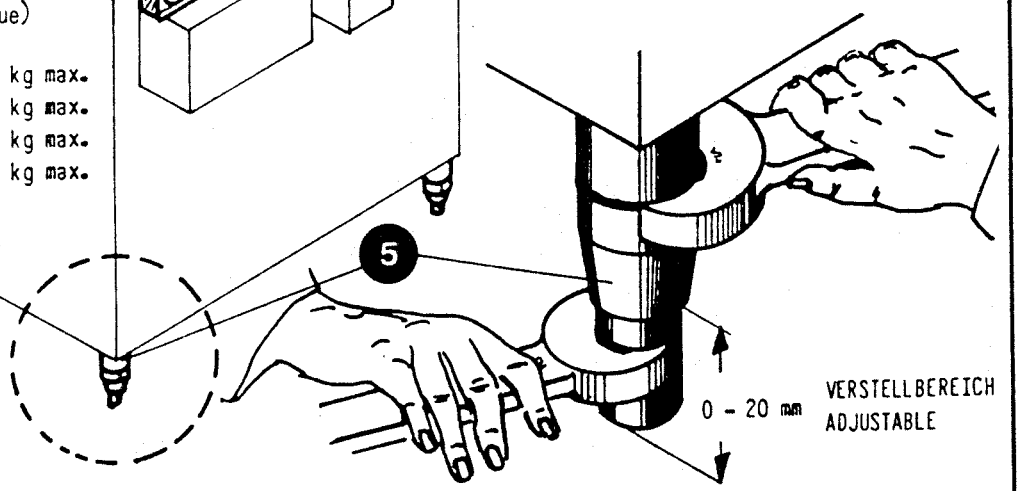
After the machine has been unpacked, it should be moved by mobile crane, exclusively.

After the top cover of the machine has been removed, four slings of equal length (2) are shackled (3) to the liftings lugs (4) and hooked to the crane (1).

The floor on which the machine is to be installed should be level. Floor tiles should be protected by the use of steel tiles on which to rest the ball-type feet of the machine (5).

To level up the machine, the spirit level (6) should be placed on the cylinder block of the high-pressure pump, as shown in the opposite diagram. The ball-type feet of the machine may be screwed in or out, as required.

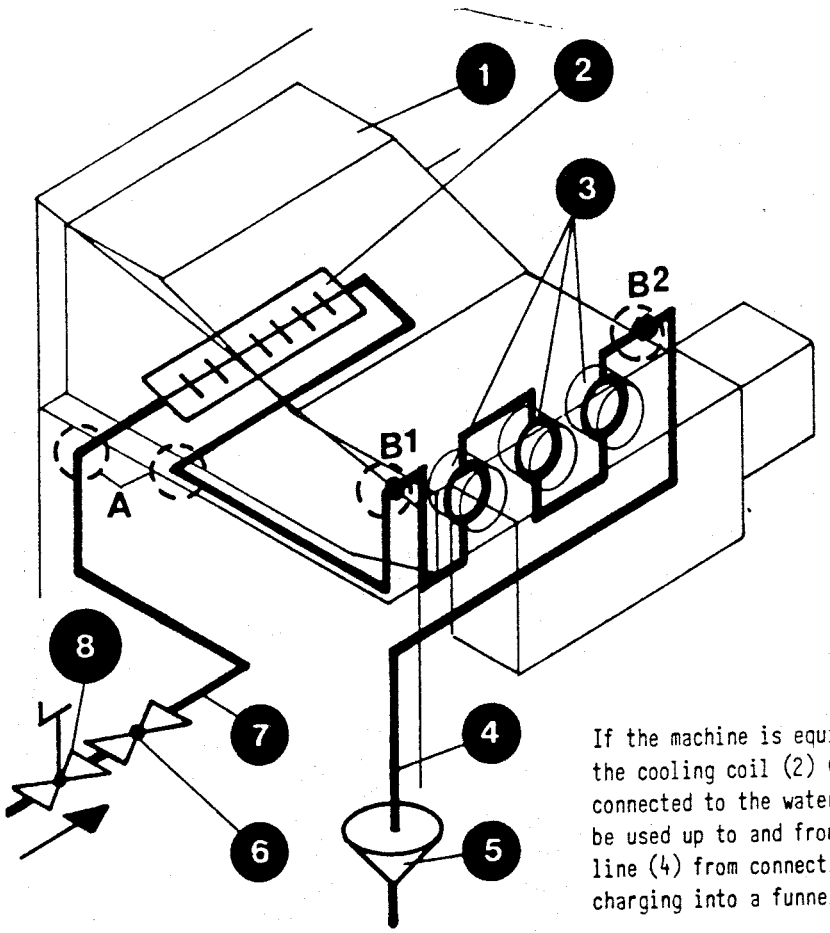




INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

DIMENSIONS OF COOLING SYSTEM PIPE CONNECTIONS

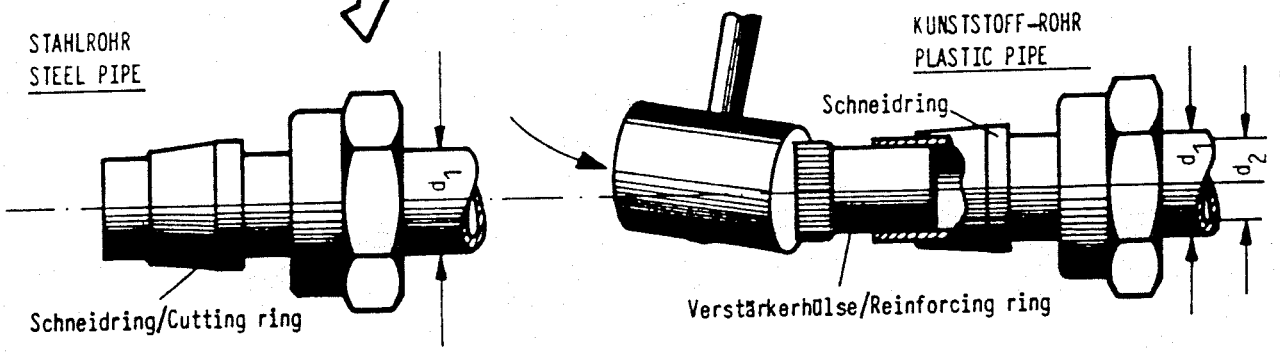


KEY TO SIGNS

1 = Drive gear / crankcase
2 = Cooling coil
3 = Pump cylinder bushes
4 = Return line
5 = Funnel
6 = Cooling water control valve
7 = Delivery line
8 = Main valve

The cooling water connections are supplied with complete cutting ring pipe couplings.
Plastic piping may be used for water delivery and return lines up to connection "A" and from connection "B 2", resp. The ends of the plastic piping should be strengthened by "reinforcing rings".

If the machine is equipped with a condensate sealing system, the cooling coil (2) (for crankcase oil cooling) is separately connected to the water delivery line. Plastic piping may also be used up to and from connections "A". The condensate return line (4) from connection (B 2) should be steel piping discharging into a funnel (5).



ROHRABMESSUNGEN IN MILLIMETER / PIPE DIAMETER IN MILLIMETRE

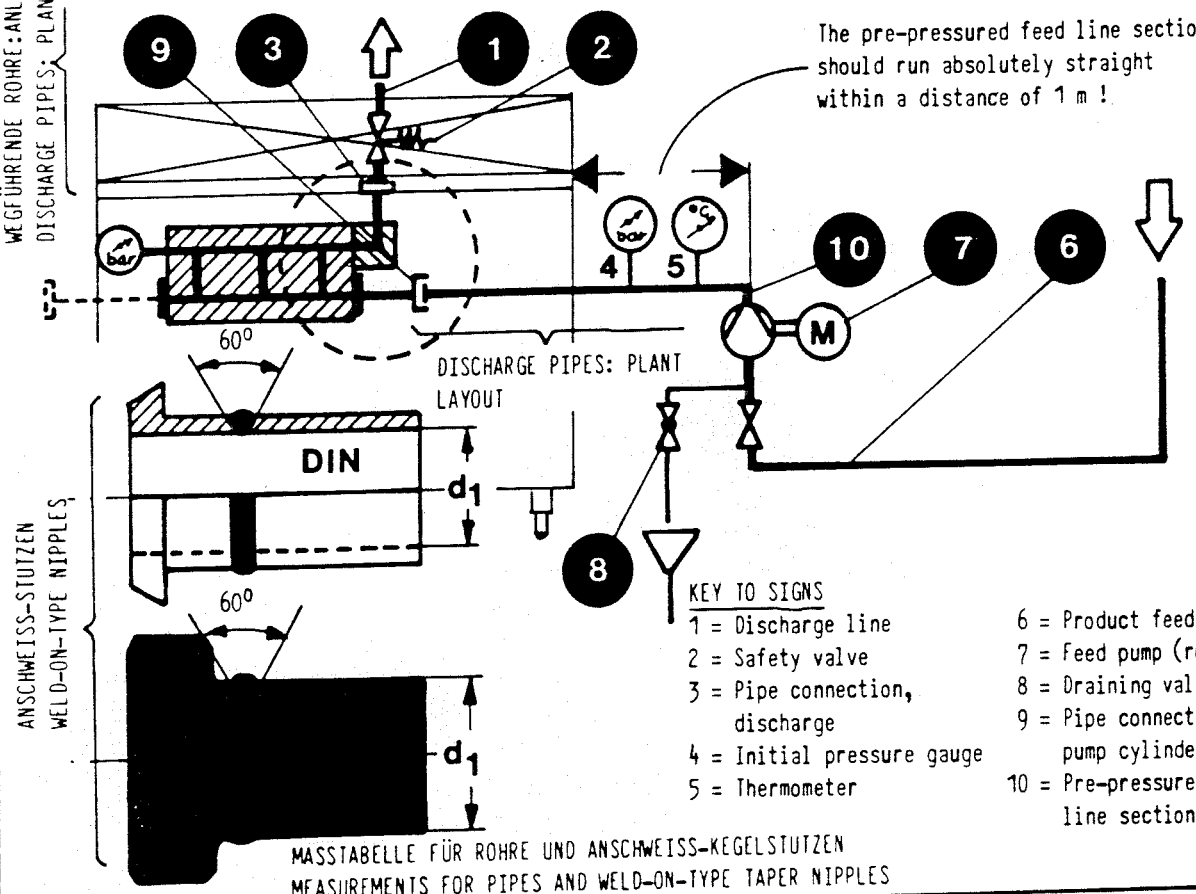
MASCHINENTYP ENGINE TYPE	STAHLROHRE / STEEL PIPES	PLASTIC PIPES		VERSTÄRKER-HÜLSE REINFORCING RING **
	AUSSENDURCHMESSER-OUTER DIAMETER	AUSSENDURCHMESSER OUTER DIAMETER	INNENDURCHMESSER INNER DIAMETER	
SHL 20	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 25	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 30	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 40	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5

** Steel and plastic piping, pipe couplings and reinforcing rings are available from our service division.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

DIMENSIONS OF PIPE CONNECTIONS AT PUMP CYLINDER BLOCK (PRODUCT INLET) AND HOMOGENIZER HEAD (DISCHARGE)



KEY TO SIGNS

1 = Discharge line
2 = Safety valve
3 = Pipe connection, discharge
4 = Initial pressure gauge
5 = Thermometer
6 = Product feed line
7 = Feed pump (rotary)
8 = Draining valve
9 = Pipe connection, pump cylinder block
10 = Pre-pressured feed line section

MASSTABELLE FÜR ROHRE UND ANSCHWEISS-KEGELSTUTZEN
MEASUREMENTS FOR PIPES AND WELD-ON-TYPE TAPER NIPPLES

MASCHINENTYP MACHINE TYPE	d_1 =	HOMOKOPF/HOMOGENIZER HEAD ABLAUF/DISCHARGE DIN (mm)	ZOLL/INCHES	ZYLINDERKOPF/CYLINDER HEAD ZULAUF/FEED DIN (mm)	ZOLL/INCHES
SHL 20	(315 bar)	40	1 1/2 "	40	1 1/2 "
SHL 25	(315 bar)	40	1 1/2 "	50	2 "
SHL 30	(315 bar)	65	2 1/2 "	80	3 "
SHL 40	(315 bar)	80	3 "	80	3 "

Homogenizers are units included in different processes. Thus the installation of product conduits are process dependend and therefore not descriped in this chapter.

Some installation rules, however have to be observed:

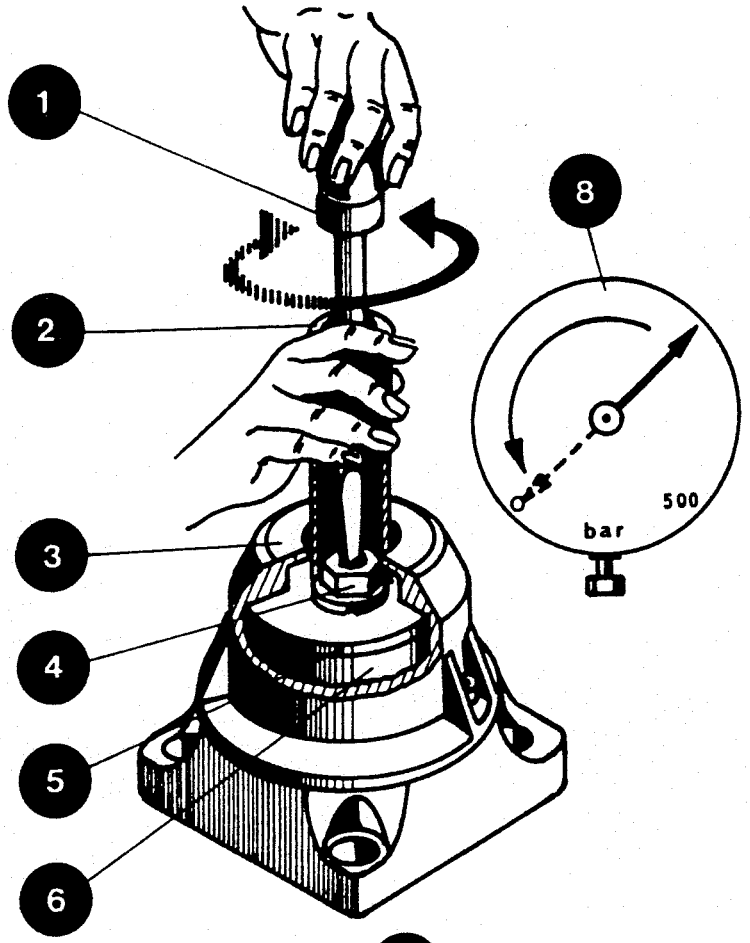
Upstream and downstream piping, i.e. feed and discharge lines must be connected to the machine as follows:

The pre-pressured feed line section (10) should run absolutely straight within a distance of 1 m (approx. 3) from the cylinder block connection (9). The whole product feed line (6) - at least the part of the pre-pressured feed line suction (10) from (9) to (7) - must have the same size as the cylinder block pipe connection (9). To obtain initial feed pressure (NPSH), a rotary pump (7) should be fitted in the feed line (6). To indicate initial feed pressure and temperature, a pressure gauge and thermometer (4 + 5) should be fitted in the pre-pressured feed line (10). If shut-off valves are fitted in the discharge line (1), a safety valve (2) should be provided, for protection of the machine. To enable pipe lines to be drained and cleaned venting valves should be fitted at the highest points of lines, and drain valves at the lowest points. Screw couplings should be used for the connections of the feed and discharge lines.
Dimensions of pipes and weld-on type taper nipples are shown in the above table.
The welding edge angle should be 60°. The welding seams should be ground and polished, internally and externally, to meet hygienic requirements.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO ADJUST THE SOLENOID VALVE



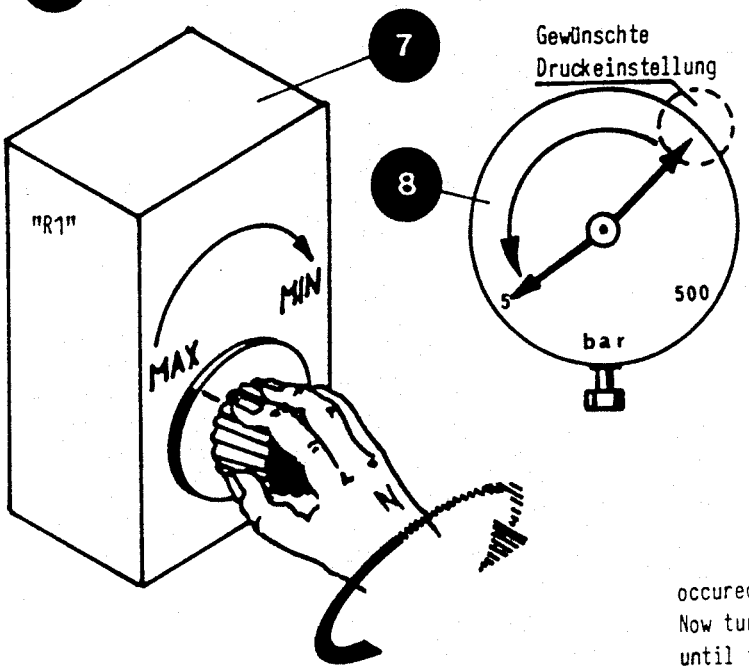
KEY TO SIGNS

1 = Screw driver
2 = Box spanner
3 = Solenoid valve
4 = Lock nut
5 = Disk
6 = Magnet core
7 = Resistor
8 = Pressure gauge

TOOLS REQUIRED

1 Screw driver
1 Box spanner, 13 mm

ATTENTION
The release pressure of the safety valve in the hydraulic system should be set 10 % higher than the control pressure of the solenoid valve!



PROCEDURE

Loosen the lock nut (4) with the box spanner (2), and the adjusting pin a few turns, counter-clockwise, with the screw driver (1).

Now switch on the control current. The valve disk (5) is now pulled towards the magnet core (6).
Now switch on the hydraulic system. Turn down the adjusting pin slowly, clockwise, with the screw driver. Now the oil pressure will build up. Watch the pressure gauge (8). As the pin is being turned down further, the pressure suddenly breaks down, and the hand of the pressure gauge returns to Zero, indicating that excess pressure has occured.
Now turn the pin carefully counter-clockwise again, until the pressure gauge indicates the desired homogenizing pressure.
Tighten up the lock nut (4) while holding the pin in position with the screw driver.

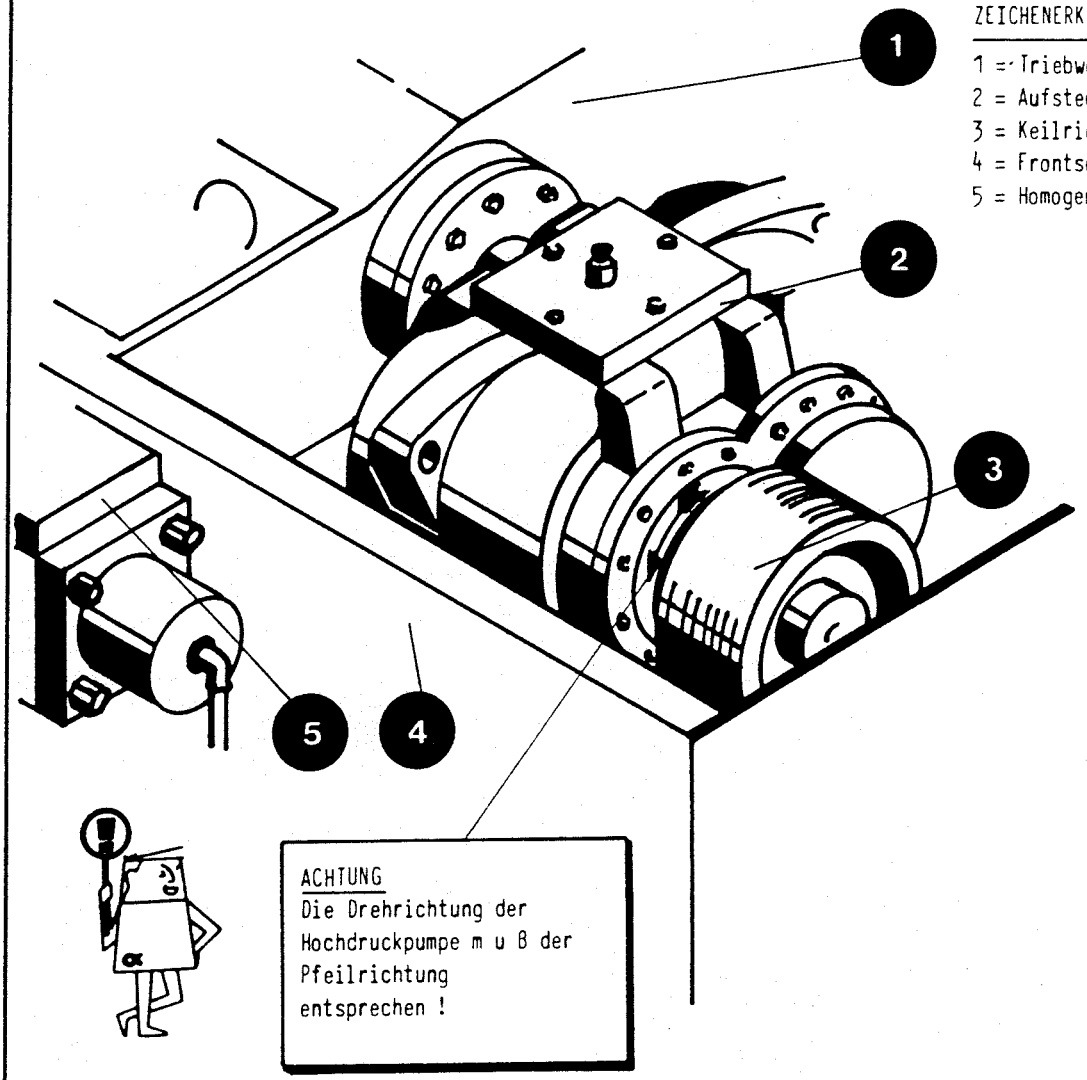
HOW TO CHECK THE CONTROLLING ACTION

Turn the resistor (R 1") from maximum to minimum position, as shown. The operating pressure should then drop to approx. 5 bar. If pressure drops below 5 bar, the resistence of the trimmer (R 2" see page 2/8) should be reduced and adjustment of the solenoid valve repeated.

DREHRICHTUNG DER HOCHDRUCKPUMPE BZW. HOMOGENISIERMASCHINE

ZEICHENERKLÄRUNG

1 = Triebwerk
2 = Aufsteckgetriebe
3 = Keilriemenscheibe
4 = Frontseite
5 = Homogenisiervorrichtung



ACHTUNG
Die Drehrichtung der Hochdruckpumpe m u ß der Pfeilrichtung entsprechen !

Die Ölschmierung der liegend angeordneten Hochdruckpumpe ist eine Tauchschmierung.

Um eine einwandfreie Schmierung aller Teile im Triebwerk (1) zu gewährleisten ist es daher erforderlich, daß die Drehrichtung der Hochdruckpumpe der Pfeilrichtung entspricht.

Der "ROTE PFEIL" ist auf dem Aufsteckgetriebe (2) angebracht.
Die Keilriemenscheibe (3) muß bei Inbetriebnahme der Homogenisiermaschine unbedingt in Pfeilrichtung laufen.
Also zum Betrachter hin, wenn er auf der Frontseite (4) der Homogenisiermaschine steht.

Dreht die Keilriemenscheibe entgegen Pfeilrichtung, ist der elektrische Anschluß des Antriebsmotors umzupolen (Phasentausch).

SECTION 4

Operation

CHECK LIST FOR INITIAL OPERATION

PRELIMINARY WORK AND CHECKS REQUIRED BEFORE THE MACHINE IS STARTED UP

Prior to initial operation of a newly installed homogenizer all component parts to come into contact with the product involved should be degreased and cleaned.
All pipework connected to the machine should also be cleaned thoroughly.

- Checking the oil level in the crankcase of the high-pressure pump.

  In static condition, the oil should be level with the mark on the perspex housing cover.
  Use high-grade lubricating oils only! These should have positive demulsifying properties.
  Do not use oils with additives that will impart emulsifying tendencies. Refer also to "Lubricants Recommendations" in "Section 1" of this manual.

- Checking the oil in the crankcase for condensate content.

  If condensate has collected in the crankcase, this should be carefully drained by the sump drain cock.
  The period of water separating from the oil will depend on the temperature and condition of the oil. A period of 8 to 10 hours may be required.

- Checking the oil level in the hydraulic control system of the homogenizing system.

  The oil level in the pump-container should show between the two punch marks on the dip stick.
  If the oil needs topping up, use hydraulic oil as recommended in "Section 1" :
  " Lubricants Recommendations "

- Depressurizing the homogenizing system.

  Set control valve of hydraulic control system to ZERO. (Two valves are provided with double-stage homogenizer heads).
  With remote-controlled systems, the resistor should be set to "minimum-pressure". (p-min.)

- Checking cooling water circulation.

  Open water shut-off valve in the delivery line to the cooling coil in the drive gear housing (crankcase).
  The water will pass through the coil and, consecutively, through the pump cylinder bushes.

  With ASEPTIC OPERATION, the cooling coil is separately supplied with water from mains.

CHECK LIST FOR INITIAL OPERATION

PRELIMINARY WORK AND CHECKS REQUIRED BEFORE THE MACHINE IS STARTED UP

Starting up the hydraulic control system

Set control valve of hydraulic control system to ZERO. Prior to initial operation and after every oil change the hydraulic oil pump should be vented to eliminate priming difficulties or feeding air into the hydraulic cylinders of the homogenizer heads.
The vent plug of the oil container should be loosened (not removed) and the pump motor switched on. Then wait until bubble-free oil will issue from the venting plug. Tighten up the plug and allow the hydraulic system to run idle, i.e. pressureless.
Repeat this procedure by loosening the vent plug of the homogenizing head (heads).

WORK AND CHECK REQUIRED AFTER STARTING UP THE HOMOGENIZER

If the machine is operated under aseptic conditions, the general operating and checking instructions of the particular plant - into which the homogenizer has been integrated - will apply, e.g. instructions referring to a VTIS-plant. (VACU-THERM INSTANT STERILIZER).

Cleaning of the product passage ways

Prior to starting actual operation, all product circulating systems and product passage ways should be cleaned with the aid of a flushing fluid. Subsequently, the system should be flushed liberally with hot water.

Release of product feed

As the product is allowed to be fed into the machine, the residual hot water is forced out of the processing system. Before the homogenizing pressure is finally adjusted, the high-pressure pump must be operating free from air. In most cases, the air in the pressureless, idling pump will be displaced from the pump block after a few pumping strokes.
To make sure that the pump has been properly de-aerated, the hydraulic pressure control valve should be closed slowly and a pressure of less than 50 bar obtained. If the needle of the pressure gauge on the pump cylinder block moves erratically back and forth, this is due to the presence of air in the pump cylinders. Return the control valve to ZERO immediately. Subsequently, repeated closing and opening of the control valve will displace the air from the individual cylinders without difficulty. Do not set the pressure higher than 50 bar. Liquids, inherently containing considerable amounts of gas, must be de-gassed prior to being fed into the homogenizer. Otherwise, excessive shocks in the pump (with erratic gauge needle deflection ranging beyong 30 bar) may occur. When the pressure gauge needle remains in static position, the final homogenizing pressure may be set as required.

CHECK LIST FOR INITIAL OPERATION

PROCEDURE AND CHECKS REQUIRED AFTER THE MACHINE IS STARTED UP

How to adjust the homogenizing pressure (Single-stage homogenizer)

The homogenizing pressure should correspond to the type and nature of the product being processed.

Slowly turn the knob of the pressure control valve from its ZERO position, in clockwise direction, until the desired operating pressure is indicated by the gauge on the pump cylinder block.

Pressure in excess of the maximum permissible pressure, to which the machine was designed and delivered, is absolutely inadmissible.

Pressure fluctuations can be eliminated by short-time opening and closing of the homogenizing system. If the fluctuations continue, the suction and delivery valves in the cylinder block should be checked. Leaky pipework may also be the cause of pressure fluctuations.

How to adjust the homogenizing pressures (Double-stage homogenizer)

The homogenizing pressures should correspond to the type and nature of the product being processed.
Slowly turn the knob of the pressure valve controlling the second stage from its ZERO position, in clockwise direction, until the pressure gauge on the pump cylinder block indicates a pressure of approx. 50 bar.

Subsequently, slowly turn the knob of the pressure valve controlling the first stage from its ZERO position, in clockwise direction, until the desired operating pressure is indicated by the gauge on the pump cylinder block.
Pressures in excess of the maximum permissible pressure, to which the machine was designed and delivered, is absolutely inadmissible.

Pressure fluctuations can be eliminated by short-time opening and closing of the homogenizing system. If the fluctuations continue, the pipework should be checked for leaks. However, defective suction and delivery valves in the pump cylinder block may be the cause of these pressure fluctuations.

LIST OF CHECKS AND WORK DURING THE HOMOGENIZING PROCESS

- Regular checks on pressure and temperature of the feed

  Pressure gauge and thermometer in the feed line should be watched continually.
  Keep the temperature of the feed as constant as possible.
  Pressure fluctuations, registered by the gauge, indicate irregular feed rate.

- Regular checks on the homogenizing pressure

  If required, the setting of the operating pressure should be adjusted with the aid of the knob on the pressure control valve. If the needle in the pressure gauge on the pump cylinder block swings back and forth, find out whether the flow rate of the feed is sufficient. Further, leaky pipe connections and defective suction and delivery valves in the pump cylinder block may be the cause of erratic deflections of the gauge needle.

- Regular checks on the cooling water circulation

  The temperature of the water for crankcase oil cooling and pump piston lubrication will depend on the flow rate of the water.

If the machine is operated under aseptic conditions, the general operating and checking instructions of the particular plant, into which the homogenizer has been integrated, will apply. The CONDENSER UNIT fitted to the machine in this instance requires additional checks. The instructions for the initial operation of the condenser system are contained in "Section 4" : " Control of steam pressure and condensate temperature ".

- Regular checks should be made of: Live steam pressure

  Steam pressure should be constantly kept at 6 - 7 bar.

- Regular checks should be made of: Condensate temperature

  Condensate temperature, at the beginning of the homogenizing operation, should be 110° C at a pressure of 0.5 bar. Pressure and temperature should be kept constant under any circumstances.

- Regular checks should be made of: Condensate circulation

  During operation, the condensate flow rate should be approx. 27 l/h. (Ascertain flow rate by running effluent condensate into measuring vessel of known capacity). Constant strong cloudiness or turbidity appearing in the condensate sight glass is an indication of defective pump piston seals which should be renewed.

- Regular checks should be made of: Cooling water flow rate

  The cooling water flow rate should be approx. 100 l/h. (Check by means of measuring vessel of known capacity).

OIL LEVEL CHECKS

DRIVE GEAR / CRANKCASE, REDUCTION GEAR, AND HYDRAULIC SYSTEM

FIG.1

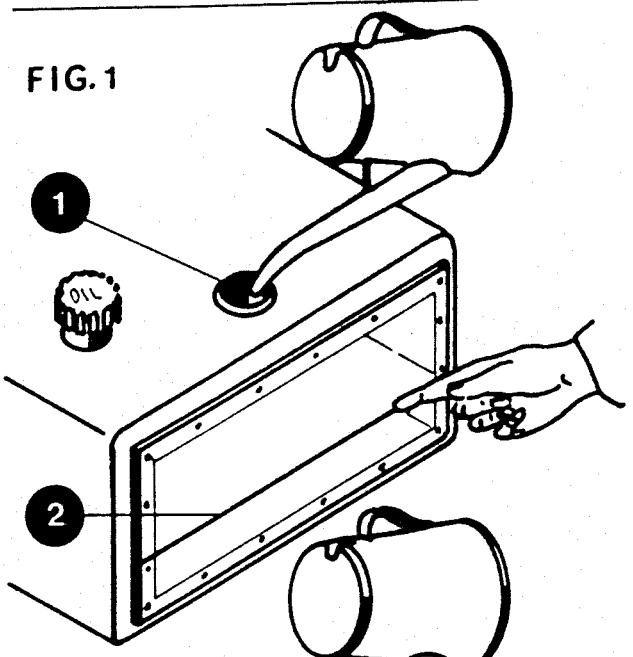


FIG.2

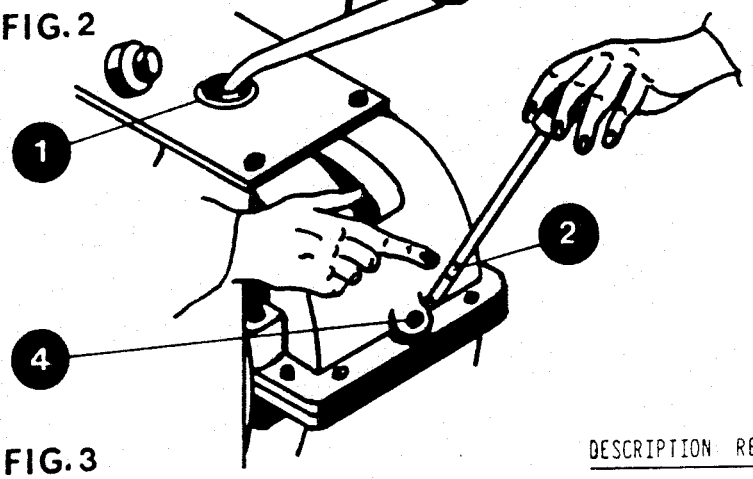
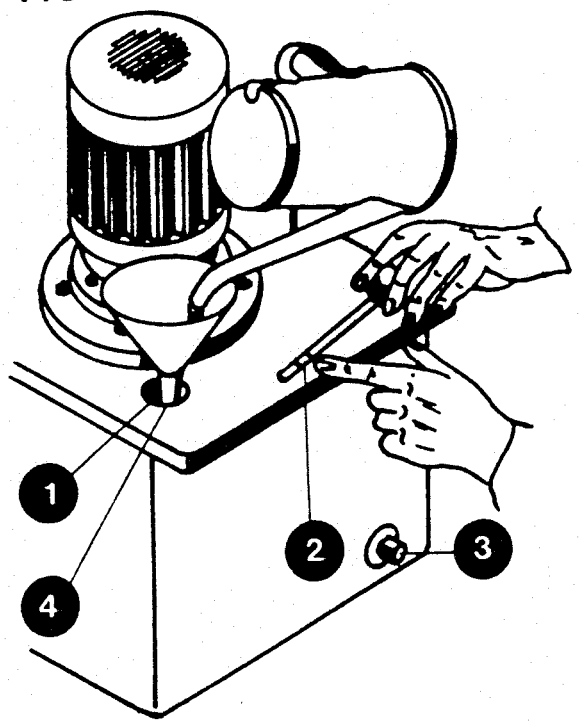


FIG.3



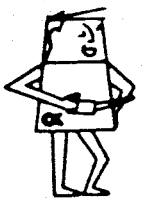
KEY TO SIGNS

1 = Oil filler
2 = Oil level mark
3 = Oil drain plug
4 = Dipstick seat

Oil levels in the pump drive gear/crankcase (Fig.1), in the reduction gear (Fig.2), and in the container of the hydraulic control system (Fig.3) should be checked every time the machine is put into operation, i.e. prior to starting up.

DESCRIPTION DRIVE GEAR/CRANKCASE

The oil level should be at the mark (2) in the perspex cover. Also check whether any water (condensate) has settled from the oil. If so, the water must be carefully drained through the cock in the sump of the housing.



ATTENTION!
Water, and used oil drained with it, must be collected in a suitable container. It must not be allowed to run into the sewage system.

Top up the oil charge through the filler (1) if any oil has been lost with the water drained.

DESCRIPTION REDUCTION GEAR

A dipstick is provided in the gear box (Fig.2), and the oil level should show between the punched marks on the dipstick (2). Fresh oil is poured through the filler (1) in the top of the housing. Used oil is drained by opening the plug in the sump of the gear box and should be collected in a suitable container.

DESCRIPTION HYDRAULIC CONTROL SYSTEM

The hydraulic unit (Fig.3) is located in the lower section of the frame. Oil check is by dipstick, as illustrated. The oil level should show between the punched marks on the dipstick (2). Fresh oil is poured through the filler (1). Used oil is drained by opening the plug (3) and should be collected in a suitable container.

Oil change periods in the pump drive / crankcase, reduction gear and hydraulic system are mentioned in Section 5 : " Maintenance".
For recommended oils refer to Section 1 : "Technical Data".

SHUT-DOWN PROCEDURE

WORK REQUIRED PRIOR TO AND AFTER SHUT-DOWN

When product is changed or product feed is interrupted

Turn knob of pressure control valve in the hydraulic control system to ZERO immediately. (In double-stage homogenizers two hydraulic pressure control valves are fitted).

Prior to completion of the homogenizing process

Residual homogenized product should be by-passed into waste tank. (Required only if homogenized and non-homogenized product must be prevented from being inter-mixed.

De-pressurize homogenizing system

Turn knob of pressure control valve in the hydraulic control system slowly to ZERO. (In double-stage homogenizers two hydraulic pressure control valves are fitted). If remote-control systems are provided, the resistor(s) should be set to $p_{min.}$

Shut off product feed

Shut-off feed and run hot water into feed line. Flush the pump cylinder block, the de-pressurized homogenizing system and the product discharge line until clear liquid runs into waste tank.
ALTERNATIVELY:
Clean and sterilize the machine in compliance with local regulations.

Shut off cooling water

Depending on the type of installation concerned, the shut-off valve in the delivery line for the oil cooler in the drive gear/crankcase closes automatically, or must be closed by hand.

Switch off power drive

Carry out specified checks and maintenance.

OPERATING TROUBLES CAUSE AND CURE

TROUBLE	POSSIBLE CAUSES	CURE
INSUFFICIENT OUTPUT	Faulty sealing surfaces of suction and delivery valves	Re-grind or replace valves
	Suction and delivery valves sticking	Clean valves and valve guides
	Suction lines leaking	Tighten up pipe connections and / or replace defective seals
	Drop in r.p.m. due to slipping V-belts	Tension V-belts
ERRATIC VEBRATION OF GAUGE NEEDLE	Air in cylinder block	De-aerate cylinders
	Leaking suction and delivery valves	Re-grind valves or replace
	Leaking piston seals	Replace seals
DESIRED HOMOGENIZING PRESSURE NOT OBTAINED	Insufficient hydraulic pressure	Check hydraulic pressure Control valve
	Homogenizing system leaking	Re-grind cone and cone seat; replace if required
HOMOGENIZING PERFORMANCE UNSATISFACTORY	Homogenizing system leaking	Re-grind cone and cone seat. Replace if required
	Hydraulic pressure insufficient	Check pressure control valve. Check hydraulic control system
	Pressure gauge on cylinder block does not work properly (Faulty indication)	Check gauge and replace if required
	It should be considered that the efficiency of the homogenizer does not depend on the homogenizer system exclusively, but also on the composition of the product to be processed. If efficiency drops, compared with initial performance, the product should be checked as well for any likely changes in composition.	
	Valve in by-pass line is partly or fully opened. Non homogenized and homogenized product is mixed.	Close valve

SECTION 5

Maintenance

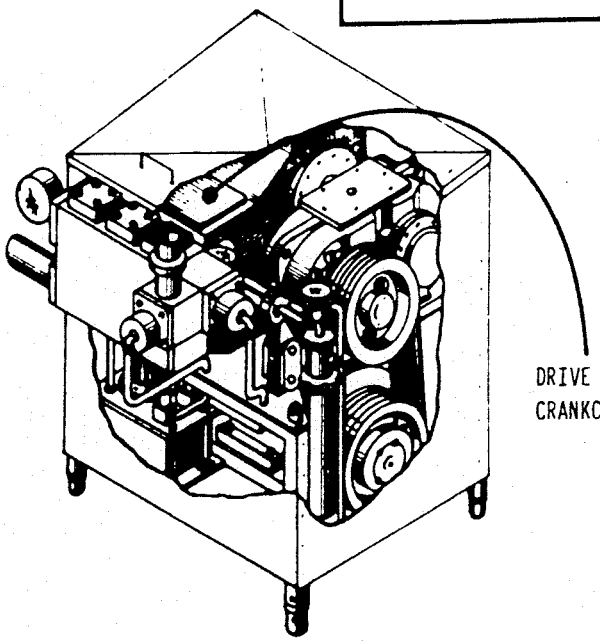
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 100



Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
W&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS in hours: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	12.000
	DRIVE GEAR/CRANKCASE									
	Check oil level	4/5	I							
	Oil change	1/4, 4/5		C*				C		
W&T	General overhaul	1/4, 4/5,5/9,5/14, 5/15,5/16, 5/21								AL
	REDUCTION GEAR									
	Check oil level	4/5	I							
	Oil change	1/4, 4/5		C*			C*			
	General overhaul	5/11,5/12								AL
	V-BELTS									
	V-belt tension	5/11		I*		I				
	MOTOR									
	Replenish grease		Every 20.000 hours of op. (Name plate refers)							

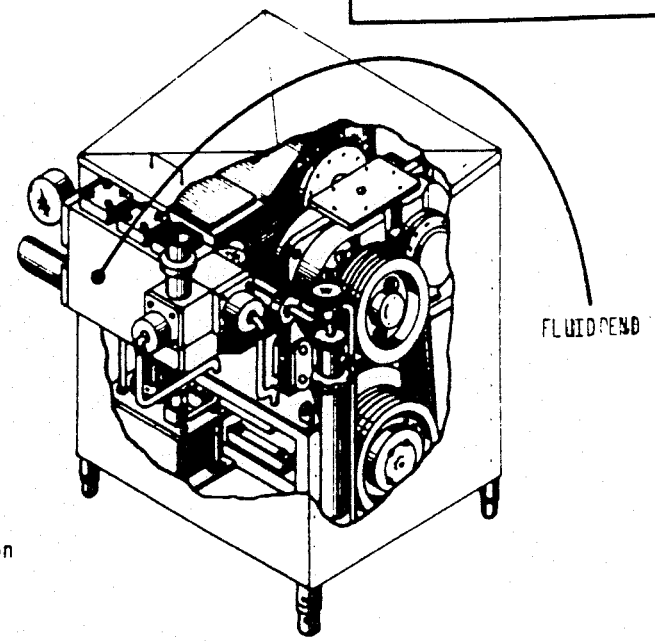
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 200



Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
W&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	12.000
	CYLINDER BLOCK									
W&T	Suction valves	2/4, 4/8, 5/5, 5/7, 5/20						I^{++}	I^{+}	
W&T	Pressure valves	2/4, 4/8, 5/5, 5/7, 5/20						I^{++}	I^{+}	
	PUMP PISTONS									
	Pistons	4/8, 5/10								AL
W&T	Piston bush	4/8, 5/10, 5/17								AL
W&T	PRESSURE GAUGE	4/8, 5/6								AL

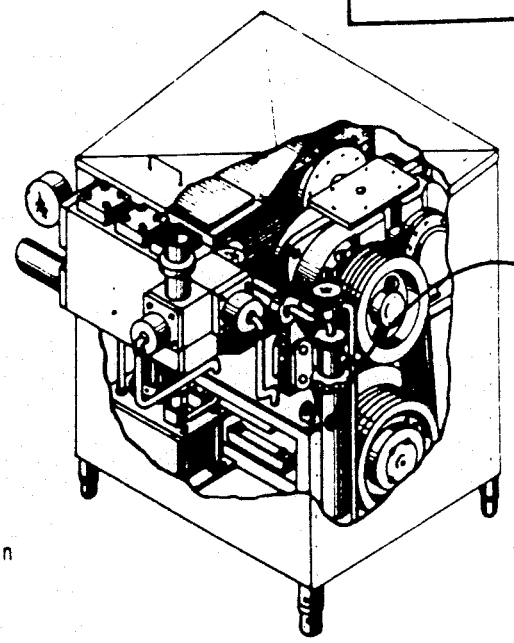
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 205



CONDENSATE SYSTEM

Inspection and overhaul Code

I = Inspection
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W&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS in hours: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	5500 — 5800
	CONDENSER									
	Jacket and coil	2/5								S++
	SIGHT GLASS									
W&T	Glass and sealings	2/5								S++
	PRESSURE GAUGE	2/5								S++
	THERMOMETER	2/5								S++
	SOLENOID VALVE	2/5								I++
	SHUT-OFF VALVES	2/5								S++

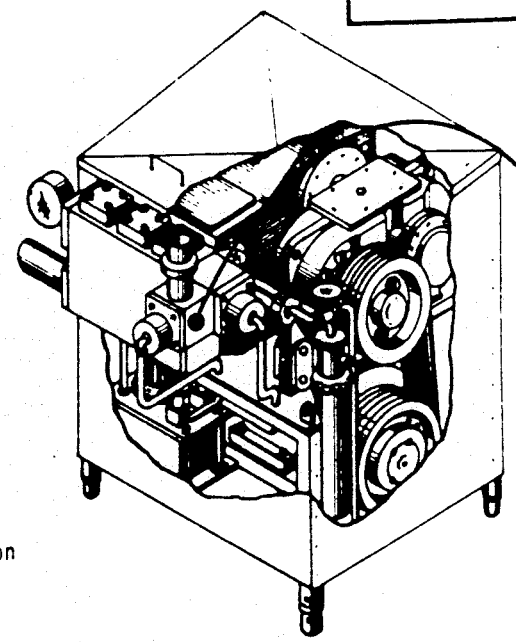
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 500



HOMOGENIZING DEVICE

Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
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AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)
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W&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	5500 — 5800
	HOMOGENIZER HEAD									
	Impact ring	2/7, 4/8, 5/8	Service life depends on product involved. If milk is processed				ca.	I		
	Cone	2/7, 4/8, 5/8								
	Cone seat	2/7, 4/8, 5/8								
W&T	Housing seals	2/7, 4/8, 5/8								
	HYDRAULIC PISTON									
W&T	Piston seals	5/8								S

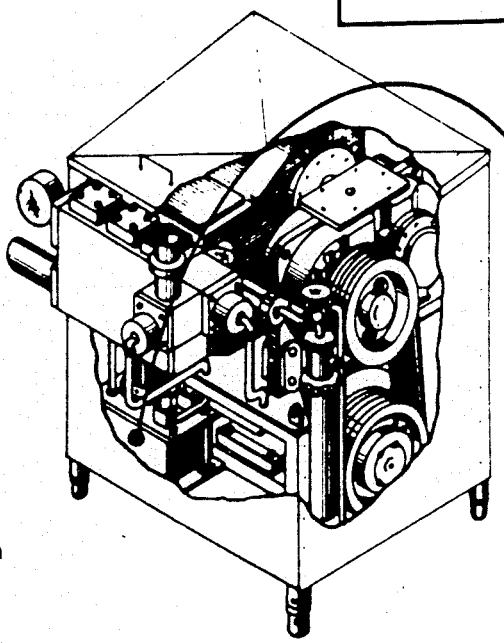
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 504



HYDRAULIC CONTROL SYSTEM

Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)
*) = With new machine
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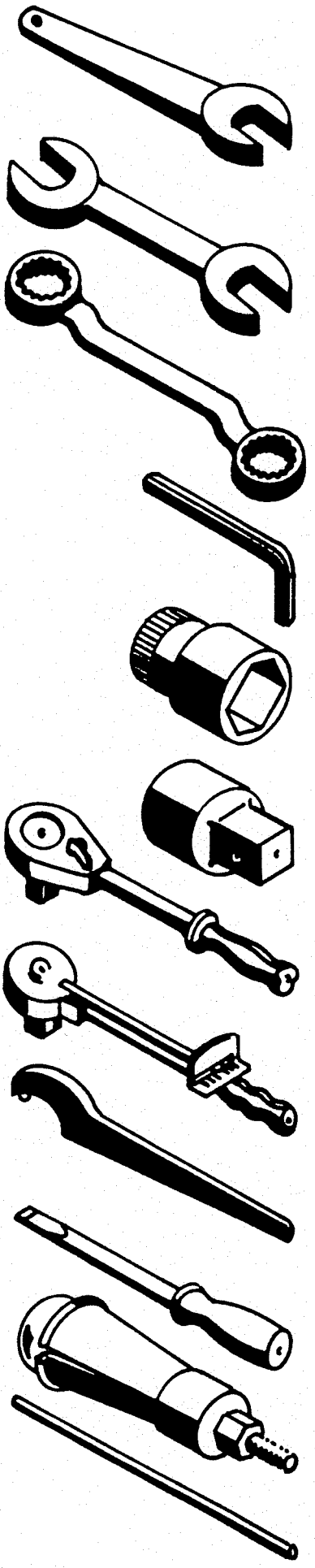
++) = Machine equipped for aseptic operation
w&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS							
			24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	8.000	12.000
	HYDRAULIC UNIT									
	Check oil level	2/8, 4/5	I							
	Oil change			C*				C		
	Clean oil filter	4/5		C*				C		
	Pressure reducing valve	4/5							I	AL
	Safety valve	4/5								

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

STANDARD WERKZEUGE / NORMAL TOOLS



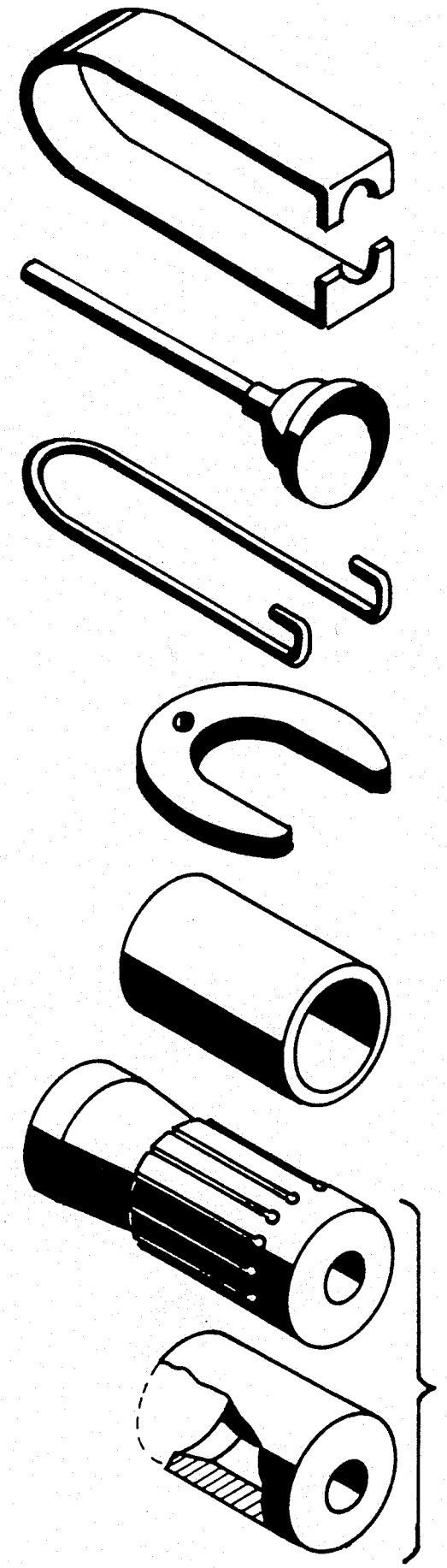
EINMAULSCHLÜSSEL SINGLE OPEN END SPANNER	SW* 13 mm, SW 22 mm
DOPPELMAULSCHLÜSSEL DOUBLE OPEN END SPANNER	SW 17 x 19 mm
DOPPELRINGSCHLÜSSEL DOUBLE HEX. RING SPANNER (Offset pattern)	SW 17 x 19 mm
INNENSECHSKANT-SCHLÜSSEL ALLEN HEAD WRENCH	5, 6, 10 mm
STECKSCHLÜSSEL-EINSATZ HEXAGON SOCKET	SW 24 mm, SW 36 mm
REDUZIERSTÜCK ADAPTOR	3/4" - 1/2"
UMSCHALTKNARRE RATCHET	3/4"
DREHMOMENTEN-SCHLÜSSEL TORQUE WRENCH	
HAKENSCHLÜSSEL HOOK SPANNER	B 120 - 130
SCHRAUBENDREHER SCREW DRIVER	
INNENAUSZIEHER INTERNAL PULLER	
DORN TOMMY BAR	15 mm ∅ x 320 mm lang/long

*) SW = Wrench opening

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

SPEZIAL WERKZEUGE
SPECIAL TOOLS



VENTILKEGEL – HEBEVORRICHTUNG
VALVE CONE LIFTING CLAMP

VENTILKUGEL – SAUGHEBER
VALVE BALL SUCTION CUP

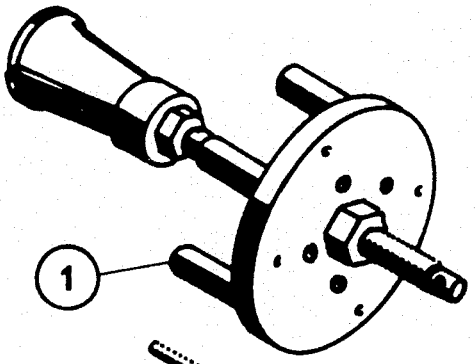
VENTILKÄFIG – HEBEVORRICHTUNG
VALVE CAGE LIFTING CLAMP

AUSZIEHVORRICHTUNG FÜR KOLBENBUCHSE
PULLER DEVICE FOR PISTON BUSH

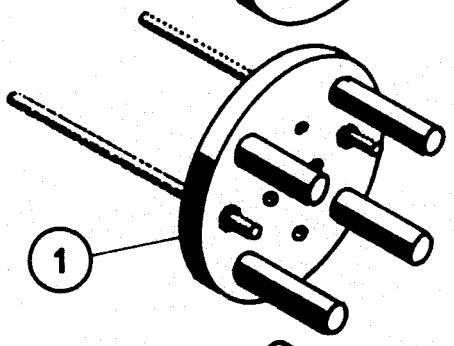
EINDRÜCKVORRICHTUNG FÜR KOLBENBUCHSE
PRESS-IN DEVICE FOR PISTON BUSH

MONTAGEVORRICHTUNG FÜR HOMOGENISIERKOPF-DICHTUNG
MOUNTING DEVICE FOR HOMOGENISING HEAD SEAL

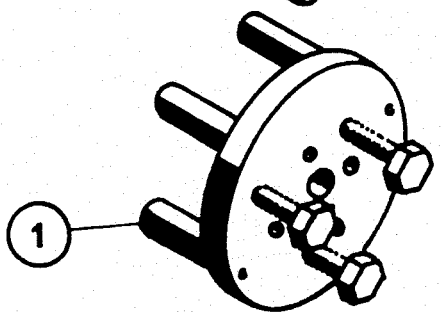
SPEZIAL WERKZEUGE
SPECIAL TOOLS



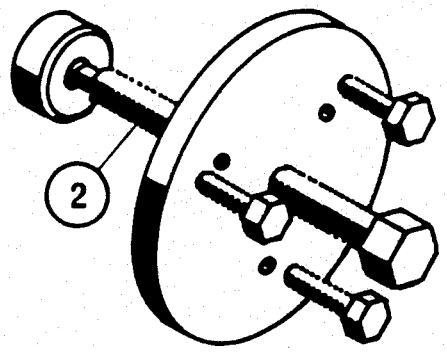
AUSZIEHVORRICHTUNG FÜR VENTILSITZE
PULLER DEVICE FOR VALVE SEATS



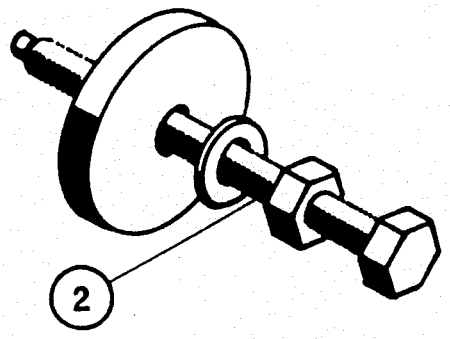
AUSZIEHVORRICHTUNG FÜR KREUZKOPF-DICHTUNGSBUCHSE
PULLER DEVICE FOR CROSS HEAD SEALING BUSH



EINZIEHVORRICHTUNG FÜR KREUZKOPF-DICHTUNGSBUCHSE
MOUNTING DEVICE FOR CROSS HEAD SEALING BUSH



ABZIEHVORRICHTUNG FÜR AUFSTECKGETRIEBE
PULLER DEVICE FOR DRIVING GEAR



AUFZIEHVORRICHTUNG FÜR AUFSTECKGETRIEBE
MOUNTING DEVICE FOR DRIVING GEAR

(1) + (2) = Kombiniert verwendbare Werkzeugteile / Tool components for multiple use.

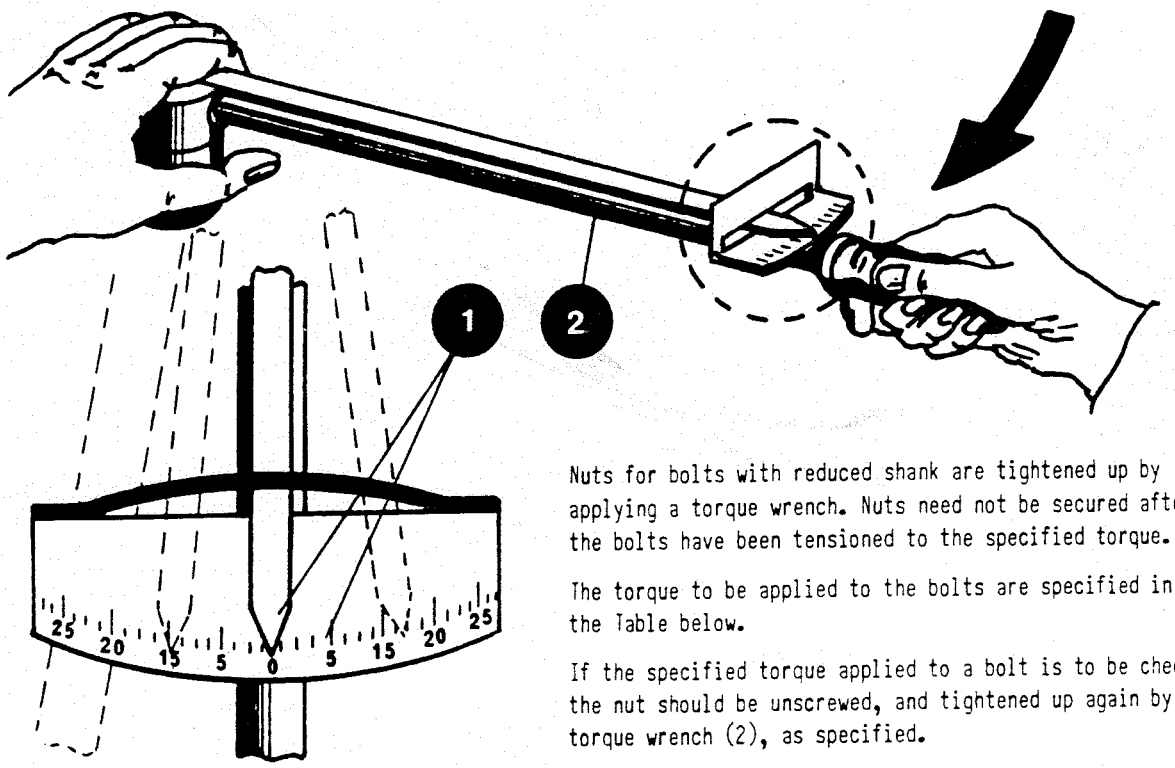
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

TORQUE SPECIFICATIONS FOR BOLTS WITH REDUCED SHANK

KEY TO SIGNS

1 = Pointer and torque scale
2 = Torque wrench

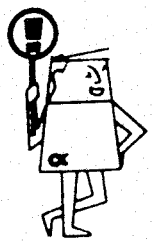


Nuts for bolts with reduced shank are tightened up by applying a torque wrench. Nuts need not be secured after the bolts have been tensioned to the specified torque.

The torque to be applied to the bolts are specified in the Table below.

If the specified torque applied to a bolt is to be checked, the nut should be unscrewed, and tightened up again by torque wrench (2), as specified.

Prior to tightening, the contact surfaces of the nuts should be cleaned and rubbed filmly with MOLYCOTE® (grey). The nuts should then be turned down by hand, thumb-tight. Then apply torque wrench and tension nuts until the pointer (1) indicates the specified torque on the scale.



ATTENTION
If the specified torque has inadvertently been exceeded, the nut should be completely unscrewed and re-tightened as required. The bolt should not be left in over-stressed condition under any circumstances.

LOCATION OF BOLTS

LOCATION OF BOLTS	MACHINE PART									
	SHL N	SHL H	SHL 20 N	SHL 20 H	SHL 25 N	SHL 25 H	SHL 30 N	SHL 30 H	SHL 40 N	SHL 40 H
CYLINDER BLOCK COVER			180	180	180	180	340	340		
CYLINDER BLOCK TO PUMP HOUSING			360	360	360	360	530	530		
GAUGE FLANGE TO CYLINDER BLOCK			140	140	140	140	240	140		
BIG-END BEARINGS, CONNECTING RODS			50	50	50	50	130	130		
HOMOGENIZER HEAD TO CYLINDER BLOCK			140	140	140	140	240	240	610	610

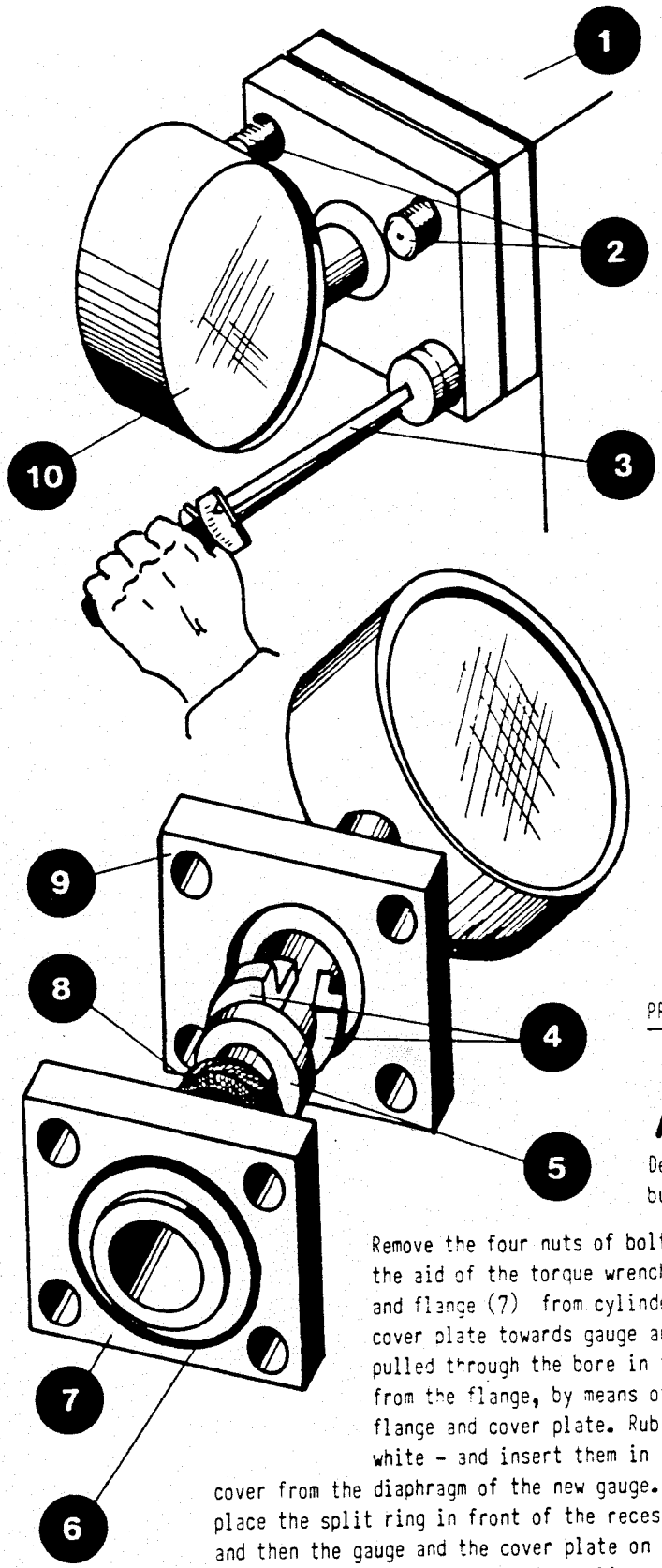
Torques expressed in NEWTON METRE

1 Nm ≈ 1/10 kp m

N = Low-pressure machine

H = High-pressure machine

HOW TO REMOVE AND FIT THE GAUGE ON THE CYLINDER BLOCK



KEY TO SIGNS

1 = Cylinder block
2 = Bolts with reduced shank
3 = Torque wrench
4 = Split ring
5 = Recess on gauge socket
6 = O-ring
7 = Flange
8 = O-ring
9 = Cover plate
10 = Gauge

TOOLS REQUIRED

1 Torque wrench
1 Hexagon socket SW 24 mm
1 Adaptor 3/4" to 1/2"
1 Scriber
MOLYCOTE® (white)
MOLYCOTE® (grey)

PREPARATORY WORK

De-pressurize the homogenizing system and close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut off cooling water supply and shut-down condenser system, if fitted. If remote-control system is installed, remove transmitter lead from gauge.

PROCEDURE

0.6 h TIME REQUIRED

Defective gauges should not be repaired locally, but forwarded to manufacturers for repairs.

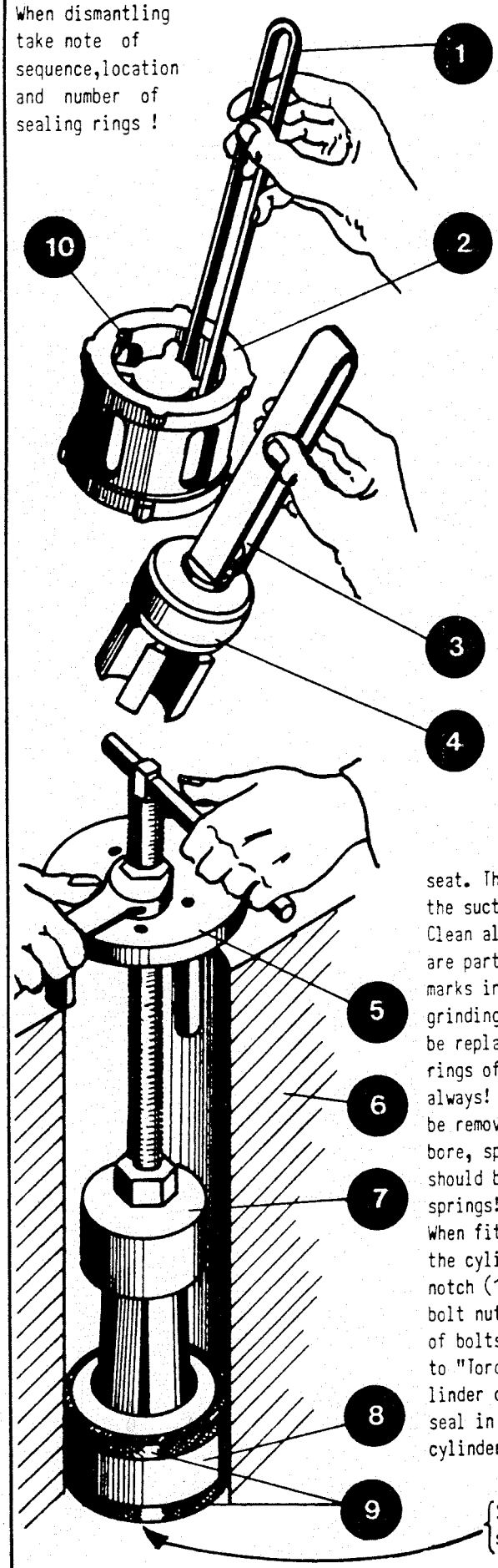
Remove the four nuts of bolts with reduced shank (2) from flange (7) with the aid of the torque wrench (3). Lift gauge (10) together with cover (9) and flange (7) from cylinder block (1). Pull flange from gauge socket. Push cover plate towards gauge and remove split ring (4). The gauge can now be pulled through the bore in the flange. Now remove O-ring (8) and O-ring (6) from the flange, by means of scriber. Thoroughly clean the split ring, flange and cover plate. Rub new O-rings (6 + 8) sparingly with MOLYCOTE - white - and insert them in the grooves of the flange. Remove protective cover from the diaphragm of the new gauge. Push gauge socket through the cover plate and place the split ring in front of the recess (5) in the gauge socket. First slip the flange and then the gauge and the cover plate on to the bolts with the reduced shaft. Make sure that all components are in perfect alignment. Clean contact surfaces of nuts and sparingly rub with MOLYCOTE (grey). Replace nuts thumb-tight. Correct the fit of the gauge to obtain proper reading position. Apply torque wrench to nuts and tighten up, crosswise, to specified torque. (Refer to " Torque specifications " in Section 5).

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT SUCTION AND PRESSURE VALVES IN CYLINDER BLOCK

When dismantling take note of sequence, location and number of sealing rings !



KEY TO SIGNS

1 = Valve cage lifter
2 = Valve cage
3 = Valve cone lifter
4 = Valve cone
5 = Valve seat puller
6 = Cylinder block
7 = Internal puller
8 = Valve seat
9 = Seal
10 = Notch for cylinder pin

TOOLS REQUIRED

1 Torque wrench
1 Hexagon socket SW 30 mm
1 Adaptor 3/4" to 1/2"
1 Set of spanners, 30–46 mm
1 Screw driver
1 Valve seat puller
Grinding compound
1 Internal puller
1 Valve cage lifter
1 Valve cone lifter
1 Tommy bar
1 Hammer handle
MOLYCOTE (grey) ®
MOLYCOTE (white) ®

PREPARATORY WORK

De-pressurize homogenizing system and close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water supply and shut-down condenser system, if fitted.

PROCEDURE

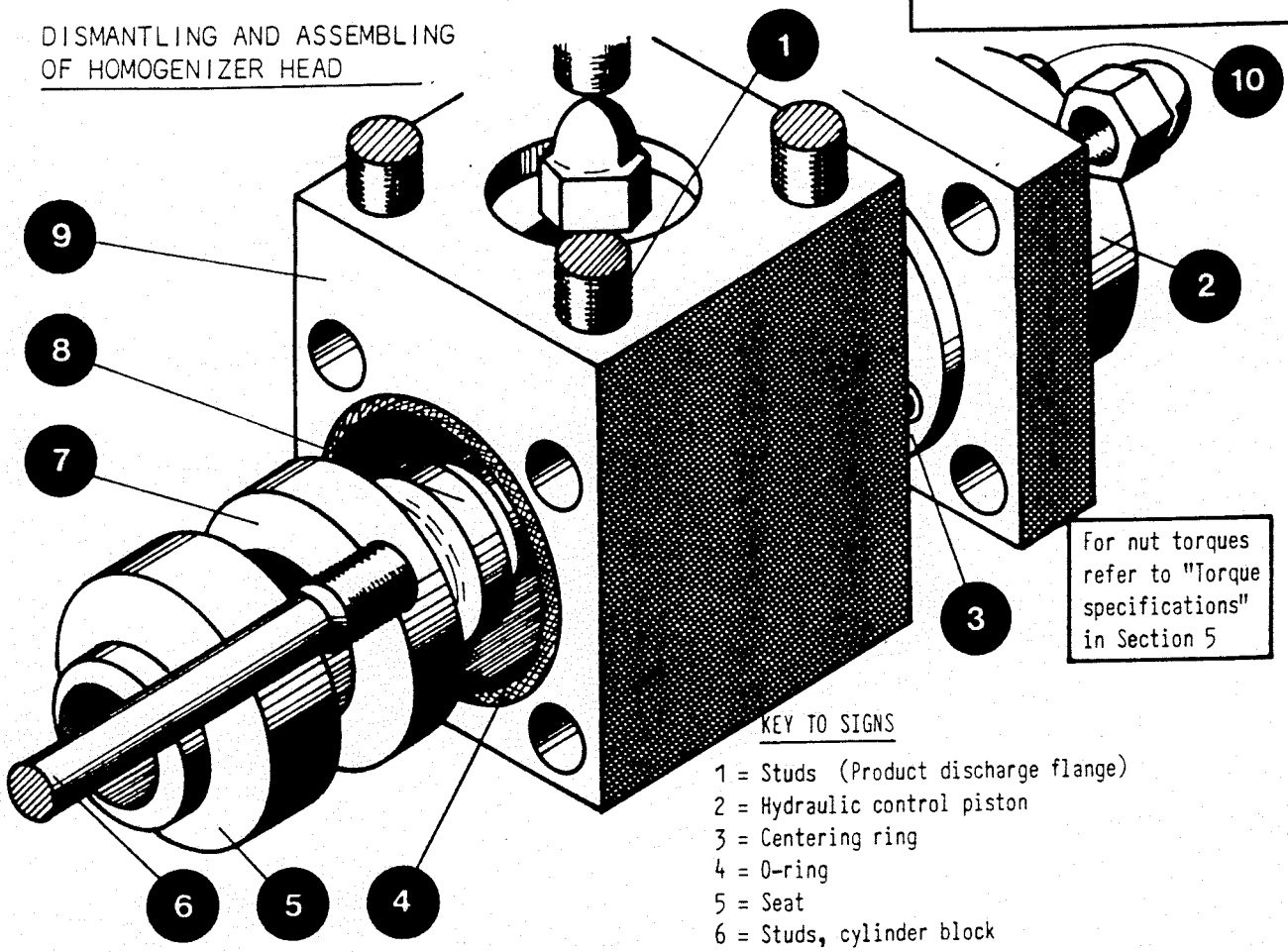
1.3 h TIME REQUIRED (per unit)

Remove nuts from bolts with reduced shank of the cylinder cover with the aid of the torque wrench. Lift cylinder cover off the cylinder block (6), use screw driver to assist lifting, if required. Apply valve cage lifter (1) and lift the pressure valve cage (2) out of the bore of the cylinder block. Apply valve cone lifter (3) and lift the valve spring and valve cone (4) out of the valve seat (8). Apply internal puller (7) together with valve seat puller (5) and pull out the valve seat. Then repeat the procedure - in the same sequence - to dismantle the suction valve.

Clean all components thoroughly and check for damages (Valve springs are particularly important!). Replace defective parts. Slight pressure marks in the contact surfaces of valve seats should be ground with fine grinding compound. If one or the other valve seat or valve cone has to be replaced, the new parts should be ground-in thoroughly. The sealing rings of the cylinder cover and valve seats must be r e n e w e d , always! Any deposits on the valve seat bore in the cylinder block should be removed; (grind lightly). Rub all parts, including the valve seat bore, sparingly with MOLYCOTE®(white). Re-fit all parts. Valve seats should be driven home with a hammer handle. Do not forget the valve springs! CAUTION : The spring load may push up the valve cages (2). When fitting the cylinder cover, particular care should be taken that the cylinder pin in the cylinder cover will fit precisely into the notch (10) of the pressure valve cage. Clean contact surfaces of the bolt nuts and rub them sparingly with MOLYCOTE®(grey). Tighten up nuts of bolts with reduced shank crosswise, to the specified torque. (Refer to "Torque specifications" in Section 5.) If leakage occurs at the cylinder cover, do not tighten up the nuts any further, but change the seal in the cylinder cover. (Refer to "How to fit lip sealing rings in cylinder block", Section 5.)

Suction-valve seating surface in cylinder block to be sparingly brushed with LOCTITE®surface sealing compound 572!

DISMANTLING AND ASSEMBLING OF HOMOGENIZER HEAD



For nut torques refer to "Torque specifications" in Section 5

KEY TO SIGNS

1 = Studs (Product discharge flange)
2 = Hydraulic control piston
3 = Centering ring
4 = O-ring
5 = Seat
6 = Studs, cylinder block
7 = Impact ring
8 = Cone
9 = Housing
10 = Vent screw

TOOLS REQUIRED

1 Torque wrench
1 Hexagon socket SW 24 mm
1 Adaptor 3/4" to 1/2"
1 Allen head wrench M 6
1 Mallet
1 Piece of hardwood
MOLYCOTE®(white)

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water supply and shut-down condenser system, if fitted. Switch off hydraulic control system.

PROCEDURE

1.8 h TIME REQUIRED

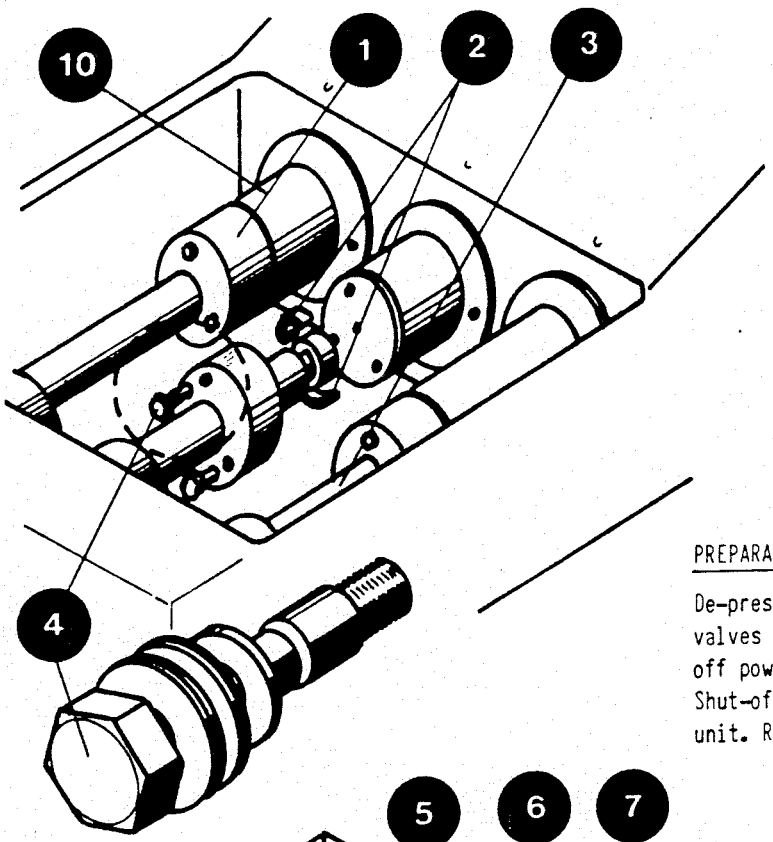
Disconnect hydraulic line from cylinder of the control piston (2). Catch up hydraulic oil in suitable container. Remove nuts from studs (1). Remove product discharge flange from homogenizer head. Screw off housing (9) from cylinder block.
Pull the seat (5), the impact ring (7), and the cone (8) out of the housing of the homogenizer head. In case of difficulty, drive out the cone from the hydraulic control piston end (2), applying gentle knocks with mallet and hardwood. Now remove O-ring (4) and back-up ring from the housing. Clean all parts thoroughly. Check seat, impact ring and cone for damages. (Also refer to "Wear phenomena in impact rings, due to excessive service periods" in Section 5 : Maintenance.) Fit new spares in exchange of worn parts. Seals should always be renewed.

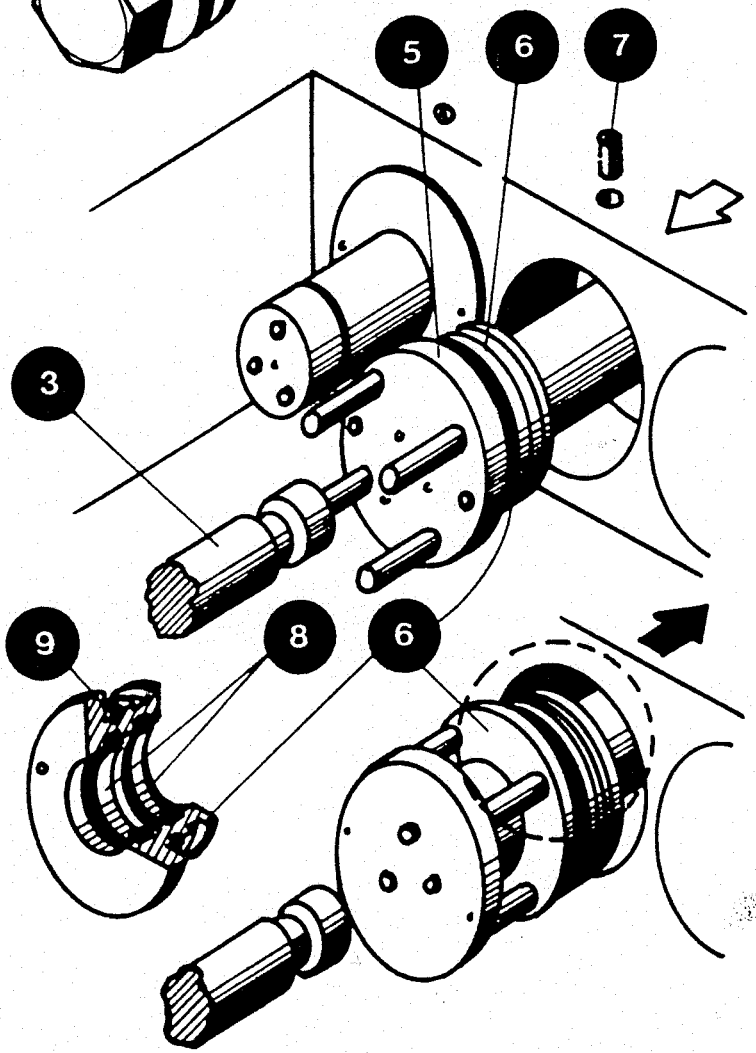
Rub all parts sparingly with MOLYCOTE®(white) and insert into the homogenizer head. Check hydraulic control piston (2) for leaks. If oil leaks from hydraulic piston, the centering ring (3) should be taken up and the piston pulled. Renew piston guide rings and STEP SEAL. The rod guide in the centering ring should also be changed. Screw the homogenizer head, together with the hydraulic control piston, onto the cylinder block. Tighten up cap nuts, crosswise, with torque wrench. Re-fit product discharge flange. Connect hydraulic line to cylinder of control piston. Bleed hydraulic system through vent screw (10). The oil must flow out free from air bubbles.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT PUMP PISTON TO CROSSHEAD EXTENSION PULL AND FIT CROSSHEAD SEALING BUSH





KEY TO SIGNS

1 = Connecting bush
2 = Split ring
3 = Piston
4 = Hex. screw with cup spring washer
5 = Combined puller and mounting device for crosshead sealing bush
6 = Crosshead sealing bush
7 = Fixing screw
8 = Grooved sealing ring
9 = O-ring
10 = Crosshead extension

TOOLS REQUIRED

1 Set of spanners 14 - 24 mm
1 Allen head wrench 6 mm
MOLYCOTE®(grey)

PREPARATORY WORK

De-pressurize the homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down the condenser unit. Remove cover. Screw out fixing screw (7).

PROCEDURE

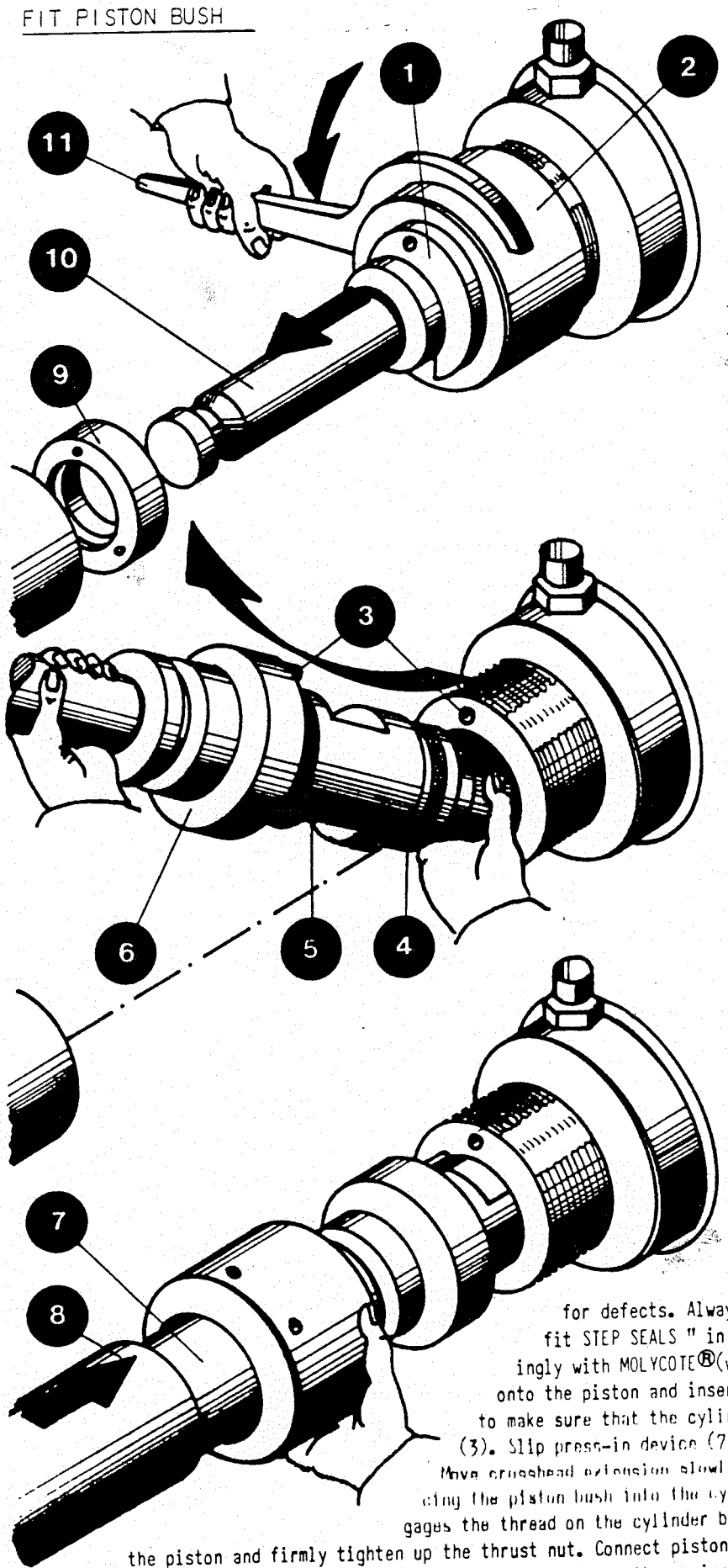
1.5 h TIME REQUIRED (per unit)

Remove the three screws with cup springs (4) from the crosshead extension (10). Slip connecting bush (1) over piston (3). Remove split ring (2) and push piston into the cylinder block. Fit puller (5) with two M 6 - screws to the crosshead sealing bush (6) and - by turning the crankshaft - pull the sealing bush together with the crosshead extension (10) out of the pump drive housing (crankcase). Clean all parts thoroughly. Always renew defective seals (8 + 9). Rub seals with MOLYCOTE. Revers the puller and fit to crosshead extension with three screws. By turning the crankshaft, the four studs in the device will force the crosshead sealing bush (6) back into the pump drive housing. Remove mounting device and secure the sealing bush with the fixing screw (7). Connect piston (3) to crosshead extension (10). Do not forget to fit the split ring (2). Firmly tighten up the screws (with spring washers) (4). The cup springs should be compressed. Finally turn the machine to ascertain proper alignment and smooth running.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT PISTON BUSH



KEY TO SIGNS

1 = Puller for piston bush
2 = Thrust nut
3 = Cylinder pin and bores
4 = O-ring and back-up ring
5 = O-ring
6 = Piston bush
7 = Press-in device for bush
8 = Crosshead extension
9 = Piston connection
10 = Piston
11 = Hook spanner

TOOLS REQUIRED

1 Set ring spanners 14 - 24 mm
1 Hook spanner B 120 - 130
1 Puller
1 Press-in device
MOLYCOTE® (white)

PREPARATORY WORK

De-pressurize the homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted.

PROCEDURE

0.5 h TIME REQUIRED (per unit)

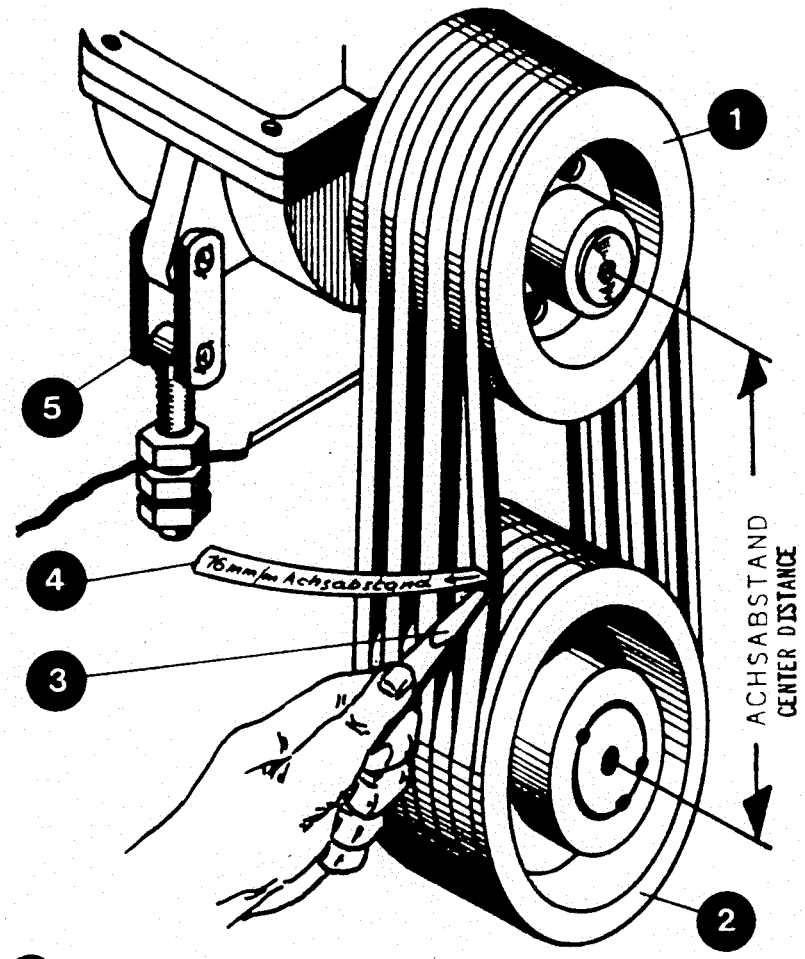
Remove piston connection (9) from crosshead extension (8). Insert puller (1) into the groove of the piston bush (6) in front of the thrust nut (2). Now screw off the thrust nut by hook spanner (11), thus pulling the piston bush out of the cylinder bush. Shift crosshead extension to outer dead centre and remove thrust nut. Pull piston (10) together with piston bush out of the cylinder bush, as illustrated. Remove header ring and spring from the cylinder bush.

Clean all parts thoroughly and check for defects. Always renew all seals! (Refer to " How fit STEP SEALS " in Section 5 (5/17). Rub all parts sparingly with MOLYCOTE® (white). Slip piston bush and seals onto the piston and insert into cylinder bush. Turn piston bush to make sure that the cylinder pin fits precisely into the bore (3). Slip press-in device (7) over the piston and fit thrust nut. Move crosshead extension slowly from bottom dead centre, thus forcing the piston bush into the cylinder bush. When the thrust nut engages the thread on the cylinder bush, remove the press-in device from the piston and firmly tighten up the thrust nut. Connect piston with the crosshead extension. Finally turn the machine to ascertain proper alignment and smooth running. Check cooling water system (under pressure) for leaks.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO CHECK V-BELT TENSION
REMOVE AND FIT V BELTS



KEY TO SIGNS

1 = Pulley, gear shaft
2 = Pulley, motor
3 = Screw driver
4 = Steel ruler
5 = Torque support

TOOLS REQUIRED

1 Set of spanners 24 - 55 mm
1 Screw driver with wide and blunt edge
1 Steel ruler

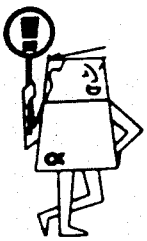
Excessive heating up, excessive vibration of V-belts, and noisy running are due to insufficient tension in the belts. Therefore, the V-belt drive should be checked at regular intervals.

PREPARATORY WORK

Switch off power and secure against unauthorized handling.
Remove enclosing panel.

PROCEDURE

1.0 h TIME REQUIRED



RULE OF THUMB
1 Metre center distance will correspond to a belt depression of approx. 16 mm

Press screw driver (3) at right angle, with moderate force, against one V-belt, i.e. in the middle between shaft centres, and measure the depression, in relation to the neighbouring belt, with the steel ruler (4). Repeat with all the belts of the drive. If the tension of the belts is not in compliance with the opposite RULE OF THUMB, the drive should be adjusted as follows:

Loosen the lock nut of the torque support (5) and turn the adjusting nut up until the V-belt drive is tensioned as specified. Then tighten up and lock.

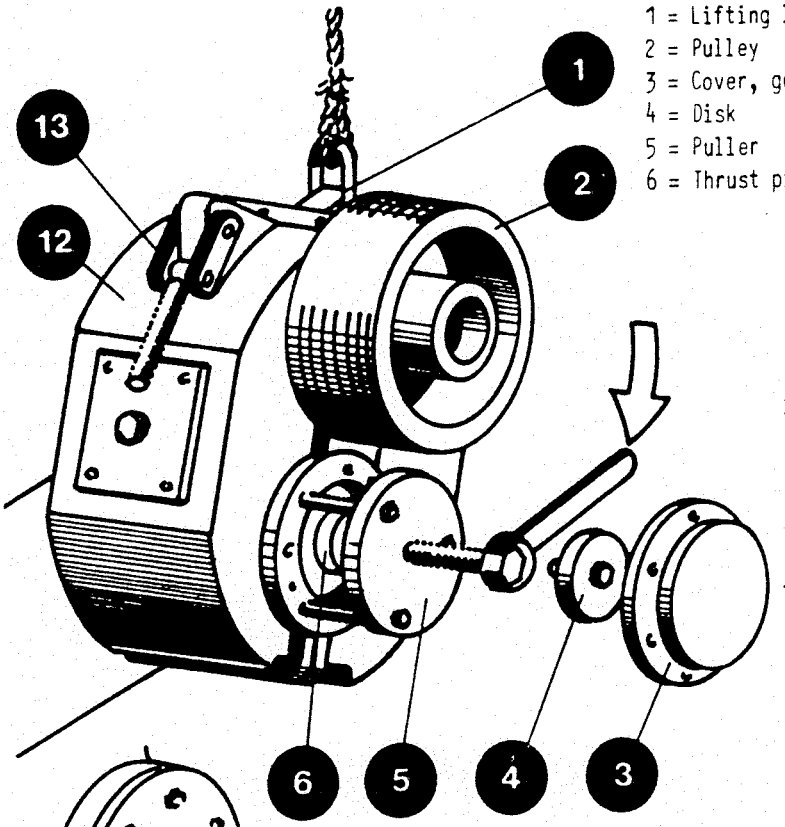
If V-belts must be renewed, the torque support should be loosened. It may be necessary to loosen the motor at its base to ensure that the belts are fitted in the pulley grooves WITHOUT FORCE. NEVER APPLY ANY LEVERAGE TO THE BELTS BY USING A SCREW DRIVER OR SIMILAR TOOL TO FORCE BELTS INTO PULLEY GROOVES! When the belts are in position, the two pulleys (1 + 2) should be aligned with the aid of a steel ruler. Tighten up the motor on its base plate, crosswise, and adjust V-belt tension by means of the torque support, as mentioned above.

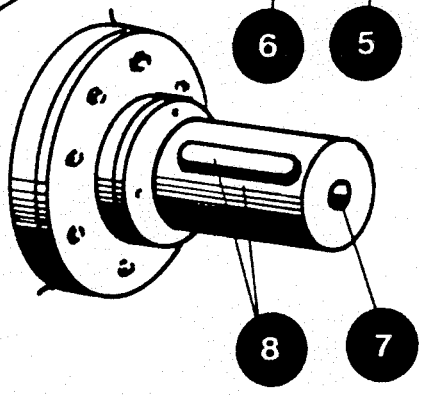
Watch the V-belt drive during the initial hours of operation. Experience proved that the drive requires re-tensioning on completion of approx. 30 minutes at operating speed. The permanent initial elongation as well as the apparent slack, due to bedding-down in the pulley grooves, are thus taken up.

HOW TO PULL AND FIT DRIVE GEAR

KEY TO SIGNS

1 = Lifting lug
2 = Pulley
3 = Cover, gear box
4 = Disk
5 = Puller
6 = Thrust piece
7 = Tapped hole in crankshaft
8 = Crankshaft with key
9 = Pull-on screw
10 = Washer
11 = Thrust disk
12 = Drive gear
13 = Torque support





TOOLS REQUIRED

1 Shackle 15 mm bolt dia. / Sling
1 Allen head wrench 8 and 14 mm, resp.
2 Puller screws M 8
1 Set of open end spanners 14 – 46 mm
ALTEMP-paste QN8 50 (Supplier: Krüger)®
MOLYCOTE® (grey)

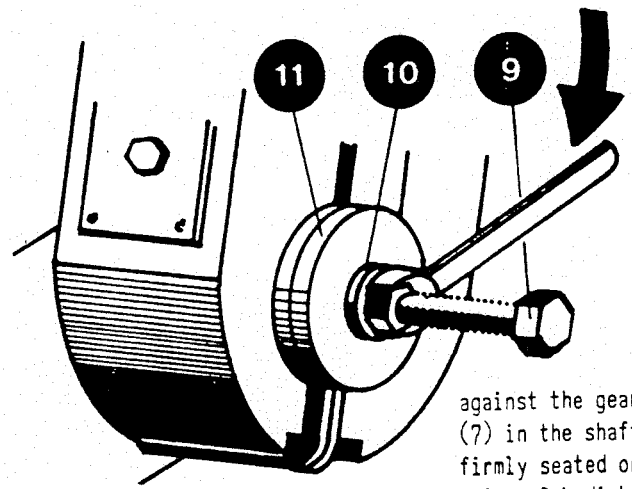
PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted. Remove cover and side panel on drive end side. Remove V-belts.

PROCEDURE

1.0 h TIME REQUIRED

Turn out screws in cover (3) and remove. If difficult, use two pulling screws. Screw disk (4) out of crankshaft. Remove lock nut of torque support (13). Shackle sling to lifting lug and hook up to hoist. Lift gear box into vertical position. Do not exert any "pull" on the gear box. Remove three gear flange screws crosswise. Fit the puller (5) with three screws to the gear. Place thrust piece (6) against the crankshaft and turn the puller screw until the gear box comes off the shaft. Now remove gear box by crane to a suitable place.



Clean crankshaft and key (8) thoroughly. Check key and key seat for hair cracks. Also clean shaft bore in gear box. Rub crankshaft and key with ALTEMP paste ®. Hook up gear box to hoist and ease it carefully towards the crankshaft. Now guide the gear box onto the crankshaft without "edging" or chafing. Place thrust disk (11) against the gear box and screw the pull-on screw (9) into the tapped hole (7) in the shaft. Now turn the pull-on nut until the drive gear (12) is firmly seated on the crankshaft. Re-install the torque support. Release sling. Rub disk (3) sparingly with MOLYCOTE® and screw into shaft end. Finally re-install cover (3). Re-install V-belts and tension correctly. Re-install side panel and top cover.

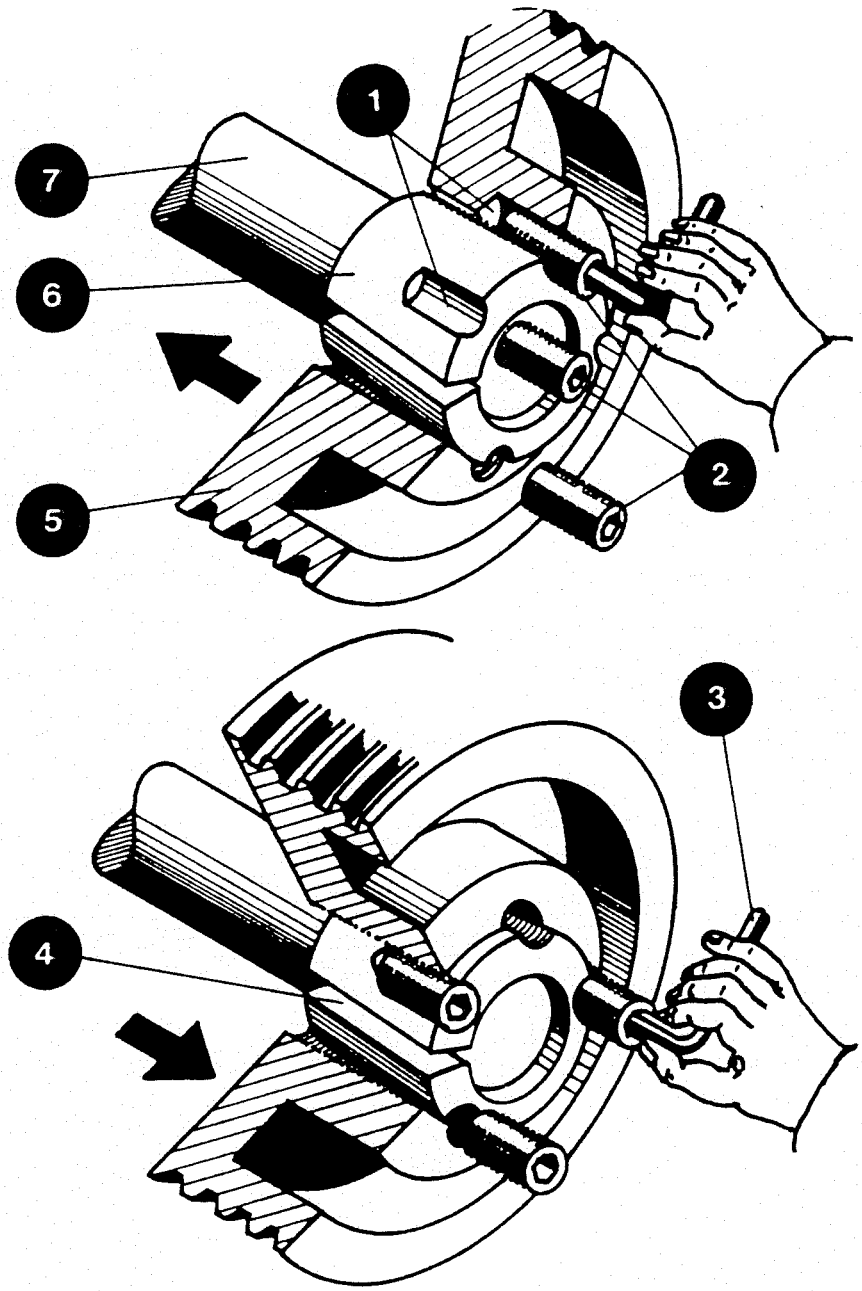
= PULL DRIVE GEAR

= Fit drive gear

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT BELT PULLEYS WITH TAPER LOCK® EXPANSION BUSHES



KEY TO SIGNS

1 = Blind hole in the expansion bush and pulley, resp.
2 = Allen head type
3 = Allen head wrench
4 = Slot
5 = Pulley
6 = Expansion bush
7 = Drive shaft

TOOLS REQUIRED

1 Set open end spanners 12 - 55 mm
1 Allen head wrench M 10
1 Mobile crane
1 Sling
De-greasing agent

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted. Remove cover and side panel. Take up torque support on gear box. Remove V-belts.

PROCEDURE

1.8 h TIME REQUIRED

The TAPER LOCK expansion bush® (6) serves to secure, in shrink fit fashion, the pulley (5) on the drive shaft (7). The expansion bush is cylindrical on the inside, and conical on the outside. The bush is slotted, longitudinally, as shown (4). Depending on size, the bush is provided at its "wide" end with two or three blind holes (1) and one through hole. The pulley (5) is provided with one blind hole and three through holes.

HOW TO REMOVE THE PULLEY

Screw out the grub screws (2) by means of the Allen head wrench (3). Screw one of the grub screws into the blind hole (1), which was not in use before. Hook up pulley to hoist by means of the sling. As the screw is being driven home, the pulley (5) is pushed off the pulled from the drive shaft. (7).

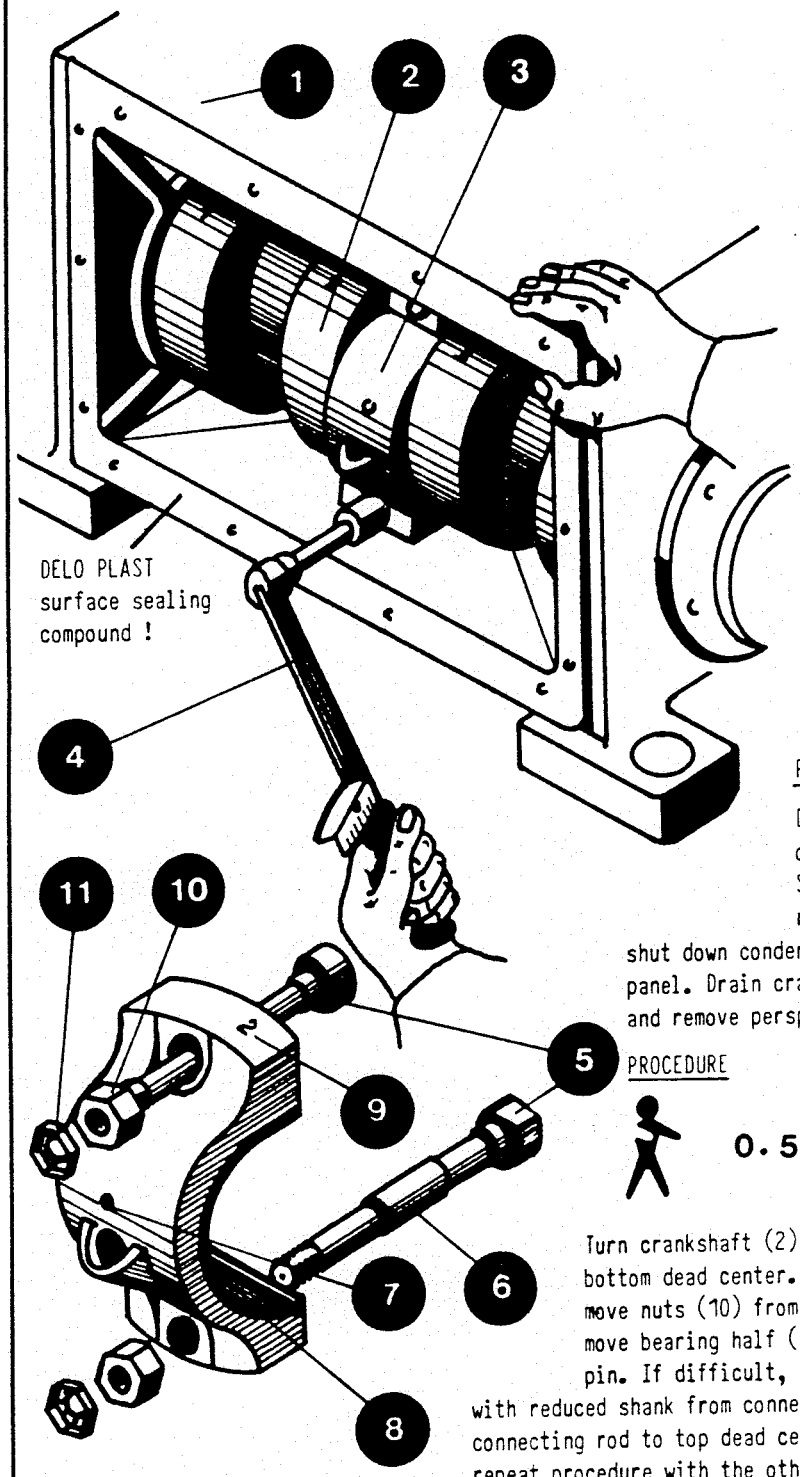
HOW TO FIT THE PULLEY

Thoroughly degrease all parts: Expansion bush (6), hub of pulley (5), and drive shaft (7). Push expansion bush into the hub of the pulley as far as possible. The halves of the holes must be mating exactly. Insert grub screws (2) loosely into the holes. Slip pulley together with the expansion bush onto the shaft. Now tighten up the screws with the Allen head wrench, uniformly. In doing so, the pulley is pulled uniformly onto the conical expansion bush. The bush will be pressed firmly onto the drive shaft.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO DISMANTLE AND ASSEMBLE BIG-END BEARINGS



KEY TO SIGNS

1 = Drive gear housing /crankcase
2 = Crankshaft
3 = Big-end bearing
4 = Torque wrench
5 = Face of extension bolt heads
6 = Bolt with reduced shank
7 = Expansion pin/bearing shell fastener
8 = Bearing shell
9 = Big end / connecting rod number
10 = Nut, bolt with reduced shank
11 = Lock nut

TOOLS REQUIRED

1 Set of open end spanners 14 - 36 mm
1 Torque wrench
1 Hexagon socket
1 Adaptor 3/4" : 1/2 "
1 Hexagon socket extension
1 Mallet
MOLYCOTE® (grey)
DELO-PLAST surface sealing compound®

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut down condenser unit, if fitted. Remove cover and side panel. Drain crankcase oil into suitable container. Unscrew and remove perspex cover from drive gear housing.

PROCEDURE

0.5 h TIME (per unit)

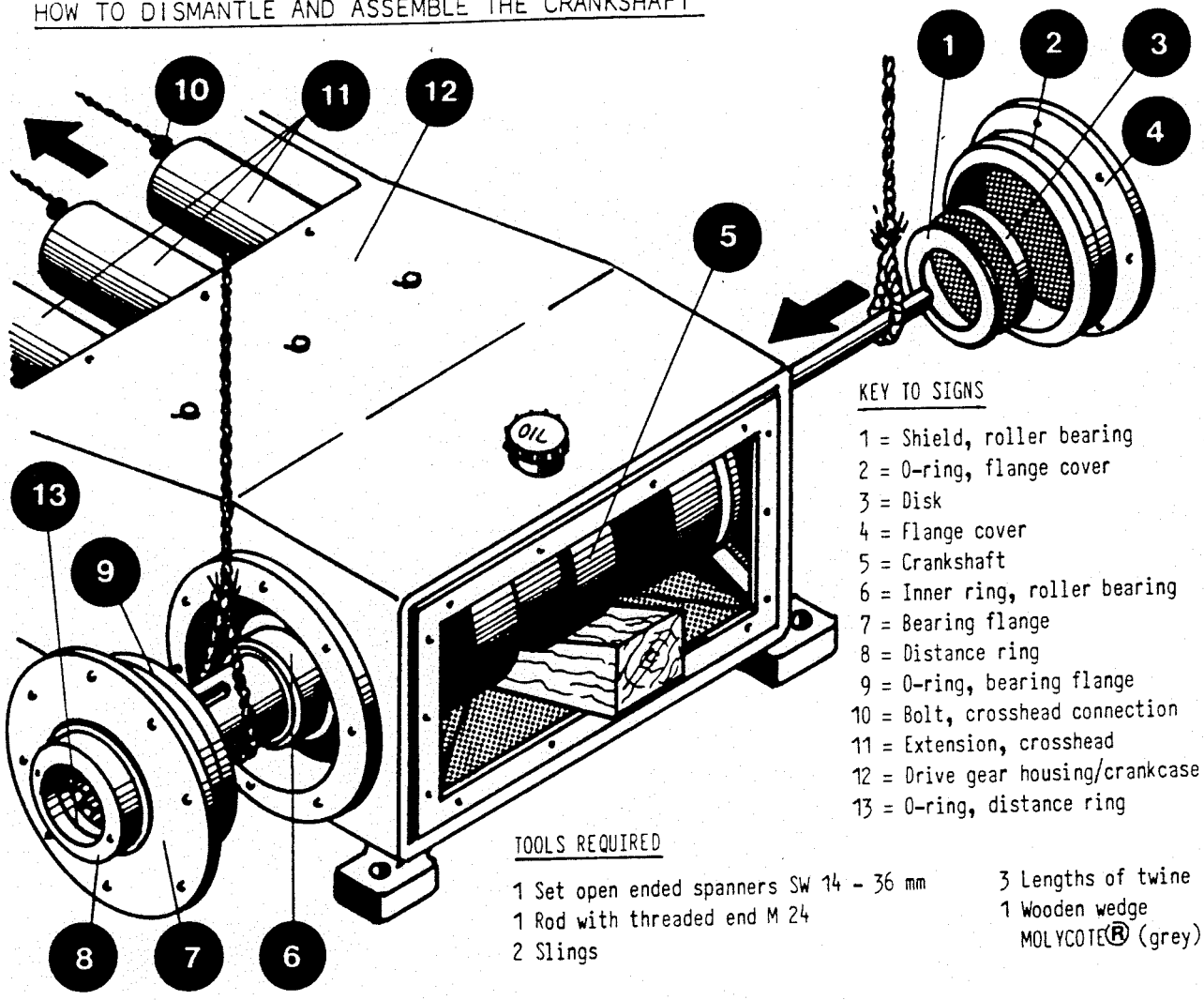
Turn crankshaft (2) so that the big-end concerned (3) will rest in bottom dead center. Remove lock nuts (11) with aid of spanner. Remove nuts (10) from bolts (6) by mean of torque spanner (4). Remove bearing half (3) together with lower bearing shell from crank-pin. If difficult, ease off by light mallet knocks. Remove bolts with reduced shank from connecting rod and turn crankshaft together with connecting rod to top dead center and leave the connecting rod there. Now repeat procedure with the other big-end bearings.

Defective bearings should always be changed, i.e. connecting rod and relevant crosshead are changed as one complete unit. The defective connecting rod assemblies should be forwarded to the manufacturer for overhaul.

Clean bearing caps and bearing shells thoroughly. Use lint-free material only. Oil bearing shells well before fitting them onto crank pins. Take note of connecting rod numbering (9). Equal numbers will identify matching parts. Example: The number "1" on the left-hand crank web will match with the numbers "1" "1" on the connecting rod. Place bolts with reduced shank (6) in the bores of the bearings (3) in such a way that the faces of the bolt heads (5) are facing towards the connecting rod. Tighten up the nuts on the bolts by means of open end spanner, hand tight (10). Turn crankshaft with big-end bearing to bottom dead center. Now loosen nuts again. Rub contact surfaces of nuts sparingly with MOLYCOTE®(grey). Tighten up nuts again, hand tight, and complete tightening-up with the aid of the torque wrench to the specified torque. (Refer to " Torque specifications for extension bolts " in Section 5). Now secure nuts with lock nuts (11). Finally turn the machine to ascertain proper alignment and smooth running. Do not forget to re-fill with crankcase oil.

ALFA-LAVAL

HOW TO DISMANTLE AND ASSEMBLE THE CRANKSHAFT



KEY TO SIGNS

1 = Shield, roller bearing
2 = O-ring, flange cover
3 = Disk
4 = Flange cover
5 = Crankshaft
6 = Inner ring, roller bearing
7 = Bearing flange
8 = Distance ring
9 = O-ring, bearing flange
10 = Bolt, crosshead connection
11 = Extension, crosshead
12 = Drive gear housing/crankcase
13 = O-ring, distance ring

TOOLS REQUIRED

1 Set open ended spanners SW 14 - 36 mm
1 Rod with threaded end M 24
2 Slings
3 Lengths of twine
1 Wooden wedge
MOLYCOTE® (grey)

PREPARATORY

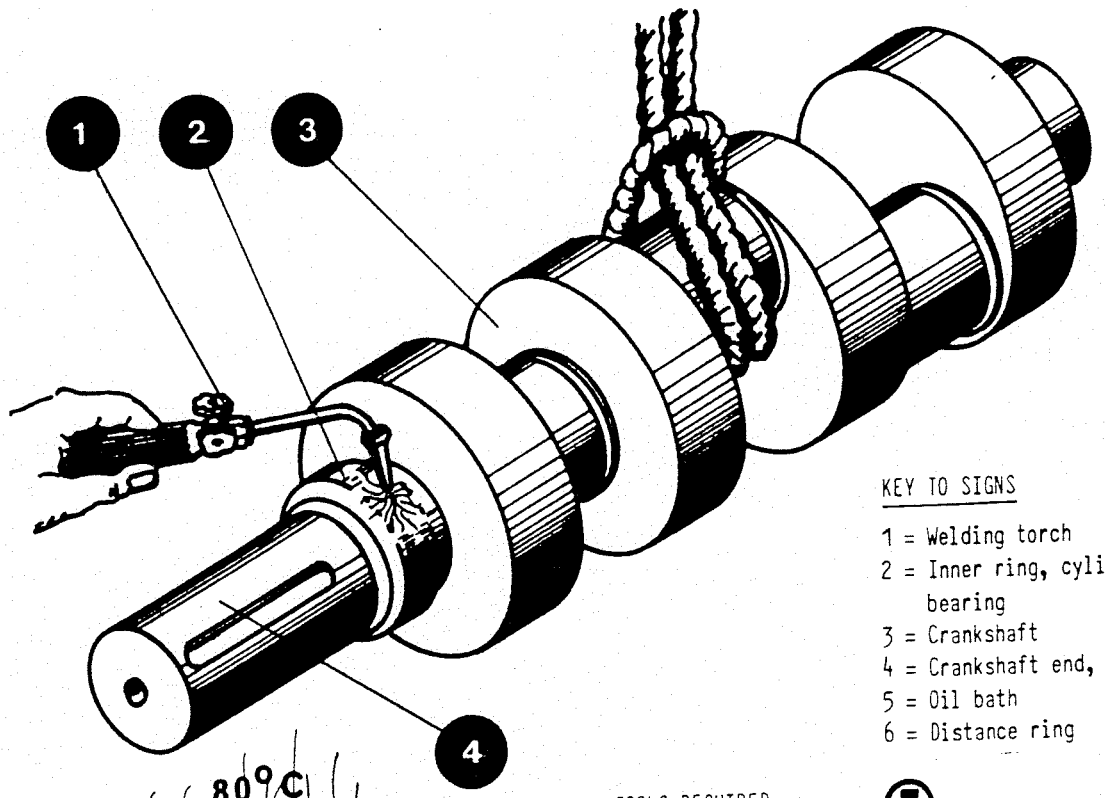
Refer to chapters "How to remove and fit V-belts" ; "How to remove and fit pump piston to crosshead extension" ; "How to pull and fit drive gear" ; "How to dismantle and assemble big-end bearings".

PROCEDURE

1.2 h TIME REQUIRED

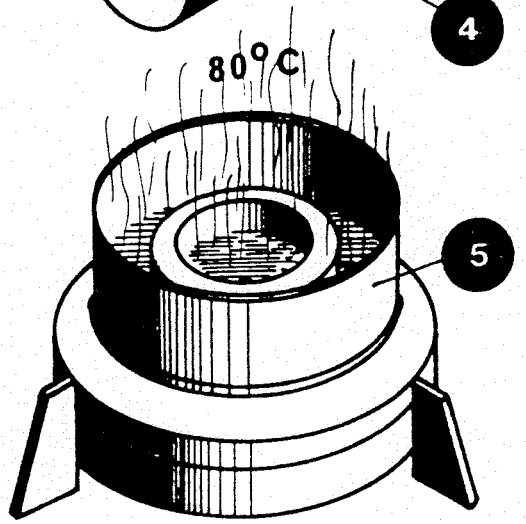
Remove bolts from bearing flange (7) and remove flange from housing (12). Pull flange with the aid of two screw bolts. The outer ring and the rollers of the cylindrical roller bearing come off the crankshaft (5) together with the bearing flange. To prevent the crankshaft from "sagging" support shaft by wooden wedge in the crankcase, as shown. Now pull distance ring (8) from shaft. Remove flange cover (4) and screw the disk (3) off the shaft. Remove bearing shield (1) from the exposed cylindrical roller bearing. Pull crosshead extensions (11) out of the drive gear housing and tie them -as far as they will go- up in this position with length of twine. (It is only in this fashion that the crankshaft can be removed without fouling the connecting rods). Now screw the threaded rod into the face of the crankshaft and suspend the shaft with the aid of the two slings, as shown, and remove the shaft from the housing in the direction indicated by the arrow. Now remove the remaining half of the bearing (at the drive-end side) from the flange (7). Then remove the remaining half of the bearing (at the opposite side) from the drive gear housing (12). The inner rings (6) of the cylindrical roller bearings should be heated and pulled off the shaft as described in chapter " How to pull and fit inner rings of crankshaft bearings ". Clean all parts thoroughly. If required, crank pins should be smoothed. Fit new cylindrical roller bearings, in reversed sequence. Always renew O-rings (2, 9 and 13). Rub all parts sparingly with MOLYCOTE (grey). The re-assembled crankshaft should be turnable by hand, without any effort.

HOW TO PULL AND FIT INNER RINGS OF CRANKSHAFT BEARINGS



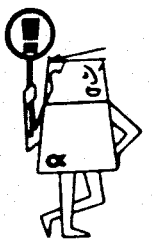
KEY TO SIGNS

1 = Welding torch
2 = Inner ring, cylindrical roller bearing
3 = Crankshaft
4 = Crankshaft end, drive-end side
5 = Oil bath
6 = Distance ring



TOOLS REQUIRED

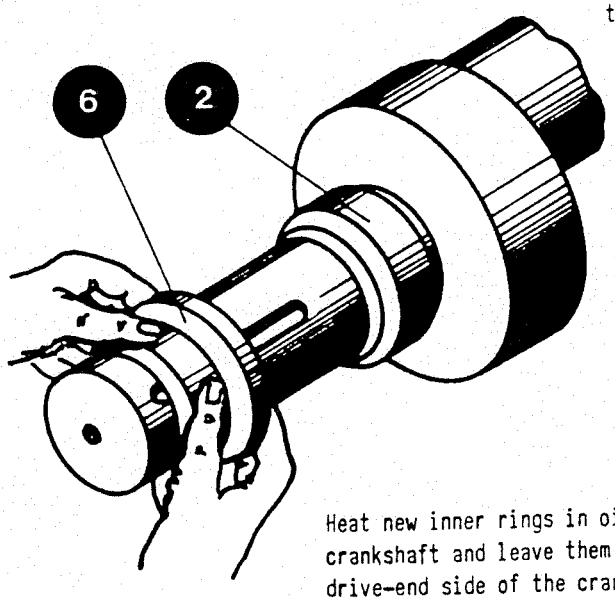
1 Welding torch
1 Sling
1 Hammer
1 Hot plate
1 Pair of asbestos gauntlets
MOLYCOTE®(grey)



ATTENTION !
Always wear heat protecting gauntlets when handling heated inner rings.

PREPARATORY WORK

Refer to the chapters "How to remove and fit V-belts" ; "How to remove and fit pump piston to crosshead extension" ; "How to pull and fit drive gear" ; "How to dismantle and assemble big-end bearings" ; "How to dismantle and assemble the crankshaft".



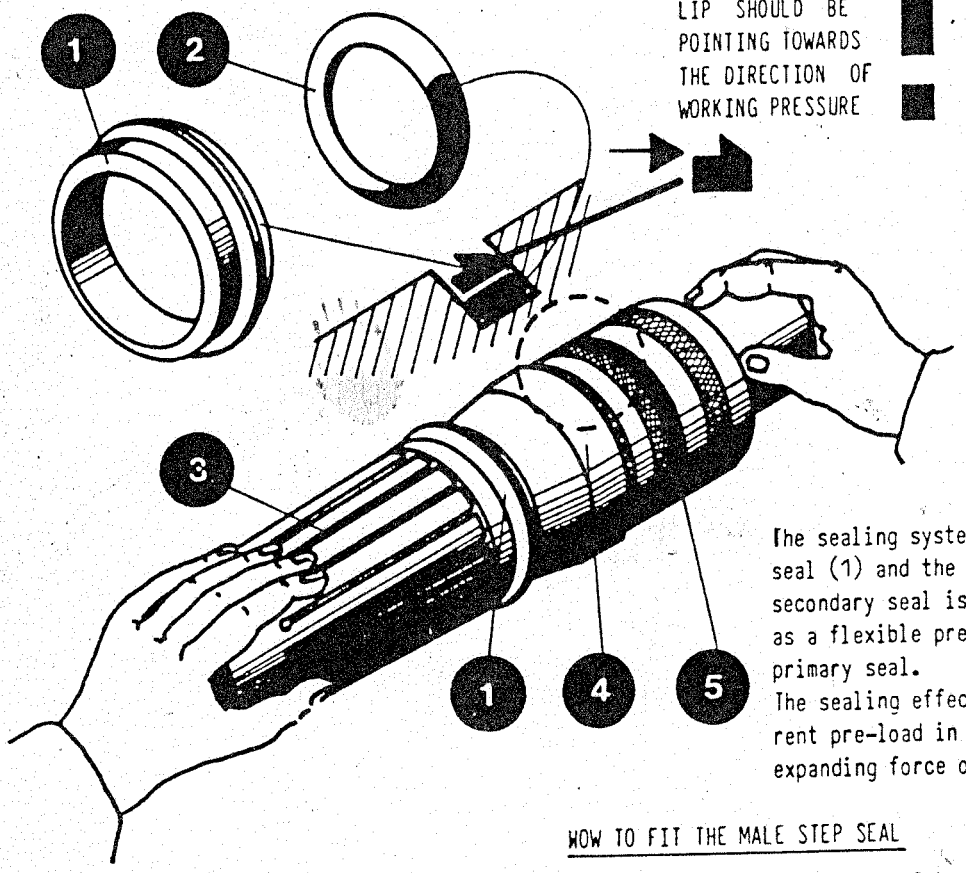
PROCEDURE

0.6 h TIME REQUIRED

Suspend the dismantled crankshaft (3) by means off sling, attached to the center, and put it down at a suitable work place.
Heat the inner ring (2) evenly by welding torch and pull off the shaft. If required, apply hammer lightly, to loosen the ring.
Clean the ring seat. If required, smooth ring seat surface with oil stone and rub sparingly with MOLYCOTE®(grey).
Heat new inner rings in oil bath to abt. 80° C, slip them up to their seats on the crankshaft and leave them to cool down. Subsequently, fit the distance ring (6) on the drive-end side of the crankshaft (4). Always renew the O-ring in hub of the distance ring.

HOW TO FIT STEP SEALS®

WHEN FITTING THE PRIMARY SEAL, THE RIGHT ANGLE OF THE LIP SHOULD BE POINTING TOWARDS THE DIRECTION OF WORKING PRESSURE

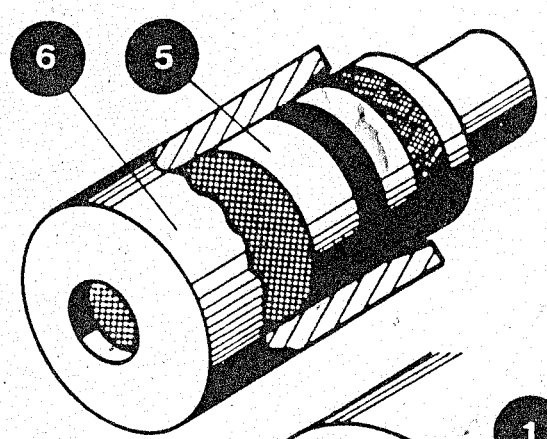


KEY TO SIGNS

1 = Primary seal
2 = Secondary seal
3 = Spreading sleeve for fitting the primary seal
4 = Fitting sleeve
5 = Piston with male STEP SEAL®
6 = Calibrating sleeve
7 = Piston bush with female STEP SEAL®

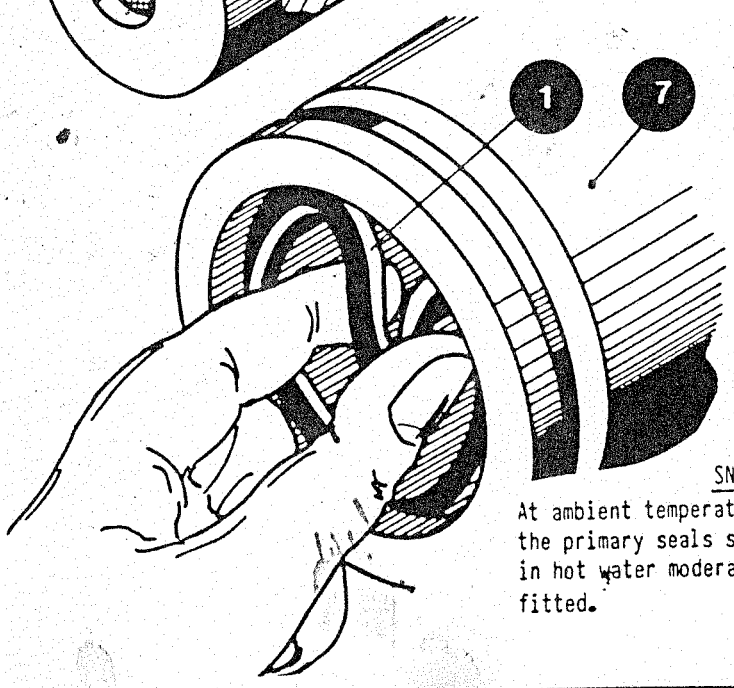
The sealing system consists of the primary seal (1) and the secondary seal (2). The secondary seal is an O-ring which serves as a flexible pre-loading support to the primary seal.
The sealing effect is caused by the inherent pre-load in the primary seal and the expanding force of the secondary seal.

HOW TO FIT THE MALE STEP SEAL



Clean seal groove thoroughly. Rub seals sparingly with MOLYCOTE®(white). Insert secondary seal (2) into the groove, by hand. Slip primary seal onto the conical sleeve (4), -the profile angle should point towards the direction of working pressure-. Slip sleeve onto the piston and push the primary seal into the sealing groove with the aid of the spreading sleeve (3). The primary seal will snap into the groove. However, it will still have a proud fit so that it must be bedded in with the aid of the calibrating sleeve (6). Care should be taken that the profiled edge is not being damaged.

HOW TO FIT THE FEMALE STEP SEAL

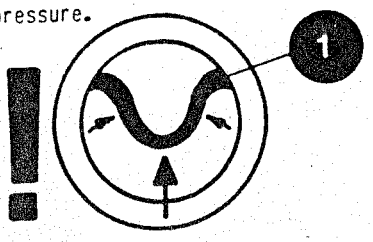


Clean seal groove thoroughly. Rub seals sparingly with MOLYCOTE®(white). Insert secondary seal (2) into groove, by hand. Ease primary seal (1) -with two fingers- over the secondary seal, while taking care that the primary seal is not being kinked or folded in doing so, and snug it down into the groove, as illustrated.

Care should be taken that the profiled edge is not being damaged.

The profile angle should point towards the direction of working pressure.

SNUGGING DIRECTION



At ambient temperatures below + 15° C the primary seals should be warmed-up in hot water moderately prior to being fitted.

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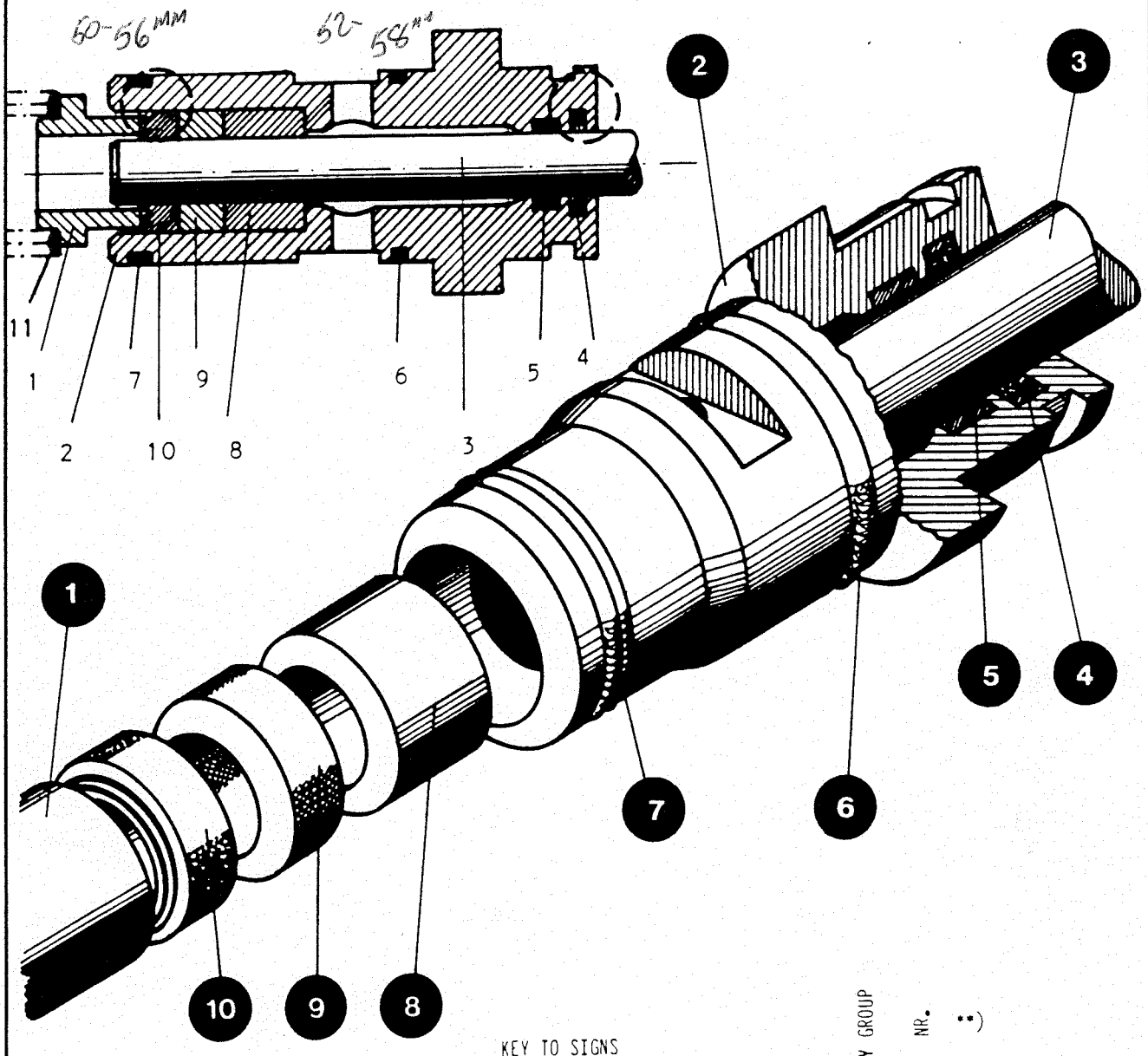
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

PISTON SEALS ASSEMBLY, HIGH-PRESSURE PUMP



KEY TO SIGNS

	ASSEMBLY GROUP POS. - NR. **)
1 = Header ring	200 - 12
2 = Piston bush	200 - 14
3 = Piston	200 - 18
4 = TURCON - STEP SEAL	200 - 16, 56
5 = Guide ring	
6 = O-ring	
7 = O-ring with back-up ring	
8 = Thrust ring	200 - 13
9 = Piston guide ring	200 - 11
10. = Grooved sealing ring	
11 = Spring	

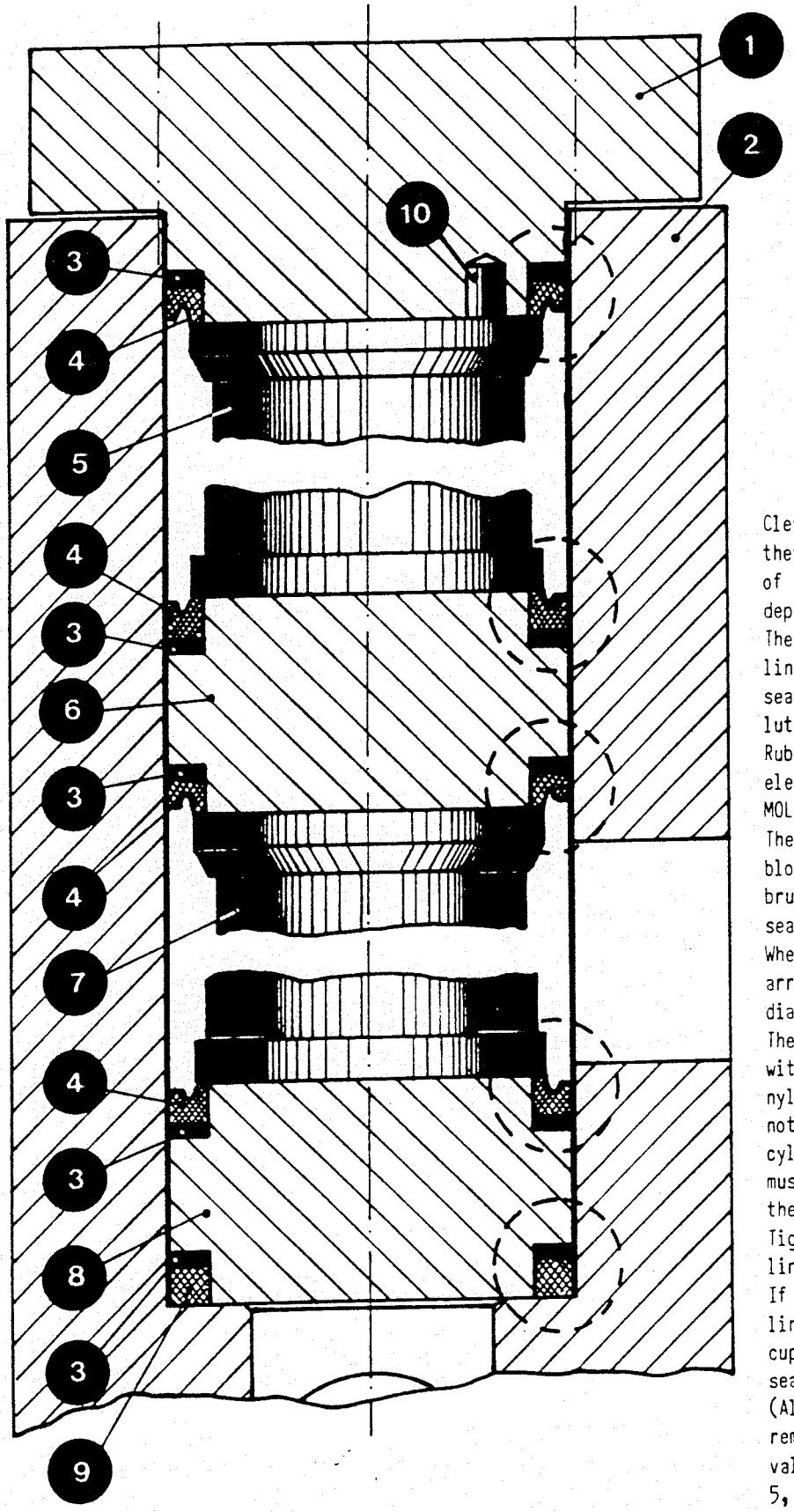
For inserting the STEP SEALS, refer to Section 5 : " How to fit STEP SEALS "

**) refer to "pink sheets"

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO FIT LIP SEALING RINGS IN CYLINDER BLOCK

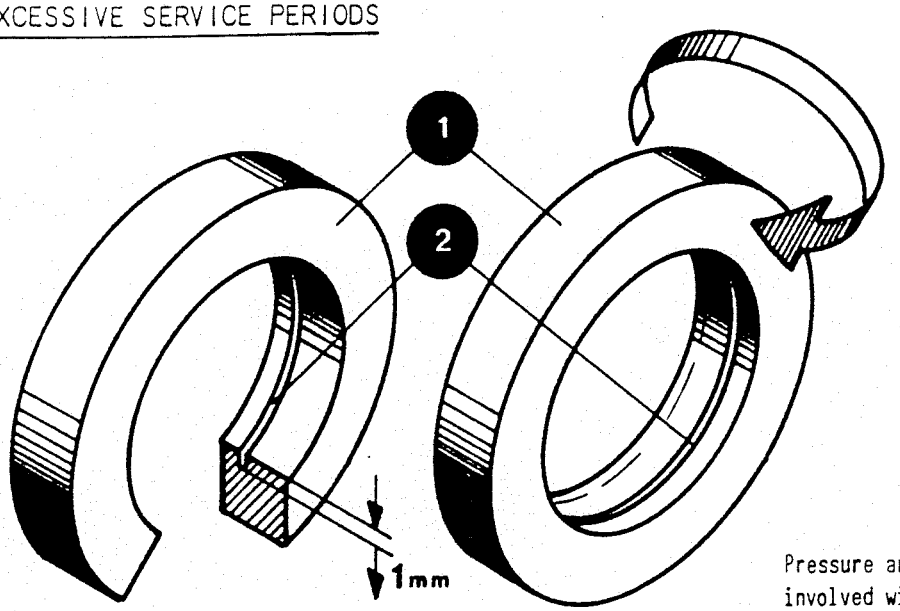


KEY TO SIGNS

1 = Cylinder cover
2 = Cylinder block
3 = Back-up ring
4 = Lip seal
5 = Cage, pressure valve
6 = Seat, pressure valve
7 = Cage, suction valve
8 = Seat, suction valve
9 = Sealing ring
10 = Cylindrical pin

Clean valve units thoroughly before they are being replaced in the bores of the cylinder block (2). All product deposits should be removed.
The grooves for the seals in the cylinder cover (1) and in the valve seats (6 + 8) should also be absolutely clean.
Rub cylinder bores and all sealing elements (3, 4, 9) sparingly with MOLYCOTE® (white).
The contact surface, in the cylinder block, for the seat (8) should be brushed with a thin coat of LOCTITE sealing compound "572".
When fitting the valve assemblies, the arrangement of seals shown in the diagram should be strictly adhered to.
The valve seats should be driven home with the aid of a hammer handle or nylon drift. The lips of seals must not be damaged. When replacing the cylinder cover (1), the dowel pin (10) must fit precisely into the notch of the pressure valve cage (5).
Tighten up the cup nuts of the cylinder cover to the specified torque.
If any leakage should occur at the cylinder cover, do not tighten up the cup nuts any further, but change the seals (3 + 4) in the cylinder cover.
(Also refer to the chapters "How to remove and fit suction and pressure valves in cylinder block", in Section 5, and "Torque specifications for extension bolts", also in Section 5.

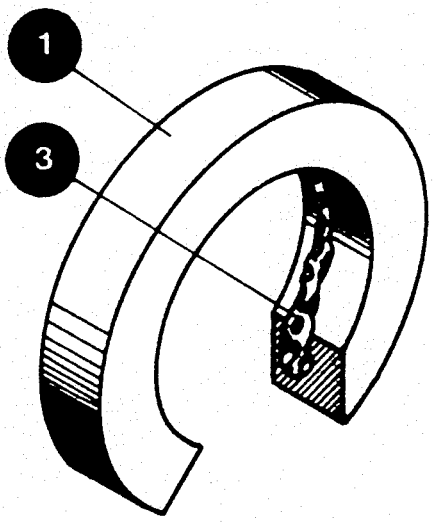
IMPACT RING DAMAGE DUE TO EXCESSIVE SERVICE PERIODS



KEY TO SIGNS

1 = Impact ring
2 = Normal cavitation grooves
3 = Deep cavitation groove
4 = Homo device seat
5 = Homo device cone
6 = Complete deterioration of Homo device cone by cavitation

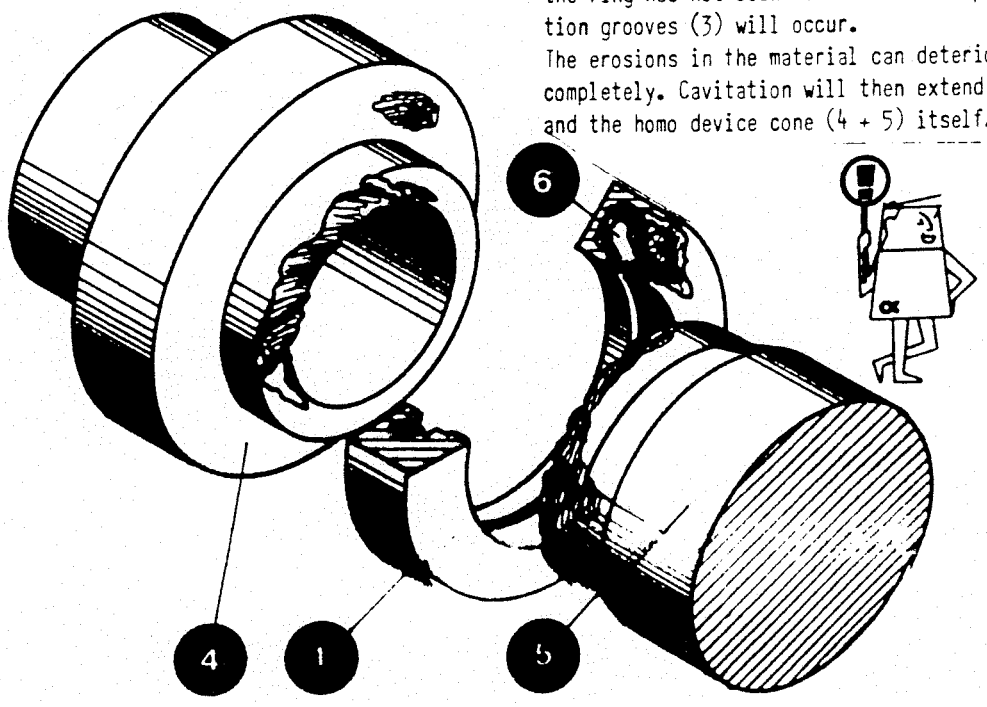
Pressure and flow rate of the product involved will determine the service life of the IMPACT RING in the homogenizer head.



The product forced through the annulus formed by the homo device cone and its seat (5 + 4) will depressurize abruptly. The sudden pressure drop will cause formation of vapour bubbles, which will attack the impact ring material and erode. A so-called cavitation groove will form (2). Within a certain service period the cavitation can be limited to the area of the impact ring.
The service life of the impact ring may be extended if regular checks are carried out to ascertain the condition of the ring. If the cavitation groove (2) has obtained a depth of approx. 1mm, the ring should be dismantled, reversed and placed back into the homogenizer head, for another service period.

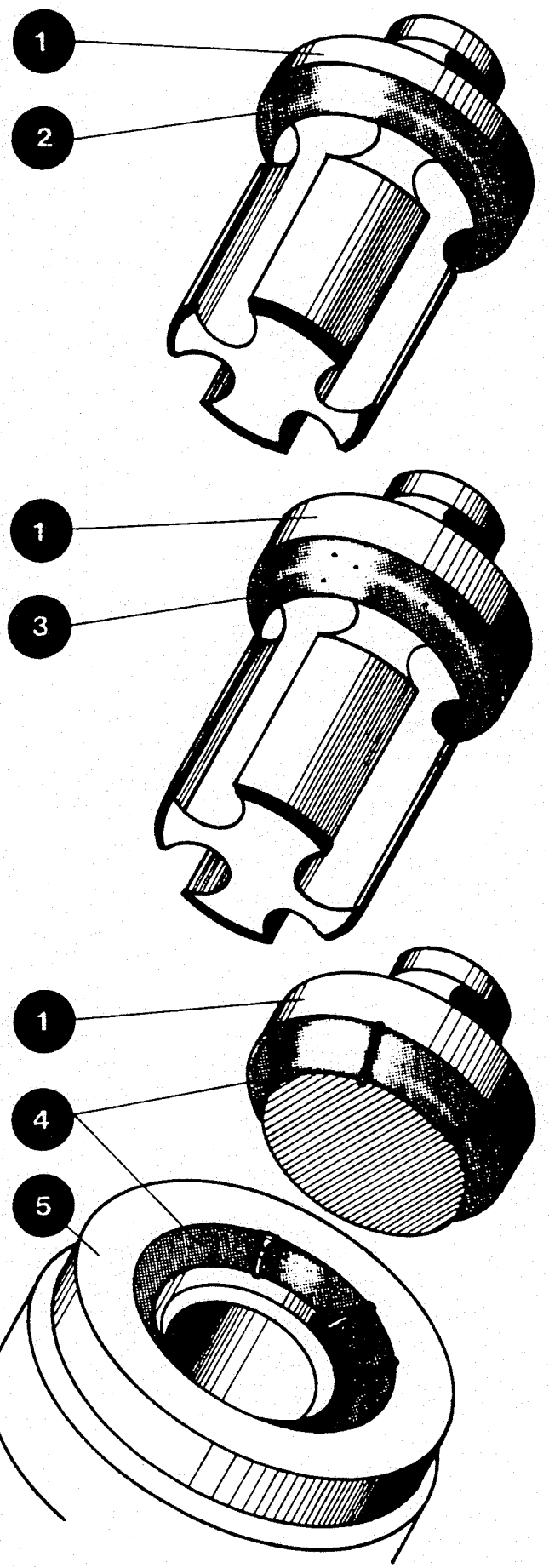
DAMAGE DUE TO EXCESSIVE SERVICE PERIODS

If the normal service life of an impact ring is exceeded, or if the ring has not been reversed at the proper time, deep cavitation grooves (3) will occur.
The erosions in the material can deteriorate the impact ring completely. Cavitation will then extend to the homo device seat and the homo device cone (4 + 5) itself.



ATTENTION
Regular checks of the impact ring will prevent cost and consequential damage.

WEAR PATTERNS IN CONTACT SURFACES OF SUCTION AND PRESSURE VALVES



KEY TO SIGNS

1 = Valve cone
2 = Normal wear pattern
3 = Pitting formation in contact surface
4 = "Blow through marks" in valve cone and seat

The service life of suction and pressure valves will greatly depend on the product involved. Regular checks of valves are therefore indispensable.

NORMAL WEAR PATTERN (2)

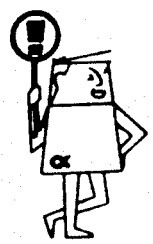
The normal wear pattern on valve contact surfaces shows a dull metallic finish. On completion of approx. 100 hours of operation the contact surface will show a slight wear mark on its entire circumference. This polished impression is quite normal. The valve does not require re-grinding.

PITTING FORMATION (3)

Pittings are hammered by solids contained in the product to be homogenized. They are the cause of "Blow through marks" in the valve cone and seat. The normal wear pattern can be restored by grinding.

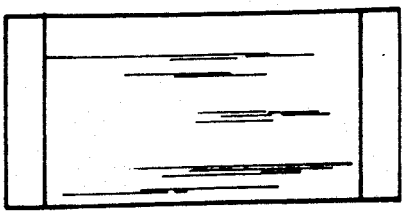
BLOW THROUGH MARKS IN VALVE CONE AND SEAT (4)

Product deposits on sporadic spots of the valve contact surface have prevented the valve from "seating" properly. The product has "blown through" and eroded the valve cone and seat across the entire width of the contact surfaces.
Failure of carrying out regular checks and maintenance will cause damage of this nature.
The valve (seat and cone) must be exchanged.



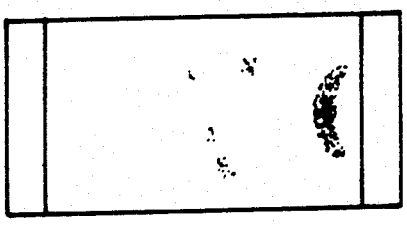
ATTENTION
Regular checks of the impact ring will prevent cost and consequential damage.

WEAR PATTERNS IN BIG-END BEARINGS



SCORINGS IN THE BEARING METAL

Scorings in the surface of bearing metal are an indication of contamination of lubricating oil.



CRESCENT-SHAPED PATTERNS IN THE VICINITY OF BEARING SHELL JOINTS

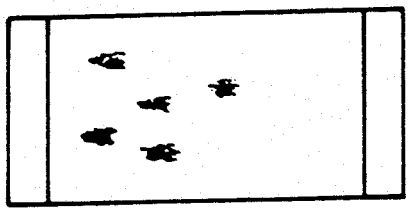
Bearing metal surface ranges from rough to scar-like or pitted appearance, indicating that corrosion has occurred.

WEAR MARK ON THE EDGE OF BEARING SHELL

Squeezed or wiped bearing metal at the edge of the bearing shell indicates that the bearing is out of alignment.

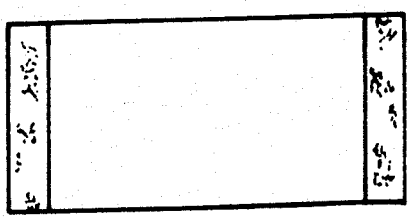
DISCOLOURATION OF BEARING SURFACE

Extensive discolouration of bearing metal is an indication of insufficient clearance and oil starvation.



"TONGUE TIP" FORMATION ON BEARING METAL

During the running-in period of bearings slight wipings of tongue-tip appearance may occur in the bearing surface. These "tongue tips" are of no importance. After a certain period of bedding in these phenomena will disappear and the surface become smooth again.



WORK MARKS ON THE FACES OF BEARING SHELL JOINTS

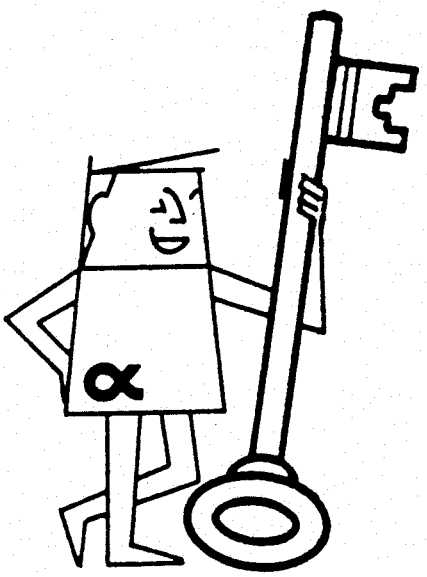
Hammer marks in the faces of the shell joints indicate that the bearing shells have not been pre-stressed adequately.

SECTION 6

Spare Parts

ED. 5/79 SHEET: REG.-No.: 06-01. DRAW-No.: TYPE: SHL

KEY TO CORRECT ORDERING OF SPARE PARTS



In the following spare parts lists all component parts of the homogenizer concerned are enumerated and shown in the accompanying diagrams.
When ordering spares, you should observe the following points:

1. Please make sure that the serial number on the identification plate of your machine is identical with the number appearing on the identification plate reproduced in this manual.

2. Find the "Position No." of the item required in the respective diagram and add the corresponding:

   IDENTITY NUMBER
   DESIGNATION of the part, and
   QUANTITY required.

To ensure prompt delivery, address your order to the

ALFA-LAVAL COMPANY

or to the

ALFA-LAVAL AGENCY

in your country.

Do not forget to mention shipping instructions.

SPECIMEN ORDER :

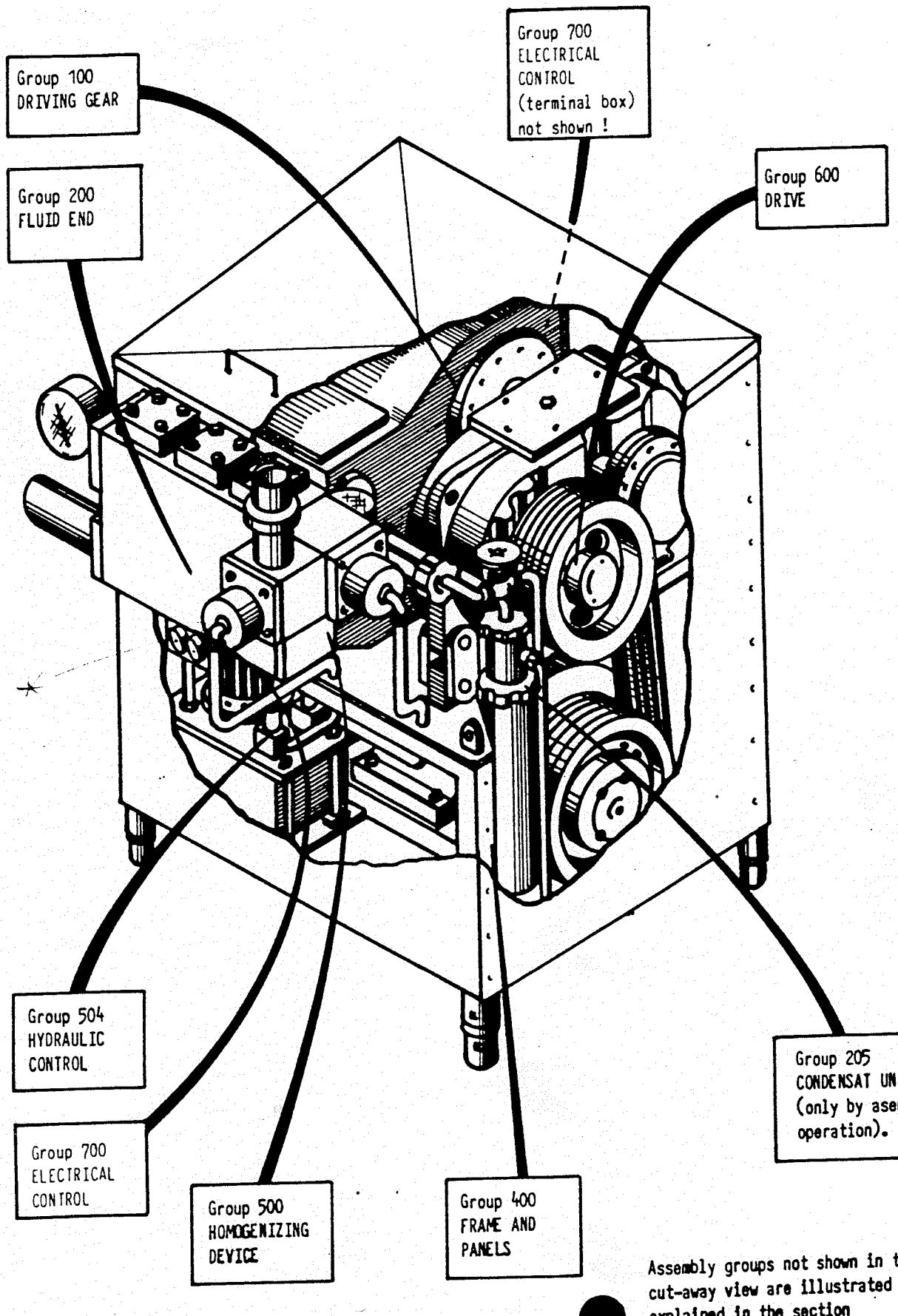
Order for spare parts required in the homogenizer Type: xxx Serial number: xxx

Please forward by air freight:

POS.-NO.	IDENTITY-NO.	DESIGNATION	QUANTITY
200-02	4 722 1095-01	Bush	1
200-06	4 600 0000-01	Spring	1
200-13	4 722 1180-01	PISTON GUIDE RING	1
200-16	4 302 0491-04	O-ring	1
200-17	4 302 0490-94	O-ring	1
200-18	4 302 0491-05	O-ring	1

ASSEMBLY GROUPS - GENERAL ARRANGEMENT

The A L F A - L A V A L Homogenizer, type SHL, consists of the following assembly groups:



Assembly groups not shown in the cut-away view are illustrated and explained in the section DESCRIPTION OF ASSEMBLY GROUPS.

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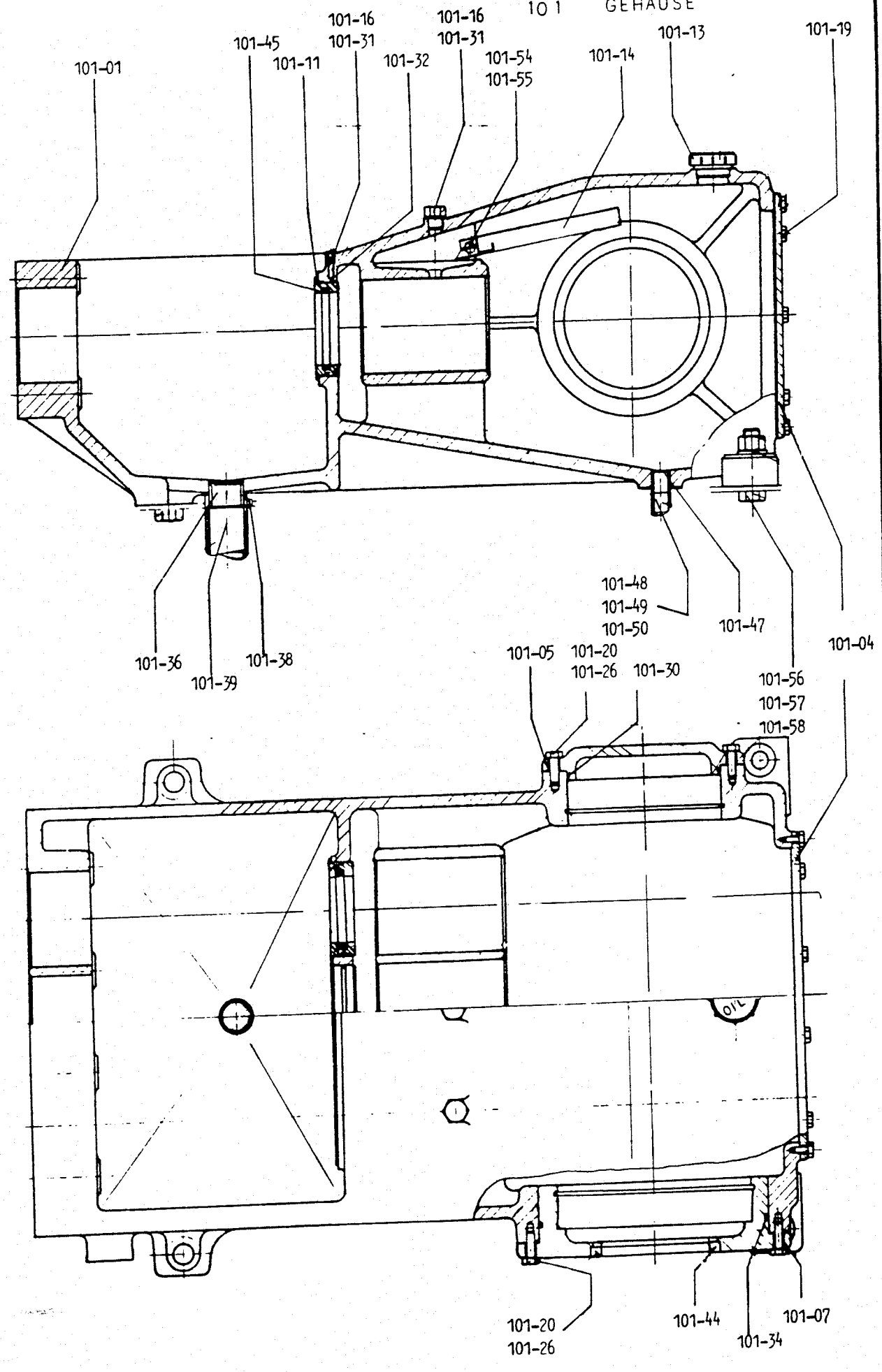
101 HOUSING GEHÄUSE



TYPE: SHL 25

DRAW.NO.: 4 722 0300

REG.No.: 101-01.02

SHEET: 1

12/78 ED.

ED. 6/79

SHEET: 1 of 2

REG.-No.: 101-01.03

DRAW-NO.: 4 722 0300

TYPE: SHL 25

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ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 101

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0300-80	Drive gear compl. Triebwerk kompl.			1		
101-00		Housing compl. Gehäuse kompl.			1		
101-01	4 722 0309-02	Housing Gehäuse		GG 25	1		
101-04	4 722 0935-01	Housing cover Gehäusedeckel		Plexiglas	1		
101-05	4 722 0311-02	Cover for flange Flanschdeckel		GG 25	1		
101-07	4 722 0313-02	Flange for bearing Lagerflansch		GG 25	1		
101-11	4 722 1427-01	Sealing bush for crosshead Dichtungsbuchse-Kreuzkopf		1.4571	3		
101-13	4 931 8090-09	Oil filling cover Ölentlüftungsdeckel	A1 R 1 1/2"	GN 549 Presstoff	3		
101-14	4 722 0407-80	Oil scraper compl. Ölabstreifer kompl.	DIN 1541	St 1203	1		
101-16	4 005 0192-26	Screw plug Verschlußschraube	R 1/2" x 20 DIN 367	M S	3		
101-18	4 003 4400-78	Threaded pin Gewindestift	AM 6 x 30 DIN 914	45 H	3		
101-19	4 000 0000-30	Hex. screw f. housing cover 6kt. Schraube f. Geh.-deckel	M 8x20 DIN 933	8.8	14		
101-20	4 000 0001-11	Hexagon screw 6kt. Schraube	M 12x35 DIN 933	8.8	16		
101-26	4 016 0151-10	Spring ring Federring	B 12 DIN 127	St	16		
101-30	4 301 5000-11	Sealing for housing cover Gehäusedeckeldichtung		it	1		
101-31	4 300 0022-00	Sealing for screw plug Dichtung f. Verschlußschraube	22 x 29 x 1,5	Cu	3		
101-32	4 302 0490-55	O-ring f. crosshead cover Runddichtring f. Kreuzk.-d.	Ø 122 x 4	Perbunan	3		
101-33	4 302 0205-01	O-ring f. flange cover Runddichtring f. flanschd.	Ø 205 x 4	Perbunan	1		
101-34	4 302 0490-56	O-ring f. flange f. bearing Runddichtring f. Lagerfl.	Ø 312 x 4	Perbunan	1		
101-36	4 350 0428-03	Pipe double nipple Rohrdoppelnipple	1 1/2 x 54 DIN 2990	St	1		
101-38	4 018 0040-29	Tube clip Schlauchklemme	SA 50 – 70 DIN 3017	WI	1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :101

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
101-39	4 844 0193-65	Hose Schlauch	∅ A 58x5x1000	PVC soft	1		
101-44	4 305 0015-00	Radial sealing ring Radialwellendichtring	A 150x180x15	Perbunan	1		
101-45	4 307 4250-10	Grooved sealing ring Nutring	L 20-80	Gummi	3		
101-47	4 350 0426-27	Pipe double nipple Rohrdoppelnippel	3/4" x 60 DIN 2982	St	2		
101-48	4 844 0193-25	Hose Schlauch	∅ A 34x45x1000	PVC soft	1		
101-49	4 018 0040-12	Tube clip Schlauchklemme	LA 25 40 DIN 3017	WI	2		
101-50	4 320 0401-04	Drain cock Entwässerungshahn	MM 3/4" DIN 361	Rg 5	1		
101-51	4 648 0000-05	Plug Verschlußstopfen	F5 D=14, d=10,7	PE soft	3		
101-54	4 000 0008-01	Hexagon screw Sechskantschraube	M 10x75 DIN 933	8.8	2		
101-55	4 010 0201-50	Hexagon nut 6kt. Mutter	M 10 DIN 934	8.8	2		
101-56	4 000 0001-96	Hexagon screw 6kt. Schraube	M 24x85 DIN 931	8.8	4		
101-57	4 015 0025-01	Washer Scheibe	B 25 DIN 125	St	4		
101-58	4 010 0202-20	Hexagon nut 6kt. Mutter	M 24 DIN 934	8.8	4		

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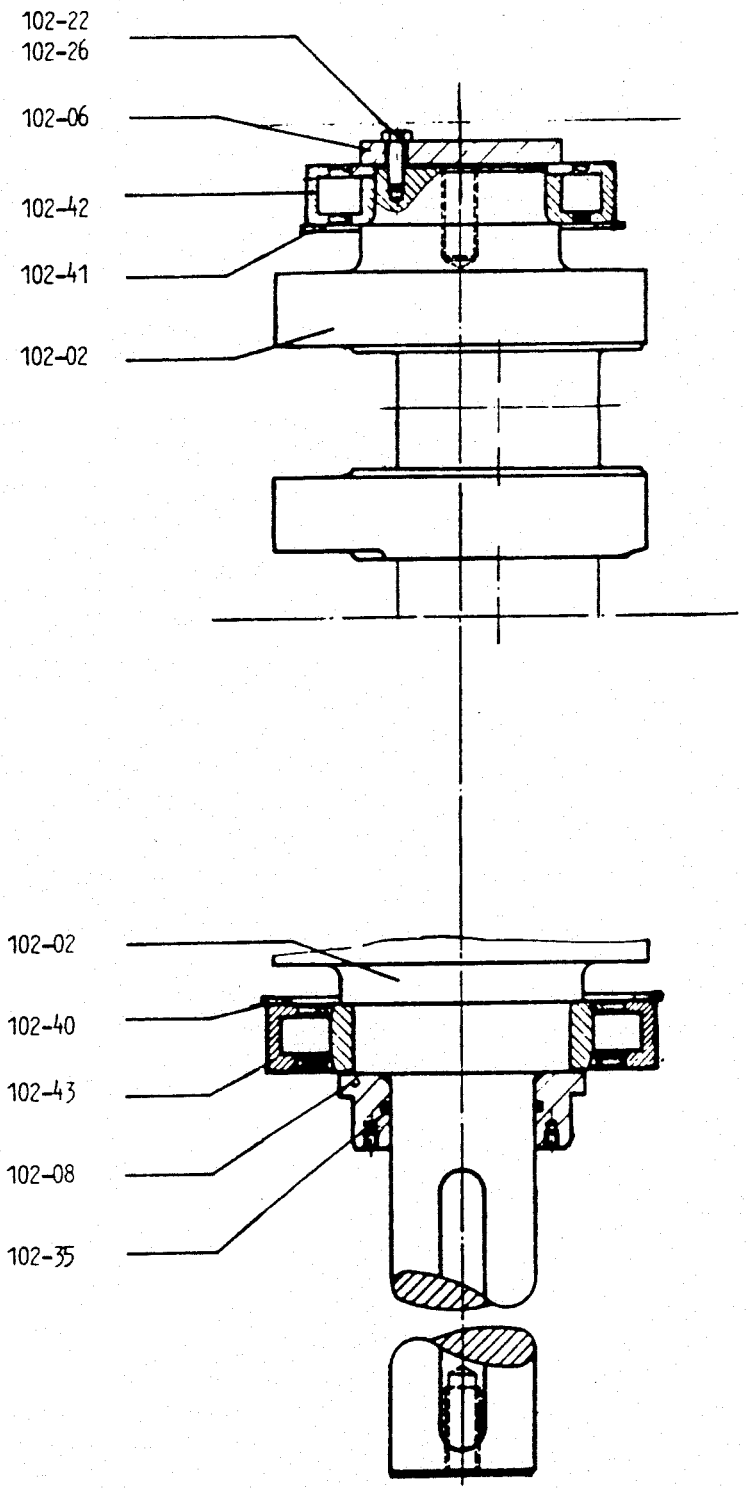
CRANKSHAFT

102

KURBELWELLE



INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :102

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0300-80	Drive gear compl. Triebwerk kompl.			1		
102-00		Crankshaft compl. Kurbelwelle kompl.	SZO 180		1		
102-02	4 722 1070-02	Crankshaft Kurbelwelle	SZO 180	42 CrMo 4	1		
102-06	4 722 0312-01	Disk Scheibe		C15	1		
102-08	4 722 0752-01	Distance ring Distanzring		C 35	1		
102-22	4 000 0001-10	Hexagon screw f. disk 6kt. Schraube f. Scheibe	M 12x30 DIN 933	8.8	3		
102-35	4 302 0105-00	O-ring Runddichtring	105x4	Perbunan	1		
102-40	4 016 0302-70	Locking ring Sicherungsring	J 270x5 DIN 472		1		
102-41	4 016 0302-15	Locking ring Sicherungsring	J 215x5 DIN 472		1		
102-42	4 241 2200-04	Cylindrical roller bearing Zylinderrollenlager	NUP 224 DIN 5412		1		
102-43	4 241 0204-10	Cylindrical roller bearing Zylinderrollenlager	NU 230 DIN 5412		1		
102-26	4 016 0151-10	Spring ring Federring	B12 DIN 127	St	3		

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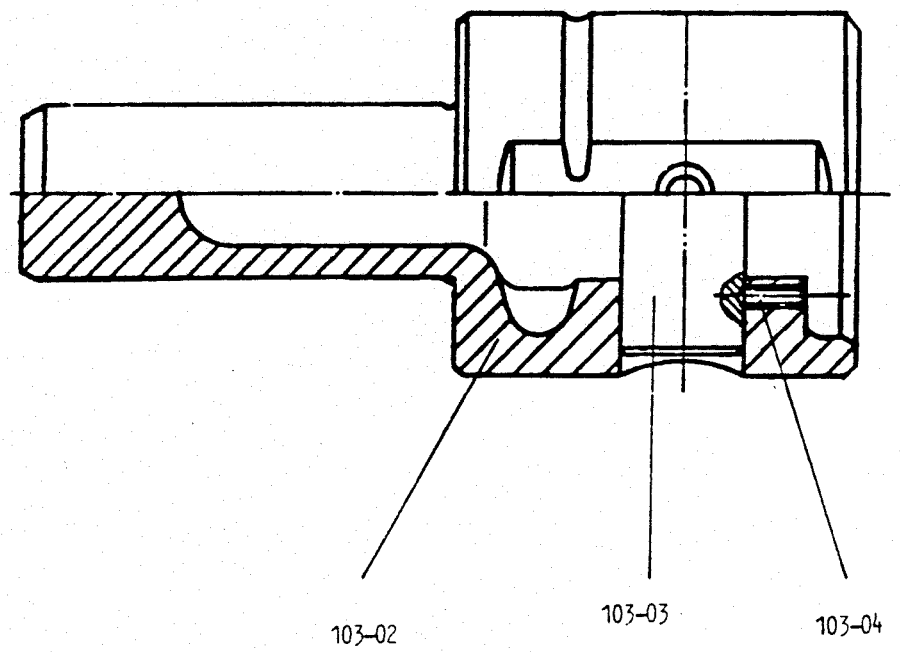
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

CROSS-HEAD

103

KREUZKOPF



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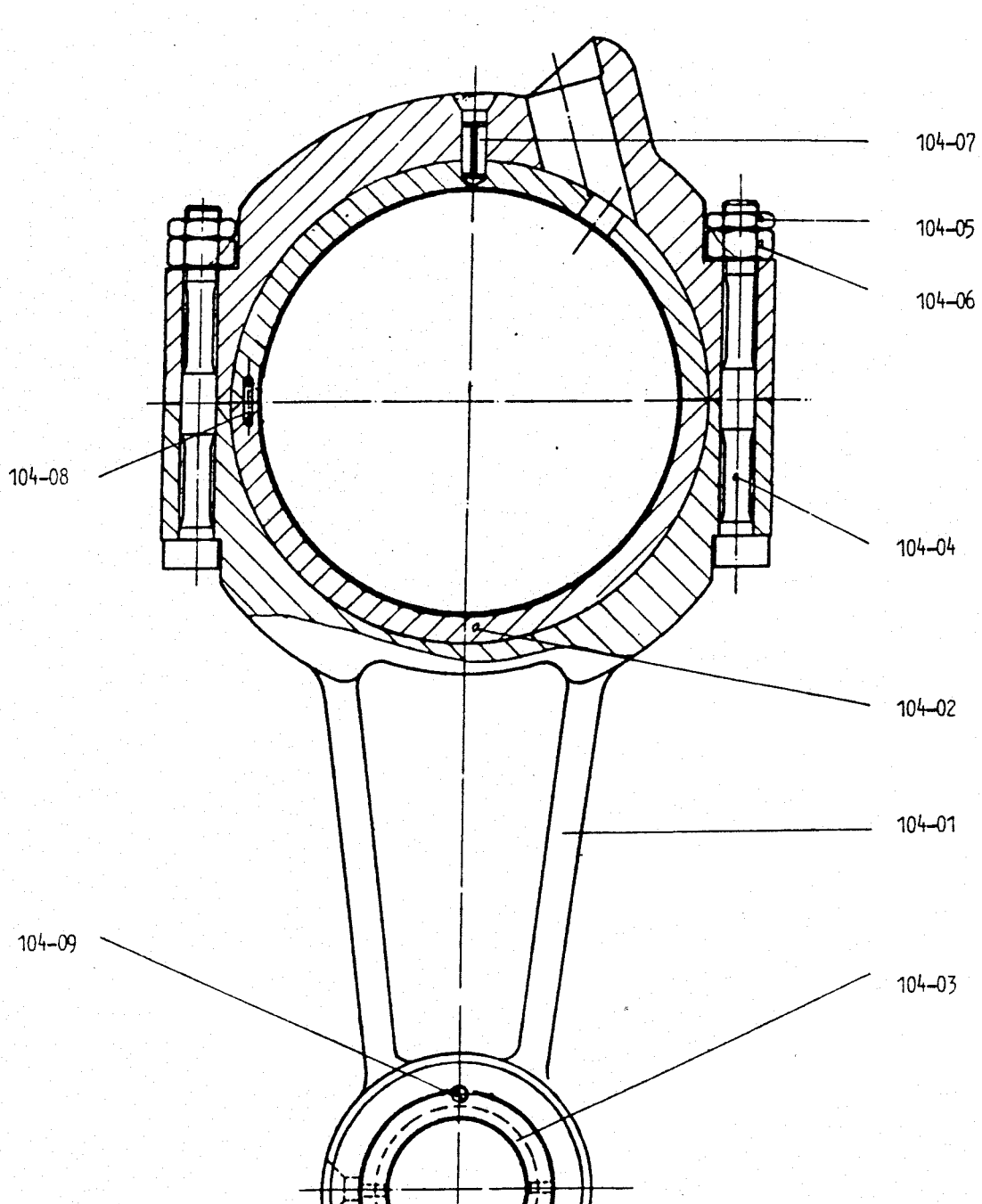
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

CONNECTING-ROD

104

PLEUELSTANGE



TYPE: SHL 25

DRAW.NO.: 4 722 0303

REG.No.: 104-01,02

SHEET: 1

12/ 78 ED.

ED. 9/78

SHEET: 1

REG.No.: 104-01.03 103-01.03

DRAW.NO.: 4 722 0302

TYPE: SHL 25

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :103/104

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0300-81	Drive gear compl. Triebwerk kompl.	SZO 160		1		
103-00	4 722 0302-80	Cross-head compl. Kreuzkopf kompl.			1		
103-02	4 722 1426-02	Cross-head Kreuzkopf		GGG 60	1		
103-03	4 722 0308-01	Cross-head-pin Kreuzkopfbolzen		C 35	1		
103-04	4 003 4400-85	Threaded pin Gewindestift	M 8x 25 DIN 914	45 H	2		
104-00	4 722 303-80	Connecting rod compl. Pleuelstange kompl.			1		
104-01	4 722 0304-02	Connecting rod Pleuelstange	2 parts		1		
104-02	4 722 1466-01	Bearing brasses Lagerschale	2 parts		1		
104-03	4 722 0306-01	Bush Buchse			1		
104-04	4 002 0000-67	Screw for connecting rod Pleuelschraube		C45 on 8.8 verg.	2		
104-05	4 010 4302-02	Locking nut Sicherungsmutter	M 12 DIN 7967	Fed.St	2		
104-06	4 010 0201-60	Hexagon nut 6kt. Mutter	M 12 DIN 934	8	2		
104-07	4 016 0504-55	Expansion pin Spannhülse	8x20 DIN 1481	Fed.St	1		
104-08	4 110 3500-10	Socket pin Zylinderstift	3x10 DIN 7	St	1		
104-09	4 002 6400-06	Threaded pin Gewindestift	M 6x10 DIN 551	5 S	1		

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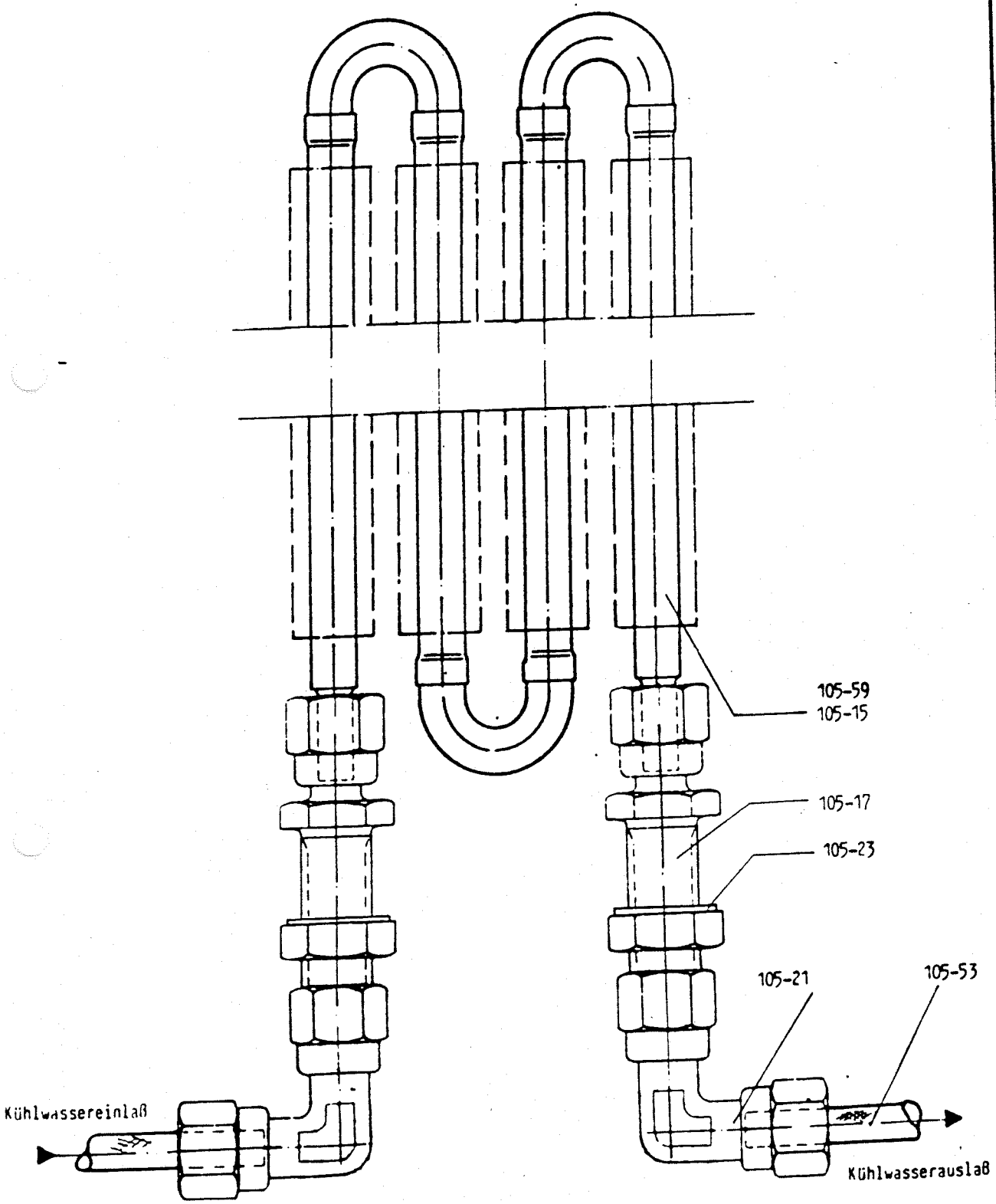
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

OEL COOLER

105

ÖLKÜHLER



TYPE: SHL 25

DRAW.NO.: 4 722 0975

REQ.No.: 105-01.02

SHEET: 1

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 105
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0300-80	Drive gear compl. Triebwerk			1		
105-00		Oil cooler compl. Ölkühler			1		
105-15	4 722 0975-01	Oil cooler Ölkühler		SF Cu	1		
105-17	4 350 8402-18	Bulk-head screw Schottverschraubung	SV 12 L	1.4571	2		
105-21	4 353 8401-31	Elbow screwing Winkelverschraubung	W 12	1.4571	2		
105-23	4 300 0018-04	Flat sealing Flachdichtung		Aluminium	2		
105-53	4 844 0192-80	Hose Schlauch	da 12x1,5x10001g	PVC	1		
105-59	4 350 004-59	Reinforcing bush Verstärkungshülse	vsh 12 x 1		2		

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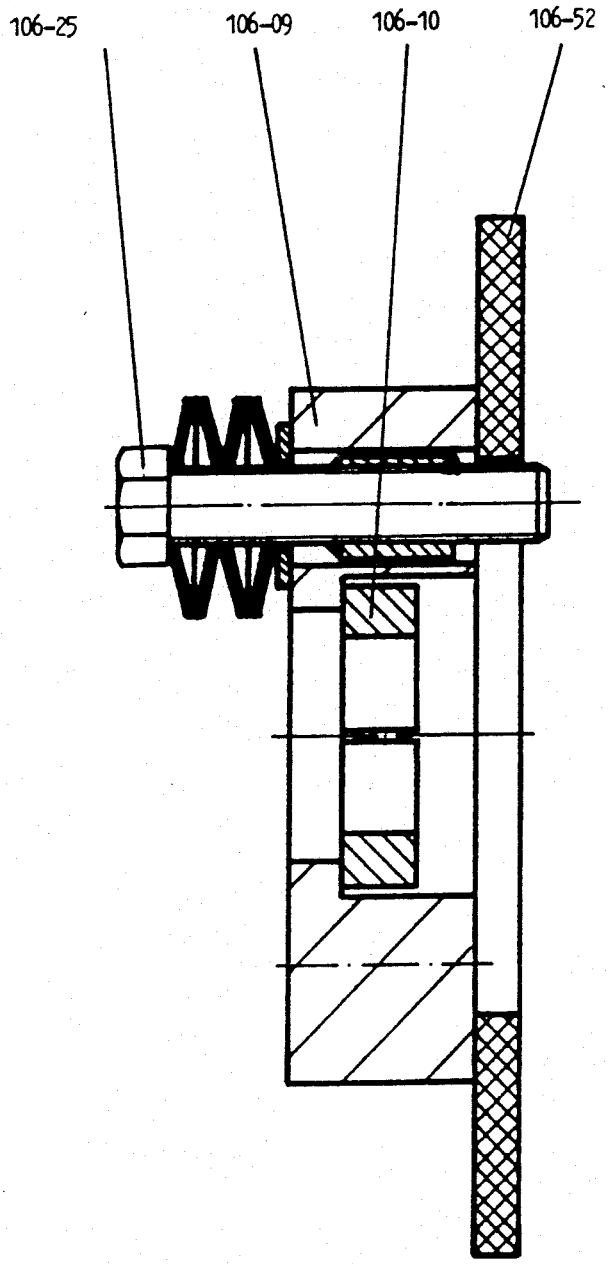
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

PISTON CONNECTION

106

KOLBENVERBINDUNG



INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

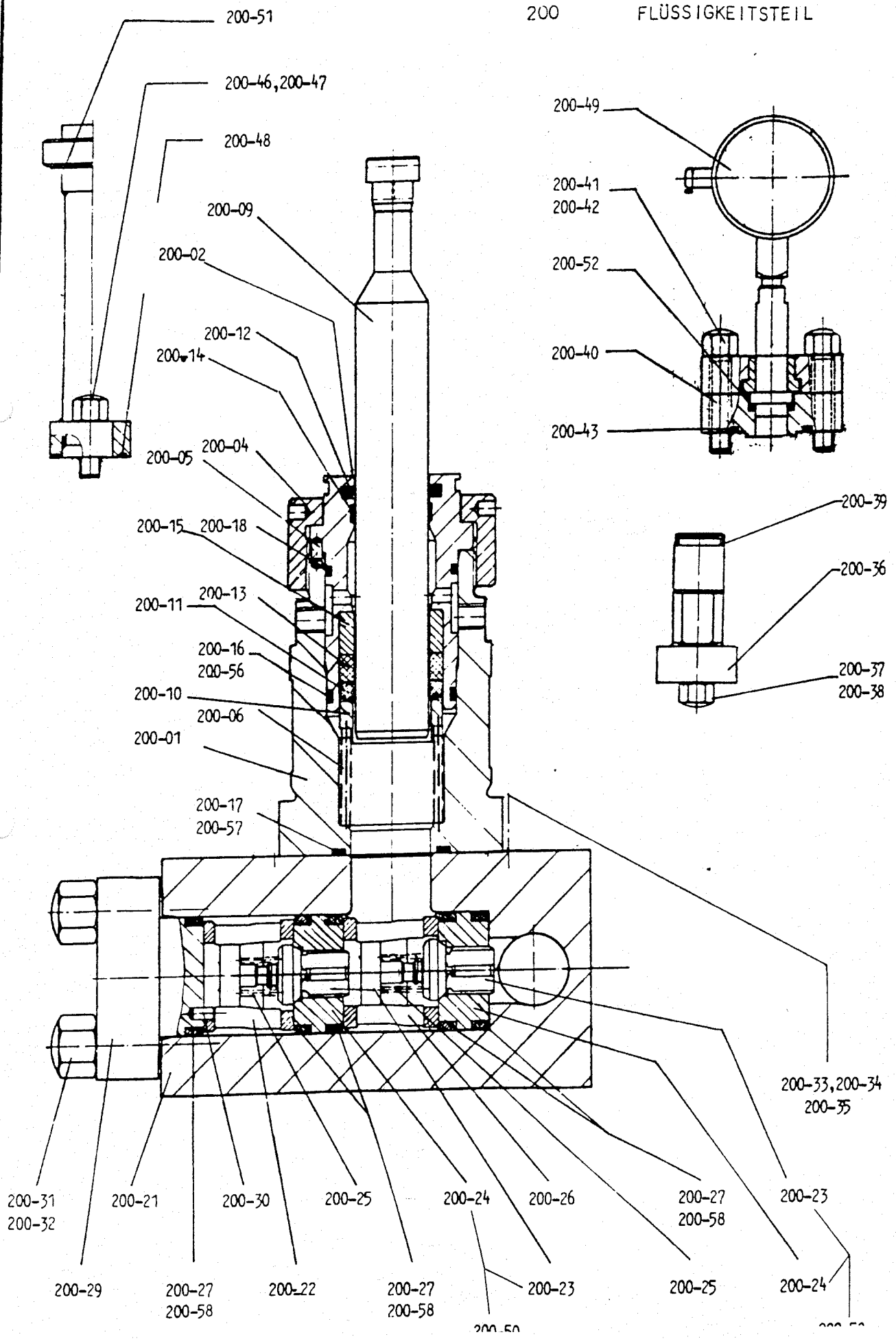
LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 106

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0300-80	Drive gear compl. Triebwerk kompl.			1		
106-00		Piston connection compl. Kolbenverbindung kompl.			1		
106-09	4 722 0915-01	Bush Buchse	2 parts geteilter	1.4571	3		
106-10	4 722 0820-02	Ring Ring			3		
106-25	4 722 1538-80	Hexagon screw w.cup spring 6kt. Schraube m.Tellerfeder			9		
106-52	4 300 0901-76	Splash protection Spritzwasserabweiser		Perbunan	3		

FLUID END

200 FLÜSSIGKEITSTEIL



INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 200
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1480-80 51/54/95	Fluid end compl. Flüssigkeitsteil kompl.	ø 45 Nutring Kegelventil				
200-01	4 722 1457-01	Cylindrical bush Zylinderbuchse		1.4571	3		
200-02	4 722 1588-01	Bush Buchse		1.4580	3		
200-04	4 722 1458-01	Scew-down nut Druckmutter		1.4401	3		
200-05	4 110 6801-12	Cylindrical pin Zylinderstift	ø 6 m6 x 12	1.4571	3		
200-06	4 600 0070-02	Spring Feder		1.4310	3		
200-09	4 722 0410-01	Piston Kolben	ø 45	1.4540	3		
200-10	4 722 0386-15	Header ring Stützring	Form B	1.4571	3		
200-11	4 722 0931-03	Grooved sealing ring Nutring		Perbunan	3		
200-12	4 722 1421-02	Turcon-stepseal Turcon-stepseal		Nr. 10	3		
200-13	4 722 1419-01	Follower Kolbenführungsring		Nr. 10	3		
200-14	4 722 1418-09	Guide Führungsring		Nr. 10	3		
200-15	4 722 1552-14	Header ring Stützring		1.4571	3		
200-16	4 302 0491-89	O-ring Runddichtring	ø 75 x 5	Neoprene	3		
200-17	4 302 0490-89	O-ring Runddichtring	ø 62 x 4	Neoprene	3		
200-18	4 302 0491-90	O-ring Runddichtring	ø 78 x 5	Neoprene	3		
200-21	4 722 1459-01	Cylinderblock Zylinderblock		1.4311	1		
200-22	4 722 0819-02	Valve cage Ventilkäfig	pressure	1.4456	3		

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 200
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-23	4 722 0818-02	Valve Ventil	top	Stellite 6	6	see Pos. 50	
200-24	4 722 0791-02	Valve seat Ventilsitz		Stellite 6	6	see Pos. 50	
200-25	4 600 0000-08	Valve spring Ventilfeder		1.4310	6		
200-26	4 722 0819-03	Valve cage Ventilkäfig	suction	1.4456	3		
200-27	4 722 0942-01	Grooved sealing ring Nutring	cylinder block	Neoprene	12		
200-28	4 722 0942-01	Grooved sealing ring Nutring	cylinder block	Neoprene	3		
200-29	4 722 0923-01	Cover Deckel		1.4300	3		
200-30	4 110 6810-12	Cylindrical pin Zylinderstift	ø 6 m6 x 12	1.4571	3		
200-31	4 010 6240-01	Cup nut Hutmutter	M 20	1.4541	12		
200-32	4 001 5020-06	Extention srew Dehn Stiftschraube	GP m 20 x 97	1.4371	12		
200-33	4 010 6240-02	Cup nut Hutmutter	M 24	1.4541	8		
200-34	4 001 5020-07	Extention srew Dehn Stiftschraube	GP m 24 x 188	1.4371	8		
200-35	4 015 0025-05	Washer Scheibe	A 25	1.4301	8		
200-36	4 722 0921-80	Cover for suction pipe Deckel f. Saugleitung			1		
200-37	4 010 6101-84	Cup nut Hutmutter	M 16	1,4571	2		
200-38	4 001 4000-40	Stud bolt Stiftschraube	M 16 x 40	1.4122	2		
200-39	4 302 0490-94	O-ring Runddichtring	ø 42 x 4	Neoprene	1		
200-40	4 722 0914-80	Pressure gauge flange Manometerflansch			1		
200-41	4 010 6101-84	Cup nut Hutmutter	M 16	1.4571	4		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 200

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-42	4 001 4001-89	Stud bolt Stiftschraube	M 16 x 75	1.4122	4		
200-43	4 302 0491-56	O-ring	ø 57 x 4	Neoprene	1		
200-44	4 722 0916-80	Suction flange Saugleitung Anschlußflansch			1	see extra list	
200-45	4 722 0917-01	Connection flange Anschlußflansch			1	see extra list	
200-46	4 010 6101-84	Cup nut Hutmutter	M 16	1.4571	2		
200-47	4 001 4000-40	Stud bolt Stiftschraube	M 16 x 40	1.4122	2		
200-48	4302 0490-95	O-ring Runddichtring	ø 68 x 4	Neoprene	1		
200-49		Pressure gauge Manometer				see extra list	
200-50	4 722 1480-54	Cone valve compl. Kegelventil kompl.				Pos. 23+24	
200-51	4 302 0054-00	Sealing for Pos. 44 Dichtung für Pos. 44	ø 54 x ø 64 x 5	Perbunan	1		
200-52	4 302 0025-01	O-ring for Pos. 40 Runddichtring für Pos. 40	ø 25 x 5	Perbunan	1		
200-53		Bush for Pos. 40 Buchse für Pos. 40					
200-54		Supported ring for Pos. 40 Stützring für Pos. 40					
200-55							
200-56	4. 722 1178-17	Back-up ring for Pos. 16 Back-up Ring für Pos. 16		PTFE Glas	3		
200-57	4 722 1178-23	Back-up ring for Pos. 17 Back-up Ring für Pos. 17		PTFE Glas	3		
200-58	4 722 1178-12	Back-up ring for Pos. 27+28 Back-up RIng für Pos. 27+28		PTFE Glas	15		

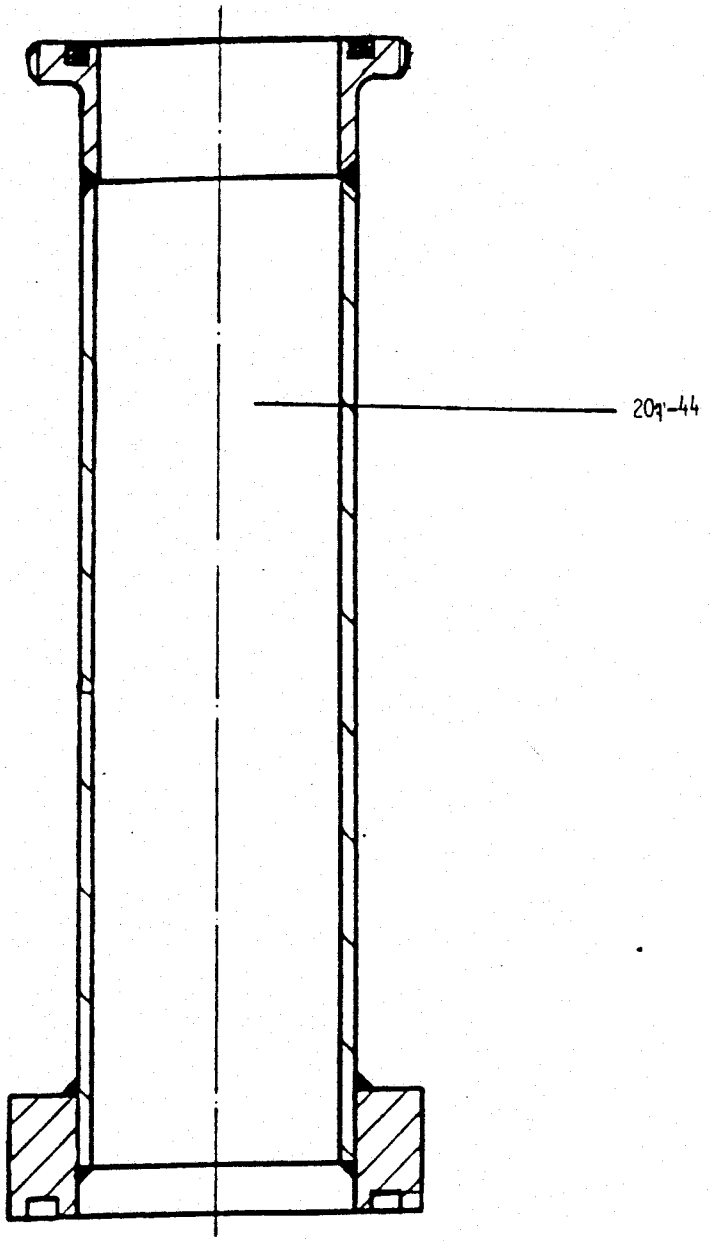
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

SUCTION CONN. FLANGE

SAUGLEITUNG ANSCHL.

SMS



TYPE: Shl

DRAW.NO.: 4 722 1612

REG.No.: 201-01.02 SMS

SHEET: 1

6/79 E

ED. 7/79

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 201

SHEET: 1

REG.-No.: 201-01.04

DRAW-No.: 4 722 0916

TYPE: SHL 25

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1480-80	Fluid end compl. Flüssigkeitsteil kompl.					
201-44	4 722 0916-80	Suction conn. flange Saugleitg. Anschlußflansch	SMS		1		

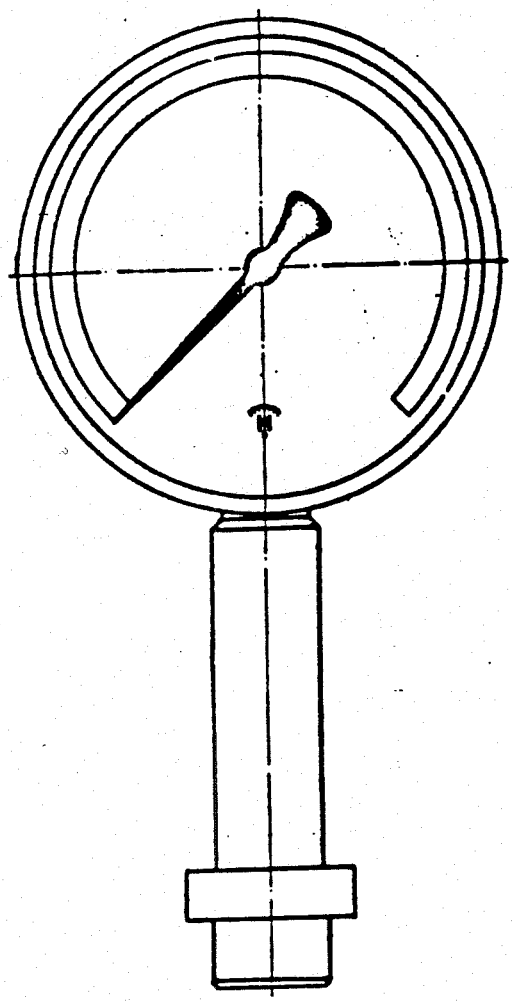
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

PRESSURE GAUGE

203

MANOMETER



TYPE: SHL 25

DRAW-NO.: 4 932 2002-18

REG.-NO.: 203-01.02

SHEET: 1

12/78 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 203

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 0922-80	Liquid part compl. Flüssigkeitsteil kompl.					
203-49	4 932 2002-18	Pressure gauge Manometer	0 - 600 bar		1		

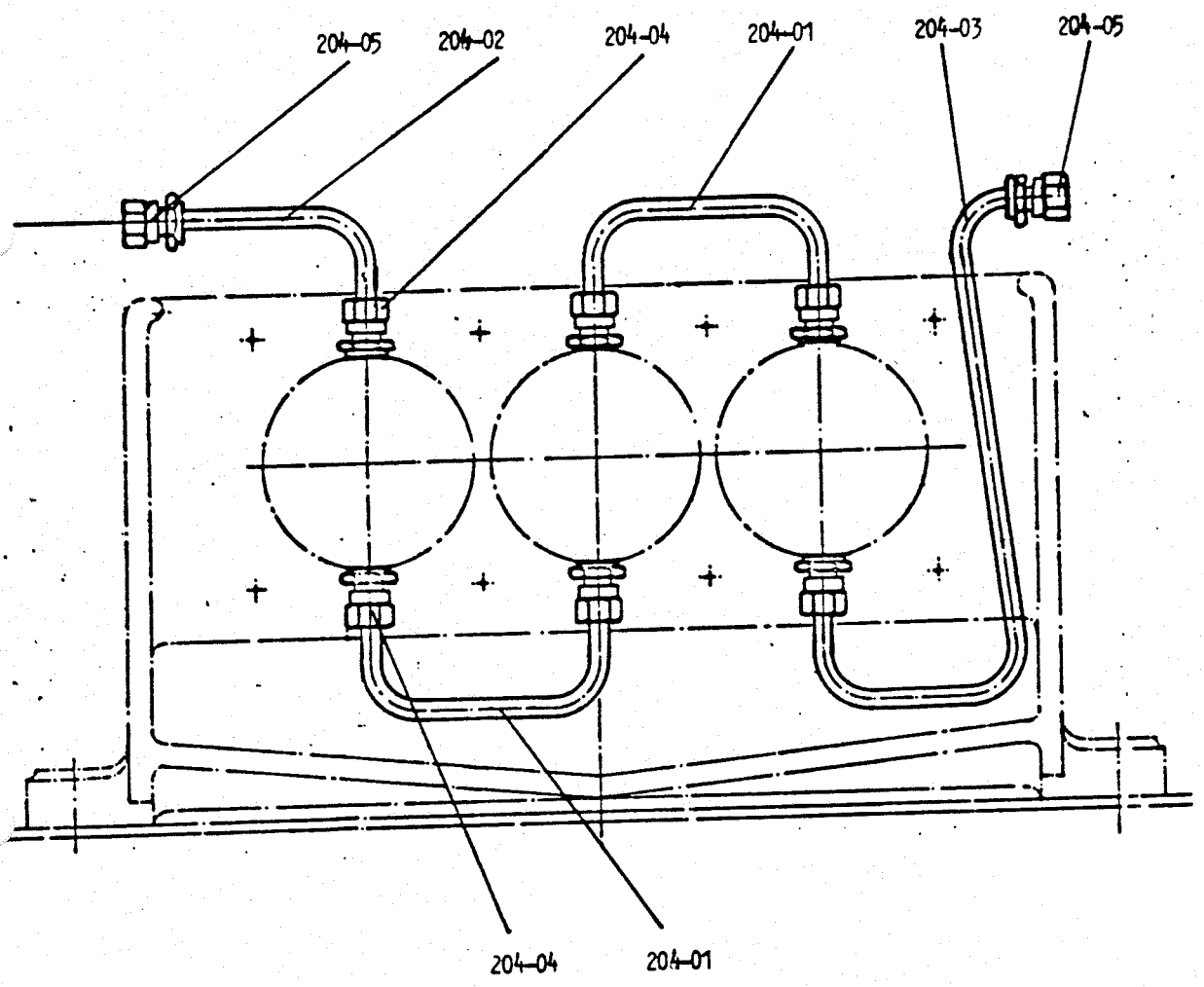
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

COOLING CIRCULATION

204

KÜHLKREISLAUF



TYPE: SHL

DRAW.NO.: 4 722 1170

REG.-NO.: 204-01.02

SHEET: 1

12/78 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 204

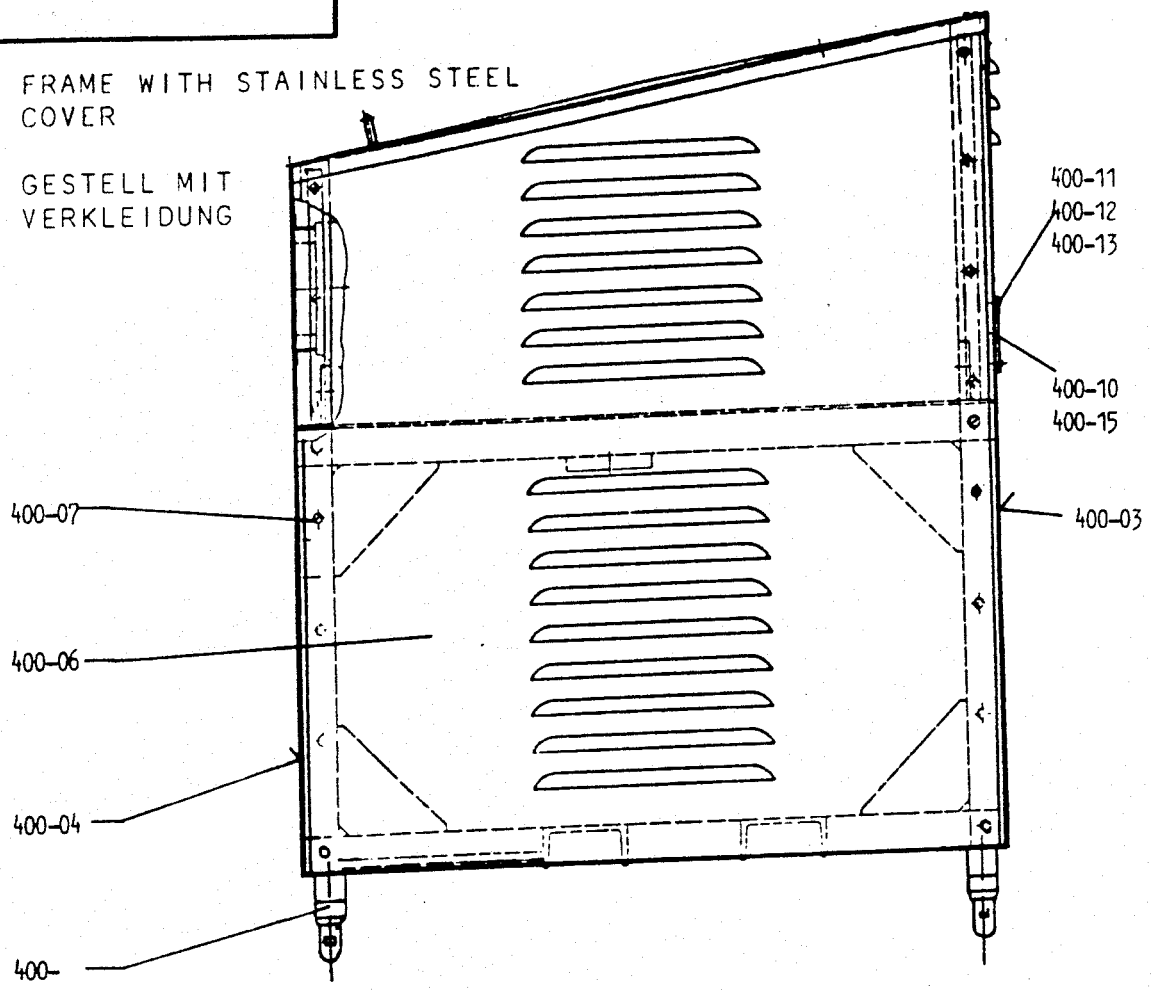
1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 0922-80	Fluid end compl. Flüssigkeitsteil kompl.			1		
204-00	4 722 1170-81	Cooling circulation compl. Kühlkreislauf kompl.			1		
204-01	4 722 1169-02	Connection pipe Verbindungsrohr		1.4541	2		
204-02	4 722 1071-02	Connection pipe Verbindungsrohr		1.4541	1		
204-03		Pipe Rohr	⌀ 10 x 1 0,6m	1.4541	1		
204-04	4 350 8400-87	Pipe union Einschraubverschraubung	GE 10-LM	1.4571	6		
204-05	4 350 8407-45	Screwing Verschraubung	GR 12-10L	1.4571	2		

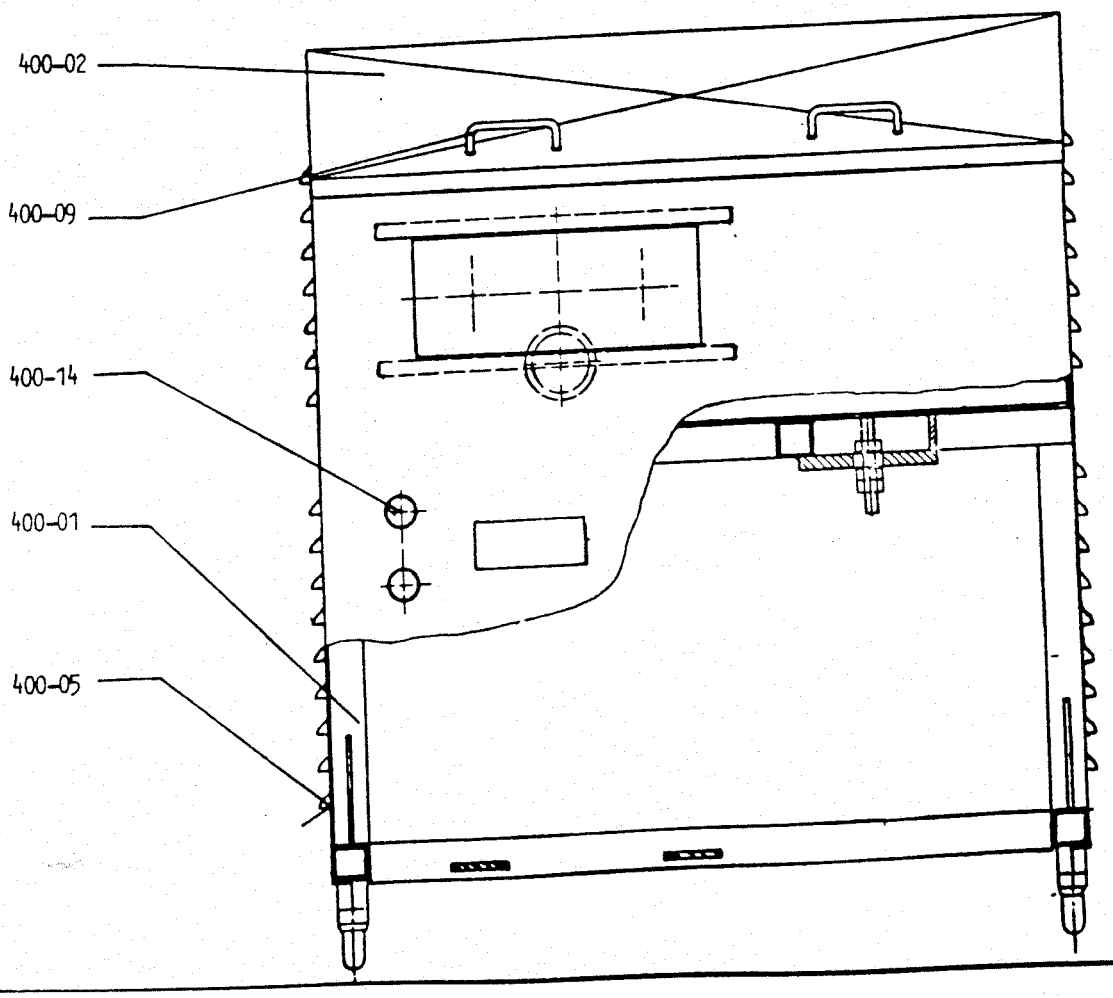
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

400 FRAME WITH STAINLESS STEEL COVER

GESTELL MIT VERKLEIDUNG





TYPE: SHL 25

DRAW.NO.: 4 722 1134

REG.-No.: 400-01.02

SHEET: 1

12/78 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 400

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
400-00	4 722 1134-83	Frame with stainless steel cover compl. Gestell mit Verkleidung compl.			1		
400-01	4 722 1024-80	Frame compl. Gestell kompl.	incl.4 adjustable foot		1		
	4 661 1000-02	Ball feet, adjustable Kalottenfuß	NW 50	1.4301			
400-02	4 722 1026-01	Cover Verkleidungsdeckel		1.4301	1		
400-03	4 722 1027-80	Back wall Rückwand			1		
400-04	4 722 1028-80	Front wall Vorderwand			1		
400-05	4 722 1030-01	Side wall Seitenwand	left	1.4301	1		
400-06	4 722 1029-01	Side wall Seitenwand	right	1.4301	1		
400-07	4 000 6100-02	Cheese head screw Flachkopfschraube	AM 6x10 DIN 85	1.4300	38		
400-09	4 019 3000-19	Handle Griff	Type 270.3	St verchromt	2		
400-10	4 722 1438-80	Oil inspection pipe Ölstandsrohr			1		
400-11	4 000 2000-39	Cheese head screw Zylinderschraube	AM 6x16 DIN 84	1.4301	6		
400-12	4 010 0201-24	Hexagon nut 6kt. Schraube	M 6 DIN 934	1.4571	6		
400-13	4 016 0150-73	Spring ring Federring	B 6 DIN 127	1.4301	6		
400-14	4 648 0000-04	Plug Verschlußstopfen	F 32	Kunststoff	2		
400-15		U-Profile U-Profil	b=2 , h=10 , s=6 311 long	rubber	1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 501

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
501-00	4 722 0958-99/	Double stage homogenizing head compl. Doppel-Homogenisierkopf kpl.	SMS ./Molkerei		1		
501-01	4 722 1014-01	Piston bush Kolbenbuchse		1.4300	2		
501-02	4 722 1017-01	Centering ring Zentrierring		1.4571	2		
501-03	4 722 1016-01	Hydraulic piston Hydraulikkolben		1.4571	2		
501-04	4 010 6101-84	Cup nut Hutmutter	M 16 DIN 917	1.4571	12		
501-05	4 001 5020-05	Stud bolt Stiftschraube		1.4122	8		
501-06	4 309 9000-06	TURCON-Stepseal TURCON-Stepseal			2		
501-07	4 306 0000-03	Rod-guide Stangenführungsring			2		
501-08	4 306 0000-02	Piston-guide ring Kolbenführungsring			4		
501-09	4 000 2300-97	Socket screw Zylinderschraube	M 8x16 DIN 912	1.4571	8		
501-10	4 000 2302-07	Socket screw Zylinderschraube	M 6x12 DIN 912	1.4571	2		
501-11	4 300 0086-16	Flat sealing ring Flachdichtung	A 6,5 x 9,5 x 1 DIN 7603	Cu	2		
501-12	4 001 4000-39	Stud bolt Stiftschraube	M 16x35 DIN 938	1.4122	4		
					1		
501-15	4 722 1613-80	Outlet flange Austrittsflansch	SMS		1		
502-00		Homogenizing device compl. Homogenisiervorrichtg.kompl.			1	see extra list	
503-00		Set of sealings compl. Dichtungssatz kompl.			1	see extra list	
501-30	4 722 1020-01	Housing Gehäuse	N	1.4300	2		

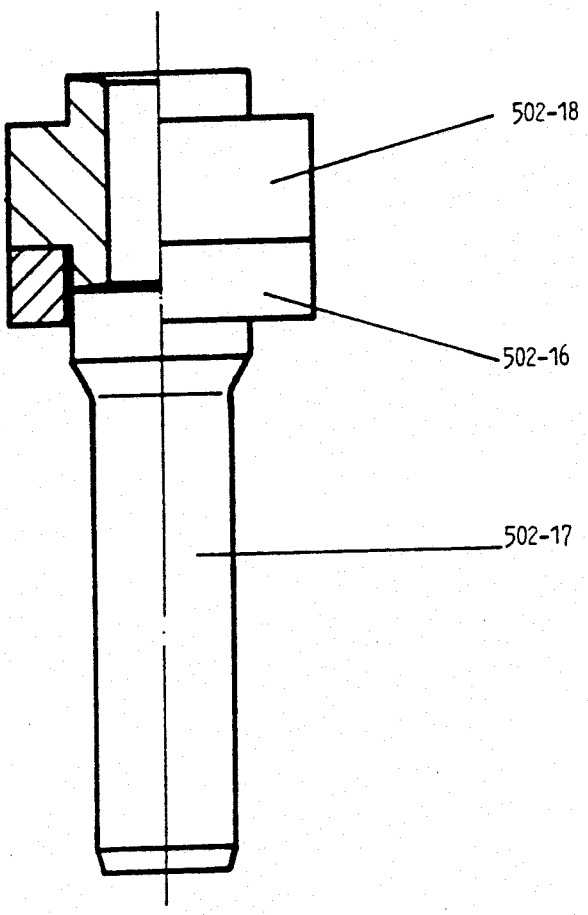
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

HOMOGENIZING DEVICE

502

HOMOGENISIERVORRICHTUNG



TYPE: SHL

DRAW.NO.: 4 722 0958

REQ.-NO.: 502-01.02

SHEET: 1

1/79 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 502
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
500-00	4 722 0958-80	Single stage homog. head cpl. Einfach Homogenisierkopf kpl.					
501-00	4 722 0958-99	Double stage homog. head cpl. Doppel Homogenisierkopf kpl.					
502-00	4 722 0958-50	Homogenizing device compl Homogenisiervorrichtung kompl			1		
502-16	4 722 1597-01	Impact ring Prallring	Ø 20 / Ø 30	Stellit 20	1		
502-17	4 722 1591-01	Homo device cone Stempel	Ø 20 / Ø 30	Stellit 20	1		
502-18	4 722 1596-01	Homo device seat Sitz	Ø 20 / Ø 30	Stellit 20	1		

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INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 502

SHEET: 1
REG.-No 502-0105
DRAW-NO.: 4 722 0958
TYPE: SHL 25

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
500-00	4 722 0958-80	Single stage homog.head cpl. Einfach-Homogenisierkopfkpl.					
501-00	4 722 0958-99	Double stage homog.head cpl. Doppel-Homogenisierkopf kpl.					
502-00	4 722 0958-75	Homogenizing device compl. Homogenisiervorricht kompl.	Ø 28 / Ø 38		1		
502-16	4 7221295-01	Impact ring Prallring	Ø 28 / Ø 38	Stellite 20	1		
502-17	4 722 1590-01	Forcer Stempel	Ø 28 / Ø 38	Stellite 20	1		
502-18	4 722 1296-01	Seat Sitz	Ø 28 / Ø 38	Stellite 20	1		

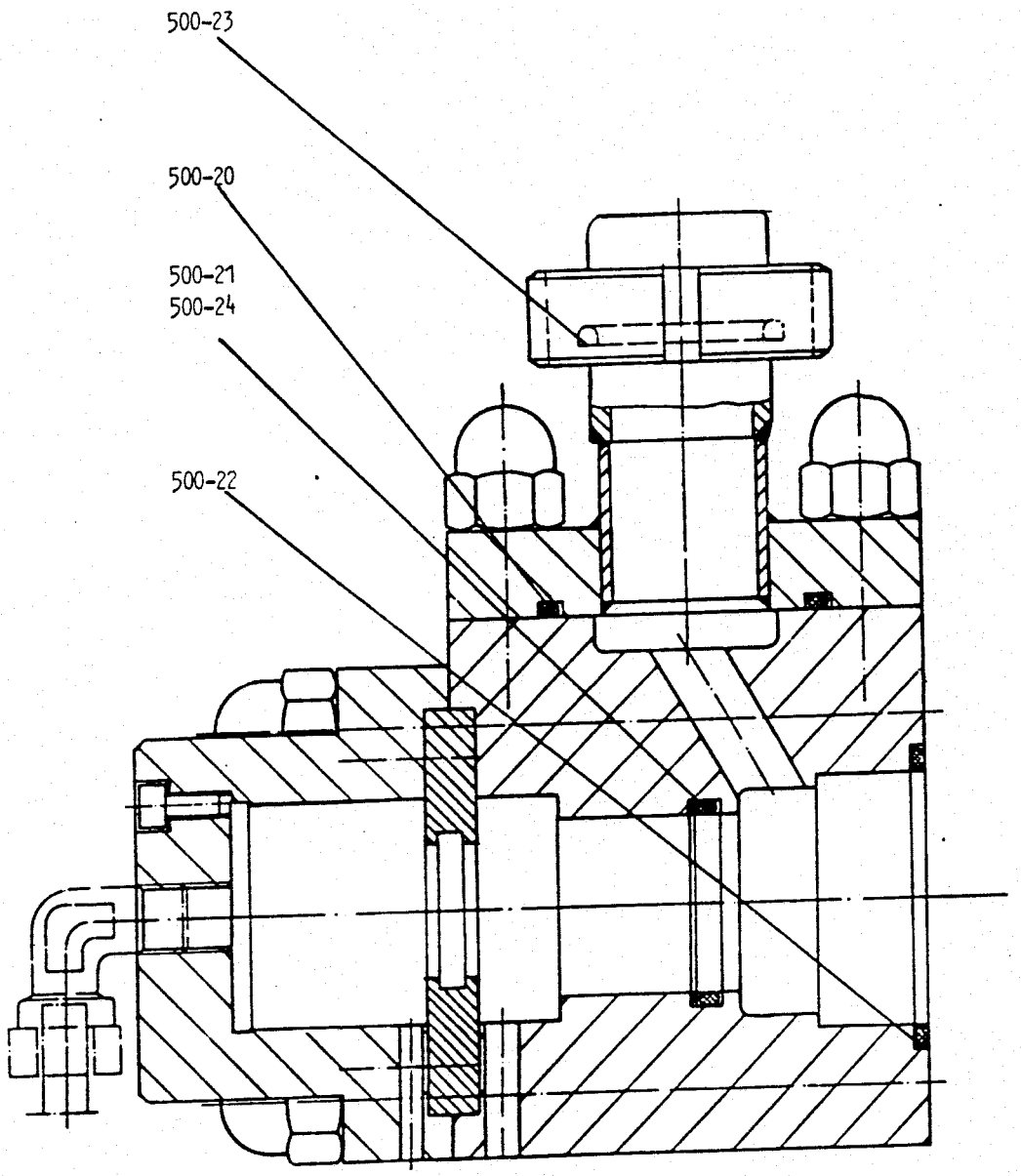
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

SET OF SEALINGS

503

DICHTUNGSSATZ



TYPE: SHL 25

DRAW-NO.: 4 722 0958

REG.-NO.: 503-01.02

SHEET: 1

12/78 ED.

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INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP: 503
BAUGRUPPE

SHEET: 1

REG.-NO.: 503-01.12

DRAW-NO.: 4 722 0958

TYPE: SHL 25

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
500-00	4 722 0958-99	Double stage homog. head cpl. Doppel Homogenisierkopf kpl.					
503-00		Set of sealing compl. Dichtungssatz kompl.	D-Perbunan-SMS		1		
503-20	4 302 0057-05	O-ring Runddichtring	Ø 57 x 4	Perbunan	1		
503-21	4 302 0492-28	O-ring Runddichtring	Ø 24,2 x 3	Perbunan	2		
503-22	4 302 0057-05	O-ring Runddichtring	Ø 57 x 4	Perbunan	2		
503-24	4 300 0902-06	Supported ring Stützring	Ø 24 x 2,6 x 1,0	PTFE	2		

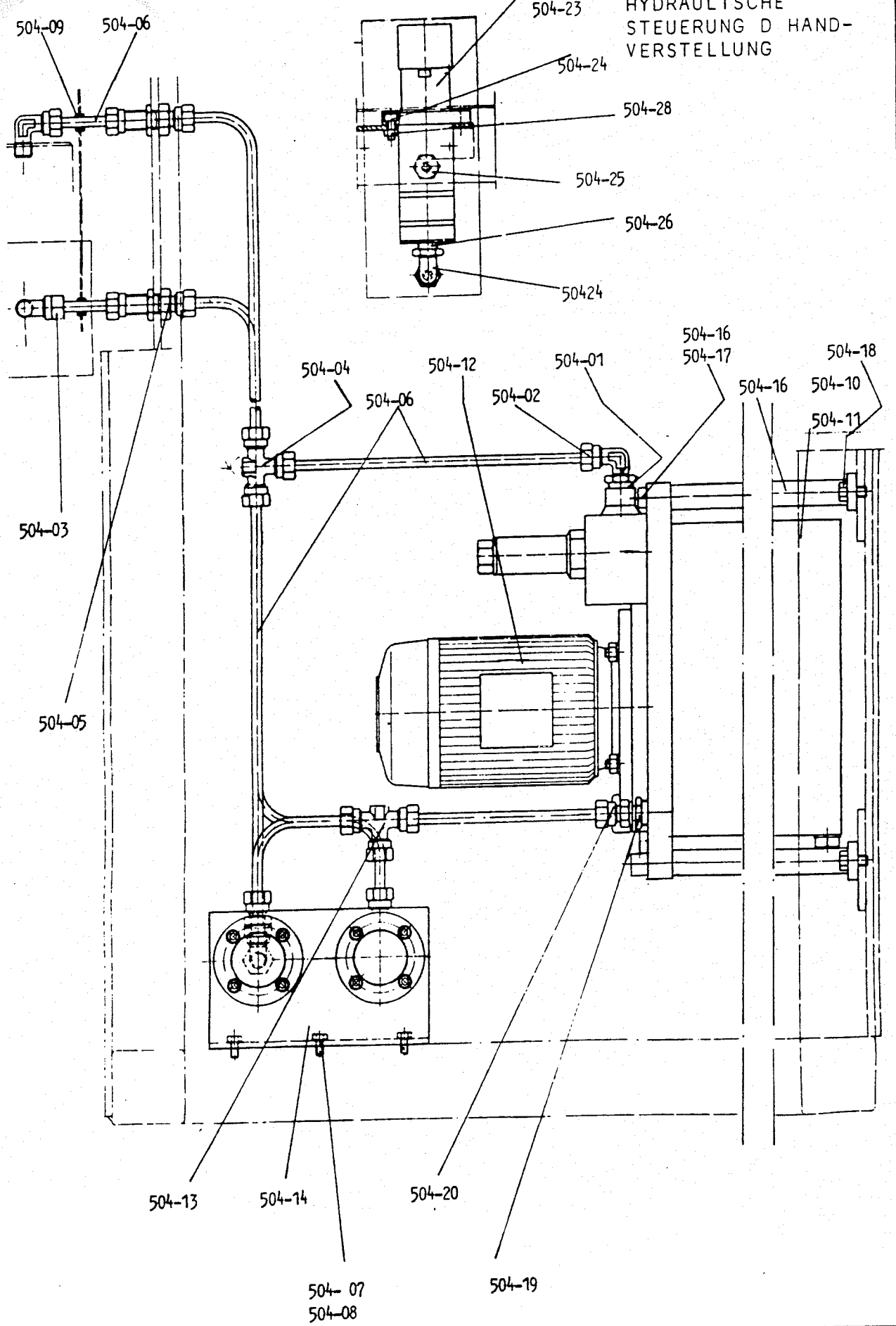
ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

504

HYDRAULIC CONTROL FOR DOUBLE STAGE HOMOGEIZING HEAD WITH HAND CONTROL

HYDRAULISCHE STEUERUNG D HAND-VERSTELLUNG



TYPE: SHL 25

DRAW.NO.: 4 722 1254

REG.No.: 504-01.02

SHEET: 1

12/78 ED.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 504

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
504-00	§ 722 1254-81 -82/-85	Hydraulic control for double stage homogenizing head with Hydraulische Steuerung D Handverstellung kompl.	hand control cpl.		1		
504-01	4 350 4893-01	Reducer Reduzierstutzen	ri 1/2" x 1/4"	St	2		
504-02	4 353 8302-03	Elbow screwing Winkelverschraubung	WE 8 - SR	St	2		
504-03	4 353 8400-33	Elbow screwing Winkelverschraubung	WE 8 - SR	1.4571	2		
504-04	4 354 8241-11	T-screwing T-Verschraubung	T 8 - S	St	2		
504-05	4 350 8243-13	Screwing Gerade Verschraubung	SV 8 - S	St	2		
504-06		Pipe Rohr	8 x 1,5 DIN 2391	1.4571	6		
504-07	4 015 0006-09	Washer Scheibe	A 6,4 DIN 125	1.4571	6		
504-08	4 000 0006-04	Hexagon screw 6kt. Schraube	M 6x16 DIN 933	1.4571	6		
504-09	4 625 9000-03	Protection ring Durchführungstülle		PVC	2		
504-10		Hydraulic oil Hydrauliköl			1		
504-11	4 708 5160-05	Hydraulic unit Hydraulikaggregat	RM 0,27- /		1		
504-12	4 620 0000-42	Drive motor Antriebsmotor	0,25 KW / 1500 U/min.		1		
504-13	4 354 8241-11	T-screwing T-Verschraubung	T 8 - S	St	1		
504-14	4 722 1032-01	Holding angle Haltewinkel		St 37-2	1		
504-16	4 722 1018-80	Holding for Hydr. unit Halter			4		
504-17	4 000 2300-20	Socket screw Zylinderschraube	M 10x30 DIN 912	8.8	4		
504-18	4 000 0006-36	Hexagon screw 6kt. Schraube	M 8x20 DIN 933	1.4571	8		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :504

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
504-19	4 350 4893-01	Reducer Reduzierstutzen	ri 1/2" x 1/4"	St	1		
504-20	4 350 8302-07	Pipe union Einschraubverschraubung	GE 8 - SR	St	1		
504-23	4 323 0000-06	Pressure valve Druckventil			2		
504-24	4 353 8302-03	Elbow screwing Winkelverschraubung	WE 8 - SR	St	2		
504-25	4 350 8302-07	Pipe union Einschraubverschraubung	GE 8 - SR	St	2		
504-26	4 350 8407-46	Reducer Reduzierstutzen	ri 3/8" x 1/4"	St	2		
504-27	4 000 2301-13	Socket screw Zylinderschraube	M 6x16 DIN 912	1.4571	8		
504-28	4 010 0201-25	Hexagon nut 6kt. Mutter	M 6 DIN 934	1.4571	8		

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

600

DRIVE

ANTRIEB

TYPE: SHL 25

DRAW-NO.: 4 722 1396

REG.-No.: 600-01.02

SHEET: 1

ED. 12/78

ED. 11/78 SHEET: 1 REG.-NO.: 600-01.04 DRAW-NO.: 4 722 1396-97 TYPE: SHL 25

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 600

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
600-00	4 722 1396-97	Drive Antrieb	SZO 180		1		
600-01	4 722 1048-02	Drive gear Aufsteckgetriebe	SZO 180		1		
600-02	4 016 2509-18	Fitting key Paßfeder	AS 28x16 x 260 lg. DIN 6885/1	St 60-2K	1		
600-03	4 722 1056-01	Disk Endscheibe			1		
600-04	4 111 0800-24	Cylindrical pin Zylinderstift	10m 6x24 DIN 7	St	1		
600-05	4 016 0011-55	Locking washer Sicherungsscheibe	25 DIN 432	1.4571	1		
600-06	4 000 0005-52	Hexagon screw 6kt. Schraube	M 24x50 DIN 933	8.8	1		
600-07	4 722 1390-83	Torque-supporting Drehmomentenstütze			1		
600-09		Belt-pulley Riemenscheibe	for gear		1		
600-11		Belt-pulley Riemenscheibe	for motor		1		
600-13		V-belt Keilriemen	SPB				

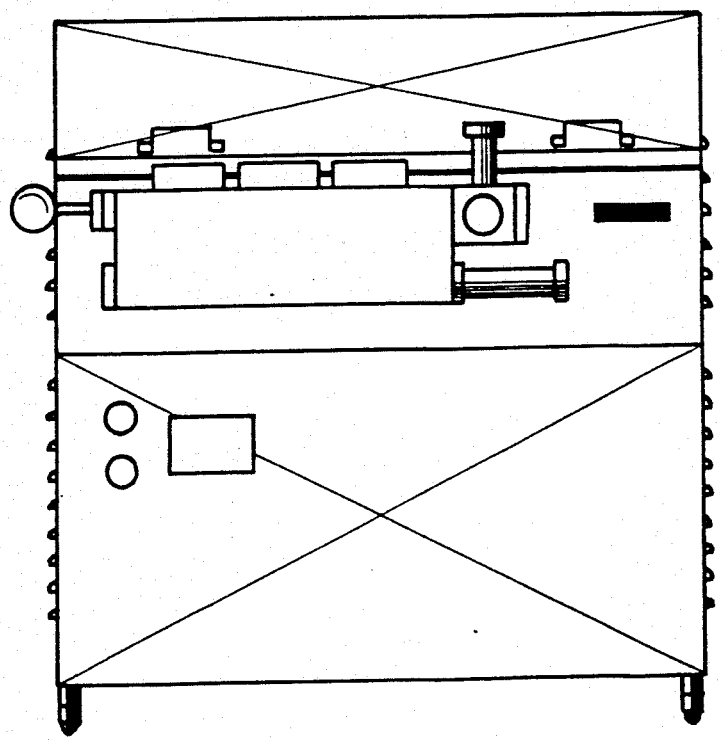
TYPE : SHL 20

MACHINE NO.: 59.10185

For info only

INSTRUCTION MANUAL

HIGH PRESSURE HOMOGENIZER



ALFA-LAVAL
Bran & Lübbe GmbH, Postfach 1360, Werkstr. 4, D-2000 Norderstedt

ED:

SHEET:

REG.-No.:

DRAW-No.:

TYPE:

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

C O N T E N T S

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

C O N T E N T S

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

GENEREL DESCRIPTION OF THE ALFA-LAVAL HIGH-PRESSURE HOMOGENIZER

The ALFA-LAVAL homogenizing machine is designed as an horizontal three-piston pump, i.e. a high-pressure, positive displacement pump delivering through homogenizing valves.
The high-pressure homogenizer is normally mounted on a frame enclosed by stainless steel panels. The electric motor as well as the electrical and hydraulic systems (except the starter switch) are integral parts of the machine, incorporated within the enclosing panels.
The high-pressure homogenizer is used for dispersion in applications found in dairy, chemopharmazeutical and allied processes.
The products to be processed are emulsions (liquid-in-liquid) or suspensions (solid particles in liquid) with viscosities of up to 15 - 20.000 mPas (c.P.) and a solids content of up to 48 - 50% in the dry phase (D.S.).

The homogenizing process requires that the feed is adequately blended or mixed and that pumping requirements are complied with.

The primary purpose of homogenizing is to break up the particles in suspension and to ensure uniform distribution of particles to improve the physical stability of the product. Depending on the nature of the particles and their readiness to break up, the separation into different phases (sedimentation, creaming-up, coagulation) is prevented or considerably delayed. High-pressure homogenizing also serves to influence viscosity, to enlarge the internal surface thus enhancing the chemical reaction rate, and to obtain cellular disintegration.

Depending on nature and condition of the product as well as on the working pressure and temperature prevailing during homogenization, particles of micron and sub-micron size are obtainable.

The ALFA-LAVAL homogenizer is designed as unit-composed system, allowing for a variety of differnt versions being available.

These include one- and two-stage homogenizing valves, various pump piston diameters and piston sealing systems, conical and ball valves (depending on the viscosity involved), and various types of material, etc.

All high-pressure homogenizers can be operated aseptically, with appropriate fittings and accessories.

Subsequent changes to other processing rates and pressures are feasible within the scope of the model concerned.

High-pressure homogenizers incorporating positive displacement pumps essentially require that the following operating conditions are maintained throughout, to ensure reliable and safe performance:

- Feed rate should be according to the layout of the machine, and feed should be under pressure appropriate to the product involved (NPHS), at all times, including cleaning periods.

- No free, i.e. non-dissolved air must be contained in the feed and/or cleaning agents.

Further, product properties, operating and cleaning temperatures, cleaning agents, quality of cooling water, operation and maintenance are factors that will greatly influence the service life of the plant and those component parts that are particularly subject to inherent wear.

This manual is to make you familiar with your high-pressure homogenizer, i.e. with its proper operation, maintenance and repair. Based on experience, we also include useful hints on trouble shooting.

Naturally, not every source of failure and every precautionary step can be enumerated. But with thorough knowledge of the manual you will be able to operate your high-pressure homogenizer in a way that will ensure satisfactory service.

It is for this purpose that the manual was issued, and we would recommend reading it from time to time.

For further advice and information please apply to your local ALFA-LAVAL company who will be at your service at all times.

PREFACE TO THE INSTRUCTION MANUAL

The manual is subdivided in such a way that, apart from giving general information, it also serves to supply advice on the installation, initial/ operation, maintenance and repair, and on ordering spare parts of the homogenizer and/or the high-pressure pump.

SECTION 1, TECHNICAL DATA

This section covers all the essential technical data of the homogenizing device, the high-pressure pump, its drive/driving gear, and lay out. It also includes cooling water and lubricants recommendations.

SECTION 2, DESCRIPTION OF (CONSTRUCTION GROUPS) ASSEMBLIES

This section describes all individual assemblies of the homogenizer. Photographs, diagrams and isometrically drawn control diagrams illustrate the text.

SECTION 3, HOW TO INSTALL THE HOMOGENIZER

This section describes the handling and installing of the homogenizer. Proper mounting work is supported by diagrams showing connections of piping and electric cables.

SECTION 4, INITIAL OPERATION

This section contains check lists covering the various checks and working procedures required to ensure trouble-free operation. A list of possible failures and likely causes serves to find the sources of trouble.

SECTION 5, MAINTENANCE AND REPAIR

Dismantling and reassembling instructions, covering the various assemblies are given in this section.
Under the heading of "Preliminary Work" those jobs are mentioned that are imparative to ensure rational and time-saving maintenance and repairs. Tools required are listed to facilitate the procedure.
The "Time Required" indicates manpower and the period of time necessary to carry out the work involved, e.g.

2 men will require 0.6 hours, i.e. 36 minutes to do the job.

These guiding values have been established by the MTM - method (METHODS TIME MEASUREMENT).
The "WORKING PROCEDURE" describes, step by step, the required maintenance and repairs to keep the homogenizer and/or high-pressure pump in satisfactory and serviceable condition. Diagrams and photographs serve to illustrate the various jobs. Numerals identifying the various component parts coincide with those mentioned in the descriptions. However, they are not identical with the "Pos.-No." in the spare parts list.

SECTION 6, SPARE PARTS

The spare parts (lists) of the various assemblies are numbered in ascending order and printed on pink paper. Lists consist of a diagram and parts list section. A specimen order form is inserted/as preface to the spare parts lists.

A correctly prepared order form will ensure prompt delivery of the spares required.

ALFA-LAVAL

Bran & Lübbe GmbH

Postfach 13 60
Werkstraße 4

D - 2000 Norderstedt

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

IDENTIFICATION OF HOMOGENIZER

The name plate is fixed to the driving gear housing, and it is visible when the cover plate is lifted. The name plate shows the type designation and serial number.
When ordering spares, please verify that the serial number on the plate coincides with the number in your instruction manual.

YOU ARE OPERATING A

HIGH-PRESSURE PUMP
TYPE: SHL
FOR USE AS

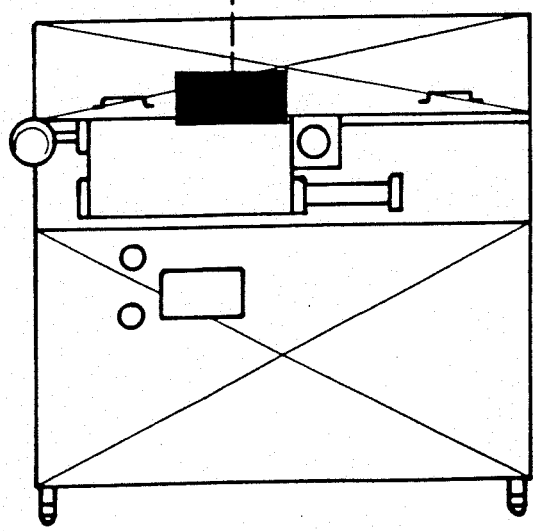
[X] HOMOGENIZING MACHINE [ ] HIGH-PRESSURE PUMP

ALFA-LAVAL
HOMOGENIZER
MANUFACTURED BY BRAN & LÜBBE GMBH D-2000 NORDERSTEDT

TYPE : SHL 20

MACHINE NO.: 59.10185 Manuf.-Year : 1984

MADE IN WESTERN GERMANY



SECTION 1

Technical Data

SECTION 2

Assembly Group Description

SECTION 2

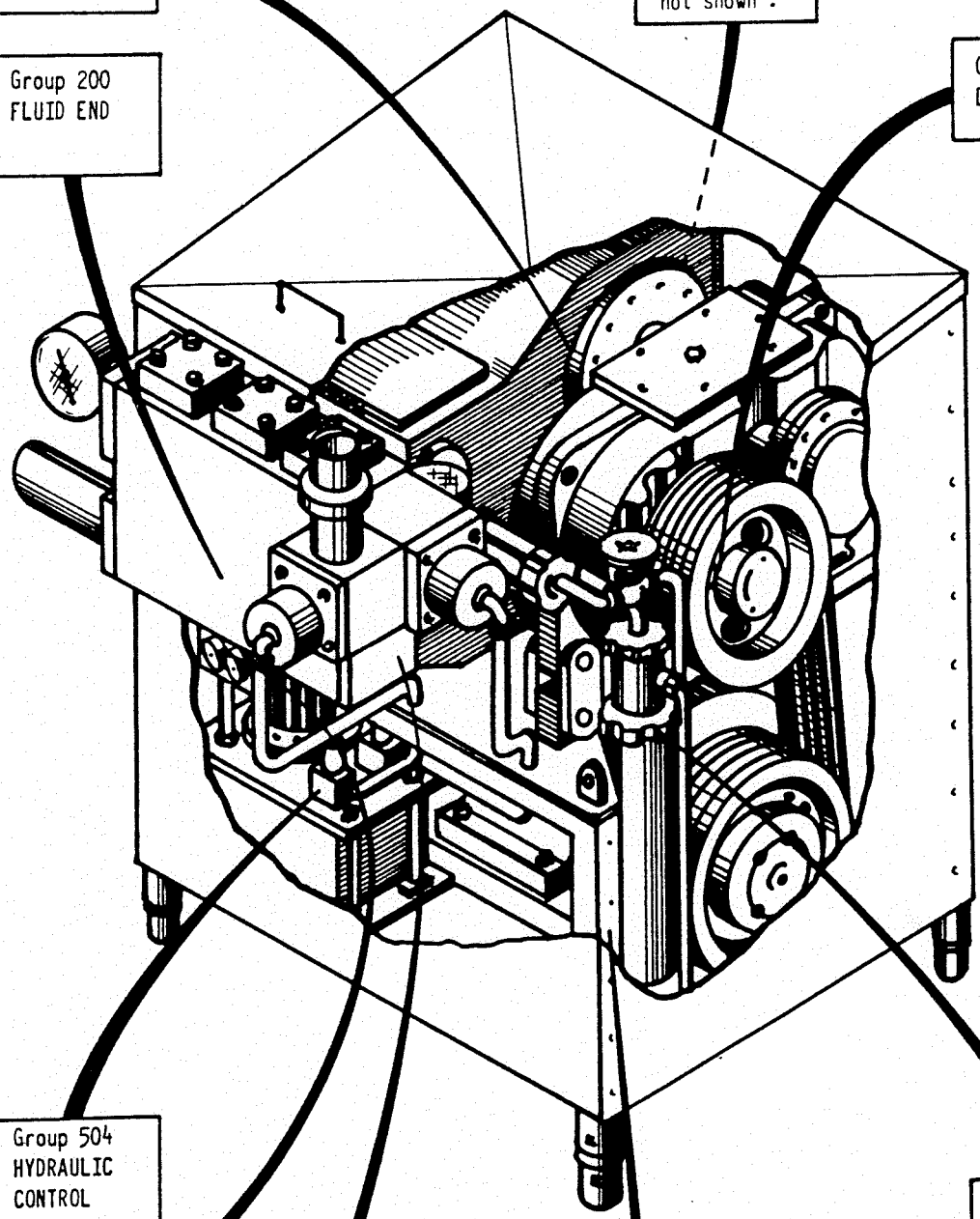
Assembly Group Description

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

ASSEMBLY GROUPS - GENERAL ARRANGEMENT

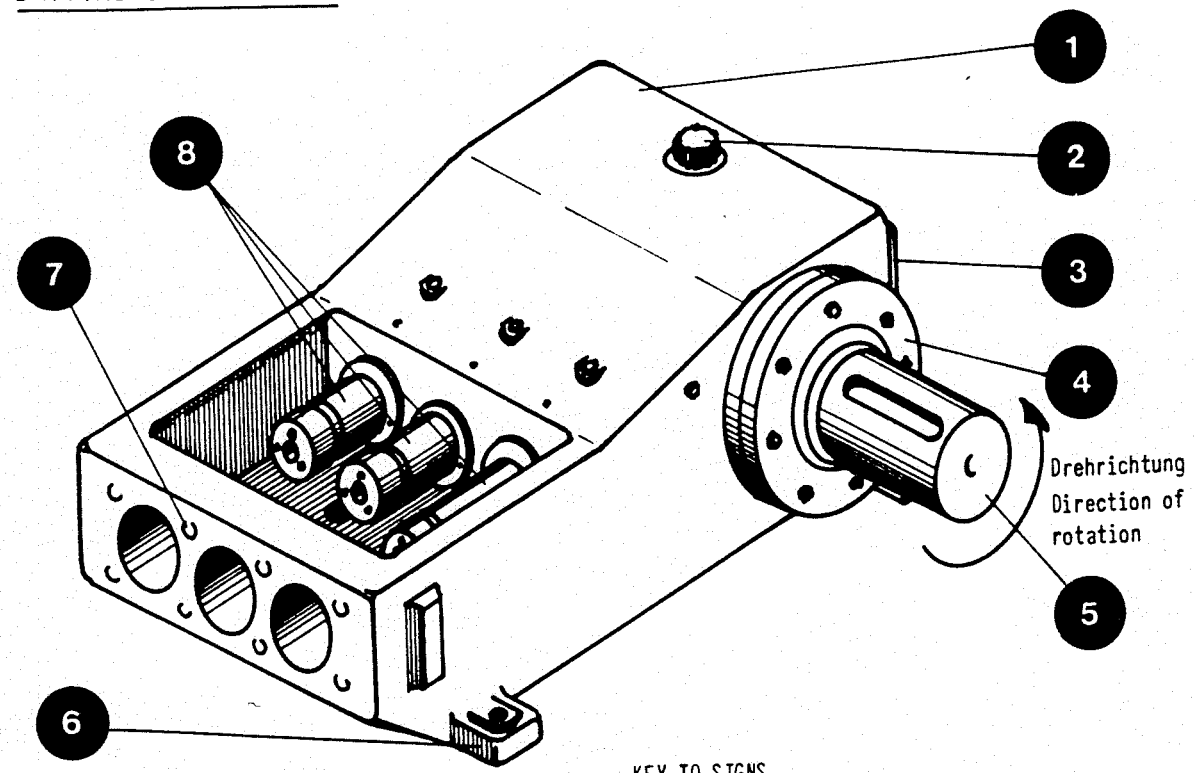
The A L F A - L A V A L Homogenizer, type SHL, consists of the following assembly groups:



Assembly groups not shown in the cut-away view are illustrated and explained in the section DESCRIPTION OF ASSEMBLY GROUPS.

ED: 4/79
SHEET:
REG.-No.: 02-01-01
DRAW-No.:
TYPE: SHL

ASSEMBLY 100
DRIVING GEAR HOUSING



KEY TO SIGNS

1 = Driving gear housing
2 = Oil filler
3 = Cover plate, perspex (transparent)
4 = Bearing flange
5 = Crankshaft, drive end (gear box end)
6 = Mounting lugs
7 = Front end surface to connect with pump cylinder block
8 = Crossheads

DESCRIPTION

The driving gear/crankcase is part of the high-pressure positive displacement pump.
To obtain continuous delivery, a three-throw crankshaft is used, with 120o between cranks. Power is supplied from the motor through V-belts and shaft mounted reduction gear.

The three-throw crankshaft (5) rotates in two cylindrical roller bearings fitted in the driving gear (1).
The big-end bearings are of the split type, with dual metal linings.
The wrist pins rest in crossheads (8) and are secured by threaded studs. The wrist pin bushes are of spun-cast bronze.

Crankshaft bearings are splash lubricated, the connecting rods scooping up the oil which is fed to the bearings through appropriate drillings. Oil from the crank webs is scraped and fed to crossheads and wrist pins. Crossheads are sealed to prevent oil spillage.

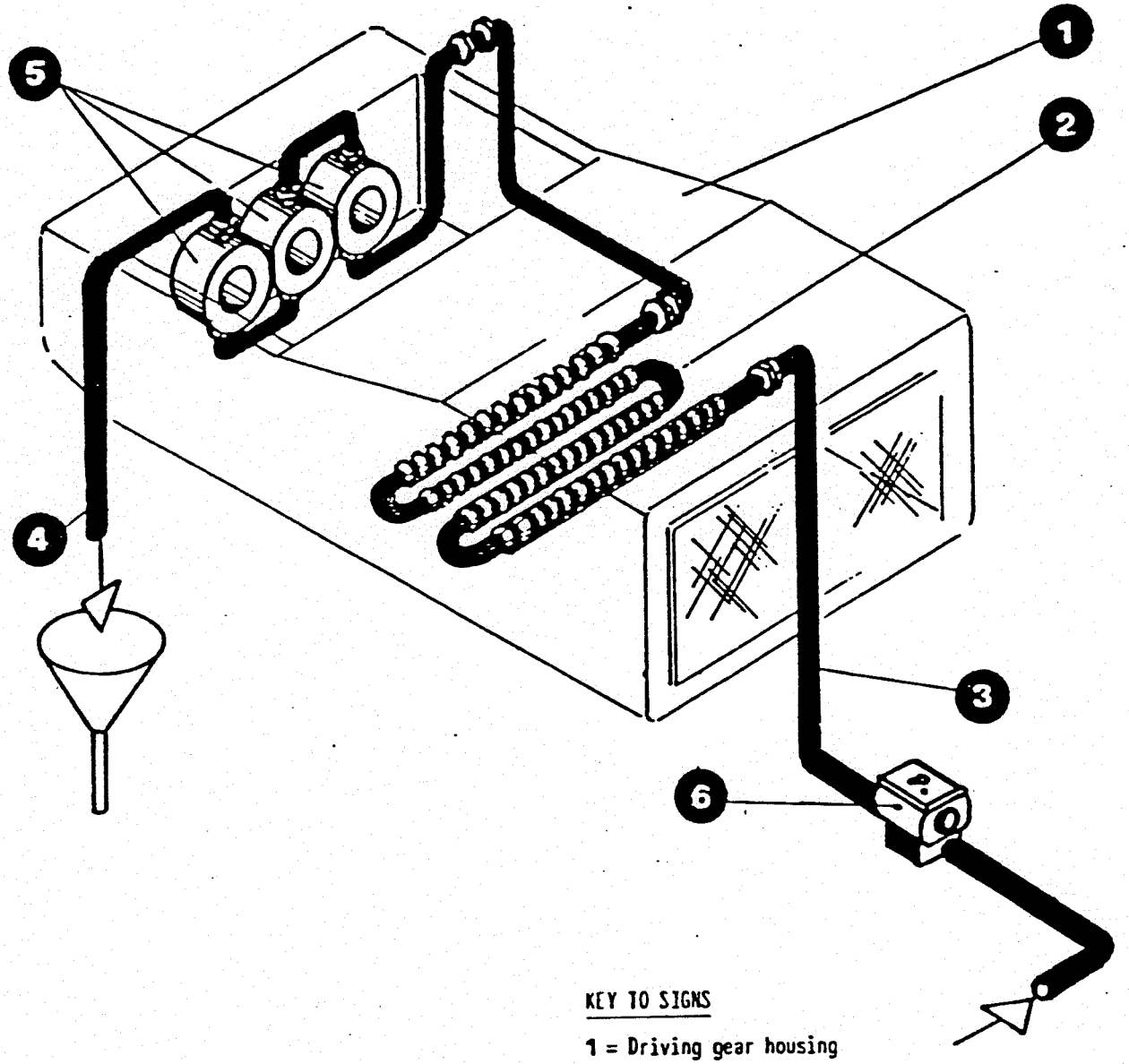
The transparent perspex cover (3) at the rear end of the driving gear housing allows for a constant check of the oil level and condensed water content.
The oil is changed by draining the used oil through sump cock

Fresh oil is poured through the filler (2).

The driving gear housing is bolted to the frame by the four mounting lugs (6).

ASSEMBLY 105
OIL COOLER IN WATER
COOLING SYSTEM

STANDARD AND SOLENOID VALVE



KEY TO SIGNS

1 = Driving gear housing
2 = Cooling coil
3 = Water inlet
4 = Water outlet
5 = Pump cylinder bushes
6 = Solenoid valve

DESCRIPTION

The oil of the driving gear is cooled by a water coil system fitted in the sump of the housing (1). The coil (2) consists of a finned pipe. Water inlet and outlet lines (3 + 4) are connected through the sides of the housing by bulkhead screws. The cooler ist readily replaceable.

The cooling water is taken from mains. It flows through the coil thus cooling the oil in the driving gear sump. The warmed-up water circulates through the sealing chambers of the pump cylinder bushes (5), thus cooling the pump pistons.
The cooling water passing through the sealing chambers also ensures boundary lubrication of the front and rear piston seals.
The used water is run to the sewage system. Solenoid valve (6) is electrically controlled so that it will be opened before homogenizer is started and closed after shut down of homogenizer.

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SHEET:
REG.-No.: 02-01.01
DRAW.-No.:
TYPE: SHL 20 / 25 / 30

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

TECHNICAL DATA

TYPE OF MACHINE	HOMOGENISER **SHL 20**
SERIAL NO.	59.101.85
YEAR OF CONSTRUCTION	1984

DESIGNATION		MEASUREMENT
The fluid end / homogenizing head is designed for :	Prod. - l/h	1450
Maximum operating pressure :	bar	276 / 4000 p.s.i.
Maximum operating temperature :	°C	85°
TECHNICAL DATA OF HIGH-PRESSURE PUMP		
Type		Horizontale 3- piston-pump
Number of plungers		3
Diameter of plungers	mm	∅ 36
Stroke of plungers	mm	65
Type of plunger seals		☒ Grooved ring ☐ V-packings
Type of valves		☒ Cone valves ☐ Ball valves
Nominal width of suction connection (SHL-H)	mm	☒ SMS 38 (38) ☐ DIN 40 (32)
Nominal width of delivery connection	mm	☒ SMS 38 ☐ DIN 40
Feed pressure	bar	1,5 - 2
TECHNICAL DATA OF HOMOGENIZING HEAD		
Type of head		☐ Single- ☒ Double-stage homogenizing head
Size of homogenizing device	mm	1st stage ∅ 10/18 , 2nd stage ∅ 10/18
Pressure setting		☒ manually ☐ manual remote control
MATERIALS		
Material of pump housing		cast iron
Material of cylinder block		stainless steel

1984

SHEET 1 of 3

PROD.-No.: 59.101.85

DRAW.-No.:

PE: SHL 20

1984

SHEET: 2 of 3

REG.-No.: 53.101.85

DRAW-No.:

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

TECHNICAL DATA

TECHNICAL DATA OF DRIVE

DESIGNATION	MEASUREMENT	DRIVE MOTOR
Manufacturer		BBC
Motor type		QU160L4AG
Voltage	V	415
Frequency	Hz	50
Rated power	KW	15
Number of RPM	1/min	1500
Type of construction		B3
Type of protection		IP54
Nominal current	A	30,5
PTB – Number (ex.proof)		
Motor weight	kg	127

DIMENSION OF V – BELT PULLEYS

Effective diameter of V – belt pulley "DRIVE MOTOR" (d_M) : 208 mm

Effective diameter of V – belt pulley "GEAR" (d_W) : 315 mm

Number of belts : 4 piece

Type of V-belts : SPA

Length of V-belts : 1982

TECHNICAL DATA OF GEAR

Manufacturer			Flender
Construction of gear			SZO 140
Number of stages	(Z)		2
Reduction ratio	(i)	1	7,185
Revolutions at outlet	min.	1/min	70
Revolutions at outlet	max.	1/min	290
Maximum torque output	($M_{t\ max}$)	Nm	3030
Quantity of oil		l	3,2
Grade of oil			See: LUBRICANTS RECOMMENDATIONS

TECHNICAL DATA OF HYDRAULIC CONTROL UNIT

MOTOR

Manufacturer			
Type			
Voltage	415		V
Frequency	☒ 50	☐ 60	Hz
Nominal current	0,8		A
Rating	0,25		KW
R.p.m.	☒ 1500	☐ 1 800	1/min

HYDRAULIC PUMP

Manufacturer	Hawe	
Type	Pistonpump	
Delivery rating	0,27	l/min
Operat.pressure	300	bar
Hydr.fluid temp.	40	°C
Filling capacity	9,5	l
Remote pressure relief	2x48 V~	

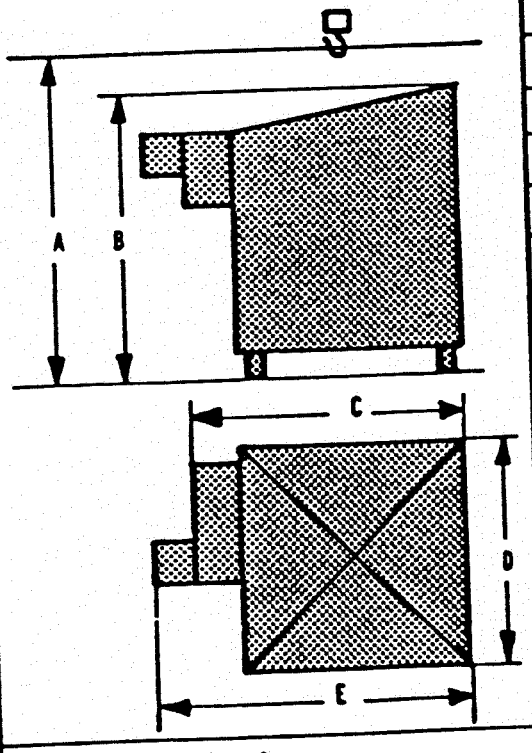
SHL 20

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

TECHNICAL DATA

DESIGNATION	MEASURING UNIT	MEASUREMENT
OIL COOLING PUMP HOUSING		
Construction of the oil cooler		Gilled pipe cooler
Consumption of cooling water approx	l/h	150 at 15°C with hardness max. 10–12 dGH
RINSING OF PISTONS		
Rinsing medium		☒ water at 15°C / ☐ hot steam condensate
Consumption of rinsing medium approx.	l/h	150
CONDENSATE UNIT		
Consumption of cooling water approx.	l/h	– at 15°C with hardness max. 10–12 dGH
Steam required approx.	kg/h	– at 140°C and a pressure of approx. 6 bar
TOTAL CONSUMPTION OF COOLING WATER approx.	l/h	150
TOTAL CONSUMPTION OF STEAM approx.	kg/h	–
OIL LUBRICATING PUMP DRIVE		
Method of lubrication		Splash lubrication
Lubrication oil quantity	kg	20
Grade of oil		See: Lubricants recommendation
EXTERNAL MEASUREMENT OF HOMOGENISER		*) 1° German Hardness (dGH) = 1.25° British Hardness / 1.79° French Hardness
	mm	A = Installation height : 2 845
	mm	B = Total height : 1 345
	mm	C = Length without homogenisation head: 1 166
	mm	D = Total length : 1 059
	mm	E = Length with homogenisation head : 1 276
Total weight of machine	kg	1087
Machine weight without drive motor	kg	960



LUBRICANTS - RECOMMENDATIONS

CRANKCASE OIL REQUIREMENTS (in driving gear of pump)

The lubricating oil serves to reduce friction and wear, and to protect bearings against corrosion. The lubricants recommended by us are high-grade, demulsifying mineral oils. They should also dissipate friction heat from bearings, offer satisfactory lubrication at all operating temperatures, suppress noise and ensure optimum/service-free operation by long service/life i.e. extended oil change periods.

GEAR OIL REQUIREMENTS (in reduction gears of pump drive)

The primary task of a gear oil is to control gear tooth wear, which may occur for various reasons, in such a way that full serviceability of gears is ensured over an extended period of operation. Gear oils should also meet the following requirements: Satisfactory demulsifying property, high oxidation and temperature stability, satisfactory corrosion protection, low foaming tendency and compatibility with non-ferrous metals. The gear oils recommended by us meet these requirements.

HYDRAULIC OIL REQUIREMENTS (in hydraulic control system)

Hydraulic oils should show specific properties to meet requirements prevailing in actual practice, viz.: satisfactory lubricating property, oxidation stability, satisfactory flow and shear stability as well as a wide temperature range. The oil should also offer anti-corrosion, anti-waer properties and favourable water and air releasing ability. It should be compatible with sealing materials and show low foaming tendency.

The alphabetical order of lubricants listed hereunder does not imply any superiority of one brand/grade over the other.

BRANDS	CRANKCASE OIL (in driving gear of pump)	VISCOSITY RATE in mm^2/s (cS) at 40° C ++	GEAR OIL (in reduction gear of pump drive)	VISCOSITY RATE in mm^2/s (cS) at 40° C ++	HYDRAULIC OIL (in hydraulic control system)	VISCOSITY RATE in mm^2/s (cS) at 40° C ++
SHL 20	20 l		3,2 l		9,5 l	
SHL 25	28 l		6,3 l		9,5 l	
SHL 30	62 l		13,0 l		9,5 l	
SHL 40	80 l		28,0 l		9,5 l	
ARAL	MOTANOL HK 100 MOTANOL HK 150	100 150	DEGOL BG	460	VITAN DE 46	46
BP	ENERGOL CS 100 ENERGOL CS 150	110 150	GR XP 460	425	ENERGOL HLP 46	46
Esso	Nuto 100 Nuto 150	100 150	SPARTAN 460	440	NUTO H46	46
Mobil	MOBIL DTE Extra MOBIL DTE,Extra Heavy	81 140	MOBILGEAR 634	433	D.T.E. 25	46
SHELL	VITREA 100 VITREA 150	100 150	OMALA 460	460	TELLUS 46	46

++) The ISO-Viscosity classification for industrial lubricants is effective since June, 1976. It is essentially identical with ISO standard specification 3448 and ensures internationally uniform viscosity ratings in mm^2/s (cS) at 40° C.

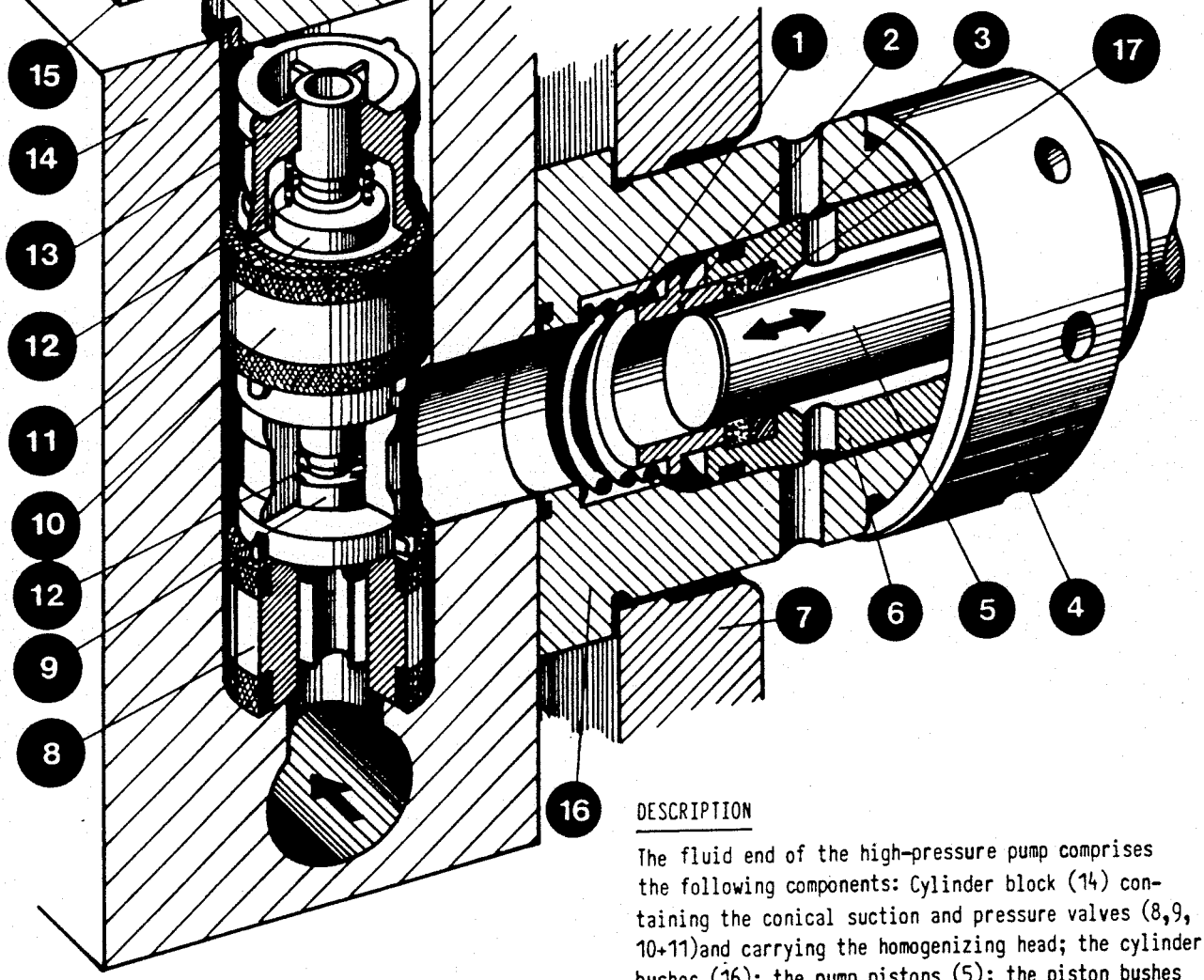
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

ASSEMBLY 200
FLUID END

KEY TO SIGNS

1 = Spring
2 = Header ring
3 = Sealing, piston
4 = Screw-down nut
5 = pump piston
6 = Piston bush
7 = Drive gear housing
8 = Suction valve seat
9 = Suction valve cone
10 = Pressure valve seat
11 = Pressure valve cone
12 = Valve spring
13 = Valve cage
14 = Cylinder block
15 = Cover
16 = Cylinder bush
17 = Piston guide ring



DESCRIPTION

The fluid end of the high-pressure pump comprises the following components: Cylinder block (14) containing the conical suction and pressure valves (8,9, 10+11)and carrying the homogenizing head; the cylinder bushes (16); the pump pistons (5); the piston bushes (6) with their seals (3) and the screw-down nuts (4). In the diagram, the piston seals at the cylinder block end are visible only; the piston seals at the opposite end are obscured by the screw-down nut.

The cylinder bushes are inserted through the drillings in the face of the drive gear housing (7). The cylinder block, which is forged in one piece, is set against the cylinder bushes and tightened up by expansion screws from the inside of the drive gear housing. The pump pistons are bolted to the crossheads, via couplings, and are guided in the piston guide rings (17), in aligment with the drive gear. The pump pistons are sealed by special sealings compatible with the substances to be homogenized. The front and rear end seals are standard equipment. The annulus between the seals provides a chamber for water cooling of the pistons and boundary lubrication of the seals. In aseptic operation, this chamber is fed with steam condensate, so that it serves as a sterilizing seal.

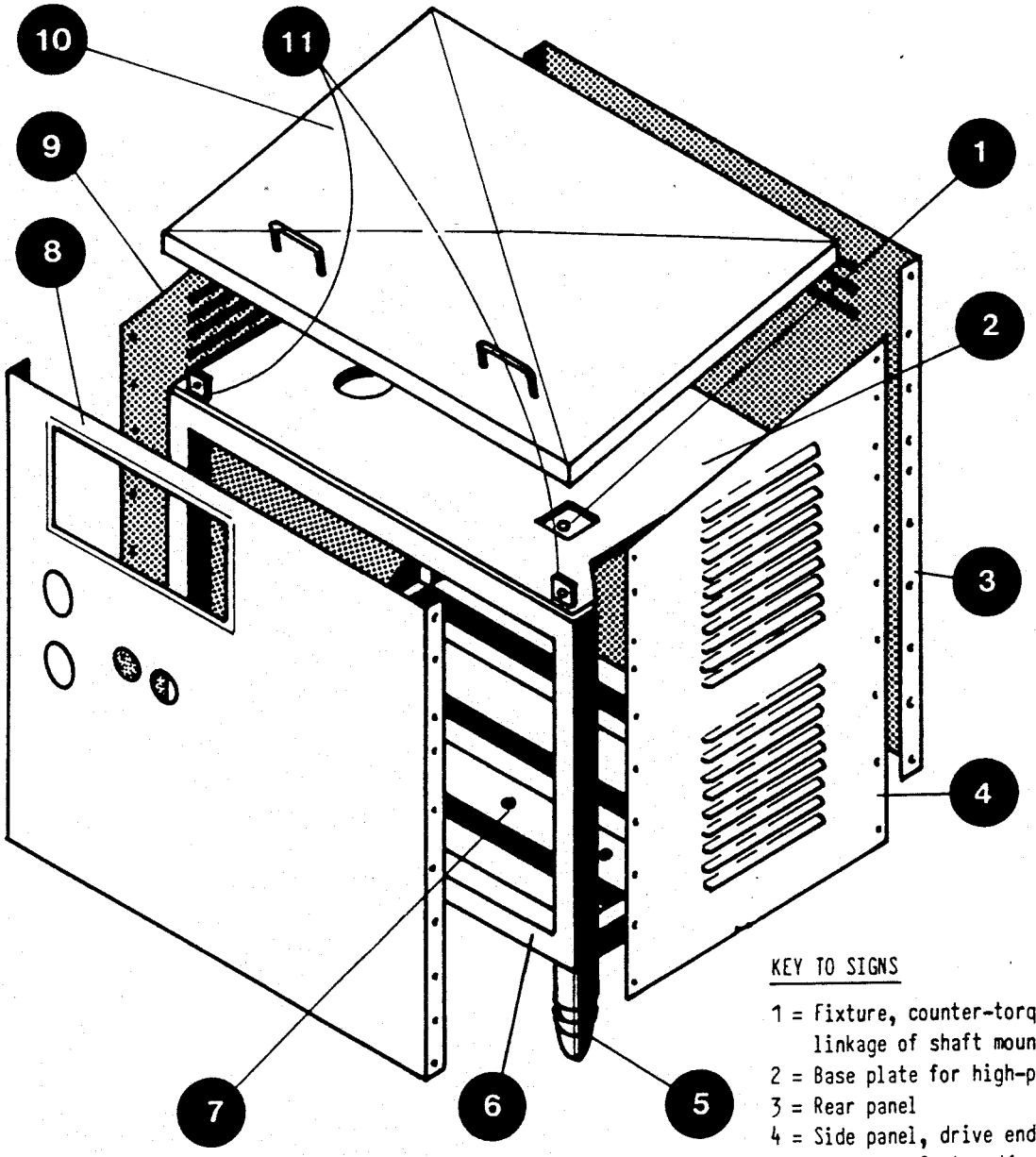
The piston bushes (6) together with the pistons (5) and seals (3) form a readily replaceable self-contained unit.

The pistons consist of high-grade, high-tensile stainless steel or are chromium-hardened, alternatively.

The readily exchangeable conical valves consist of stellite.

Depending on the layout of the pump, delivery pressures of up to 630 bar are obtainable.

ASSEMBLY 400
STAINLESS STEEL PANELS



KEY TO SIGNS

1 = Fixture, counter-torque linkage of shaft mounted gear
2 = Base plate for high-pressure pump
3 = Rear panel
4 = Side panel, drive end
5 = Ball-type foot, adjustable
6 = Frame
7 = Motor carrier
8 = Front panel
9 = Side panel
10 = Cover, top
11 = Lifting lugs

DESCRIPTION

The frame (6) consists of welded box sections. The base plate (2) is welded to the frame and carries the high-pressure pump with shaft mounted reduction gear. The gear box is linked to the fixture (1), to take up the torque.

The motor carrier (7) is located in the lower part of the frame.

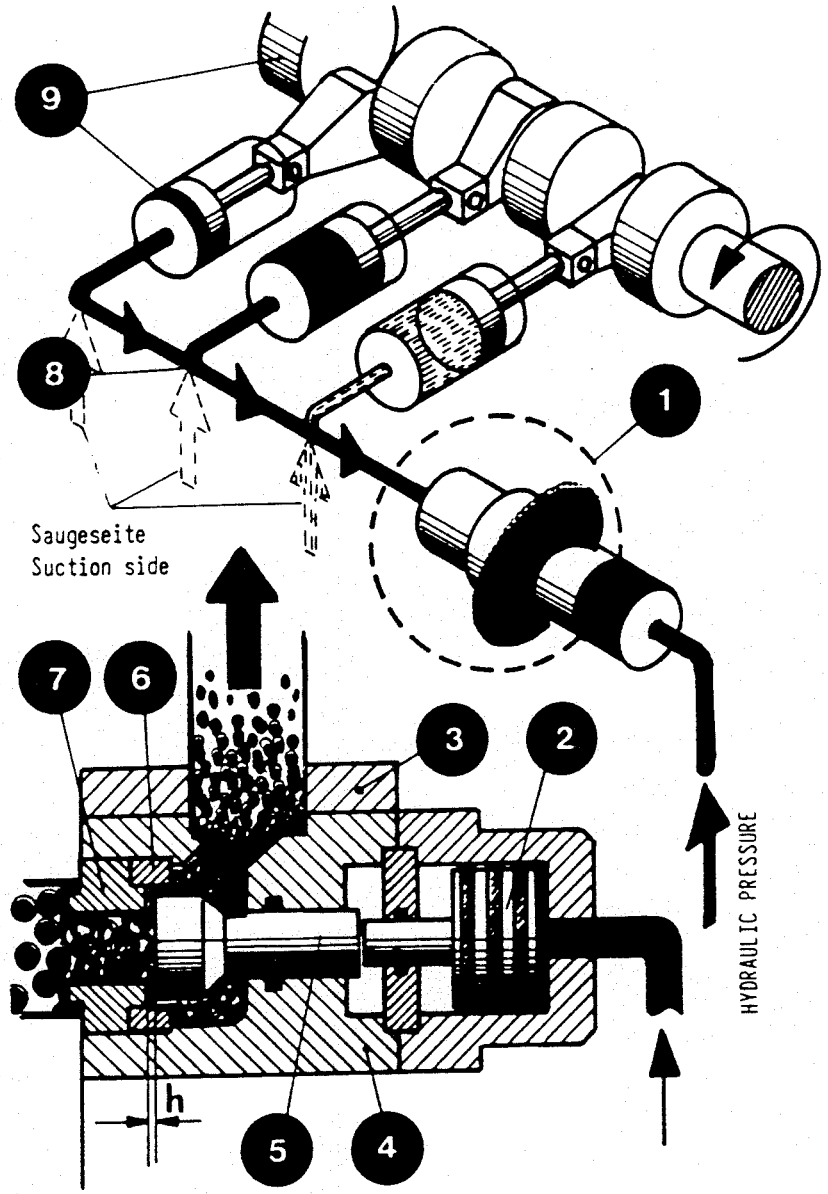
Another plate carries the hydraulic unit controlling the pressure in the homogenizing heads. The frame rests on ball-type feet (5) which are vertically adjustable. On removal of the top cover (10), the machine can be lifted by the four lugs (11).

The frame is enclosed by stainless steel panels (3, 4, 8 and 9), which are bolted to the frame. The cover (10) is detachable. The electric and hydraulic controls are positioned in the front panel (8). Side and rear panels are provided with louvres for ventilation. The frame has a multi-coat protective finish. The stainless steel panels are glass-bead blasted.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

ASSEMBLY 500
HOMOGENIZING DEVICE



KEY TO SIGNS

1 = Homogenizing device
2 = Hydraulic control system
3 = Product flange discharge
4 = Homogenizing head
5 = Homo device cone
6 = Impact ring
7 = Homo device seat
8 = High-pressure manifold in cylinder block
9 = Three-piston high-pressure pump

DESCRIPTION

The homogenizing head (4), incorporating the homogenizing system (1) is fed by the three-piston high-pressure pump (9), i.e. the head is flanged to the cylinder block of the pump. The homogenizing device represents a throttle valve which is closed by hydraulic pressure. To avoid excessive pump pressures, the machine must always be started up with opened i.e. pressureless homogenizing valve.

The product, i.e. the feed, is delivered under initial pressure to the suction side of the pump. The pump pistons force the product into the manifold (8) and via the open homogenizing valve and discharge flange (3) into the discharge line.

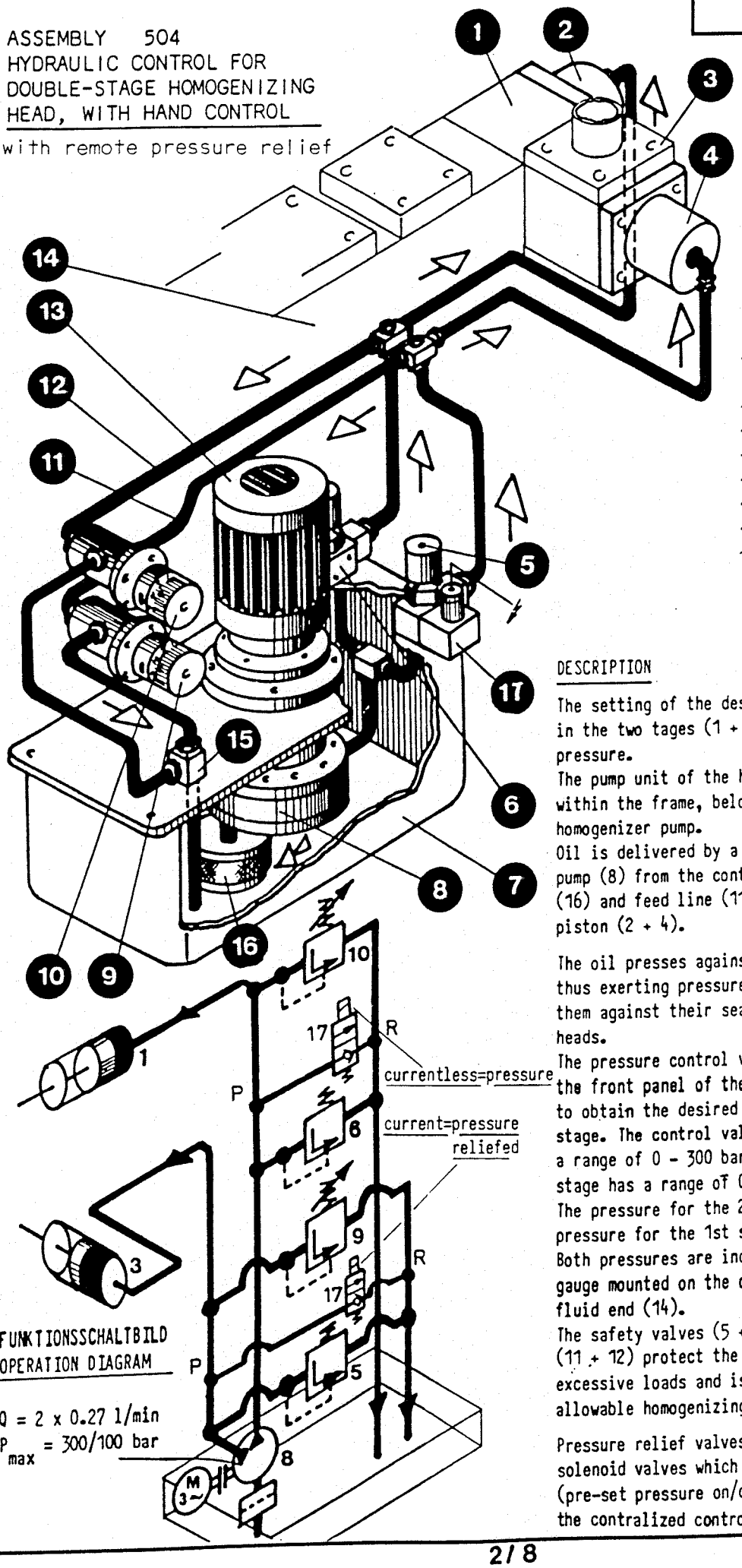
To start the homogenizing process the desired homogenizing valve pressure is set with the aid of the hydraulic control system (2) while the pump is delivering. The homo device cone (5) is pressed by the hydraulic piston (2) against the product flow discharged through the seat (7). An annulus or ring gap is thus obtained, amounting to the dimension " h " shown in the diagram. The product is forced through the gap and depressurized in the process. This release causes a high velocity of flow. The product impinges against the inner surface of the impact ring (6) with this high velocity and is released through the discharge flange (3) of the homogenizing head (4).

The flash-like energy conversion – from high to low pressure (approx. 1 bar) – will cause shear and impact forces, cavitation (vapour phase effects) and turbulence, which will effect the desired homogenization of the product.

The highly strained components (5,6 and 7) are made of stellite. The homo device seat (7) and the impact ring (6) are purely wear parts which may be reused, in reversed position, for another period of operation, thus obtaining double service life.
The homogenizing process can be effected in one or two stages. The use of a secondary stage can improve the desired effect if a low hydraulic pressure is applied against the primary stage. The power requirements of the pump is not affected thereby. The operating pressure prevailing in the primary stage is the controlling factor.

ASSEMBLY 504
HYDRAULIC CONTROL FOR
DOUBLE-STAGE HOMOGENIZING
HEAD, WITH HAND CONTROL

with remote pressure relief



KEY TO SIGNS

1 = Homogen. head, 1st stage
2 = Hydraulic piston
3 = Homogen. head, 2nd stage
4 = Hydraulic piston
5 = Safety valve 2nd stage
6 = Safety valve 1st stage
7 = Oil container
8 = Radial piston pump
9 = Pressure control valve, 2nd stage (0 - 100 bar)
10 = Pressure control valve, 1st stage (0 - 300 bar)
11 = Delivery line,2nd stage
12 = Delivery line,1st stage
13 = Motor
14 = Fluid end
15 = Common return line
16 = Oil filter
17 = Pressure relief valve 1st + 2nd stage

DESCRIPTION

The setting of the desired homogenizing pressures in the two tages (1 + 3) is effected by hydraulic pressure.
The pump unit of the hydraulic system is mounted within the frame, below the high-pressure homogenizer pump.
Oil is delivered by a self priming radial piston pump (8) from the container (7) through a filter (16) and feed line (11 + 12) to the hydraulic piston (2 + 4).

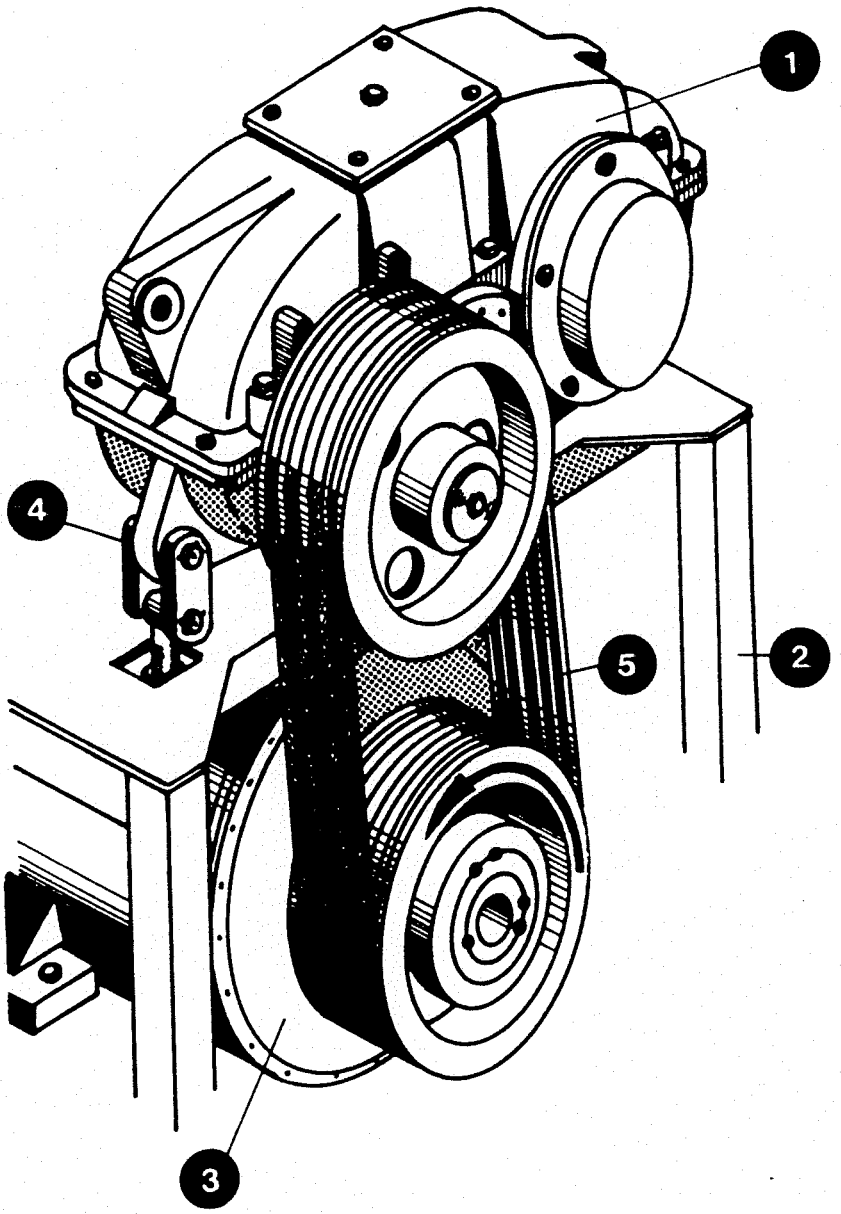
The oil presses against the hydraulic pistons, thus exerting pressure on the cones and holding them against their seats in the homogenizing heads.
The pressure control valves (9 + 10), located at the front panel of the machine, are set by hand to obtain the desired pressure in the 1st and 2nd stage. The control valve for the 1st stage has a range of 0 - 300 bar; the valve for the 2nd stage has a range of 0 - 100 bar.
The pressure for the 2nd stage is set first. The pressure for the 1st stage is set subsequently. Both pressures are indicated by the high-pressure gauge mounted on the cylinder block of the fluid end (14).
The safety valves (5 + 6) in the delivery lines (11 + 12) protect the hydraulic system against excessive loads and is limiting the maximum allowable homogenizing pressure of the machine.

Pressure relief valves (17) are remote controlled solenoid valves which are electrically actuated (pre-set pressure on/off) by switches located in the contralized control station.

TYPE: SHL 2-stufig mit Druckfernentlastung DRAW-No.: REG.-No.: 02-05.06 SHEET: ED. 5/82

ALFA-LAVAL

ASSEMBLY 600
DRIVE
(REDUCTION GEAR, FLOATING)



KEY TO SIGNS

1 = Crankshaft mounted, red. gear
2 = Frame
3 = Motor
4 = Torque support
5 = V-belts

DESCRIPTION

The high-pressure pump of the homogenizer is driven by a motor (3) through V-belts (5) and crankshaft mounted reduction gears (1).

The motor is, as a rule, a water-proofed asynchronous motor mounted on the lower base plate (2).

The hollow shaft of the reduction gear is key-fitted on the crankshaft of the pump. The reactive moment of the driving torque is taken up by the "torque support"(4).

The gears are splash lubricated. The lower part of the gear box serves as a sump. The oil drain plug is provided with a permanent magnet. Narrow V-belts are used for power transmission.

SECTION 3

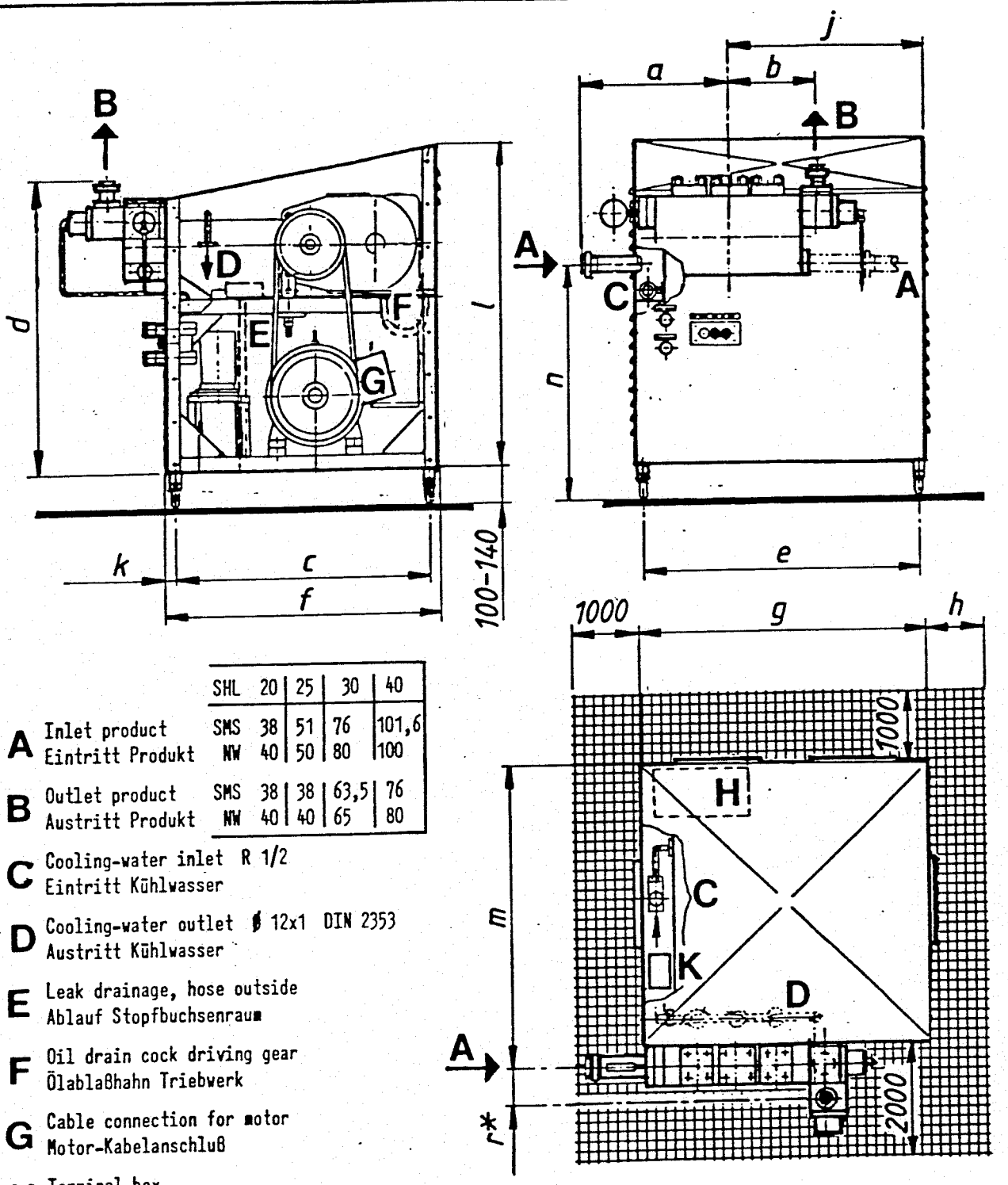
Installation

HOMOGENIZER-INSTALLATION DRAWING SHL 20-40

HOMOGENISATOR - AUFSTELLUNGSPLAN

ALFA-LAVAL

ED 11/83 SHEET: 1 REG.-No.: DRAW-No.:



		SHL	20	25	30	40
A	Inlet product Eintritt Produkt	SMS	38	51	76	101,6
		NW	40	50	80	100
B	Outlet product Austritt Produkt	SMS	38	38	63,5	76
		NW	40	40	65	80

C Cooling-water inlet R 1/2
Eintritt Kühlwasser

D Cooling-water outlet ⌀ 12x1 DIN 2353
Austritt Kühlwasser

E Leak drainage, hose outside
Ablauf Stopfbuchsenraum

F Oil drain cock driving gear
Ölablaßhahn Triebwerk

G Cable connection for motor
Motor-Kabelanschluß

H Terminal box
Klemmenkasten

K Electronic box for remote pressure indication
Elektronik Teil bei Ferndruckanzeige

SHL	a	b	c	d	e	f	g	h	j	k	l	m	n	r*	weight kg net without motor Gewicht kg ohne Motor
20	487	290	908	1016	1000	1036	1059	1000	716	39	1235	1097	710	122	860
25	531	320	1070	1176	1190	1156	1229	1500	832	43	1290	1226	841	122	1500
30	604	393	1480	1524	1470	1588	1562	1500	1060	54	1794	1678	1060	162	2750
40	629	470	1604	1750	1634	1800	1735	1800	1210	74	1916	1858	1200	222	4250

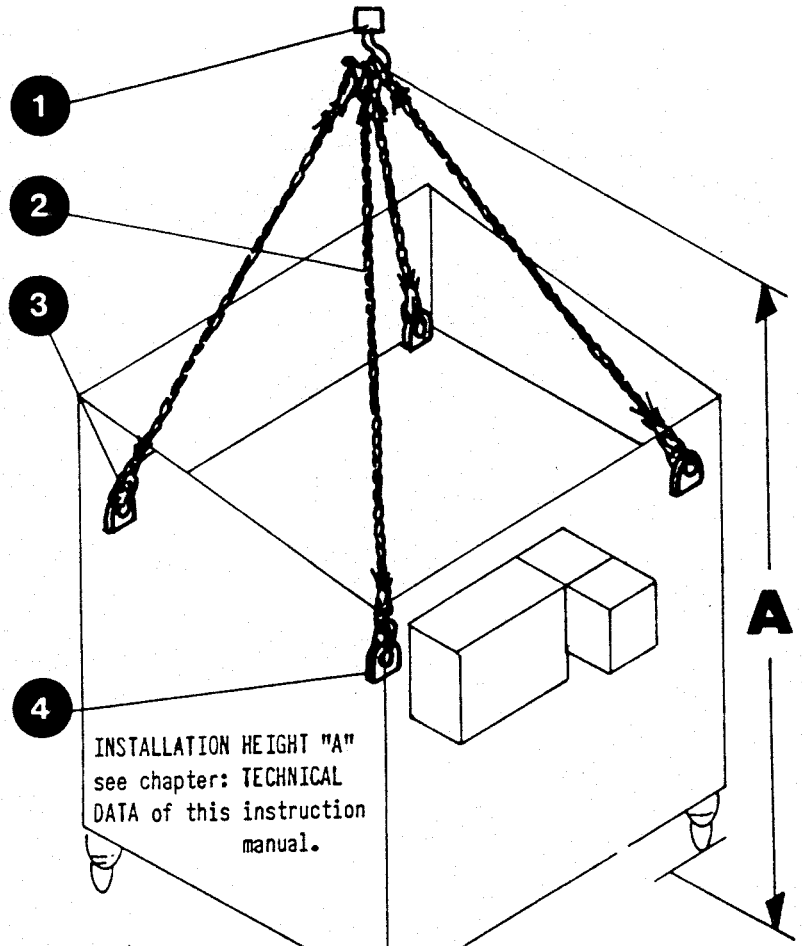
* Dimension for double-stage homogenizing head
Maß für Doppel-Homogenisierkopf

TYPE:SHL 20-40 Aufstellungsplan

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HANDLING AND POSITIONING



KEY TO SIGNS

1 = Hoisting hook
2 = Slings
3 = Shackle
4 = Lifting lugs
5 = Ball-type feet
6 = Spirit level

TOOLS REQUIRED

4 Slings of equal length
4 Shackles, 30 mm bolt dia.
2 Spanners, adjustable
1 Spirit level
1 Crane, mobile

WORKING PROCEDURE

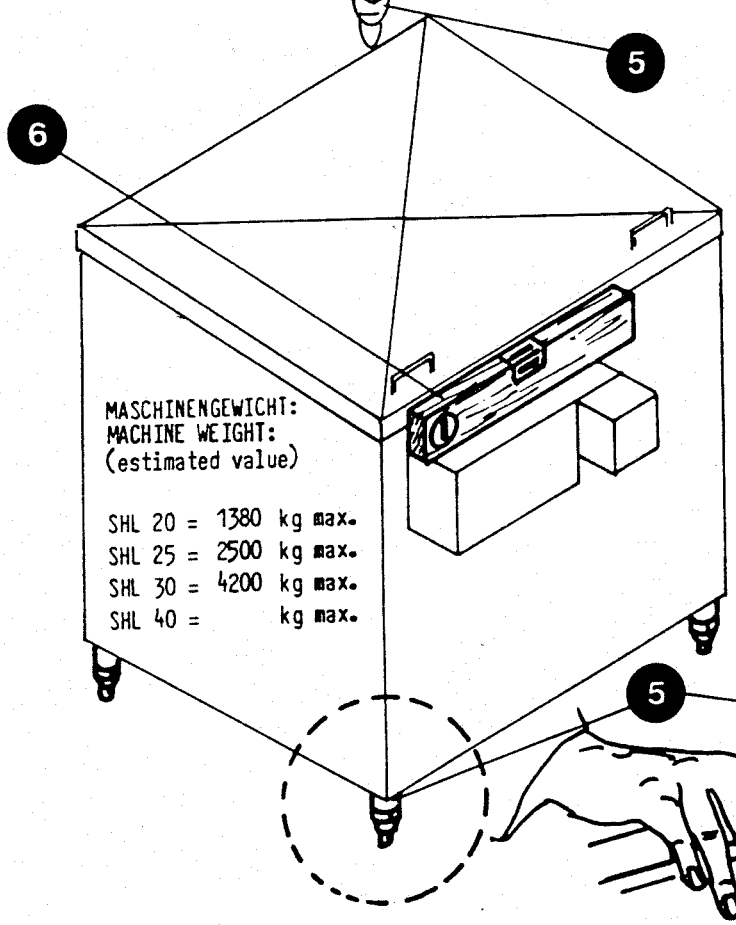
1.0 h TIME REQUIRED

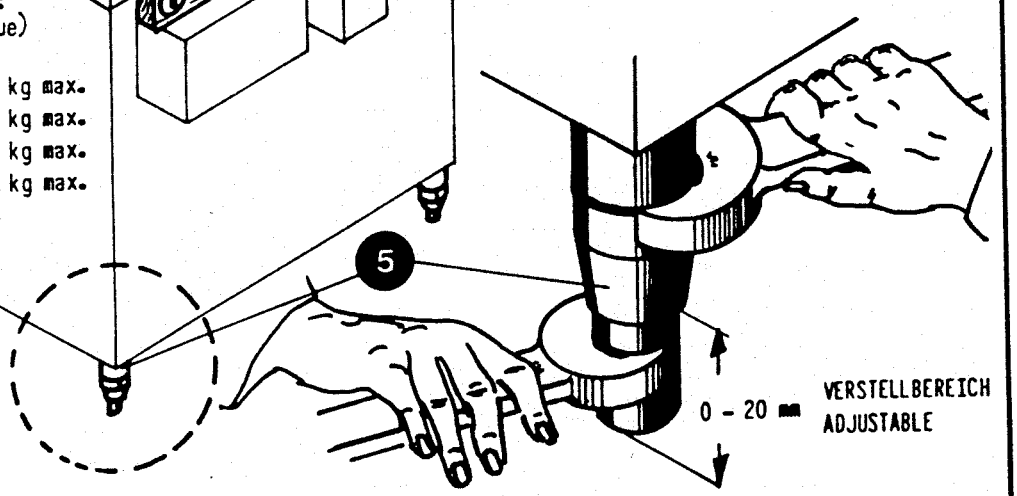
After the machine has been unpacked, it should be moved by mobile crane, exclusively.

After the top cover of the machine has been removed, four slings of equal length (2) are shackled (3) to the liftings lugs (4) and hooked to the crane (1).

The floor on which the machine is to be installed should be level. Floor tiles should be protected by the use of steel tiles on which to rest the ball-type feet of the machine (5).

To level up the machine, the spirit level (6) should be placed on the cylinder block of the high-pressure pump, as shown in the opposite diagram. The ball-type feet of the machine may be screwed in or out, as required.

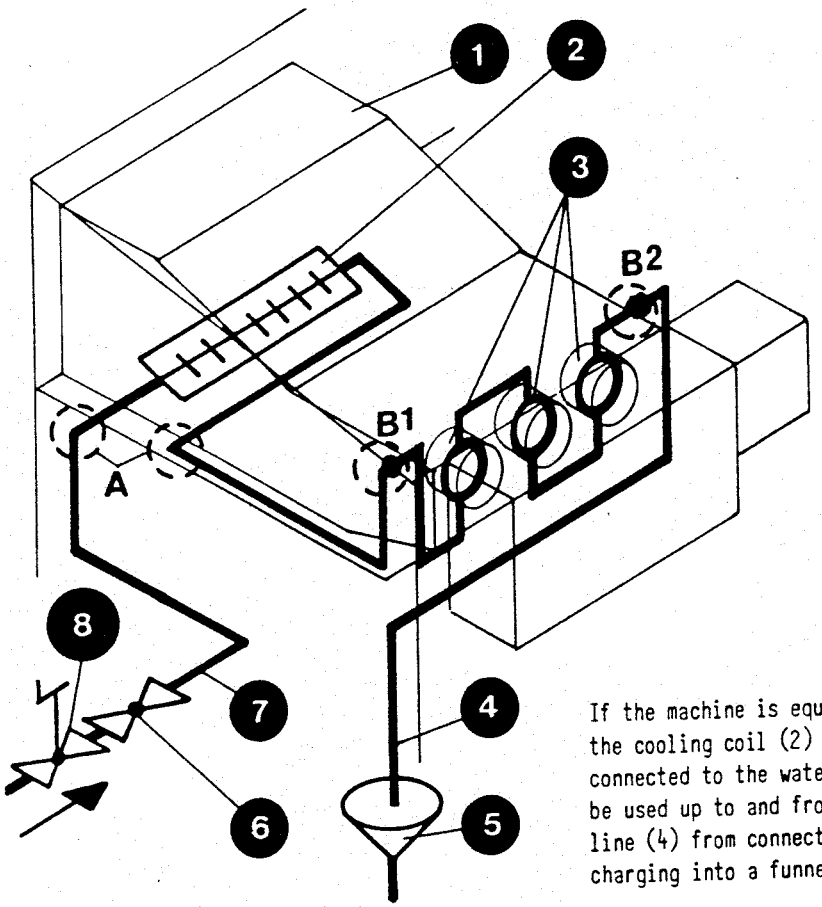




INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

DIMENSIONS OF COOLING SYSTEM PIPE CONNECTIONS

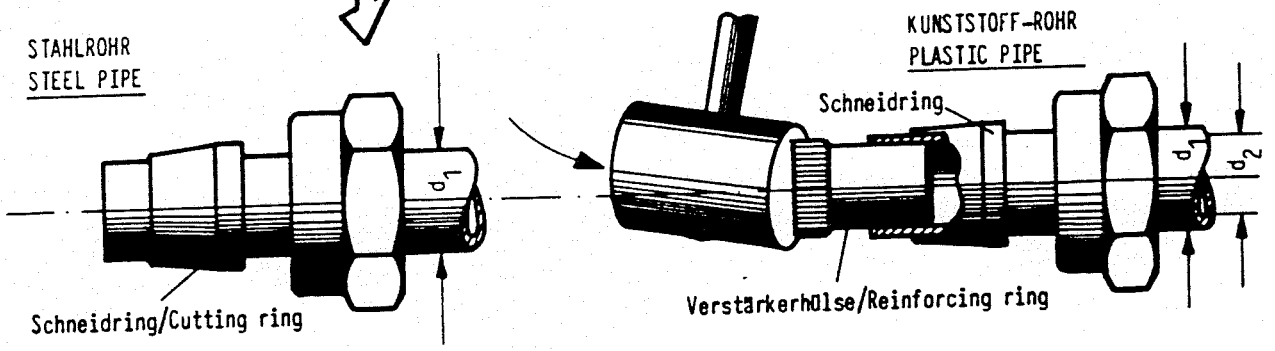


KEY TO SIGNS

1 = Drive gear / crankcase
2 = Cooling coil
3 = Pump cylinder bushes
4 = Return line
5 = Funnel
6 = Cooling water control valve
7 = Delivery line
8 = Main valve(solenoid or pneumatic valve) If not delivered with the machine it must be installed on site !

The cooling water connections are supplied with complete cutting ring pipe couplings.
Plastic piping may be used for water delivery and return lines up to connection "A" and from connection "B 2", resp. The ends of the plastic piping should be strengthened by "reinforcing rings".

If the machine is equipped with a condensate sealing system, the cooling coil (2) (for crankcase oil cooling) is separately connected to the water delivery line. Plastic piping may also be used up to and from connections "A". The condensate return line (4) from connection (B 2) should be steel piping discharging into a funnel (5).



ROHRABMESSUNGEN IN MILLIMETER / PIPE DIAMETER IN MILLIMETRE

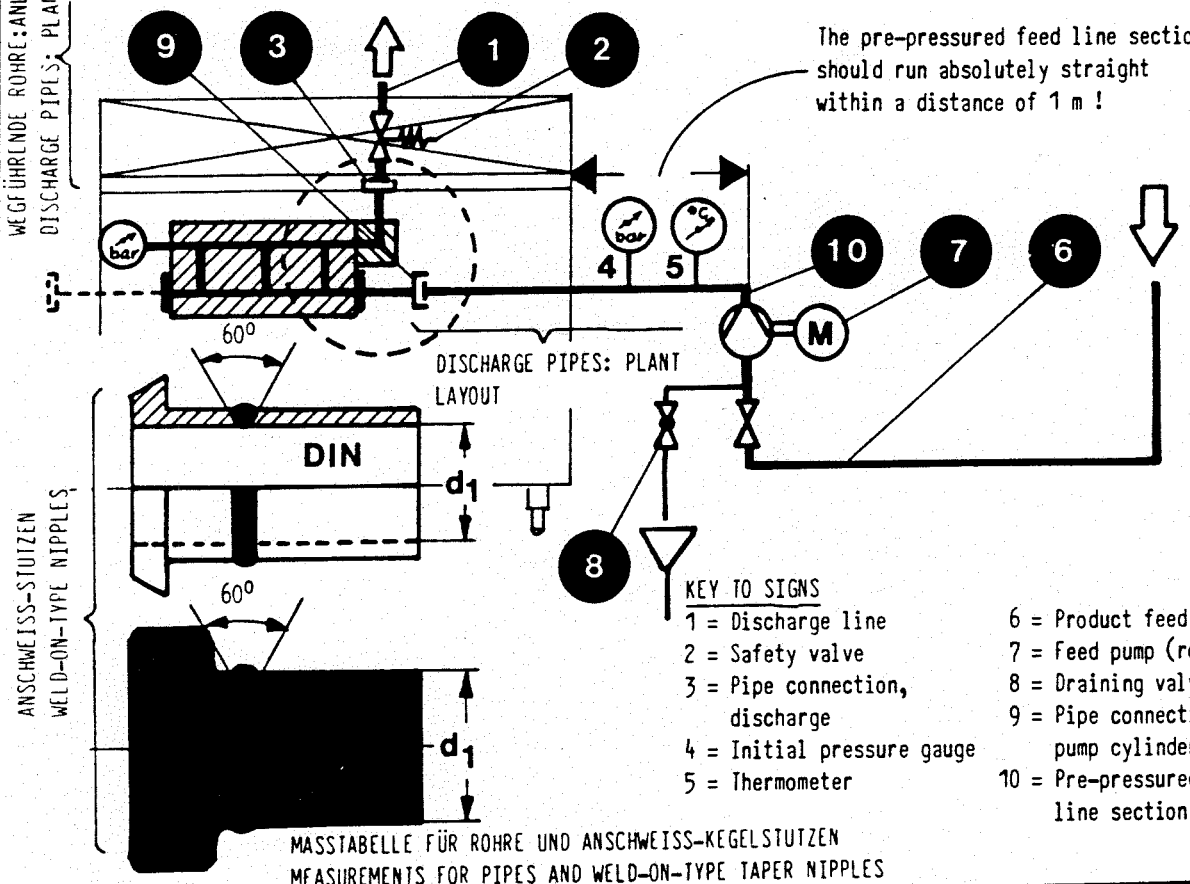
MASCHINENTYP ENGINE TYPE	STAHLROHRE / STEEL PIPES	PLASTIC PIPES		VERSTÄRKER-HÜLSE REINFORCING RING **
	AUSSENDURCHMESSER-OUTER DIAMETER	AUSSENDURCHMESSER OUTER DIAMETER	INNENDURCHMESSER INNER DIAMETER	
SHL 20	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 25	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 30	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5
SHL 40	d_1 = 12 mm	d_1 = 12 mm	d_2 = 9 mm	vsh 12 x 1.5

** Steel and plastic piping, pipe couplings and reinforcing rings are available from our service division.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

DIMENSIONS OF PIPE CONNECTIONS AT PUMP CYLINDER BLOCK (PRODUCT INLET) AND HOMOGENIZER HEAD (DISCHARGE)



MASSTABELLE FÜR ROHRE UND ANSCHWEISS-KEGELSTUTZEN
MEASUREMENTS FOR PIPES AND WELD-ON-TYPE TAPER NIPPLES

MASCHINENTYP / MACHINE TYPE	HOMOKOPF/HOMOGENIZER HEAD ABLAUF/DISCHARGE d_1 = DIN (mm)	ZOLL/INCHES	ZYLINDERKOPF/CYLINDER HEAD ZULAUF/FEED DIN (mm)	ZOLL/INCHES
SHL 20 (up to 315 bar)	40	1 1/2 "	40	1 1/2 "
SHL 25 (up to 315 bar)	40	1 1/2 "	50	2 "
SHL 30 (up to 315 bar)	65	2 1/2 "	80	3 "
SHL 40 (up to 315 bar)	80	3 "	80	3 "
SHL 40 (up to 200 bar)	80	3 "	100	4 "

Homogenizers are units included in different processes. Thus the installation of product conduits are process dependend and therefore not descriped in this chapter.

Some installation rules, however have to be observed:

Upstream and downstream piping, i.e. feed and discharge lines must be connected to the machine as follows:

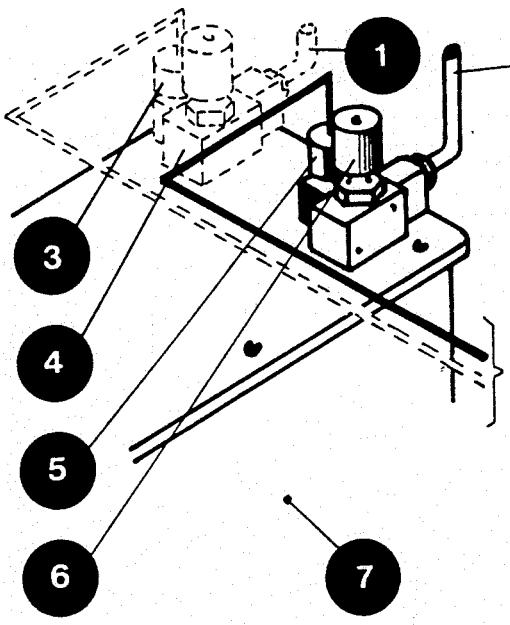
The pre-pressured feed line section (10) should run absolutely straight within a distance of 1 m (approx. 3) from the cylinder block connection (9). The whole product feed line (6) – at least the part of the pre-pressured feed line suction (10) from (9) to (7) – must have the same size as the cylinder block pipe connection (9). To obtain initial feed pressure (NPSH), a rotary pump (7) should be fitted in the feed line (6). To indicate initial feed pressure and temperature, a pressure gauge and thermometer (4 + 5) should be fitted in the pre-pressured feed line (10). If shut-off valves are fitted in the discharge line (1), a safety valve (2) should be provided, for protection of the machine. To enable pipe lines to be drained and cleaned venting valves should be fitted at the highest points of lines, and drain valves at the lowest points. Screw couplings should be used for the connections of the feed and discharge lines.
Dimensions of pipes and weld-on type taper nipples are shown in the above table.
The welding edge angle should be 60°. The welding seams should be ground and polished, internally and externally, to meet hygienic requirements.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

VERDRAHTUNGSPLAN FÜR DIE DRUCKENTLASTUNGS-VENTILE DER HYDRAULISCHEN STEUERUNG

WIRING DIAGRAMS FOR THE PRESSURE UNLOADING VALVES ON THE HYDRAULIC CONTROL UNIT



Anschlußleitung / branch line

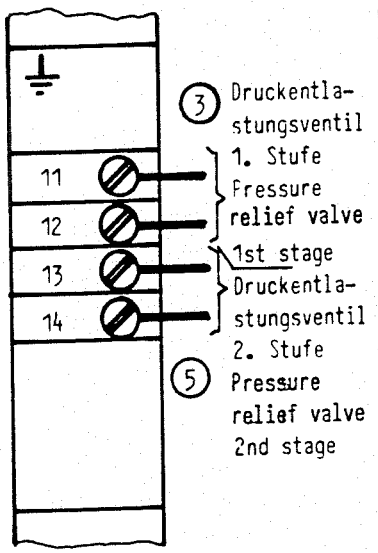
ZEICHENERKLÄRUNG

1 = Druckleitung 1. Stufe
2 = Druckleitung 2. Stufe
3 = Druckentlastungsventil 1. Stufe
4 = Sicherheitsventil 1. Stufe
5 = Druckentlastungsventil 2. Stufe
6 = Sicherheitsventil 2. Stufe
7 = Hydraulisches Steueraggregat

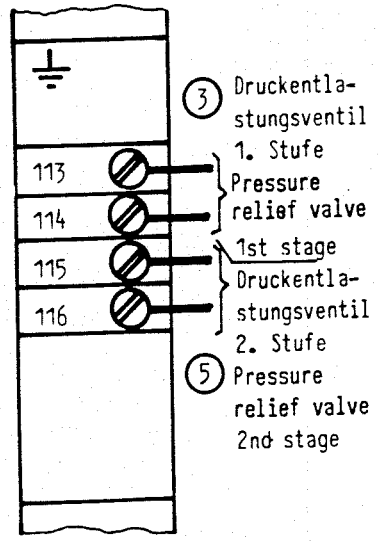
KEY TO SIGNS

1 = Pressure pipe 1st stage
2 = Pressure pipe 2nd stage
3 = Pressure relief valve 1st stage (remote control)
4 = Pressure relief valve 1st stage **(safety valve)**
5 = Pressure relief valve 2nd stage (remote control)
6 = Pressure relief valve 2nd stage (safety valve)
7 = Hydraulic control unit

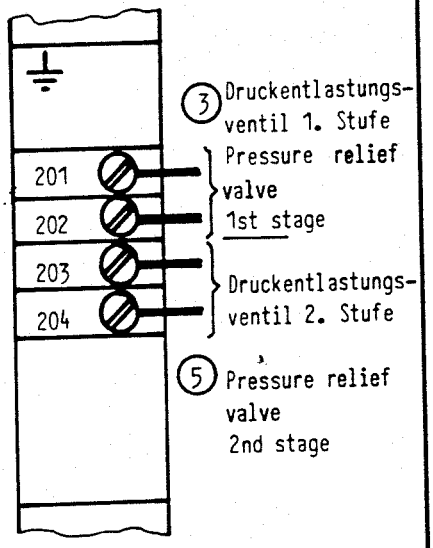
220 V ~
220 V A.C.



48 V ~
48 V A.C.



24 V ⎓
24 V D.C.



ANSCHLUSSLEISTEN IM KLEMMENKASTEN DER HOMOGENISIERMASCHINE
CONNECTIONS TERMINAL BOARDS

Pos. ③ + ⑤ stromlos = Druck
currentless = Pressure

mit Spannung = drucklos
Current = pressure reliefed

SECTION 4

Operation

CHECK LIST FOR INITIAL OPERATION

PRELIMINARY WORK AND CHECKS REQUIRED BEFORE THE MACHINE IS STARTED UP

Prior to initial operation of a newly installed homogenizer all component parts to come into contact with the product involved should be degreased and cleaned.
All pipework connected to the machine should also be cleaned thoroughly.

- **Checking the oil level in the crankcase of the high-pressure pump.**

  In static condition, the oil should be level with the mark on the perspex housing cover.
  Use high-grade lubricating oils only! These should have positive demulsifying properties.
  Do not use oils with additives that will impart emulsifying tendencies. Refer also to "Lubricants Recommendations" in "Section 1" of this manual.

- **Checking the oil in the crankcase for condensate content.**

  If condensate has collected in the crankcase, this should be carefully drained by the sump drain cock.
  The period of water separating from the oil will depend on the temperature and condition of the oil. A period of 8 to 10 hours may be required.

- **Checking the oil level in the hydraulic control system of the homogenizing system.**

  The oil level in the pump-container should show between the two punch marks on the dip stick.
  If the oil needs topping up, use hydraulic oil as recommended in "Section 1" :
  " Lubricants Recommendations "

- **Depressurizing the homogenizing system.**

  Set control valve of hydraulic control system to ZERO. (Two valves are provided with double-stage homogenizer heads).
  With remote-controlled systems, the resistor should be set to "minimum-pressure". (p-min.)

- **Checking cooling water circulation.**

  Open water shut-off valve in the delivery line to the cooling coil in the drive gear housing (crankcase).
  The water will pass through the coil and, consecutively, through the pump cylinder bushes.

  With ASEPTIC OPERATION, the cooling coil is separately supplied with water from mains.

CHECK LIST FOR INITIAL OPERATION

PRELIMINARY WORK AND CHECKS REQUIRED BEFORE THE MACHINE IS STARTED UP

● Starting up the hydraulic control system

Set control valve of hydraulic control system to ZERO. Prior to initial operation and after every oil change the hydraulic oil pump should be vented to eliminate priming difficulties or feeding air into the hydraulic cylinders of the homogenizer heads.
The vent plug of the oil container should be loosened (not removed) and the pump motor switched on. Then wait until bubble-free oil will issue from the venting plug. Tighten up the plug and allow the hydraulic system to run idle, i.e. pressureless.
Repeat this procedure by loosening the vent plug of the homogenizing head (heads).

WORK AND CHECK REQUIRED AFTER STARTING UP THE HOMOGENIZER

If the machine is operated under aseptic conditions, the general operating and checking instructions of the particular plant – into which the homogenizer has been integrated – will apply, e.g. instructions referring to a VTIS-plant. (VACU-THERM INSTANT STERILIZER).

● Cleaning of the product passage ways

Prior to starting actual operation, all product circulating systems and product passage ways should be cleaned with the aid of a flushing fluid. Subsequently, the system should be flushed liberally with hot water.

● Release of product feed

As the product is allowed to be fed into the machine, the residual hot water is forced out of the processing system. Before the homogenizing pressure is finally adjusted, the high-pressure pump must be operating free from air. In most cases, the air in the pressureless, idling pump will be displaced from the pump block after a few pumping strokes.
To make sure that the pump has been properly de-aerated, the hydraulic pressure control valve should be closed slowly and a pressure of less than 50 bar obtained. If the needle of the pressure gauge on the pump cylinder block moves erratically back and forth, this is due to the presence of air in the pump cylinders. Return the control valve to ZERO immediately. Subsequently, repeated closing and opening of the control valve will displace the air from the individual cylinders without difficulty. Do not set the pressure higher than 50 bar. Liquids, inherently containing considerable amounts of gas, must be de-gassed prior to being fed into the homogenizer. Otherwise, excessive shocks in the pump (with erratic gauge needle deflection ranging beyong 30 bar) may occur. When the pressure gauge needle remains in static position, the final homogenizing pressure may be set as required.

CHECK LIST FOR INITIAL OPERATION

PROCEDURE AND CHECKS REQUIRED AFTER THE MACHINE IS STARTED UP

How to adjust the homogenizing pressure (Single-stage homogenizer)

The homogenizing pressure should correspond to the type and nature of the product being processed.

Slowly turn the knob of the pressure control valve from its ZERO position, in clockwise direction, until the desired operating pressure is indicated by the gauge on the pump cylinder block.

Pressure in excess of the maximum permissible pressure, to which the machine was designed and delivered, is absolutely inadmissible.

Pressure fluctuations can be eliminated by short-time opening and closing of the homogenizing system. If the fluctuations continue, the suction and delivery valves in the cylinder block should be checked. Leaky pipework may also be the cause of pressure fluctuations.

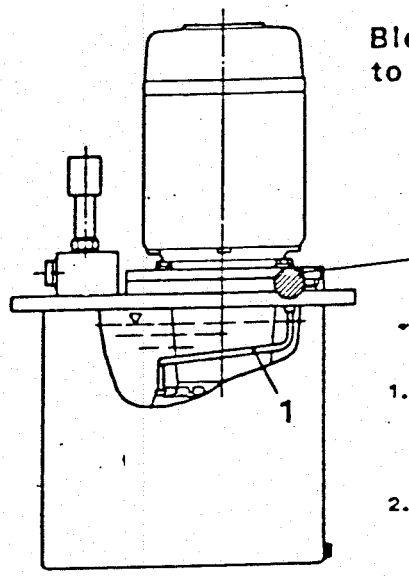
How to adjust the homogenizing pressures (Double-stage homogenizer)

The homogenizing pressures should correspond to the type and nature of the product being processed.
Slowly turn the knob of the pressure valve controlling the second stage from its ZERO position, in clockwise direction, until the pressure gauge on the pump cylinder block indicates a pressure of approx. 50 bar.

Subsequently, slowly turn the knob of the pressure valve controlling the first stage from its ZERO position, in clockwise direction, until the desired operating pressure is indicated by the gauge on the pump cylinder block.
Pressures in excess of the maximum permissible pressure, to which the machine was designed and delivered, is absolutely inadmissible.

Pressure fluctuations can be eliminated by short-time opening and closing of the homogenizing system. If the fluctuations continue, the pipework should be checked for leaks. However, defective suction and delivery valves in the pump cylinder block may be the cause of these pressure fluctuations.

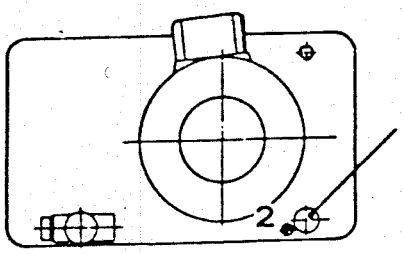
Operation of Hydraulic Units



Bleed pump prior to starting!

1... bleed hose already provided in the unit by the factory.

2... bleed screw M 6 x 6
DIN 912-8.8
with sealing ring
A 6 x 10 x 1
DIN 7603-Cu



oil filler neck

HAWE

HEILMEIER & WEINLEIN
8 MUNCHEN 80 · NEUMARKTER STR. 26

Description of Bleeding Operation

Screw the bleed screw fully out prior to filling the unit with hydraulic oil. Fill with a proprietary hydraulic oil, preferably via a funnel (with screen insert) provided with a bleed bead along the funnel tube for faster filling. If necessary, wait several minutes until the air has been expelled by the oil from the interior of the pump. Then re-tighten the bleed screw.

Switch the pump on and off several times, and then operate it under zero-pressure circulation for a short period of time if the control system design is compatible with this mode of operation. Alternatively, the pressure limiting valve should be reset to the zero pressure condition and the circulation effected via this valve.

Subsequently, operate the hydraulic installation without load several times through all functional movements, if necessary with the pressure limiting valve reset, until these movements are carried out smoothly within the predetermined time.

Reset the pressure limiting valve up to the specified value (check with a pressure gauge).

LIST OF CHECKS AND WORK DURING THE HOMOGENIZING PROCESS

- Regular checks on pressure and temperature of the feed

  Pressure gauge and thermometer in the feed line should be watched continually.
  Keep the temperature of the feed as constant as possible.
  Pressure fluctuations, registered by the gauge, indicate irregular feed rate.

- Regular checks on the homogenizing pressure

  If required, the setting of the operating pressure should be adjusted with the aid of the knob on the pressure control valve. If the needle in the pressure gauge on the pump cylinder block swings back and forth, find out whether the flow rate of the feed is sufficient. Further, leaky pipe connections and defective suction and delivery valves in the pump cylinder block may be the cause of erratic deflections of the gauge needle.

- Regular checks on the cooling water circulation

  The temperature of the water for crankcase oil cooling and pump piston lubrication will depend on the flow rate of the water.

If the machine is operated under aseptic conditions, the general operating and checking instructions of the particular plant, into which the homogenizer has been integrated, will apply. The CONDENSER UNIT fitted to the machine in this instance requires additional checks. The instructions for the initial operation of the condenser system are contained in "Section 4" : " Control of steam pressure and condensate temperature ".

- Regular checks should be made of: Live steam pressure

  Steam pressure should be constantly kept at 6 – 7 bar.

- Regular checks should be made of: Condensate temperature

  Condensate temperature, at the beginning of the homogenizing operation, should be 110° C at a pressure of 0.5 bar. Pressure and temperature should be kept constant under any circumstances.

- Regular checks should be made of: Condensate circulation

  During operation, the condensate flow rate should be approx. 27 l/h. (Ascertain flow rate by running effluent condensate into measuring vessel of known capacity). Constant strong cloudiness or turbidity appearing in the condensate sight glass is an indication of defective pump piston seals which should be renewed.

- Regular checks should be made of: Cooling water flow rate

  The cooling water flow rate should be approx. 100 l/h. (Check by means of measuring vessel of known capacity).

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

OIL LEVEL CHECKS

DRIVE GEAR / CRANKCASE, REDUCTION GEAR, AND HYDRAULIC SYSTEM

FIG. 1

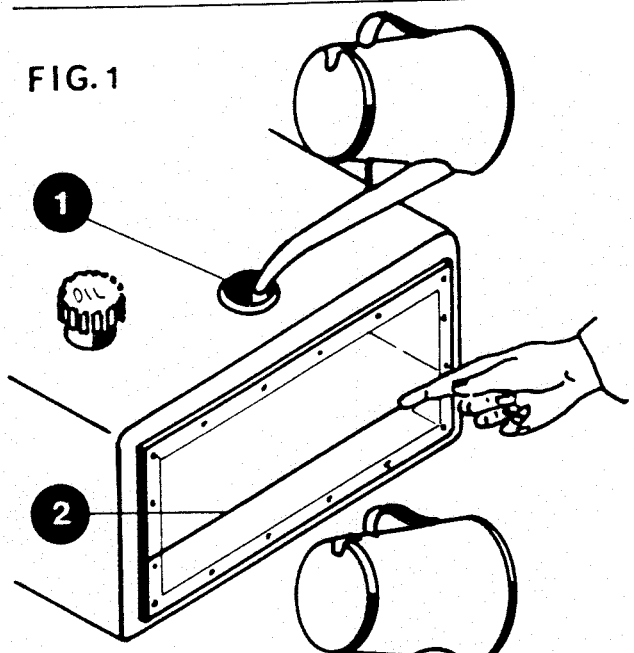


FIG. 2

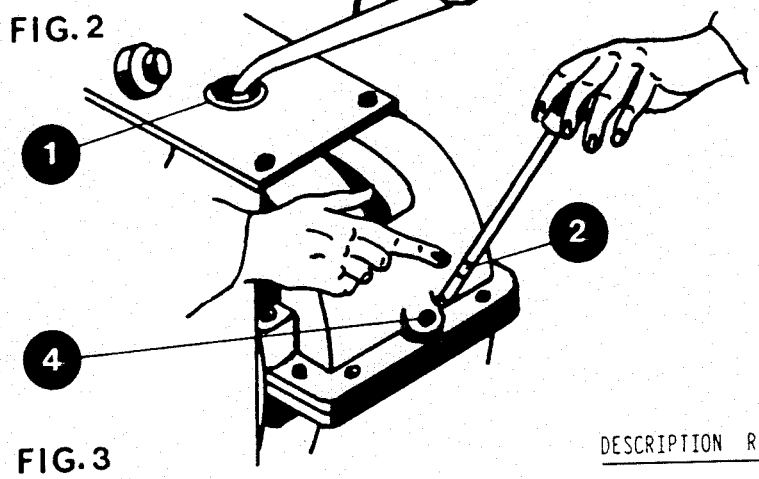
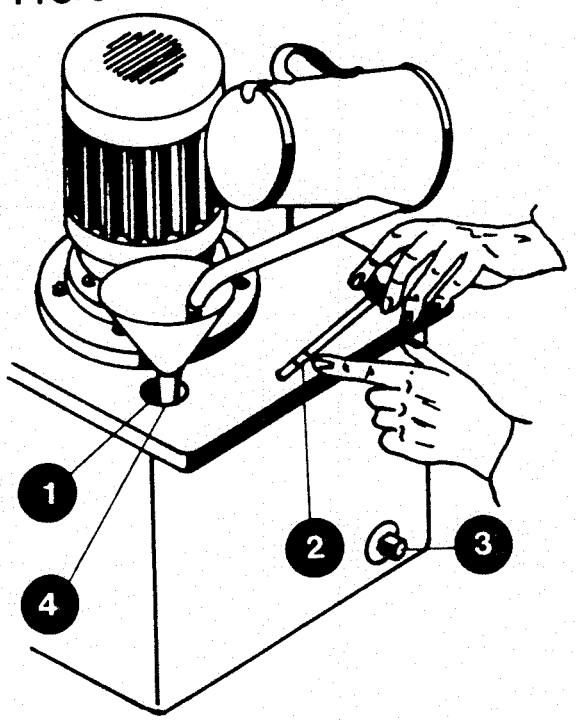


FIG. 3



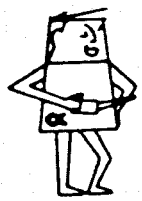
KEY TO SIGNS

1 = Oil filler
2 = Oil level mark
3 = Oil drain plug
4 = Dipstick seat

Oil levels in the pump drive gear/crankcase (Fig.1), in the reduction gear (Fig.2), and in the container of the hydraulic control system (Fig.3) should be checked every time the machine is put into operation, i.e. prior to starting up.

DESCRIPTION DRIVE GEAR/CRANKCASE

The oil level should be at the mark (2) in the perspex cover. Also check whether any water (condensate) has settled from the oil. If so, the water must be carefully drained through the cock in the sump of the housing.



ATTENTION!
Water, and used oil drained with it, must be collected in a suitable container. It must not be allowed to run into the sewage system.

Top up the oil charge through the filler (1) if any oil has been lost with the water drained.

DESCRIPTION REDUCTION GEAR

A dipstick is provided in the gear box (Fig.2), and the oil level should show between the punched marks on the dipstick (2). Fresh oil is poured through the filler (1) in the top of the housing. Used oil is drained by opening the plug in the sump of the gear box and should be collected in a suitable container.

DESCRIPTION HYDRAULIC CONTROL SYSTEM

The hydraulic unit (Fig.3) is located in the lower section of the frame. Oil check is by dipstick, as illustrated. The oil level should show between the punched marks on the dipstick (2). Fresh oil is poured through the filler (1). Used oil is drained by opening the plug (3) and should be collected in a suitable container.

Oil change periods in the pump drive / crankcase, reduction gear and hydraulic system are mentioned in Section 5 : " Maintenance".
For recommended oils refer to Section 1 : "Technical Data".

SHUT-DOWN PROCEDURE

WORK REQUIRED PRIOR TO AND AFTER SHUT-DOWN

When product is changed or product feed is interrupted

Turn knob of pressure control valve in the hydraulic control system to ZERO immediately. (In double-stage homogenizers two hydraulic pressure control valves are fitted).

Prior to completion of the homogenizing process

Residual homogenized product should be by-passed into waste tank. (Required only if homogenized and non-homogenized product must be prevented from being inter-mixed.

De-pressurize homogenizing system

Turn knob of pressure control valve in the hydraulic control system slowly to ZERO. (In double-stage homogenizers two hydraulic pressure control valves are fitted). If remote-control systems are provided, the resistor(s) should be set to p_{min}.

Shut off product feed

Shut-off feed and run hot water into feed line. Flush the pump cylinder block, the de-pressurized homogenizing system and the product discharge line until clear liquid runs into waste tank.
ALTERNATIVELY:
Clean and sterilize the machine in compliance with local regulations.

Shut off cooling water

Depending on the type of installation concerned, the shut-off valve in the delivery line for the oil cooler in the drive gear/crankcase closes automatically, or must be closed by hand.

Switch off power drive

Carry out specified checks and maintenance.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

OPERATING TROUBLES
CAUSE AND CURE

TROUBLE	POSSIBLE CAUSES	CURE
INSUFFICIENT OUTPUT	Faulty sealing surfaces of suction and delivery valves	Re-grind or replace valves
	Suction and delivery valves sticking	Clean valves and valve guides
	Suction lines leaking	Tighten up pipe connections and / or replace defective seals
	Drop in r.p.m. due to slipping V-belts	Tension V-belts
ERRATIC VEBRATION OF GAUGE NEEDLE	Air in cylinder block	De-aerate cylinders
	Leaking suction and delivery valves	Re-grind valves or replace
	Leaking piston seals	Replace seals
DESIRED HOMOGENIZING PRESSURE NOT OBTAINED	Insufficient hydraulic pressure	Check hydraulic pressure Control valve
	Homogenizing system leaking	Re-grind cone and cone seat; replace if required
HOMOGENIZING PERFORMANCE UNSATISFACTORY	Homogenizing system leaking	Re-grind cone and cone seat. Replace if required
	Hydraulic pressure insufficient	Check pressure control valve. Check hydraulic control system
	Pressure gauge on cylinder block does not work properly (faulty indication)	Check gauge and replace if required
	It should be considered that the efficiency of the homogenizer does not depend on the homogenizer system exclusively, but also on the composition of the product to be processed. If efficiency drops, compared with initial performance, the product should be checked as well for any likely changes in composition.	
	Valve in by-pass line is partly or fully opened. Non homogenized and homogenized product is mixed.	Close valve

SECTION 5

Maintenance

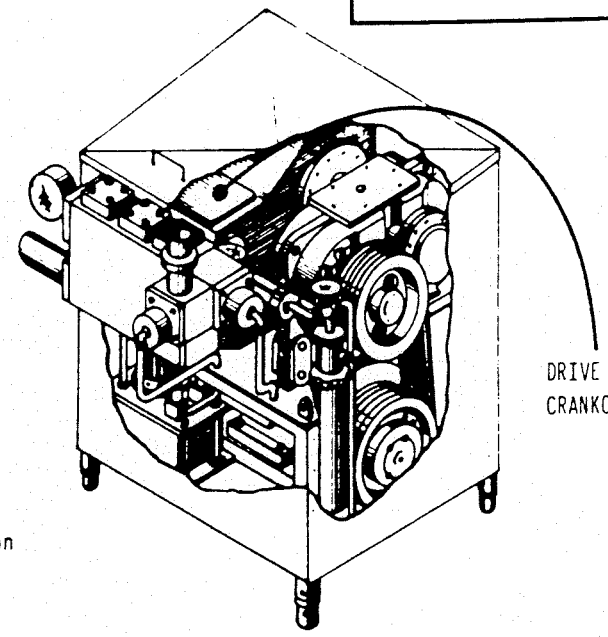
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 100



DRIVE GEAR/
CRANKCASE

Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications:
Replenish or change grease if required.
O = Overhaul
AL = General overhaul
(ALFA-LAVAL recommend:
Overhaul to be carried out under supervision
of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
w&T = wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS in hours: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2000 5000	12.000
	DRIVE GEAR/CRANKCASE									
	Check oil level	4/5	I							
	Oil change	1/4, 4/5		C*				C		
W&T	General overhaul	1/4, 4/5,5/9,5/14, 5/15,5/16, 5/21								AL
	REDUCTION GEAR									
	Check oil level	4/5	I							
	Oil change	1/4, 4/5			C*				C	
	General overhaul	5/11,5/12								AL
	V-BELTS									
	V-belt tension	5/11		I*		I				
	MOTOR									
	Replenish grease		Every 20.000 hours of op. (Name plate refers)							

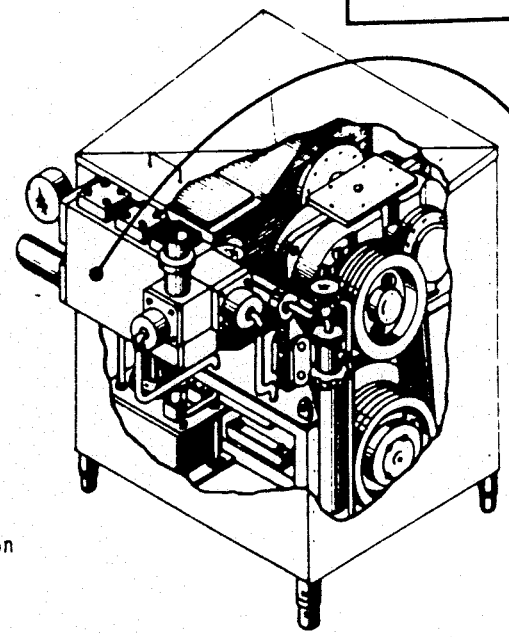
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 200



FLUID END

Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
w&T = wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	12.000
	CYLINDER BLOCK									
W&T	Suction valves	2/4, 4/8, 5/5, 5/7, 5/20					I			
W&T	Pressure valves	2/4, 4/8, 5/5, 5/7, 5/20					I			
	PUMP PISTONS									
	Pistons	4/8, 5/10								AL
W&T	Piston bush	4/8, 5/10, 5/17								AL
W&T	PRESSURE GAUGE	4/8, 5/6								AL

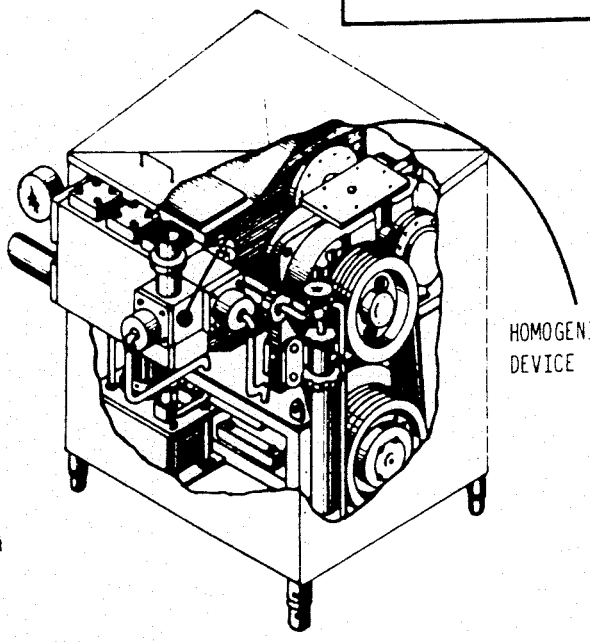
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 500



HOMOGENIZING DEVICE

Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
w&T = wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	2500 — 2900	5500 — 5800
	HOMOGENIZER HEAD									
	Impact ring	2/7, 4/8, 5/8	Service life depends on product involved. If milk is processed ca.					I		
	Cone	2/7, 4/8, 5/8								
	Cone seat	2/7, 4/8, 5/8								
W&T	Housing seals	2/7, 4/8, 5/8								
	HYDRAULIC PISTON									
W&T	Piston seals	5/8								S

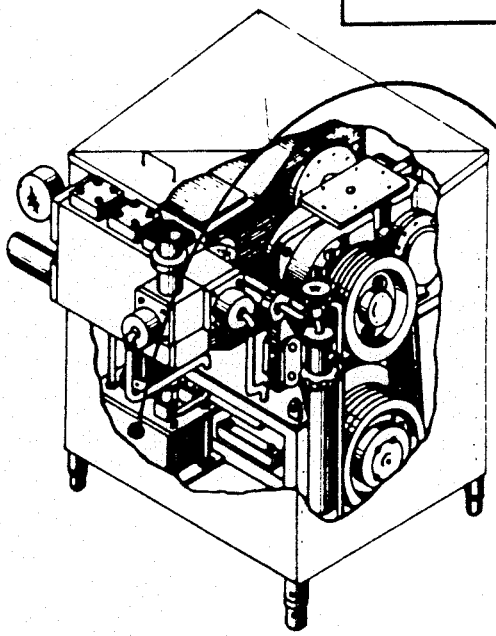
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

INSPECTION AND OVERHAUL SHEET

TYPE : **SHL**

ASSEMBLY : 504



HYDRAULIC CONTROL SYSTEM

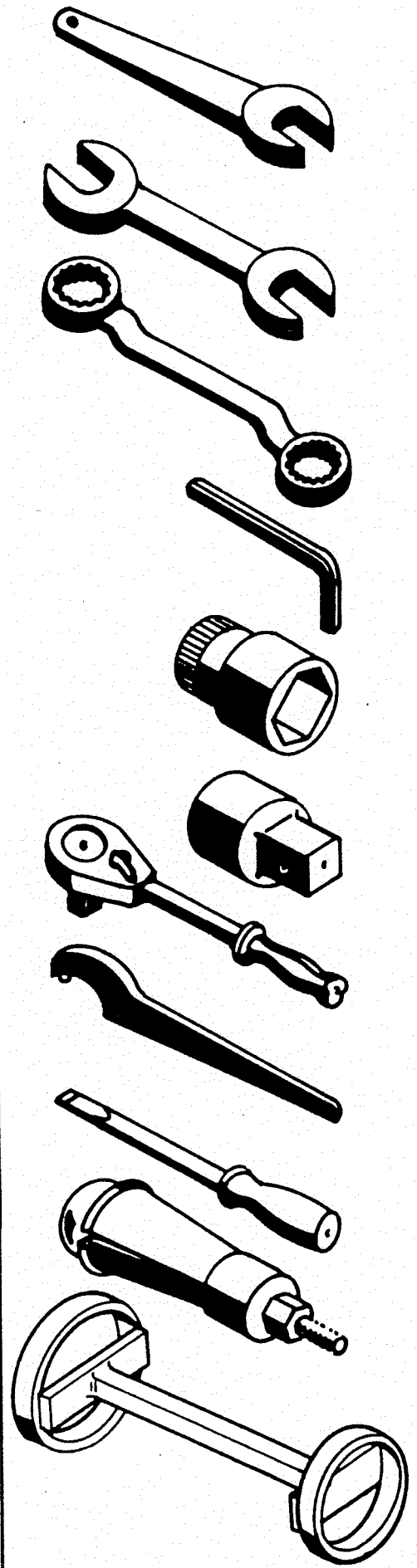
Inspection and overhaul Code

I = Inspection
S = Servicing
C = Oil change. In grease applications: Replenish or change grease if required.
O = Overhaul
AL = General overhaul (ALFA-LAVAL recommend: Overhaul to be carried out under supervision of ALFA-LAVAL engineer.)

*) = With new machine
**) = After every overhaul
+) = Standard model
++) = Machine equipped for aseptic operation
w&T = Wear part (renew)

W & T	MACHINE PART	MAINTENANCE INSTRUCTION refer to Section 5 . and spare parts lists (pink sheets)	OPERATING PERIODS IN HOURS: 24 — daily	200 — 250	400 — 500	700 — 750	1200 — 1600	2000 — 2300	8.000	12.000
	HYDRAULIC UNIT									
	Check oil level	2/8, 4/5	I							
	Oil change								C	
	Clean oil filter	4/5							C	
	Pressure reducing valve	4/5								AL
	Safety valve	4/5							I	

STANDARD WERKZEUGE / NORMAL TOOLS



EINMAULSCHLÜSSEL
SINGLE OPEN END SPANNER — SW* 13 mm, SW 22 mm

DOPPELMAULSCHLÜSSEL
DOUBLE OPEN END SPANNER — SW 17 x 19 mm

DOPPELRINGSCHLÜSSEL
DOUBLE HEX. RING SPANNER
(Offset pattern) — SW 17 x 19 mm

INNENSECHSKANT-SCHLÜSSEL
ALLEN HEAD WRENCH — 5, 6, 10 mm

STECKSCHLÜSSEL-EINSATZ
HEXAGON SOCKET — SW 24 mm, SW 36 mm

REDUZIERSTÜCK
ADAPTOR — 3/4" - 1/2"

UMSCHALTKNARRE
RATCHET — 3/4"

HAKENSCHLÜSSEL
HOOK SPANNER — B 120 - 130

SCHRAUBENDREHER
SCREW DRIVER

INNENAUSZIEHER
INTERNAL PULLER

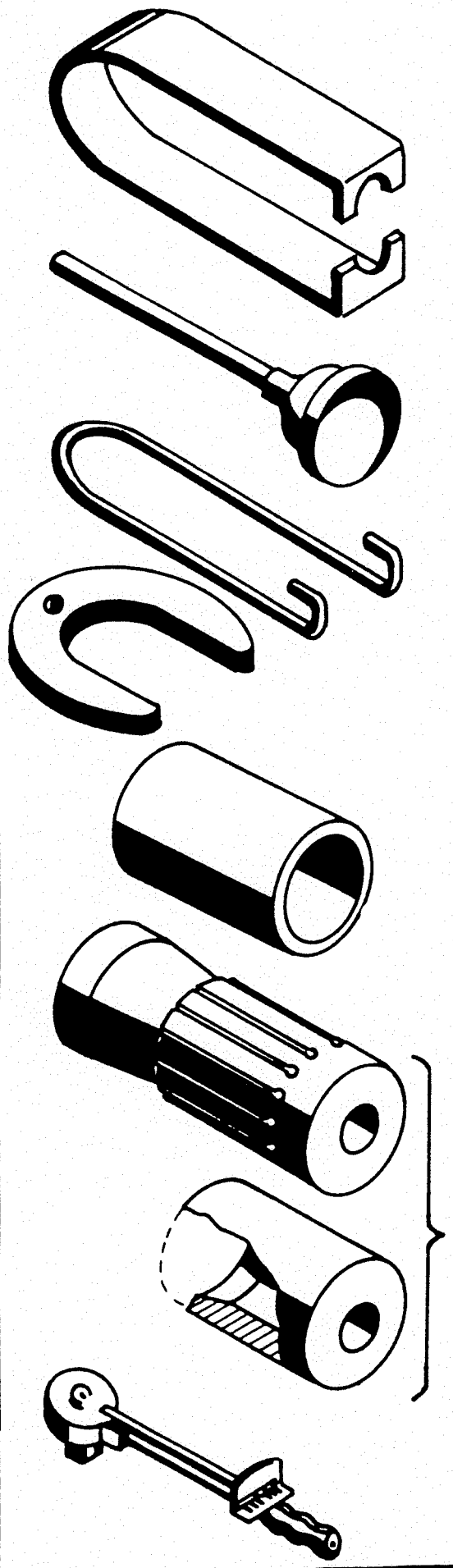
VENTILDICHTUNGSEINBAUVORRICHTUNG
VALVE FITTINGS DEVICE

*) SW = Wrench opening

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

SPEZIAL WERKZEUGE
SPECIAL TOOLS



VENTILKEGEL - HEBEVORRICHTUNG
VALVE CONE LIFTING CLAMP

VENTILKUGEL - SAUGHEBER
VALVE BALL SUCTION CUP

VENTILKÄFIG - HEBEVORRICHTUNG
VALVE CAGE LIFTING CLAMP

AUSZIEHVORRICHTUNG FÜR KOLBENBUCHSE
PULLER DEVICE FOR PISTON BUSH

EINDRÜCKVORRICHTUNG FÜR KOLBENBUCHSE
PRESS-IN DEVICE FOR PISTON BUSH

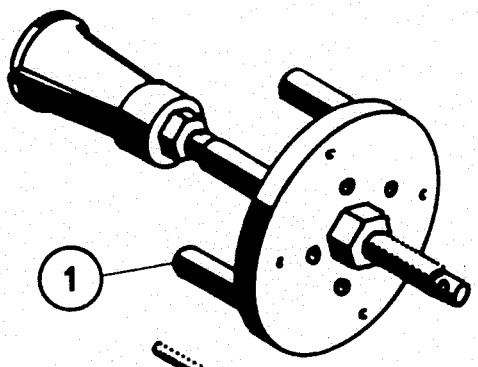
MONTAGEVORRICHTUNG FÜR HOMOGENISIERKOPF-DICHTUNG
MOUNTING DEVICE FOR HOMOGENISING HEAD SEAL

DREHMOMENTEN-SCHLÜSSEL
TORQUE WRENCH

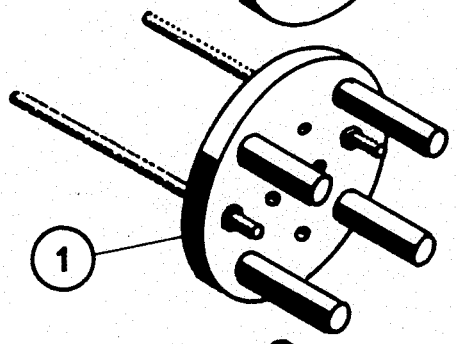
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

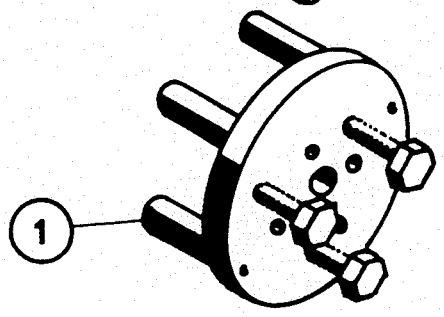
SPEZIAL WERKZEUGE
SPECIAL TOOLS



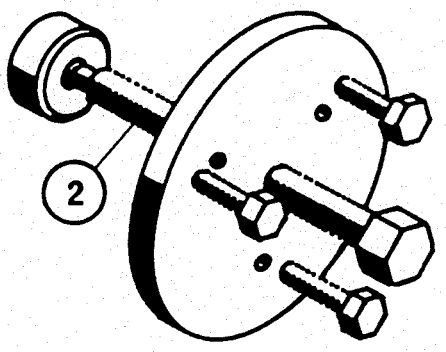
AUSZIEHVORRICHTUNG FÜR VENTILSITZE
PULLER DEVICE FOR VALVE SEATS



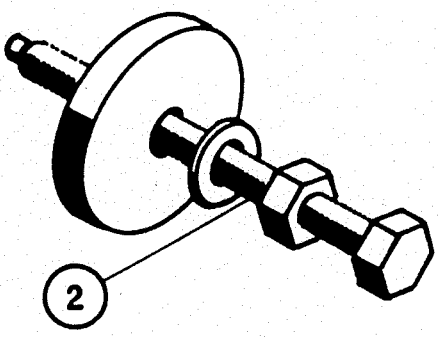
AUSZIEHVORRICHTUNG FÜR KREUZKOPF-DICHTUNGSBUCHSE
PULLER DEVICE FOR CROSS HEAD SEALING BUSH



EINZIEHVORRICHTUNG FÜR KREUZKOPF-DICHTUNGSBUCHSE
MOUNTING DEVICE FOR CROSS HEAD SEALING BUSH



ABZIEHVORRICHTUNG FÜR AUFSTECKGETRIEBE
PULLER DEVICE FOR DRIVING GEAR



AUFZIEHVORRICHTUNG FÜR AUFSTECKGETRIEBE
MOUNTING DEVICE FOR DRIVING GEAR

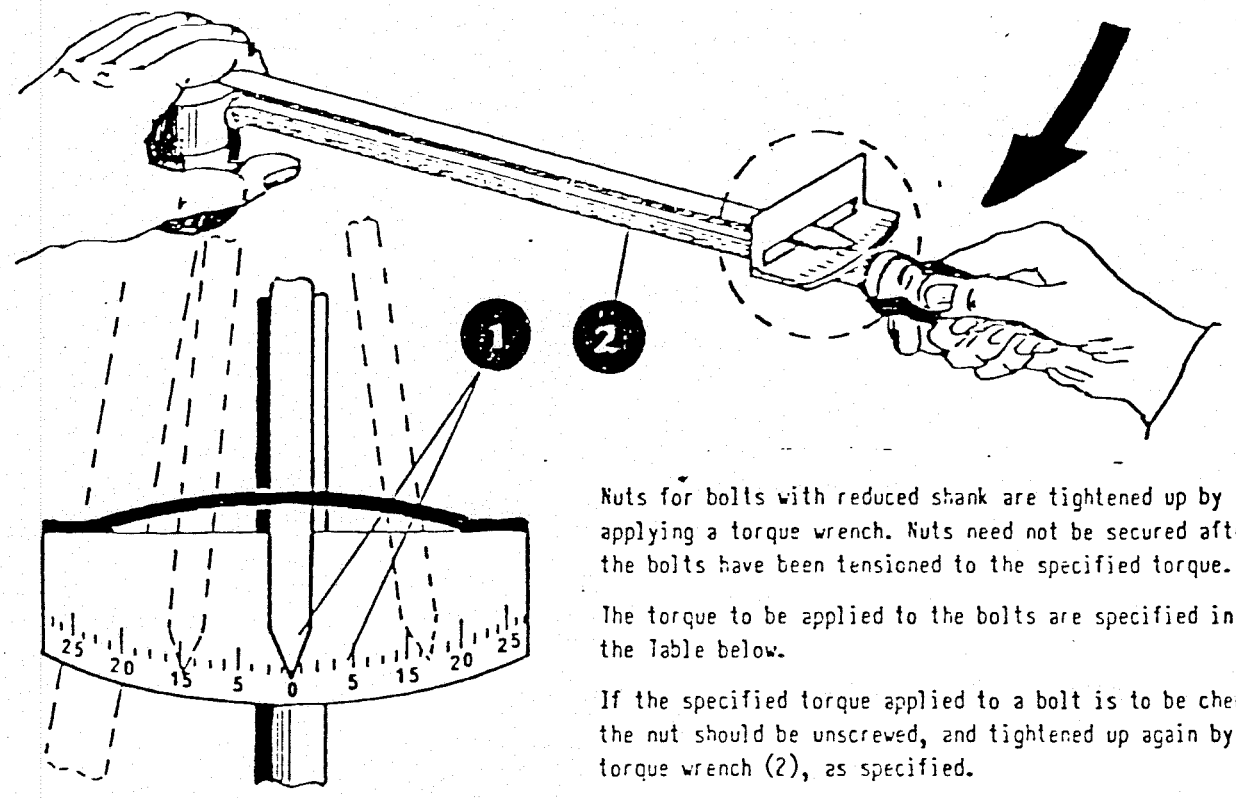
(1) + (2) = Kombiniert verwendbare Werkzeugteile / Tool components for multiple use.

ALFA-LAVAL

TABLE SPECIFICATIONS FOR BOLTS WITH REDUCED SHANK

KEY TO SIGNS

1 = Pointer and torque scale
2 = Torque wrench

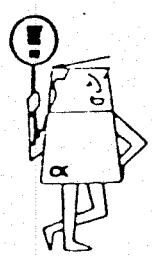


Nuts for bolts with reduced shank are tightened up by applying a torque wrench. Nuts need not be secured after the bolts have been tensioned to the specified torque.

The torque to be applied to the bolts are specified in the Table below.

If the specified torque applied to a bolt is to be checked, the nut should be unscrewed, and tightened up again by torque wrench (2), as specified.

Prior to tightening, the contact surfaces of the nuts should be cleaned and rubbed filmly with MOLYCOTE® (grey). The nuts should then be turned down by hand, thumb-tight. Then apply torque wrench and tension nuts until the pointer (1) indicates the specified torque on the scale.



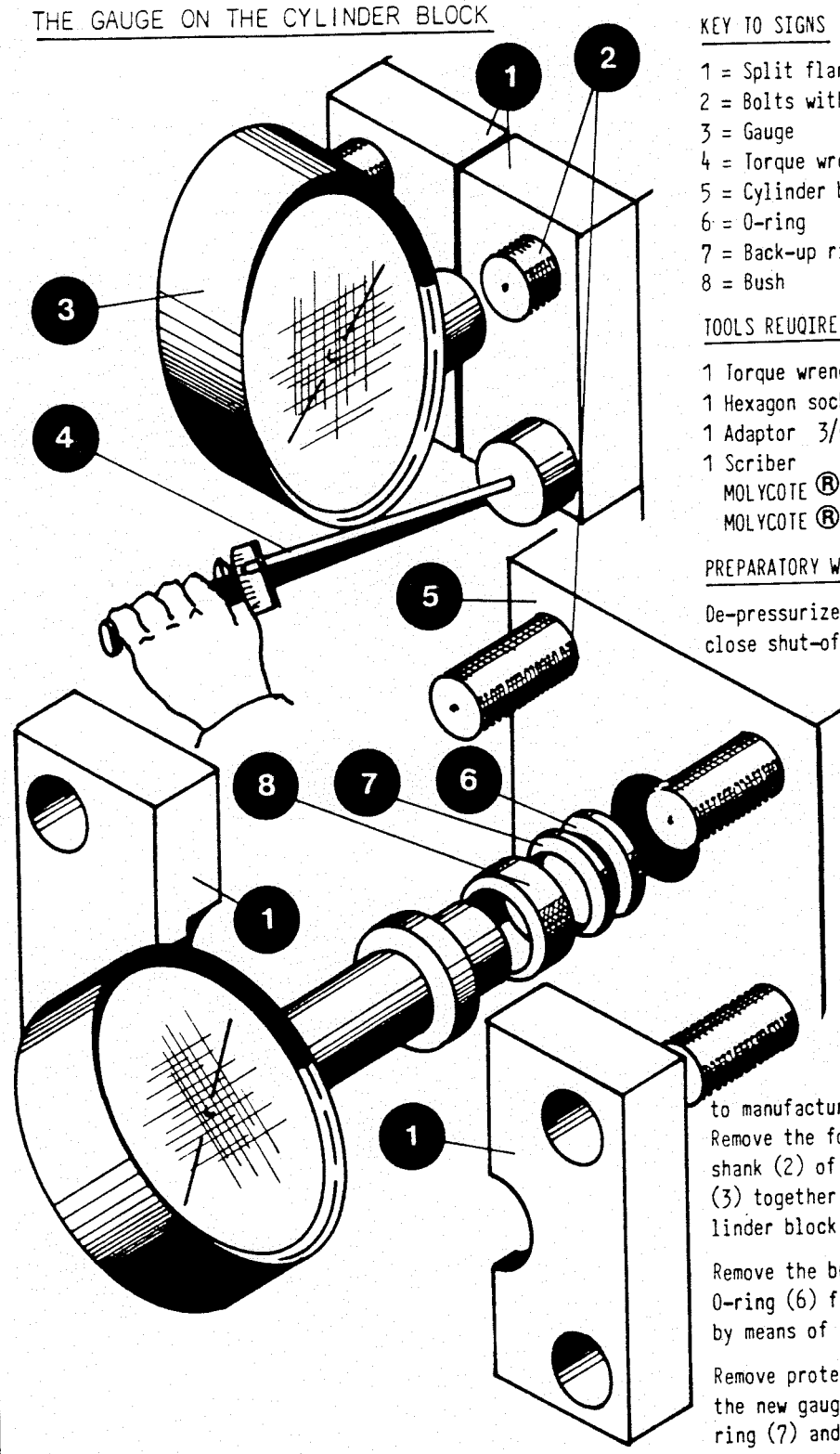
ATTENTION
If the specified torque has inadvertently been exceeded, the nut should be completely unscrewed and re-tightened as required. The bolt should not be left in over-stressed condition under any circumstances.

LOCATION OF BOLTS

LOCATION OF BOLTS	MACHINE PART										
	SHL N	SHL H	SHL 20 N	SHL 20 H	SHL 25 N	SHL 25 H	SHL 30 N	SHL 30 H	SHL 40 N	SHL 40, 400bar	
CYLINDER BLOCK COVER			180	180	180	180	340	340	450	450	Torques expressed in NEWTON METRE
CYLINDER BLOCK TO PUMP HOUSING			360	360	360	360	530	530	800	800	1 Nm ≈ 1/10 kp m
GAUGE FLANGE TO CYLINDER BLOCK			140	140	140	140	240	140	610	380	N = Low-pressure machine
BIG-END BEARINGS, CONNECTING RODS			50	50	50	50	130	130	250	250	H = High-pressure machine
HOMOGENIZER HEAD TO CYLINDER BLOCK			140	140	140	140	240	240	610	380	

REQ.-No.: 05-05.0 SHEET: DRAW-No.: TYPE: SHL

HOW TO REMOVE AND FIT THE GAUGE ON THE CYLINDER BLOCK



KEY TO SIGNS

1 = Split flange
2 = Bolts with reduced shank
3 = Gauge
4 = Torque wrench
5 = Cylinder block
6 = O-ring
7 = Back-up ring
8 = Bush

TOOLS REUQIRED

1 Torque wrench
1 Hexagon socket SW 24 mm
1 Adaptor 3/4" to 1/2"
1 Scriber
MOLYCOTE ® (white)
MOLYCOTE ® (grey)

PREPARATORY WORK

De-pressurize the homogenizing system and close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water supply and shut-down condenser system, if fitted. If remote-control system is installed, remove transmitter lead from gauge.

PROCEDURE

0.5 h TIME REQUIRED

Defective gauges should not be repaired locally, but forwarded to manufactures for repairs.
Remove the four nuts of the bolts with reduced shank (2) of the split flange (1). Lift gauge (3) together with the split flange off the cylinder block (5).

Remove the bush (8), back-up ring (7) and O-ring (6) from the bore in the cylinder block, by means of scriber.

Remove protective cover from the diaphragm of the new gauge. Renew the bush (8), back-up ring (7) and O-ring (6). Rub the new parts sparingly with MOLYCOTE (white) and slips them onto the gauge socket. Now insert gauge together with new sealings into the bore of the cylinder block. Slip the two halves of the split flange onto the bolts with reduced shank (2). Rub the contact surfaces of the nuts and the threads of the bolts sparingly with MOLYCOTE ®(grey). Replace nuts thumb-tight. Correct the fit of the gauge to obtain proper reading position. Apply torque wrench and tighten up nuts to specification.

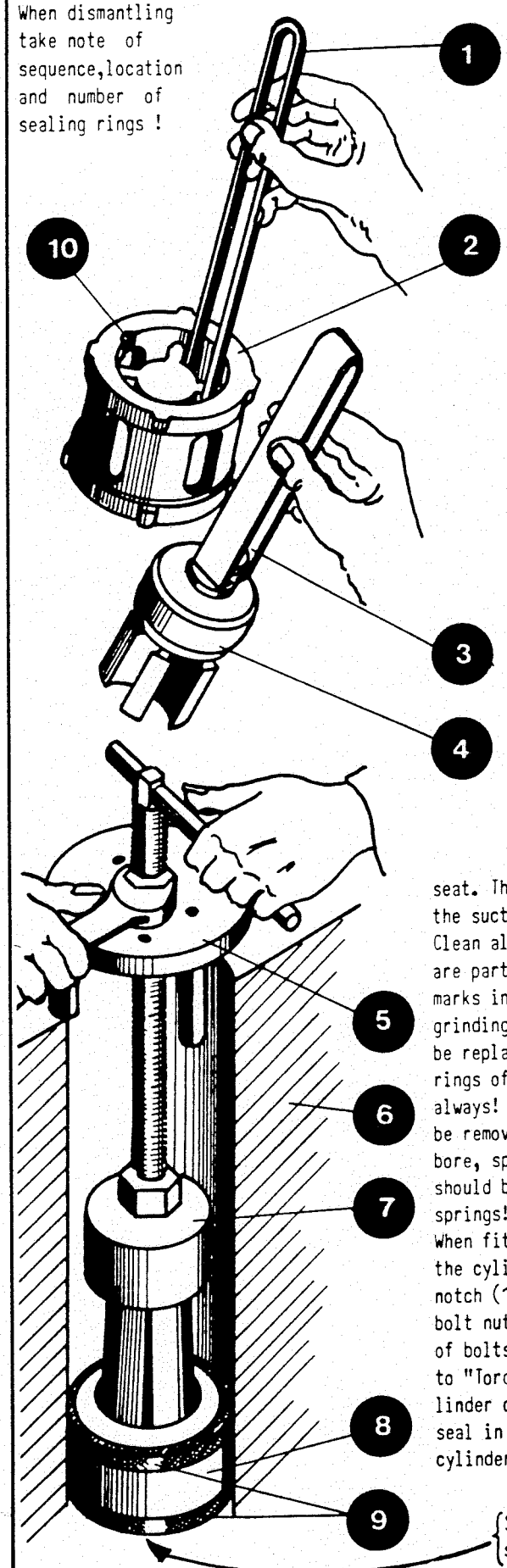
(Refer to " Torque specifications " in Section 5)

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT SUCTION AND PRESSURE VALVES IN CYLINDER BLOCK

When dismantling take note of sequence, location and number of sealing rings !



KEY TO SIGNS

1 = Valve cage lifter
2 = Valve cage
3 = Valve cone lifter
4 = Valve cone
5 = Valve seat puller
6 = Cylinder block
7 = Internal puller
8 = Valve seat
9 = Seal
10 = Notch for cylinder pin

TOOLS REQUIRED

1 Torque wrench
1 Hexagon socket SW 30 mm
1 Adaptor 3/4" to 1/2"
1 Set of spanners, 30–46 mm
1 Screw driver
1 Valve seat puller
Grinding compound
1 Internal puller
1 Valve cage lifter
1 Valve cone lifter
1 Tommy bar
1 Hammer handle
MOLYCOTE (grey) ®
MOLYCOTE (white) ®

PREPARATORY WORK

De-pressurize homogenizing system and close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water supply and shut-down condenser system, if fitted.

PROCEDURE

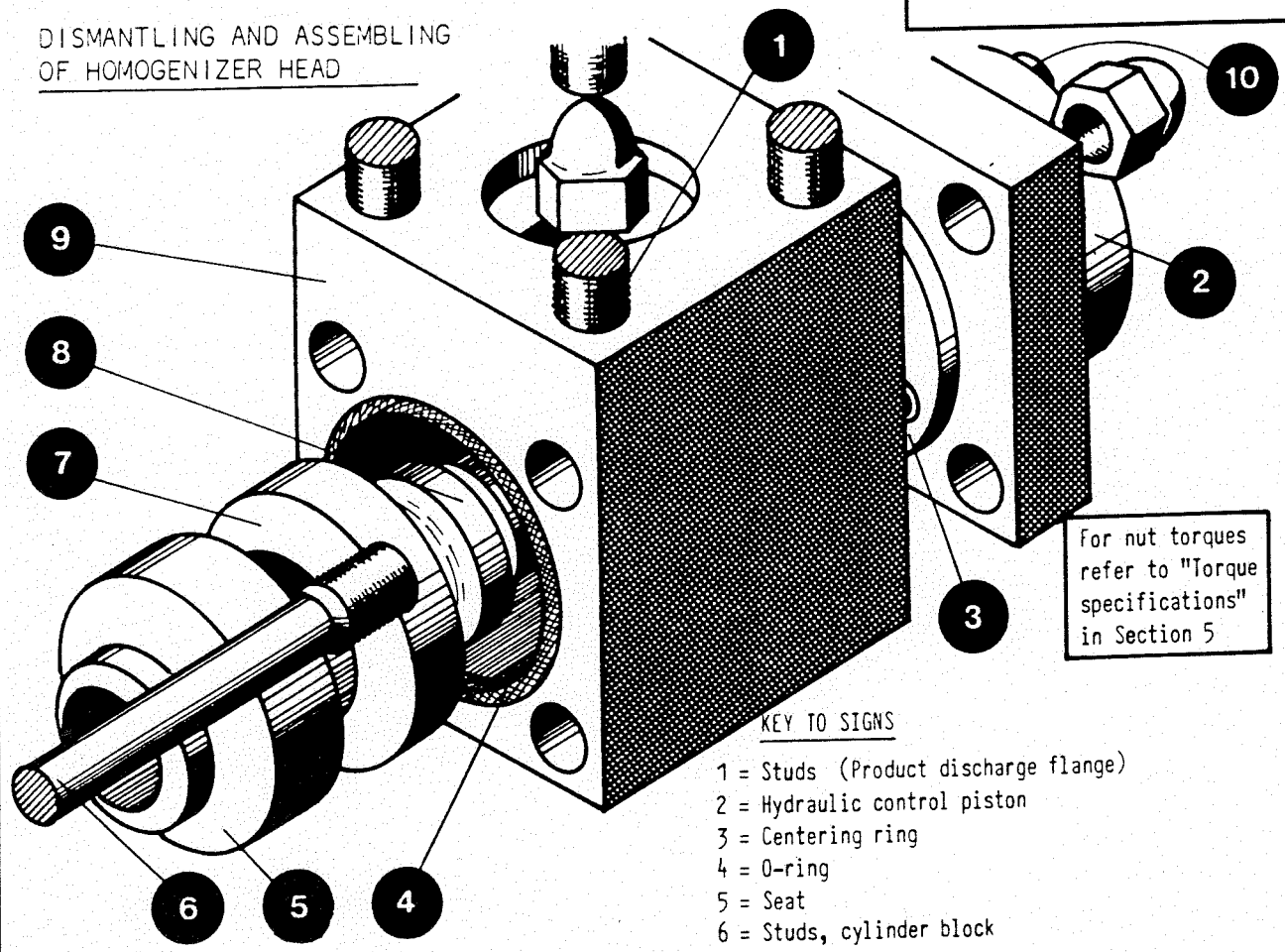
1.3 h TIME REQUIRED (per unit)

Remove nuts from bolts with reduced shank of the cylinder cover with the aid of the torque wrench. Lift cylinder cover off the cylinder block (6), use screw driver to assist lifting, if required. Apply valve cage lifter (1) and lift the pressure valve cage (2) out of the bore of the cylinder block. Apply valve cone lifter (3) and lift the valve spring and valve cone (4) out of the valve seat (8). Apply internal puller (7) together with valve seat puller (5) and pull out the valve seat. Then repeat the procedure - in the same sequence - to dismantle the suction valve.

Clean all components thoroughly and check for damages (Valve springs are particularly important!). Replace defective parts. Slight pressure marks in the contact surfaces of valve seats should be ground with fine grinding compound. If one or the other valve seat or valve cone has to be replaced, the new parts should be ground-in thoroughly. The sealing rings of the cylinder cover and valve seats must be r e n e w e d , always! Any deposits on the valve seat bore in the cylinder block should be removed; (grind lightly). Rub all parts, including the valve seat bore, sparingly with MOLYCOTE®(white). Re-fit all parts. Valve seats should be driven home with a hammer handle. Do not forget the valve springs! CAUTION : The spring load may push up the valve cages (2). When fitting the cylinder cover, particular care should be taken that the cylinder pin in the cylinder cover will fit precisely into the notch (10) of the pressure valve cage. Clean contact surfaces of the bolt nuts and rub them sparingly with MOLYCOTE®(grey). Tighten up nuts of bolts with reduced shank crosswise, to the specified torque. (Refer to "Torque specifications" in Section 5.) If leakage occurs at the cylinder cover, do not tighten up the nuts any further, but change the seal in the cylinder cover. (Refer to "How to fit lip sealing rings in cylinder block", Section 5.)

Suction-valve seating surface in cylinder block to be sparingly brushed with LOCTITE®surface sealing compound 572!

DISMANTLING AND ASSEMBLING OF HOMOGENIZER HEAD



For nut torques refer to "Torque specifications" in Section 5

KEY TO SIGNS

1 = Studs (Product discharge flange)
2 = Hydraulic control piston
3 = Centering ring
4 = O-ring
5 = Seat
6 = Studs, cylinder block
7 = Impact ring
8 = Cone
9 = Housing
10 = Vent screw

TOOLS REQUIRED

1 Torque wrench
1 Hexagon socket SW 24 mm
1 Adaptor 3/4" to 1/2"
1 Allen head wrench M 6
1 Mallet
1 Piece of hardwood
MOLYCOTE®(white)

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water supply and shut-down condenser system, if fitted. Switch off hydraulic control system.

PROCEDURE

1.8 h TIME REQUIRED

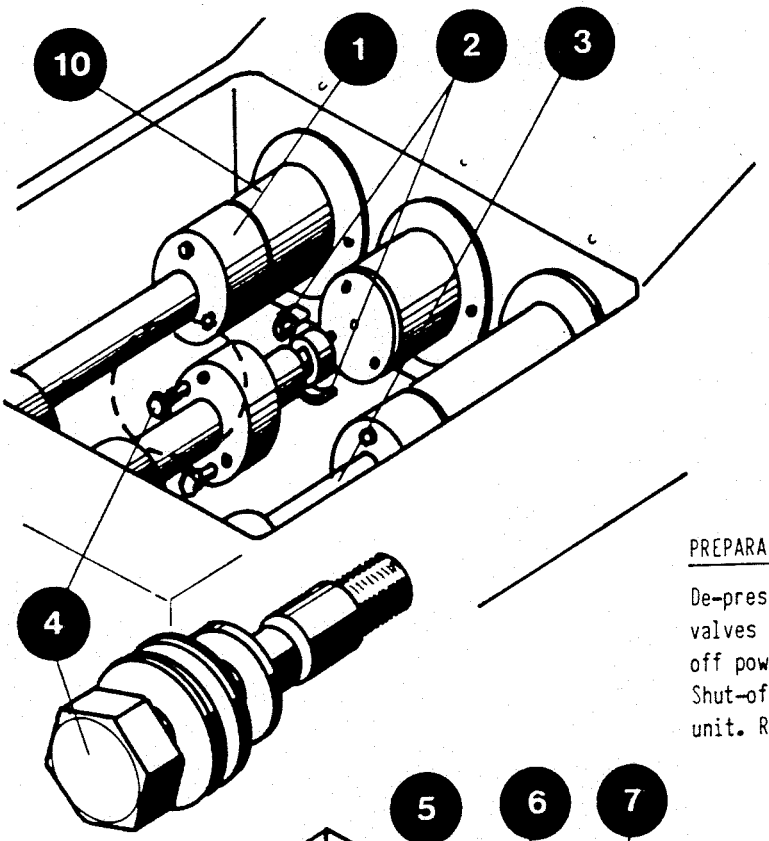
Disconnect hydraulic line from cylinder of the control piston (2). Catch up hydraulic oil in suitable container. Remove nuts from studs (1). Remove product discharge flange from homogenizer head. Screw off housing (9) from cylinder block.
Pull the seat (5), the impact ring (7), and the cone (8) out of the housing of the homogenizer head. In case of difficulty, drive out the cone from the hydraulic control piston end (2), applying gentle knocks with mallet and hardwood. Now remove O-ring (4) and back-up ring from the housing. Clean all parts thoroughly. Check seat, impact ring and cone for damages. (Also refer to "Wear phenomena in impact rings, due to excessive service periods" in Section 5 : Maintenance.) Fit new spares in exchange of worn parts. Seals should always be renewed.

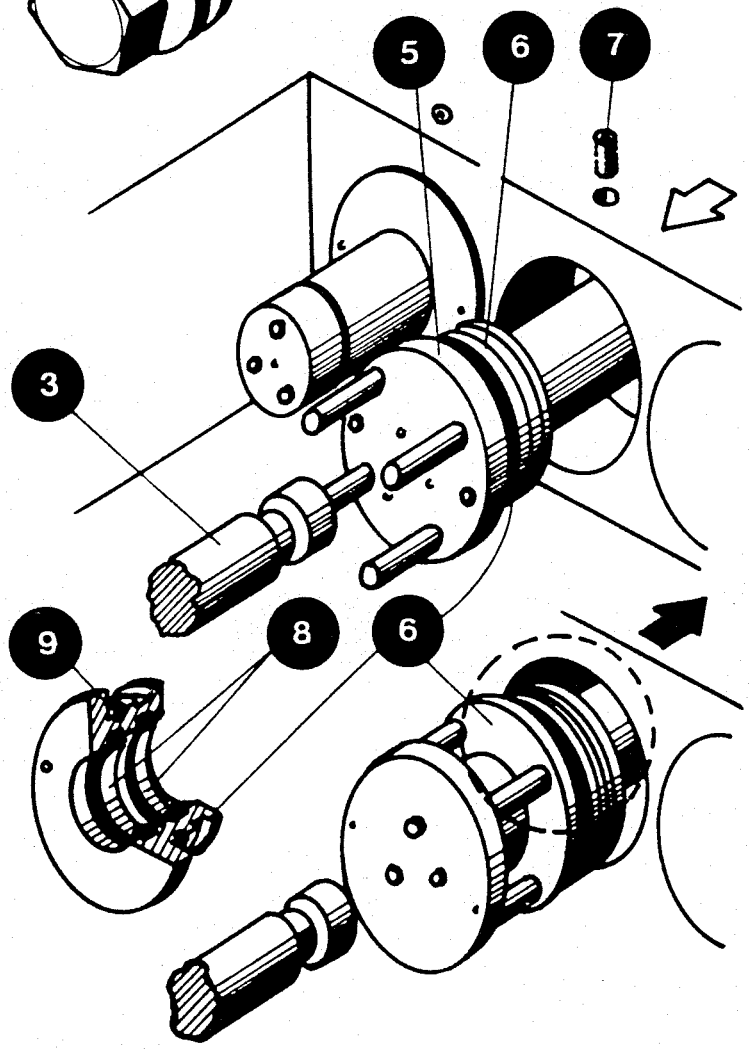
Rub all parts sparingly with MOLYCOTE®(white) and insert into the homogenizer head. Check hydraulic control piston (2) for leaks. If oil leaks from hydraulic piston, the centering ring (3) should be taken up and the piston pulled. Renew piston guide rings and STEP SEAL. The rod guide in the centering ring should also be changed. Screw the homogenizer head, together with the hydraulic control piston, onto the cylinder block. Tighten up cap nuts, crosswise, with torque wrench. Re-fit product discharge flange. Connect hydraulic line to cylinder of control piston. Bleed hydraulic system through vent screw (10). The oil must flow out free from air bubbles.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO REMOVE AND FIT PUMP PISTON TO CROSSHEAD EXTENSION PULL AND FIT CROSSHEAD SEALING BUSH





KEY TO SIGNS

1 = Connecting bush
2 = Split ring
3 = Piston
4 = Hex. screw with cup spring washer
5 = Combined puller and mounting device for crosshead sealing bush
6 = Crosshead sealing bush
7 = Fixing screw
8 = Grooved sealing ring
9 = O-ring
10 = Crosshead extension

TOOLS REQUIRED

1 Set of spanners 14 - 24 mm
1 Allen head wrench 6 mm
MOLYCOTE®(grey)

PREPARATORY WORK

De-pressurize the homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down the condenser unit. Remove cover. Screw out fixing screw (7).

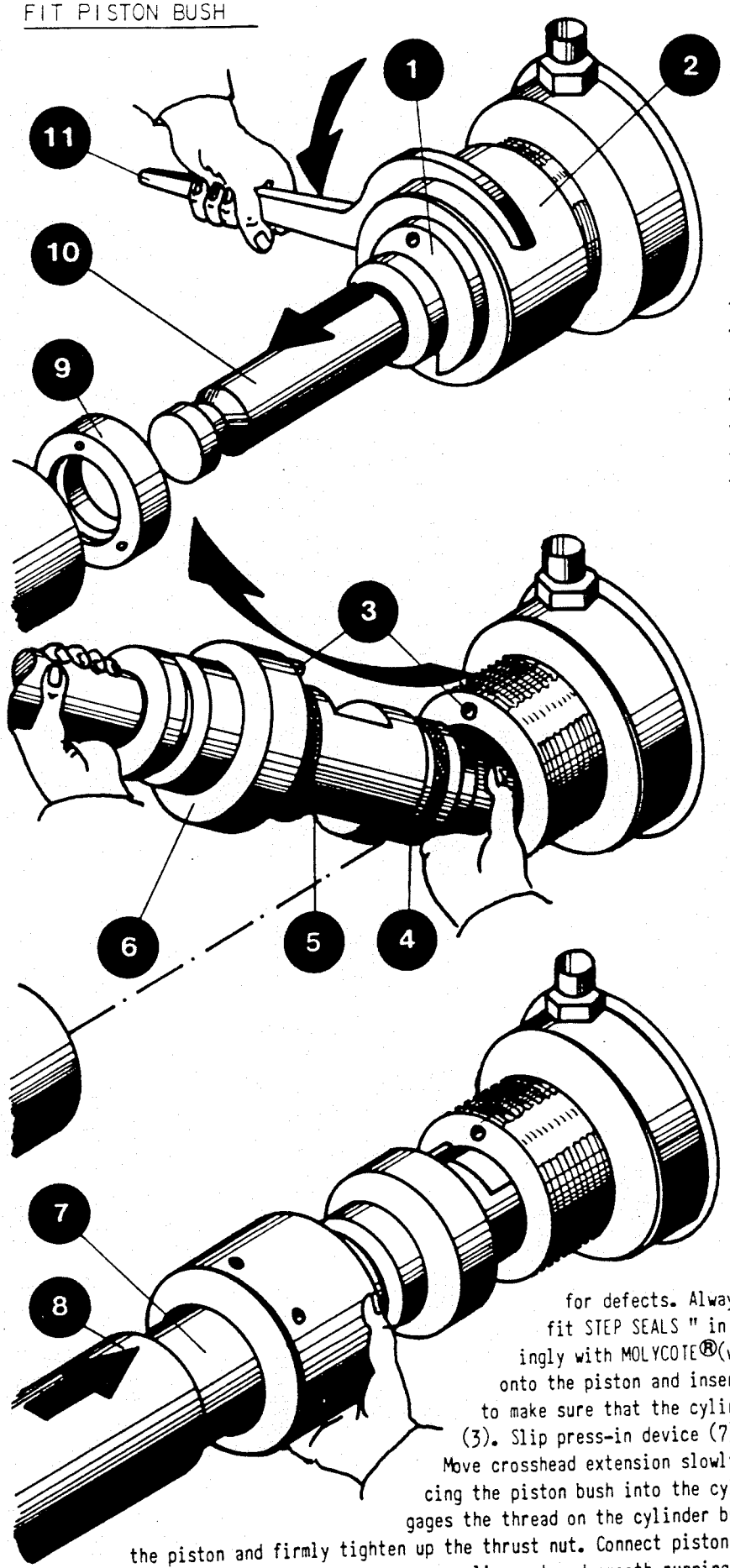
PROCEDURE

1.5 h TIME REQUIRED (per unit)

Remove the three screws with cup springs (4) from the crosshead extension (10). Slip connecting bush (1) over piston (3). Remove split ring (2) and push piston into the cylinder block. Fit puller (5) with two M 6 - screws to the crosshead sealing bush (6) and - by turning the crankshaft - pull the sealing bush together with the crosshead extension (10) out of the pump drive housing (crankcase). Clean all parts thoroughly. Always renew defective seals (8 + 9). Rub seals with MOLYCOTE. Revers the puller and fit to crosshead extension with three screws. By turning the crankshaft, the four studs in the device will force the crosshead sealing bush (6) back into the pump drive housing. Remove mounting device and secure the sealing bush with the fixing screw (7). Connect piston (3) to crosshead extension (10). Do not forget to fit the split ring (2). Firmly tighten up the screws (with spring washers) (4). The cup springs should be compressed. Finally turn the machine to ascertain proper alignment and smooth running.

ALFA-LAVAL

HOW TO REMOVE AND FIT PISTON BUSH



KEY TO SIGNS

1 = Puller for piston bush
2 = Thrust nut
3 = Cylinder pin and bores
4 = O-ring and back-up ring
5 = O-ring
6 = Piston bush
7 = Press-in device for bush
8 = Crosshead extension
9 = Piston connection
10 = Piston
11 = Hook spanner

TOOLS REQUIRED

1 Set ring spanners 14 - 24 mm
1 Hook spanner 8 120 - 130
1 Puller
1 Press-in device
MOLYCOTE® (white)

PREPARATORY WORK

De-pressurize the homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted.

PROCEDURE

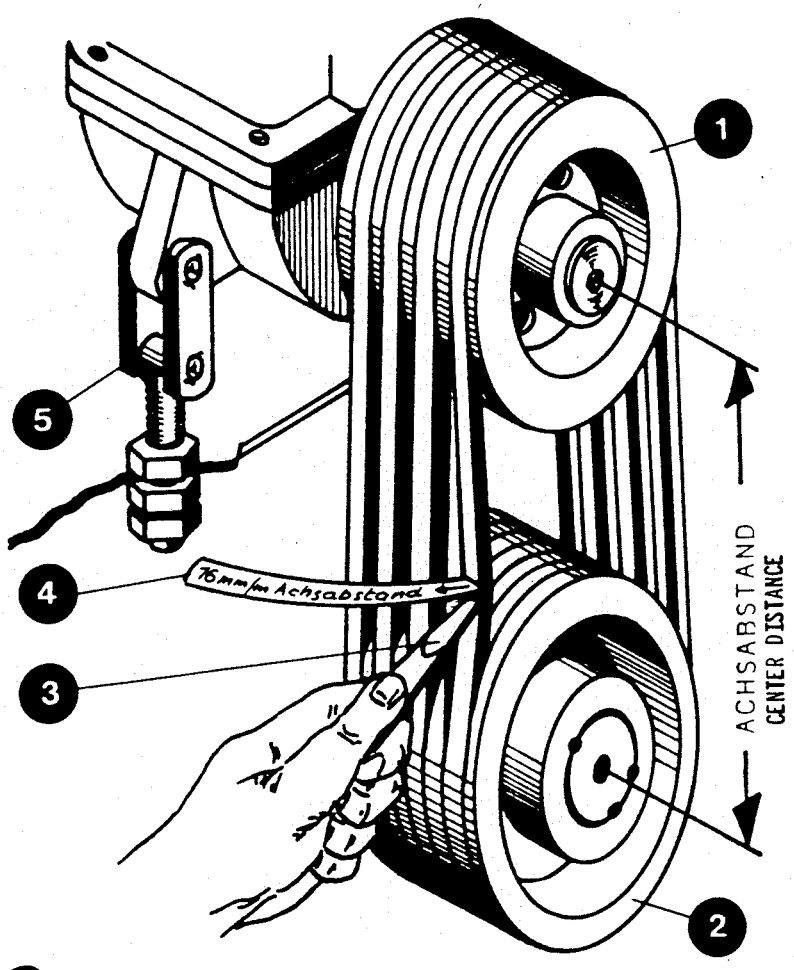
0.5 h TIME REQUIRED (per unit)

Remove piston connection (9) from crosshead extension (8). Insert puller (1) into the groove of the piston bush (6) in front of the thrust nut (2). Now screw off the thrust nut by hook spanner (11), thus pulling the piston bush out of the cylinder bush. Shift crosshead extension to outer dead centre and remove thrust nut. Pull piston (10) together with piston bush out of the cylinder bush, as illustrated. Remove header ring and spring from the cylinder bush.

Clean all parts thoroughly and check for defects. Always renew all seals! (Refer to " How fit STEP SEALS " in Section 5 (5/17). Rub all parts sparingly with MOLYCOTE® (white). Slip piston bush and seals onto the piston and insert into cylinder bush. Turn piston bush to make sure that the cylinder pin fits precisely into the bore (3). Slip press-in device (7) over the piston and fit thrust nut. Move crosshead extension slowly from bottom dead centre, thus forcing the piston bush into the cylinder bush. When the thrust nut engages the thread on the cylinder bush, remove the press-in device from the piston and firmly tighten up the thrust nut. Connect piston with the crosshead extension. Finally turn the machine to ascertain proper alignment and smooth running. Check cooling water system (under pressure) for leaks.

ALFA-LAVAL

HOW TO CHECK V-BELT TENSION
REMOVE AND FIT V BELTS



KEY TO SIGNS

1 = Pulley, gear shaft
2 = Pulley, motor
3 = Screw driver
4 = Steel ruler
5 = Torque support

TOOLS REQUIRED

1 Set of spanners 24 – 55 mm
1 Screw driver with wide and blunt edge
1 Steel ruler

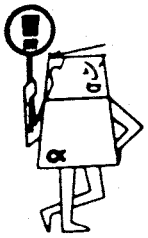
Excessive heating up, excessive vibration of V-belts, and noisy running are due to insufficient tension in the belts. Therefore, the V-belt drive should be checked at regular intervals.

PREPARATORY WORK

Switch off power and secure against unauthorized handling.
Remove enclosing panel.

PROCEDURE

1.0 h TIME REQUIRED



RULE OF THUMB
1 Metre center distance will correspond to a belt depression of approx. 16 mm

Press screw driver (3) at right angle, with moderate force, against one V-belt, i.e. in the middle between shaft centres, and measure the depression, in relation to the neighbouring belt, with the steel ruler (4). Repeat with all the belts of the drive. If the tension of the belts is not in compliance with the opposite RULE OF THUMB, the drive should be adjusted as follows:

Loosen the lock nut of the torque support (5) and turn the adjusting nut up until the V-belt drive is tensioned as specified. Then tighten up and lock.

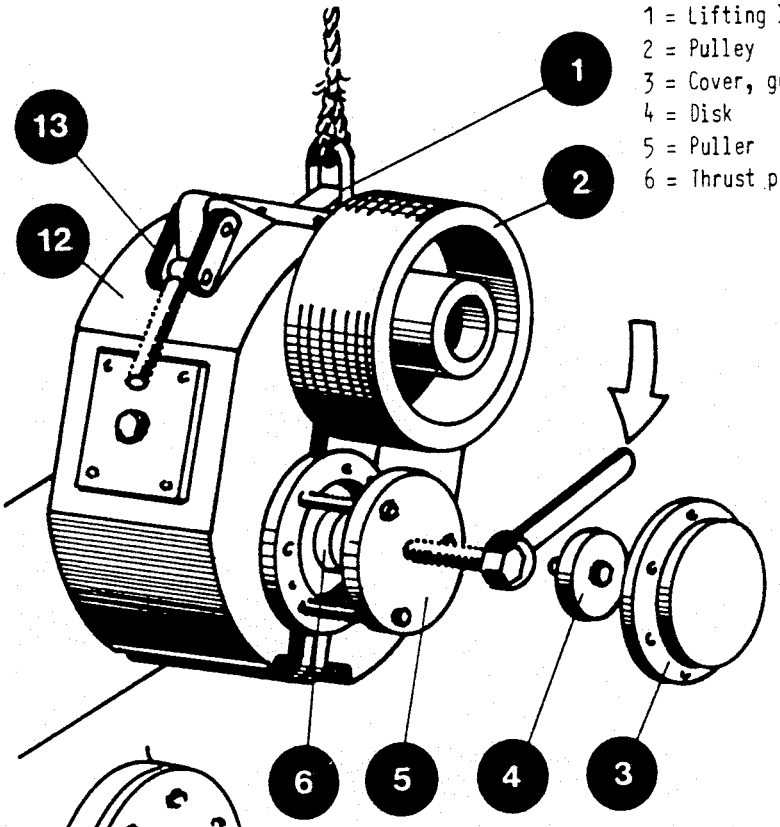
If V-belts must be renewed, the torque support should be loosened. It may be necessary to loosen the motor at its base to ensure that the belts are fitted in the pulley grooves WITHOUT FORCE. NEVER APPLY ANY LEVERAGE TO THE BELTS BY USING A SCREW DRIVER OR SIMILAR TOOL TO FORCE BELTS INTO PULLEY GROOVES! When the belts are in position, the two pulleys (1 + 2) should be aligned with the aid of a steel ruler. Tighten up the motor on its base plate, crosswise, and adjust V-belt tension by means of the torque support, as mentioned above.

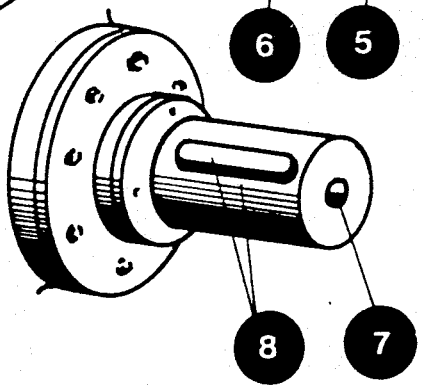
Watch the V-belt drive during the initial hours of operation. Experience proved that the drive requires re-tensioning on completion of approx. 30 minutes at operating speed. The permanent initial elongation as well as the apparent slack, due to bedding-down in the pulley grooves, are thus taken up.

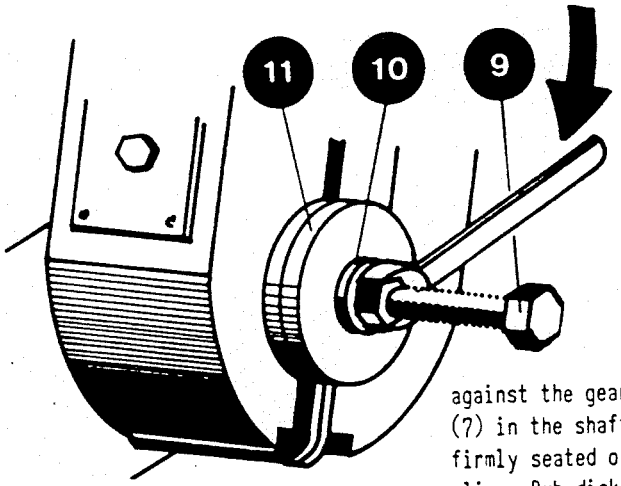
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO PULL AND FIT DRIVE GEAR







= PULL DRIVE GEAR

= Fit drive gear

KEY TO SIGNS

1 = Lifting lug
2 = Pulley
3 = Cover, gear box
4 = Disk
5 = Puller
6 = Thrust piece
7 = Tapped hole in crankshaft
8 = Crankshaft with key
9 = Pull-on screw
10 = Washer
11 = Thrust disk
12 = Drive gear
13 = Torque support

TOOLS REQUIRED

1 Shackle 15 mm bolt dia. / Sling
1 Allen head wrench 8 and 14 mm, resp.
2 Puller screws M 8
1 Set of open end spanners 14 – 46 mm
ALTEMP-paste QNB 50 (Supplier: Krüger)®
MOLYCOTE® (grey)

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted. Remove cover and side panel on drive end side. Remove V-belts.

PROCEDURE

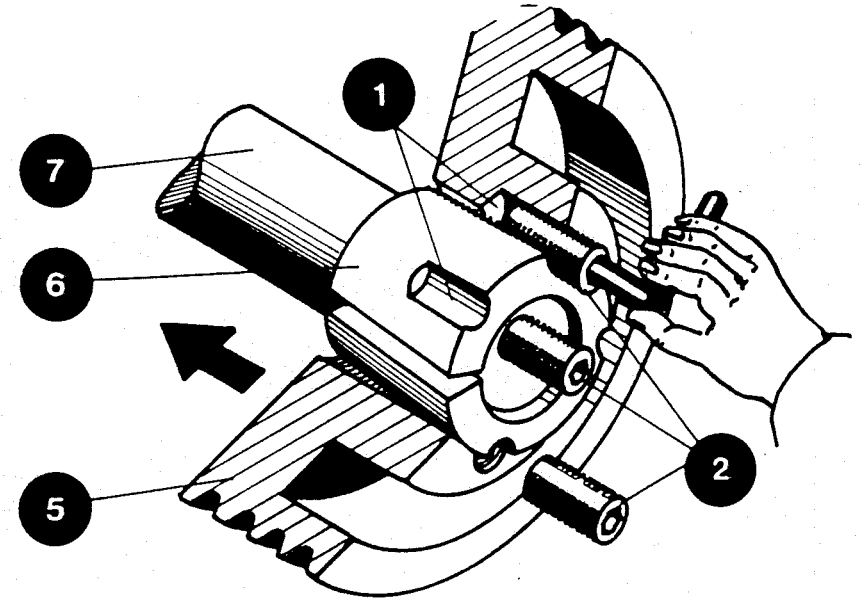
1.0 h TIME REQUIRED

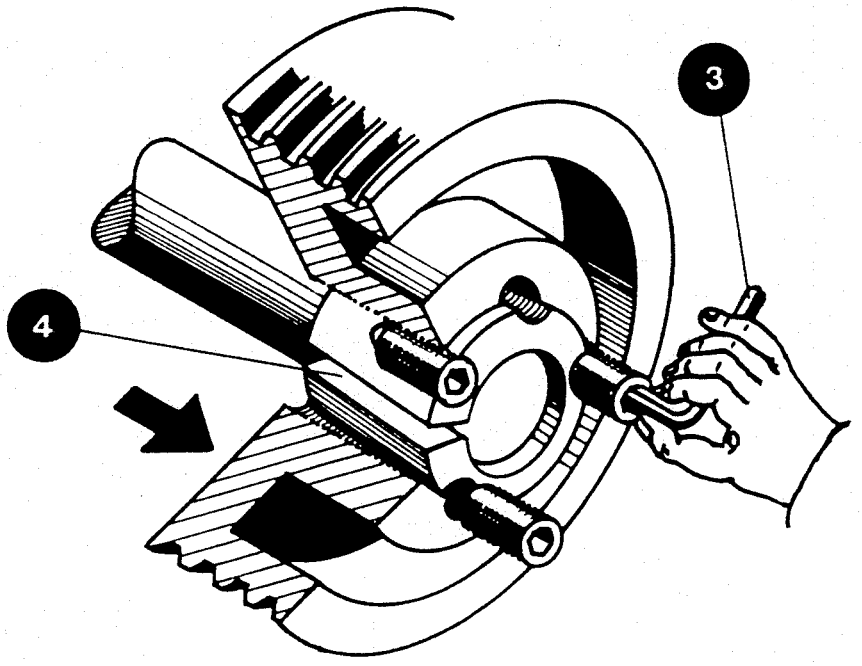
Turn out screws in cover (3) and remove. If difficult, use two pulling screws. Screw disk (4) out of crankshaft. Remove lock nut of torque support (13). Shackle sling to lifting lug and hook up to hoist. Lift gear box into vertical position. Do not exert any "pull" on the gear box. Remove three gear flange screws crosswise. Fit the puller (5) with three screws to the gear. Place thrust piece (6) against the crankshaft and turn the puller screw until the gear box comes off the shaft. Now remove gear box by crane to a suitable place.

Clean crankshaft and key (8) thoroughly. Check key and key seat for hair cracks. Also clean shaft bore in gear box. Rub crankshaft and key with ALTEMP paste®. Hook up gear box to hoist and ease it carefully towards the crankshaft. Now guide the gear box onto the crankshaft without "edging" or chafing. Place thrust disk (11) against the gear box and screw the pull-on screw (9) into the tapped hole (7) in the shaft. Now turn the pull-on nut until the drive gear (12) is firmly seated on the crankshaft. Re-install the torque support. Release sling. Rub disk (3) sparingly with MOLYCOTE® and screw into shaft end. Finally re-install cover (3). Re-install V-belts and tension correctly. Re-install side panel and top cover.

ALFA-LAVAL

HOW TO REMOVE AND FIT BELT PULLEYS WITH TAPER LOCK® EXPANSION BUSHES





KEY TO SIGNS

1 = Blind hole in the expansion bush and pulley, resp.
2 = Allen head type
3 = Allen head wrench
4 = Slot
5 = Pulley
6 = Expansion bush
7 = Drive shaft

TOOLS REQUIRED

1 Set open end spanners 12 – 55 mm
1 Allen head wrench M 10
1 Mobile crane
1 Sling
De-greasing agent

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut-down condenser unit, if fitted. Remove cover and side panel. Take up torque support on gear box. Remove V-belts.

PROCEDURE

1.8 h TIME REQUIRED

The TAPER LOCK expansion bush® (6) serves to secure, in shrink fit fashion, the pulley (5) on the drive shaft (7). The expansion bush is cylindrical on the inside, and conical on the outside. The bush is slotted, longitudinally, as shown (4). Depending on size, the bush is provided at its "wide" end with two or three blind holes (1) and one through hole. The pulley (5) is provided with one blind hole and three through holes.

HOW TO REMOVE THE PULLEY

Screw out the grub screws (2) by means of the Allen head wrench (3). Screw one of the grub screws into the blind hole (1), which was not in use before. Hook up pulley to hoist by means of the sling. As the screw is being driven home, the pulley (5) is pushed off the pulled from the drive shaft (7).

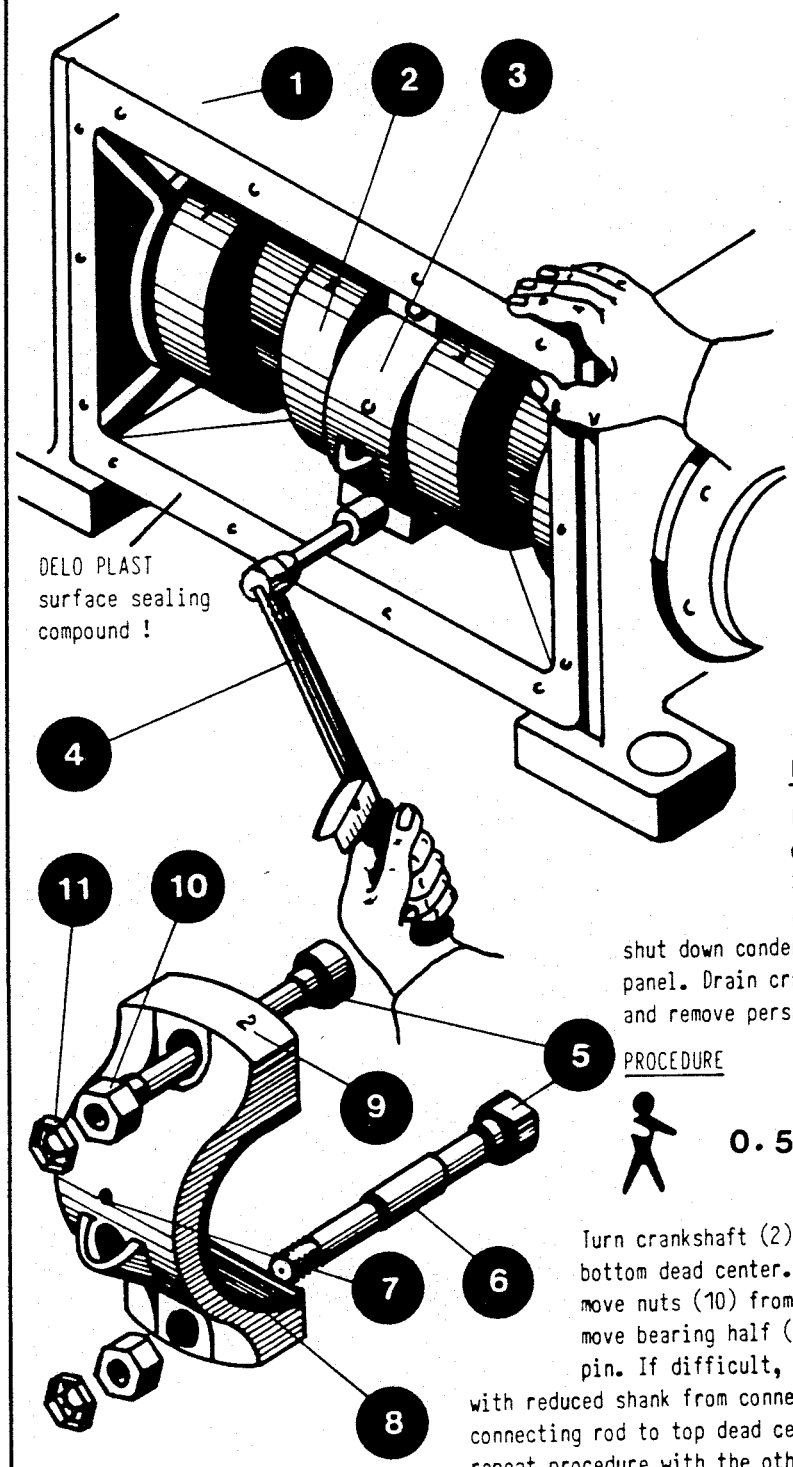
HOW TO FIT THE PULLEY

Thoroughly degrease all parts: Expansion bush (6), hub of pulley (5), and drive shaft (7). Push expansion bush into the hub of the pulley as far as possible. The halves of the holes must be mating exactly. Insert grub screws (2) loosely into the holes. Slip pulley together with the expansion bush onto the shaft. Now tighten up the screws with the Allen head wrench, uniformly. In doing so, the pulley is pulled uniformly onto the conical expansion bush. The bush will be pressed firmly onto the drive shaft.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO DISMANTLE AND ASSEMBLE BIG-END BEARINGS



KEY TO SIGNS

1 = Drive gear housing /crankcase
2 = Crankshaft
3 = Big-end bearing
4 = Torque wrench
5 = Face of extension bolt heads
6 = Bolt with reduced shank
7 = Expansion pin/bearing shell fastener
8 = Bearing shell
9 = Big end / connecting rod number
10 = Nut, bolt with reduced shank
11 = Lock nut

TOOLS REQUIRED

1 Set of open end spanners 14 - 36 mm
1 Torque wrench
1 Hexagon socket
1 Adaptor 3/4" : 1/2 "
1 Hexagon socket extension
1 Mallet
MOLYCOTE® (grey)
DELO-PLAST surface sealing compound ®

PREPARATORY WORK

De-pressurize homogenizing system. Close shut-off valves in product feed and discharge lines. Switch off power and secure against unauthorized handling. Shut-off cooling water and shut down condenser unit, if fitted. Remove cover and side panel. Drain crankcase oil into suitable container. Unscrew and remove perspex cover from drive gear housing.

PROCEDURE

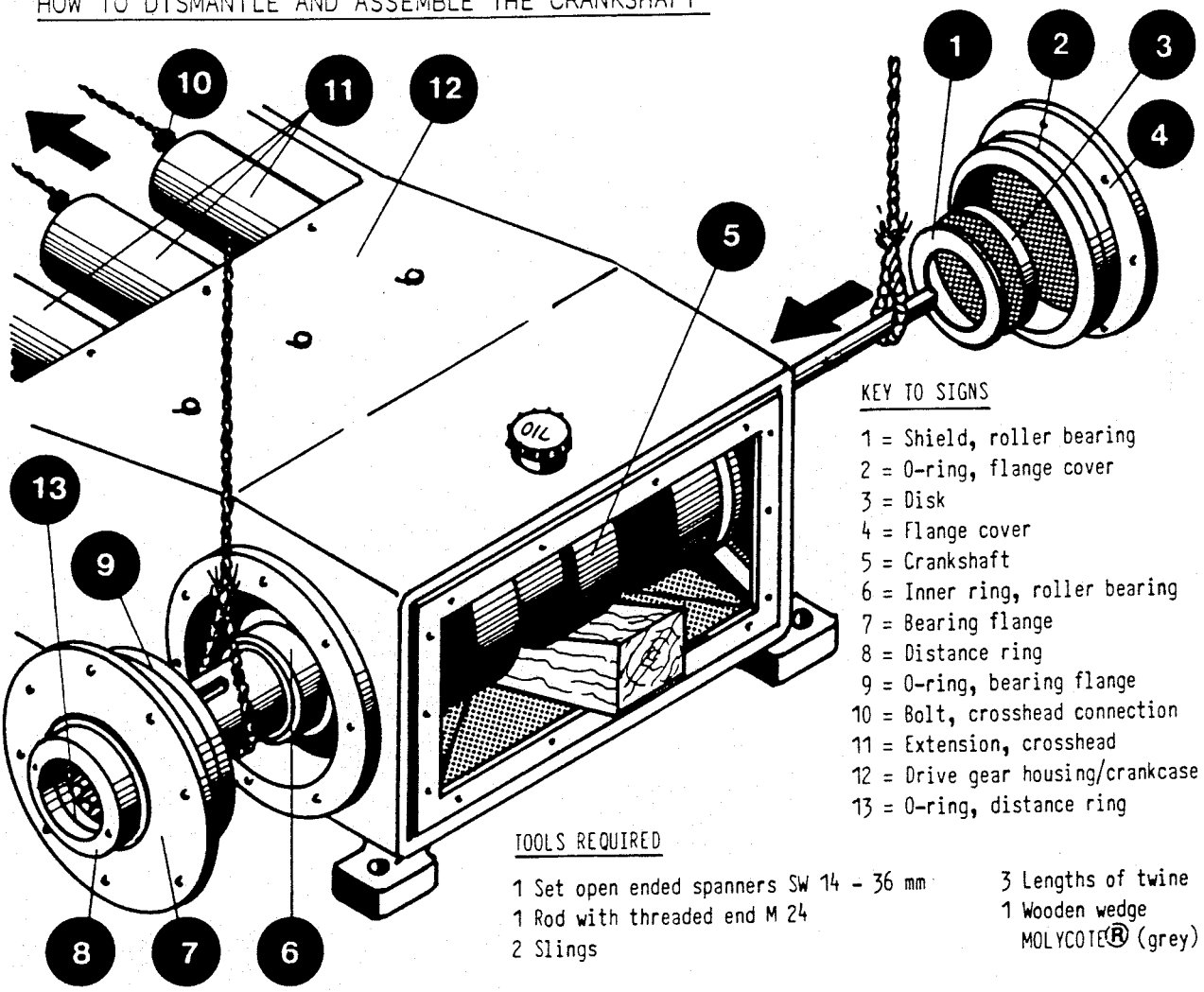
0.5 h TIME (per unit)

Turn crankshaft (2) so that the big-end concerned (3) will rest in bottom dead center. Remove lock nuts (11) with aid of spanner. Remove nuts (10) from bolts (6) by mean of torque spanner (4). Remove bearing half (3) together with lower bearing shell from crank pin. If difficult, ease off by light mallet knocks. Remove bolts with reduced shank from connecting rod and turn crankshaft together with connecting rod to top dead center and leave the connecting rod there. Now repeat procedure with the other big-end bearings.

Defective bearings should always be changed, i.e. connecting rod and relevant crosshead are changed as one complete unit. The defective connecting rod assemblies should be forwarded to the manufacturer for overhaul.

Clean bearing caps and bearing shells thoroughly. Use lint-free material only. Oil bearing shells well before fitting them onto crank pins. Take note of connecting rod numbering (9). Equal numbers will identify matching parts. Example: The number "1" on the left-hand crank web will match with the numbers "1" "1" on the connecting rod. Place bolts with reduced shank (6) in the bores of the bearings (3) in such a way that the faces of the bolt heads (5) are facing towards the connecting rod. Tighten up the nuts on the bolts by means of open end spanner, hand tight (10). Turn crankshaft with big-end bearing to bottom dead center. Now loosen nuts again. Rub contact surfaces of nuts sparingly with MOLYCOTE®(grey). Tighten up nuts again, hand tight, and complete tightening-up with the aid of the torque wrench to the specified torque. (Refer to " Torque specifications for extension bolts " in Section 5). Now secure nuts with lock nuts (11). Finally turn the machine to ascertain proper alignment and smooth running. Do not forget to re-fill with crankcase oil.

HOW TO DISMANTLE AND ASSEMBLE THE CRANKSHAFT



KEY TO SIGNS

1 = Shield, roller bearing
2 = O-ring, flange cover
3 = Disk
4 = Flange cover
5 = Crankshaft
6 = Inner ring, roller bearing
7 = Bearing flange
8 = Distance ring
9 = O-ring, bearing flange
10 = Bolt, crosshead connection
11 = Extension, crosshead
12 = Drive gear housing/crankcase
13 = O-ring, distance ring

TOOLS REQUIRED

1 Set open ended spanners SW 14 - 36 mm
1 Rod with threaded end M 24
2 Slings
3 Lengths of twine
1 Wooden wedge
MOLYCOTE® (grey)

PREPARATORY

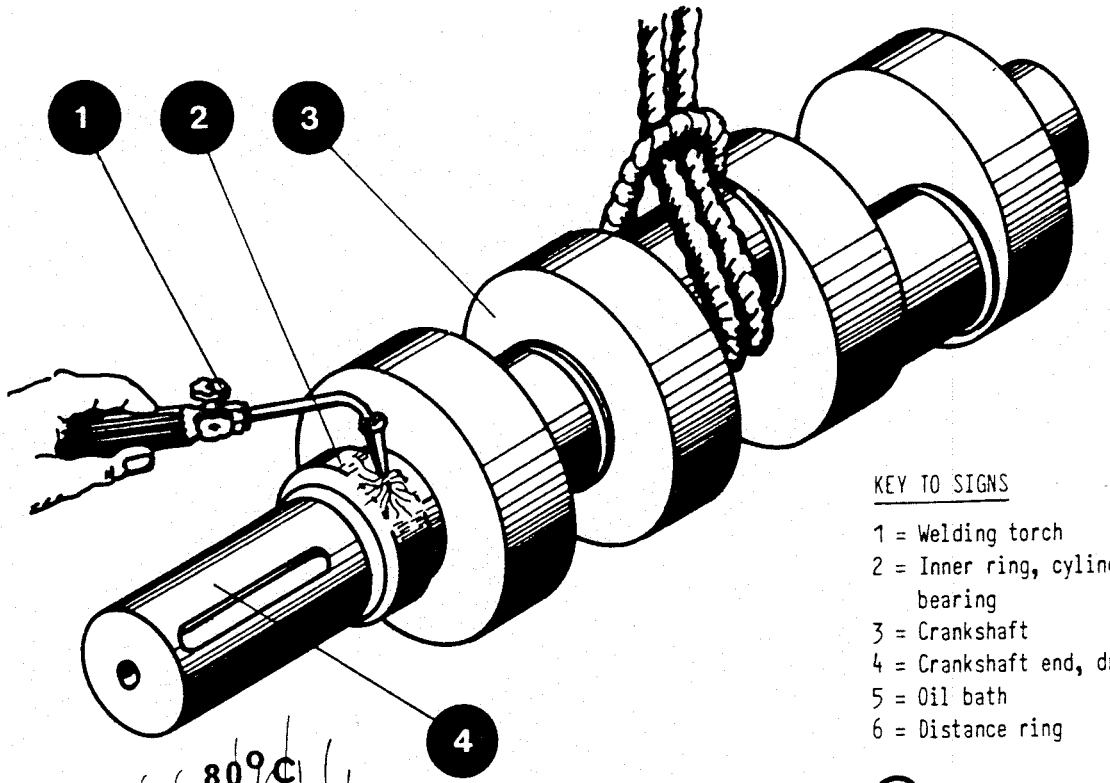
Refer to chapters "How to remove and fit V-belts" ; "How to remove and fit pump piston to crosshead extension" ; "How to pull and fit drive gear" ; "How to dismantle and assemble big-end bearings".

PROCEDURE

1.2 h TIME REQUIRED

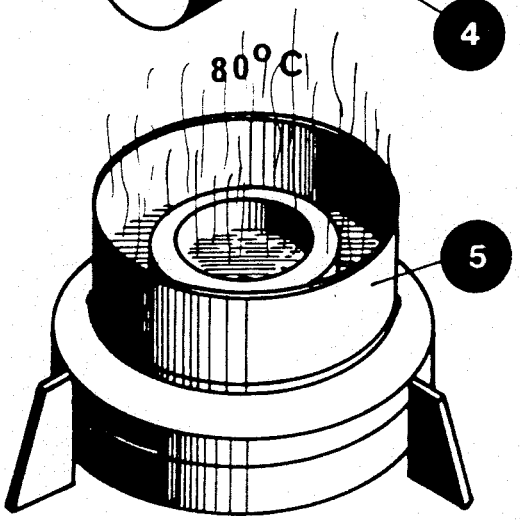
Remove bolts from bearing flange (7) and remove flange from housing (12). Pull flange with the aid of two screw bolts. The outer ring and the rollers of the cylindrical roller bearing come off the crankshaft (5) together with the bearing flange. To prevent the crankshaft from "sagging" support shaft by wooden wedge in the crankcase, as shown. Now pull distance ring (8) from shaft. Remove flange cover (4) and screw the disk (3) off the shaft. Remove bearing shield (1) from the exposed cylindrical roller bearing. Pull crosshead extensions (11) out of the drive gear housing and tie them -as far as they will go- up in this position with length of twine. (It is only in this fashion that the crankshaft can be removed without fouling the connecting rods). Now screw the threaded rod into the face of the crankshaft and suspend the shaft with the aid of the two slings, as shown, and remove the shaft from the housing in the direction indicated by the arrow. Now remove the remaining half of the bearing (at the drive-end side) from the flange (7). Then remove the remaining half of the bearing (at the opposite side) from the drive gear housing (12). The inner rings (6) of the cylindrical roller bearings should be heated and pulled off the shaft as described in chapter " How to pull and fit inner rings of crankshaft bearings ". Clean all parts thoroughly. If required, crank pins should be smoothed. Fit new cylindrical roller bearings, in reversed sequence. Always renew O-rings (2, 9 and 13). Rub all parts sparingly with MOLYCOTE (grey). The re-assembled crankshaft should be turnable by hand, without any effort.

HOW TO PULL AND FIT INNER RINGS OF CRANKSHAFT BEARINGS



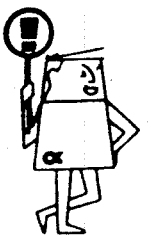
KEY TO SIGNS

1 = Welding torch
2 = Inner ring, cylindrical roller bearing
3 = Crankshaft
4 = Crankshaft end, drive-end side
5 = Oil bath
6 = Distance ring



TOOLS REQUIRED

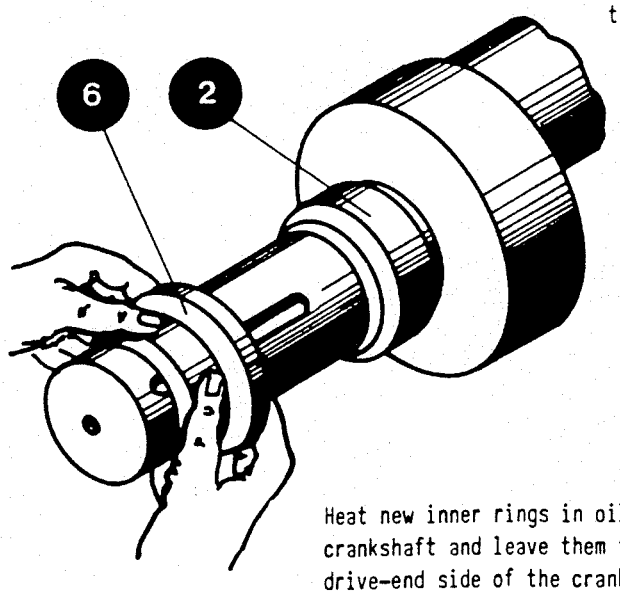
1 Welding torch
1 Sling
1 Hammer
1 Hot plate
1 Pair of asbestos gauntlets
MOLYCOTE®(grey)



ATTENTION !
Always wear heat protecting gauntlets when handling heated inner rings.

PREPARATORY WORK

Refer to the chapters "How to remove and fit V-belts" ; "How to remove and fit pump piston to crosshead extension" ; "How to pull and fit drive gear" ; "How to dismantle and assemble big-end bearings" ; "How to dismantle and assemble the crankshaft".



PROCEDURE

0.6 h TIME REQUIRED

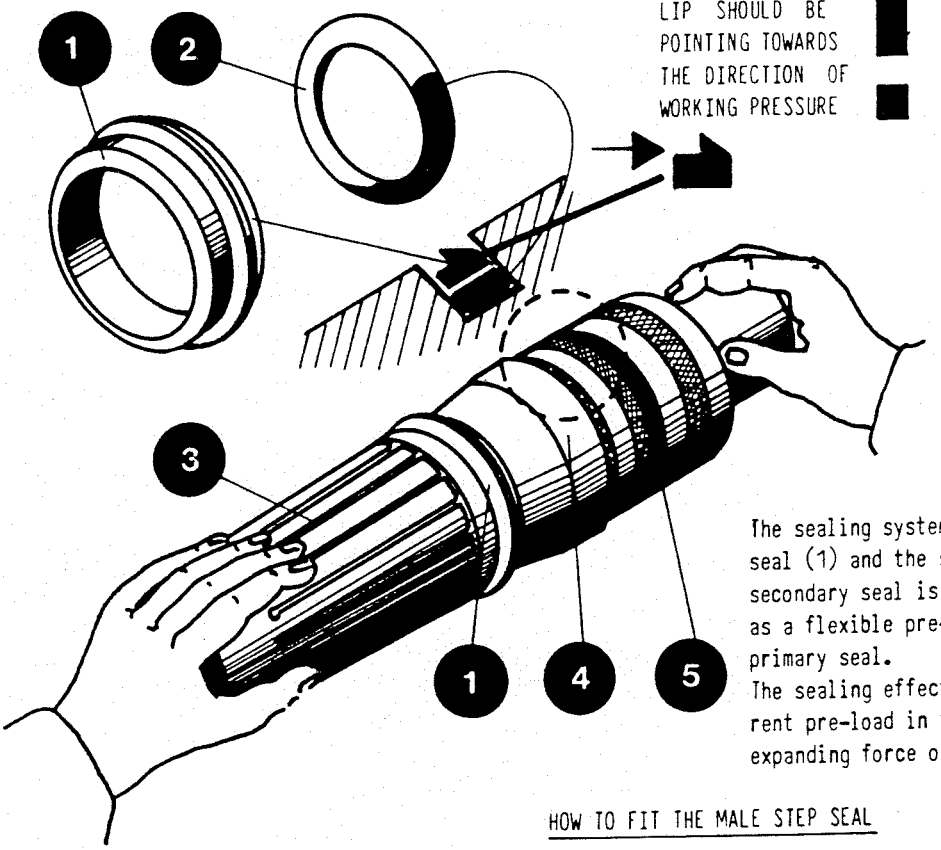
Suspend the dismantled crankshaft (3) by means off sling, attached to the center, and put it down at a suitable work place.
Heat the inner ring (2) evenly by welding torch and pull off the shaft. If required, apply hammer lightly, to loosen the ring.
Clean the ring seat. If required, smooth ring seat surface with oil stone and rub sparingly with MOLYCOTE®(grey).
Heat new inner rings in oil bath to abt. 80° C, slip them up to their seats on the crankshaft and leave them to cool down. Subsequently, fit the distance ring (6) on the drive-end side of the crankshaft (4). Always renew the O-ring in hub of the distance ring.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO FIT STEP SEALS®

WHEN FITTING THE PRIMARY SEAL, THE RIGHT ANGLE OF THE LIP SHOULD BE POINTING TOWARDS THE DIRECTION OF WORKING PRESSURE

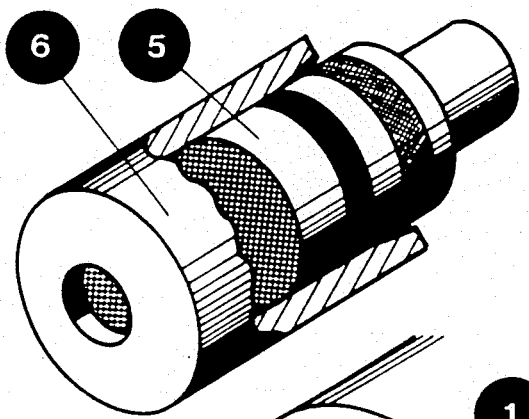


KEY TO SIGNS

1 = Primary seal
2 = Secondary seal
3 = Spreading sleeve for fitting the primary seal
4 = Fitting sleeve
5 = Piston with male STEP SEAL®
6 = Calibrating sleeve
7 = Piston bush with female STEP SEAL®

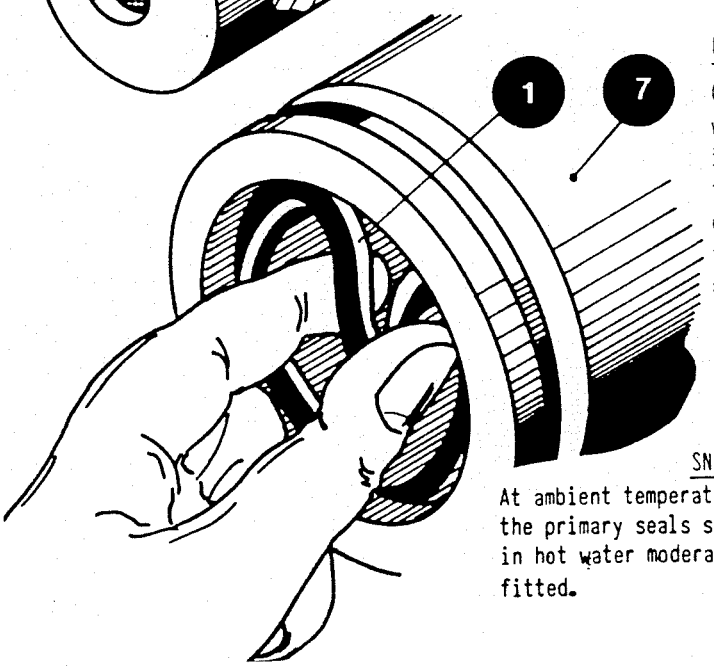
The sealing system consists of the primary seal (1) and the secondary seal (2). The secondary seal is an O-ring which serves as a flexible pre-loading support to the primary seal.
The sealing effect is caused by the inherent pre-load in the primary seal and the expanding force of the secondary seal.

HOW TO FIT THE MALE STEP SEAL



Clean seal groove thoroughly. Rub seals sparingly with MOLYCOTE®(white). Insert secondary seal (2) into the groove, by hand. Slip primary seal onto the conical sleeve (4), -the profile angle should point towards the direction of working pressure-. Slip sleeve onto the piston and push the primary seal into the sealing groove with the aid of the spreading sleeve (3). The primary seal will snap into the groove. However, it will still have a proud fit so that it must be bedded in with the aid of the calibrating sleeve (6). Care should be taken that the profiled edge is not being damaged.

HOW TO FIT THE FEMALE STEP SEAL

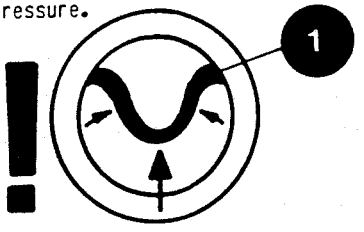


Clean seal groove thoroughly. Rub seals sparingly with MOLYCOTE®(white). Insert secondary seal (2) into groove, by hand. Ease primary seal (1) -with two fingers- over the secondary seal, while taking care that the primary seal is not being kinked or folded in doing so, and snug it down into the groove, as illustrated.

Care should be taken that the profiled edge is not being damaged.

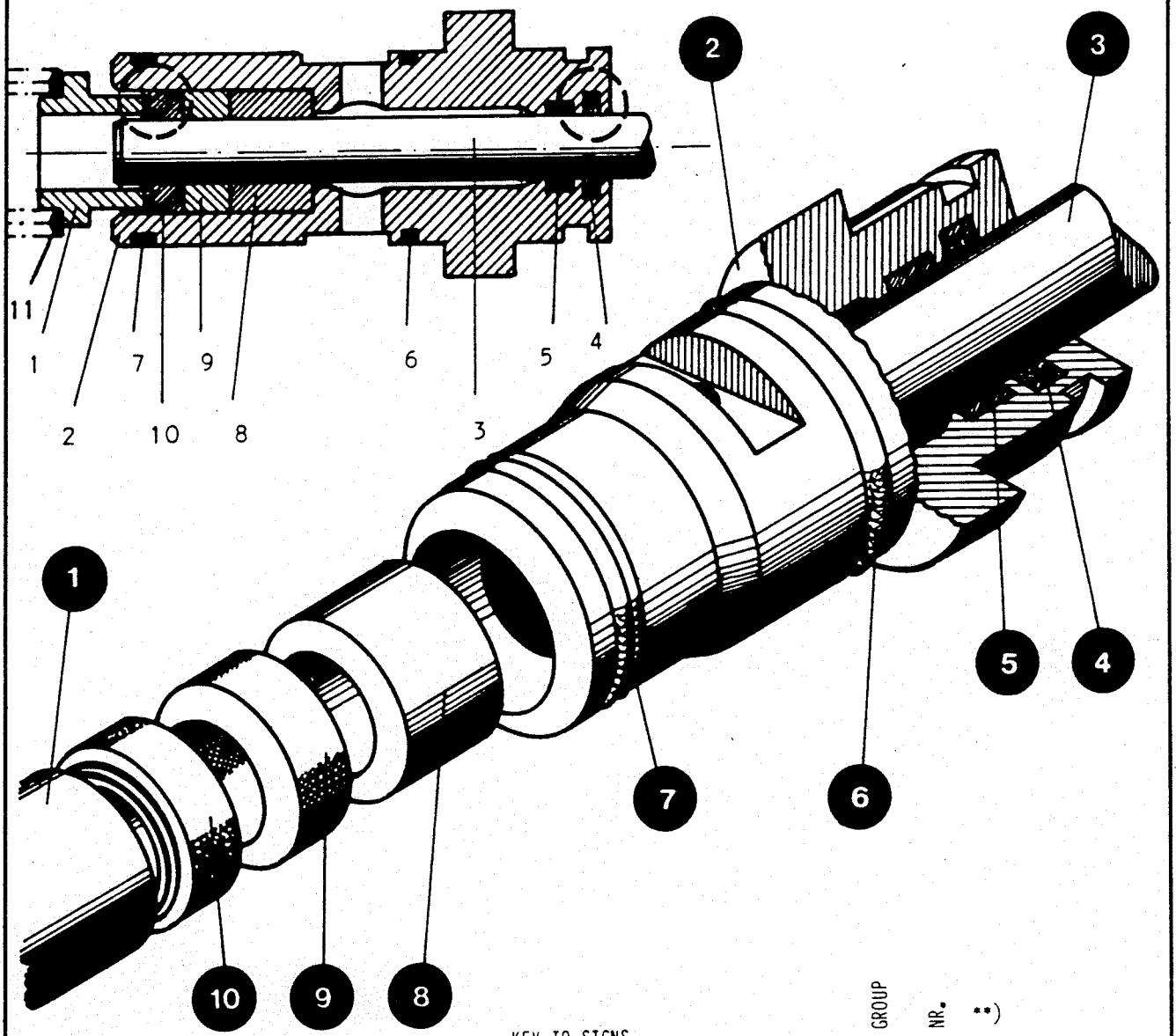
The profile angle should point towards the direction of working pressure.

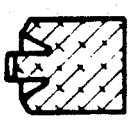
SNUGGING DIRECTION



At ambient temperatures below + 15° C the primary seals should be warmed-up in hot water moderately prior to being fitted.

PISTON SEALS ASSEMBLY, HIGH-PRESSURE PUMP





KEY TO SIGNS

	ASSEMBLY GROUP POS. - NR. **)
1 = Header ring	
2 = Piston bush	
3 = Piston	
4 = TURCON - STEP SEAL	200 - 12
5 = Guide ring	200 - 14
6 = O-ring	200 - 18
7 = O-ring with back-up ring	200 - 16, 56
8 = Thrust ring	
9 = Piston guide ring	200 - 13
10 = Grooved sealing ring	200 - 11
11 = Spring	

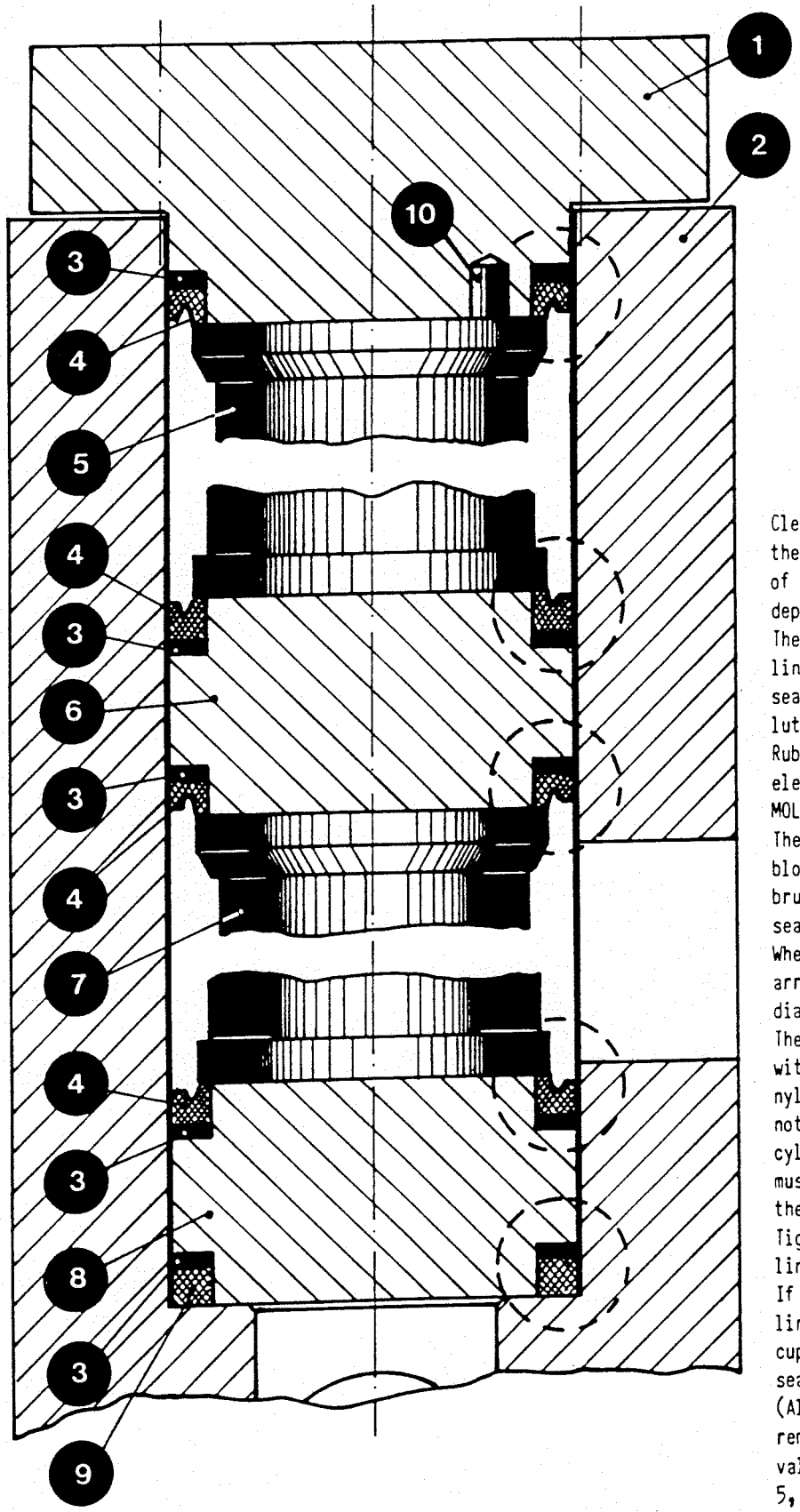
For inserting the STEP SEALS, refer to Section 5 : " How to fit STEP SEALS "

**) refer to "pink sheets"

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

HOW TO FIT LIP SEALING RINGS IN CYLINDER BLOCK

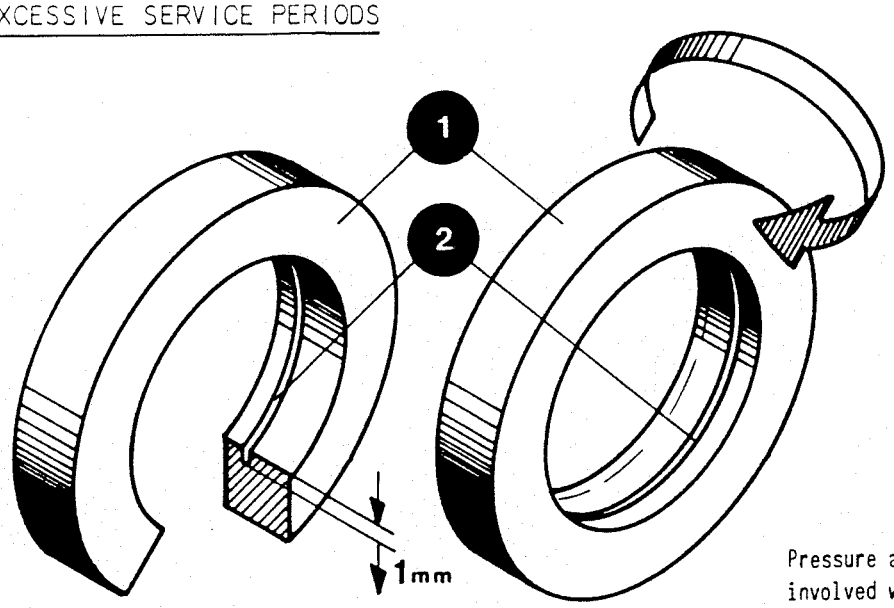


KEY TO SIGNS

1 = Cylinder cover
2 = Cylinder block
3 = Back-up ring
4 = Lip seal
5 = Cage, pressure valve
6 = Seat, pressure valve
7 = Cage, suction valve
8 = Seat, suction valve
9 = Sealing ring
10 = Cylindrical pin

Clean valve units thoroughly before they are being replaced in the bores of the cylinder block (2). All product deposits should be removed.
The grooves for the seals in the cylinder cover (1) and in the valve seats (6 + 8) should also be absolutely clean.
Rub cylinder bores and all sealing elements (3, 4, 9) sparingly with MOLYCOTE ® (white).
The contact surface, in the cylinder block, for the seat (8) should be brushed with a thin coat of LOCTITE sealing compound "572".
When fitting the valve assemblies, the arrangement of seals shown in the diagram should be strictly adhered to.
The valve seats should be driven home with the aid of a hammer handle or nylon drift. The lips of seals must not be damaged. When replacing the cylinder cover (1), the dowel pin (10) must fit precisely into the notch of the pressure valve cage (5).
Tighten up the cup nuts of the cylinder cover to the specified torque.
If any leakage should occur at the cylinder cover, do not tighten up the cup nuts any further, but change the seals (3 + 4) in the cylinder cover.
(Also refer to the chapters "How to remove and fit suction and pressure valves in cylinder block", in Section 5, and "Torque specifications for extension bolts", also in Section 5.

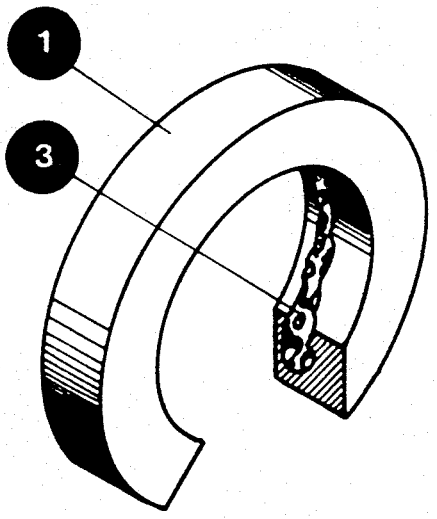
IMPACT RING DAMAGE DUE TO EXCESSIVE SERVICE PERIODS



KEY TO SIGNS

1 = Impact ring
2 = Normal cavitation grooves
3 = Deep cavitation groove
4 = Homo device seat
5 = Homo device cone
6 = Complete deterioration of Homo device cone by cavitation

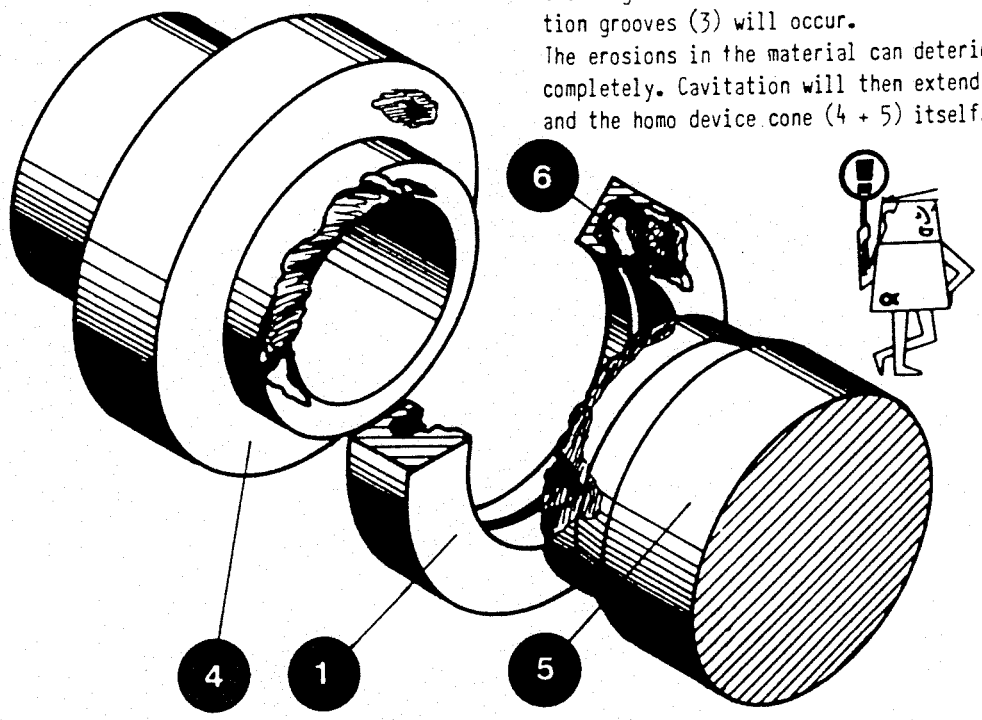
Pressure and flow rate of the product involved will determine the service life of the IMPACT RING in the homogenizer head.



The product forced through the annulus formed by the homo device cone and its seat (5 + 4) will depressurize abruptly. The sudden pressure drop will cause formation of vapour bubbles, which will attack the impact ring material and erode. A so-called cavitation groove will form (2). Within a certain service period the cavitation can be limited to the area of the impact ring.
The service life of the impact ring may be extended if regular checks are carried out to ascertain the condition of the ring. If the cavitation groove (2) has obtained a depth of approx. 1mm the ring should be dismantled, reversed and placed back into the homogenizer head, for another service period.

DAMAGE DUE TO EXCESSIVE SERVICE PERIODS

If the normal service life of an impact ring is exceeded, or if the ring has not been reversed at the proper time, deep cavitation grooves (3) will occur.
The erosions in the material can deteriorate the impact ring completely. Cavitation will then extend to the homo device seat and the homo device cone (4 + 5) itself.

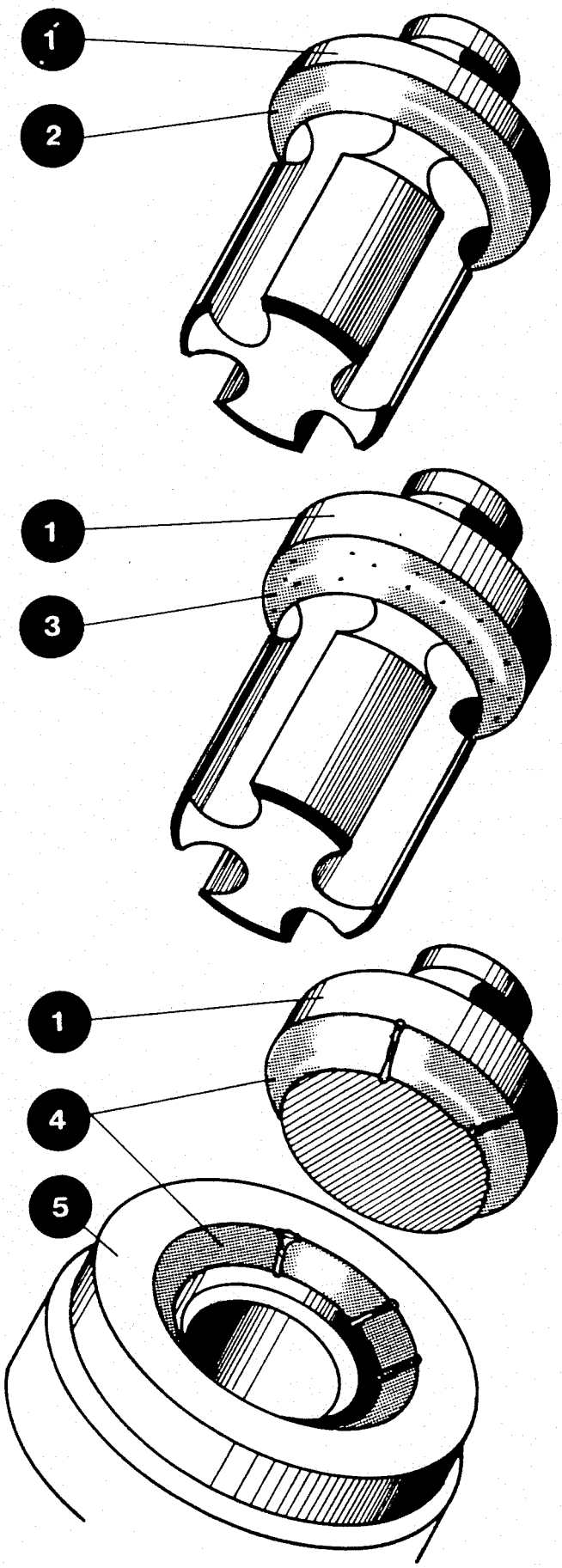


ATTENTION
Regular checks of the impact ring will prevent cost and consequential damage.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

WEAR PATTERNS IN CONTACT SURFACES OF SUCTION AND PRESSURE VALVES



KEY TO SIGNS

1 = Valve cone
2 = Normal wear pattern
3 = Pitting formation in contact surface
4 = "Blow through marks" in valve cone and seat

The service life of suction and pressure valves will greatly depend on the product involved. Regular checks of valves are therefore indispensable.

NORMAL WEAR PATTERN (2)

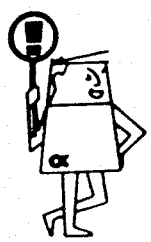
The normal wear pattern on valve contact surfaces shows a dull metallic finish. On completion of approx. 100 hours of operation the contact surface will show a slight wear mark on its entire circumference. This polished impression is quite normal. The valve does not require re-grinding.

PITTING FORMATION (3)

Pittings are hammered by solids contained in the product to be homogenized. They are the cause of "Blow through marks" in the valve cone and seat. The normal wear pattern can be restored by grinding.

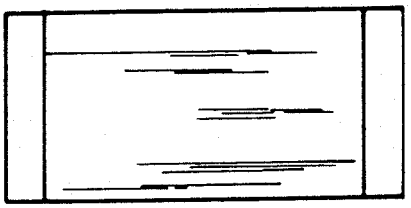
BLOW THROUGH MARKS IN VALVE CONE AND SEAT (4)

Product deposits on sporadic spots of the valve contact surface have prevented the valve from "seating" properly. The product has "blown through" and eroded the valve cone and seat across the entire width of the contact surfaces.
Failure of carrying out regular checks and maintenance will cause damage of this nature.
The valve (seat and cone) must be exchanged.



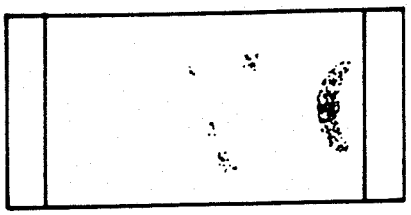
ATTENTION
Regular checks of the impact ring will prevent cost and consequential damage.

WEAR PATTERNS IN BIG-END BEARINGS



SCORINGS IN THE BEARING METAL

Scorings in the surface of bearing metal are an indication of contamination of lubricating oil.

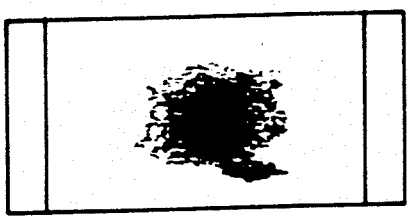


CRESCENT-SHAPED PATTERNS IN THE VICINITY OF BEARING SHELL JOINTS

Bearing metal surface ranges from rough to scar-like or pitted appearance, indicating that corrosion has occurred.

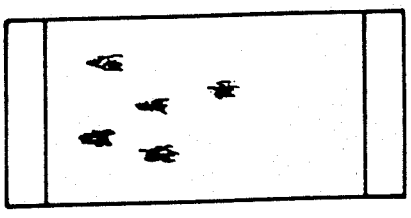
WEAR MARK ON THE EDGE OF BEARING SHELL

Squeezed or wiped bearing metal at the edge of the bearing shell indicates that the bearing is out of alignment.



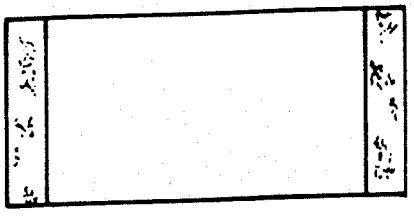
DISCOLOURATION OF BEARING SURFACE

Extensive discolouration of bearing metal is an indication of insufficient clearance and oil starvation.



"TONGUE TIP" FORMATION ON BEARING METAL

During the running-in period of bearings slight wipings of tongue-tip appearance may occur in the bearing surface. These "tongue tips" are of no importance. After a certain period of bedding in these phenomena will disappear and the surface become smooth again.



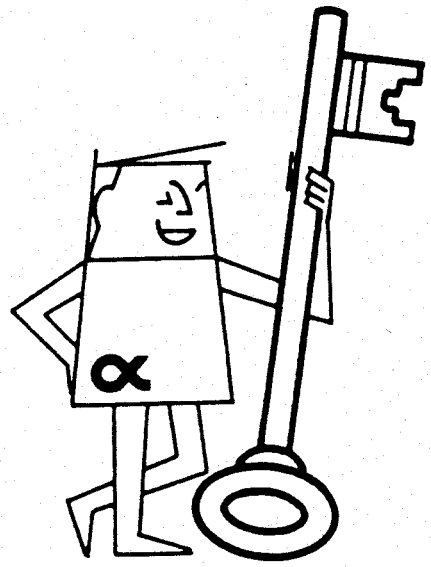
WORK MARKS ON THE FACES OF BEARING SHELL JOINTS

Hammer marks in the faces of the shell joints indicate that the bearing shells have not been pre-stressed adequately.

SECTION 6

Spare Parts

KEY TO CORRECT ORDERING OF SPARE PARTS



In the following spare parts lists all component parts of the homogenizer concerned are enumerated and shown in the accompanying diagrams.
When ordering spares, you should observe the following points:

1. Please make sure that the serial number on the identification plate of your machine is identical with the number appearing on the identification plate reproduced in this manual.

2. Find the "Position No." of the item required in the respective diagram and add the corresponding:

   IDENTITY NUMBER
   DESIGNATION of the part, and
   QUANTITY required.

To ensure prompt delivery, address your order to the

ALFA-LAVAL COMPANY

or to the

ALFA-LAVAL AGENCY

in your country.

Do not forget to mention shipping instructions.

SPECIMEN ORDER :

Order for spare parts required in the homogenizer Type: xxx Serial number: xxx

Please forward by air freight:

POS.-NO.	IDENTITY-NO.	DESIGNATION	QUANTITY
200-02	4 722 1095-01	Bush	1
200-06	4 600 0000-01	Spring	1
200-13	4 722 1180-01	PISTON GUIDE RING	1
200-16	4 302 0491-04	O-ring	1
200-17	4 302 0490-94	O-ring	1
200-18	4 302 0491-05	O-ring	1

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

Construction-Group Contents

Baugruppen-Übersicht

Constr.-Group. BAUGRUPPE	DISIGNATION / BEZEICHNUNG		IDENT.-NUMBER / IDENTITÄTS-Nr.
100	drive gear	Triebwerk	4 722 0959-80
101	housing	Gehäuse	4 722 0968-02
102	crankshaft	Kurbelwelle	4 722 1072-02
103	cross-head	Kreuzkopf	4 722 0965-80
104	connection-rod	Pleuelstange	4 722 0961-80
105	oil-cooler	Ölkühler	4 722 0975-01
106	piston connection	Kolbenverbindung	see extra list
200	fluid end	Flüssigkeitsteil H ϕ 36	4 722 1064-80/98/89/49
201	suction conn. flange	Saugleitung Anschlußflansch	4 722 1612-80
203	pressure gauge	Manometer 0-300/600bar	4 932 2002- 20
204	cooling circulation	Kühlkreislauf H 48V	4 722 1170- 88
205	condensate unit	Kondensateinheit	–
206	Pressure gauge Flange	Manometerfl. f.Höchstdruckausf.	–
400	frame with stainless steel	Gestell mit Verkleidung	4 722 1134- 80
500	single-stage homogenizing head	Einfach-Homogenisierkopf -m.Austrittsfl. + Gehäuse -	–
501	double-stage homogenizing head	Doppel-Homogenisierkopf - m.Austrittsfl. + Gehäuse -	4 722 0958- 99
502	homogenizing device 1st-stage	Homogenisiervorrichtung 1. Stufe	4 722 0958- 98 ϕ 10/18
502	homogenizing device 2nd-stage	Honogenisiervorrichtung 2. Stufe	4 722 0958- 98 ϕ 10/18
503	set of sealing for homog.head	Dichtungssatz	4 722 0958- 88
504	hydraulic control	Hydr.-Steuerung 2x48V ~	4 722 1254- 82/85/81
505	hydraulic pressure indication	Hydr. Druckanzeige	–
600	drive	Antrieb	4 722 1396- 81
700	electric control	elektr. Steuerung	4 722 1586- 80
701	remote pressure control	Druckfernanzeige	–
702	oil level minimum control	minimum Ölstandskontrolle	–
702	thermostater	Temperaturregler	–
800	wiring diagram	Verdrahtungsplan	see extra list

1984

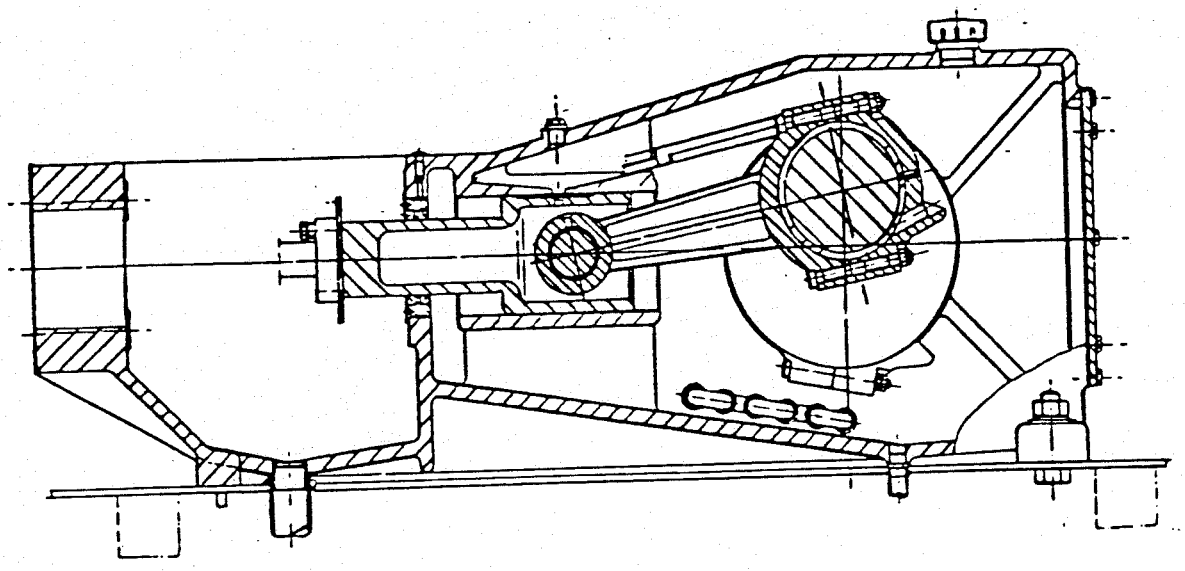
Kom.-Nr. 59.101.85

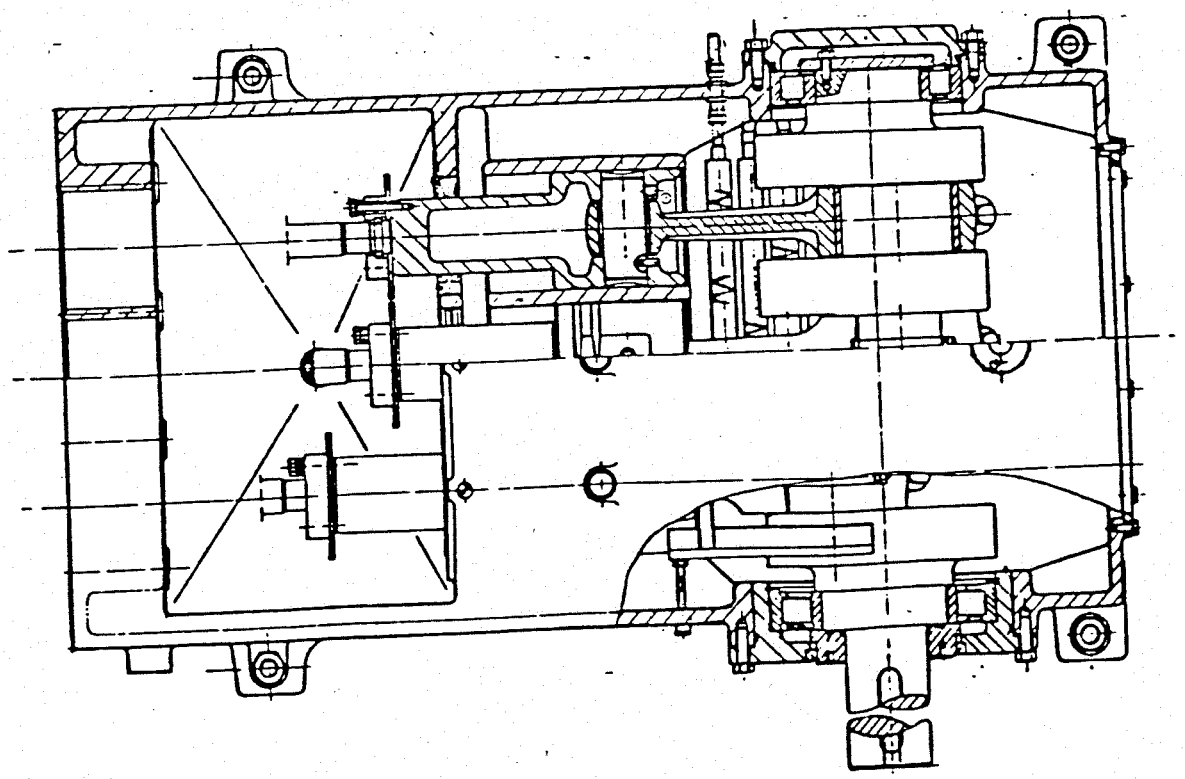
SML 20

ALFA-LAVAL

DRIVE GEAR COMPL.
TRIEBWERK KOMPL.
SYSTEME D'ENTRA INEMENT, COMPL.
ENGRENAGEM DE ACIONAMENTO
DRIVVÄXEL, KOMPLETT
ПРИВОД, КОМПЛ.

CONSTR.-GROUP
BAUGRUPPE
100

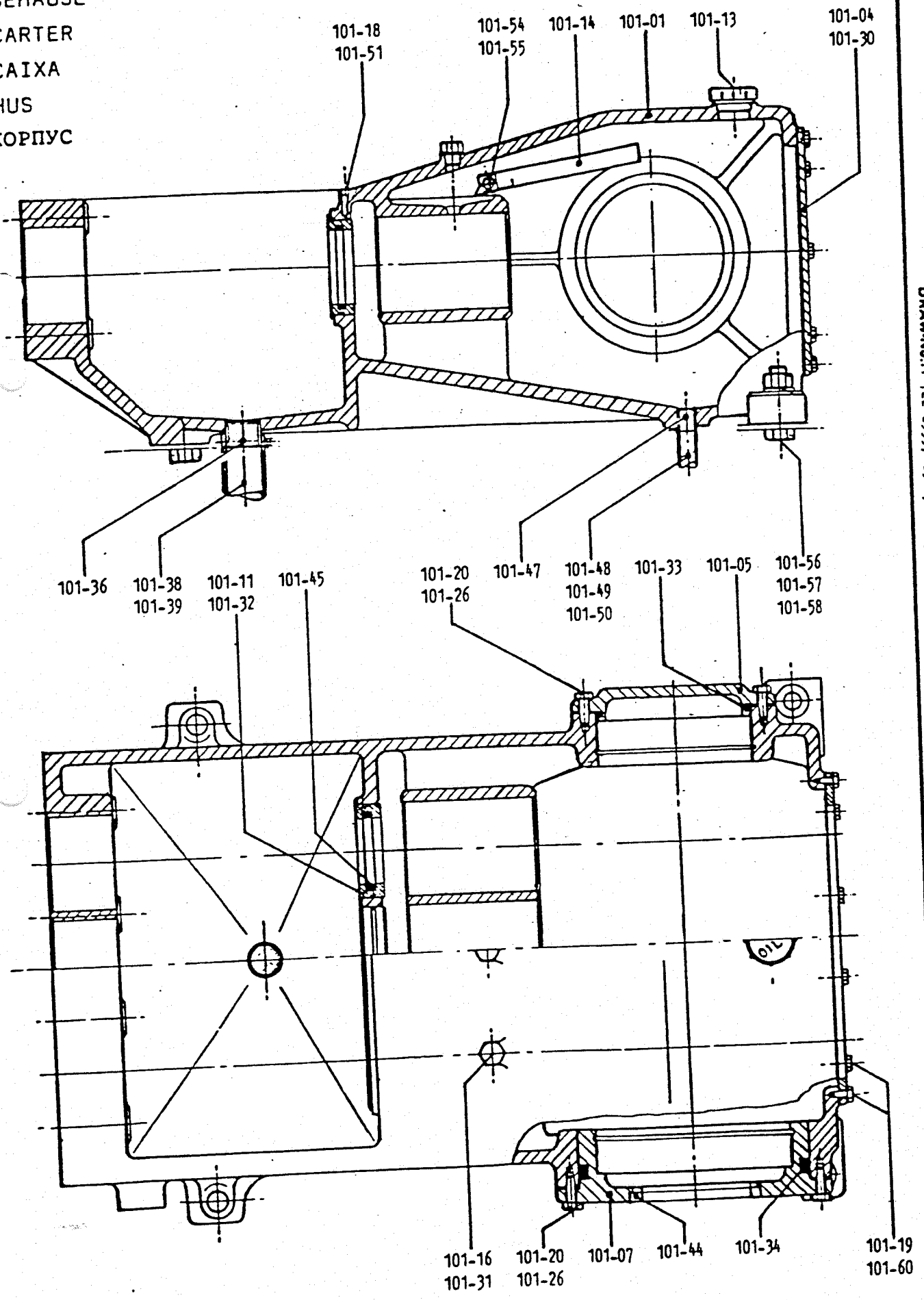




ED 8/82
SHEET:
REG.-No.: 100-01.02
DRAW-No.: 4 722 0300/ 0959/ 1243/ 1637
TYPE: SHL 20-40

101

HOUSING
GEHÄUSE
CARTER
CAIXA
HUS
КОРПУС



TYPE: SHL 20-40
DRAW-NO.: 4 722 0959/ 0300/ 1243/ 1637
REG.-No.: 101-01.02
SHEET: 1
12/82 E

8/82 ED.

SHEET: 1 of 2

REQ.No.: 101-01.03

DRAW.NO.: 4 722 0959

TYPE: SHL 20

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE: 101

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0959-80	Drive gear compl. Triebwerk kompl.			1		
101-00		Housing compl. Gehäuse kompl.			1		
101-01	4 722 0968-02	Housing Gehäuse			1		
101-04	4 722 0935-01	Housing cover Gehäusedeckel			1		
101-05	4 722 0970-02	Cover for flange Flanschdeckel			1		
101-07	4 722 0972-02	Flange for bearing Lagerflansch			1		
101-11	4 722 1389-01	Sealing bush for cross head Dichtungsbuchse f.Kreuzkopf			3		
101-13	4 931 8090-09	Oil filling cover Öl-Entlüftungsdeckel	A2 R 1 1/2" DIN 1541		1		
101-14	4 722 0978-80	Oil scraper Ölabstreifer			1		
101-16	4 005 0192-26	Screw plug Verschlußschraube	R 1/2" x 20 DIN 367		3		
101-18	4 003 4400-96	Threaded pin Gewindestift	M 6x20 DIN 914		3		
101-19	4 000 0000-30	Hexagon screw 6kt. Schraube	M 8x20 DIN 933		14		
101-20	4 000 0001-11	Hexagon screw 6kt. Schraube	M 12x35 DIN 933		12		
101-26	4 016 0151-10	Spring ring Federring	B 12 DIN 127		15	for Pos.20,22	
101-31	4 300 0022-00	Sealing for screw plug Dichtung f.Verschlußschraube	22x29x1,5		3		
101-32	4 302 0490-71	O-ring for cross head cover Runddichtring f.Kreuzkopfd.	ϕ 104 x 4	Perbunan	3		
101-33	4 302 0490-72	O-ring for flange cover Runddichtring f.Flanschdeckl.	ϕ172 x 4	Perbunan	1		
101-34	4 302 0490-40	O-ring for bearing flange Runddichtring f. Lagerflansch	ϕ242x4	Perbunan	1		
101-36	4 350 0428-03	Pipe double nipple Rohrdoppelnippel	1 1/2" x 54 DIN 2990		1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

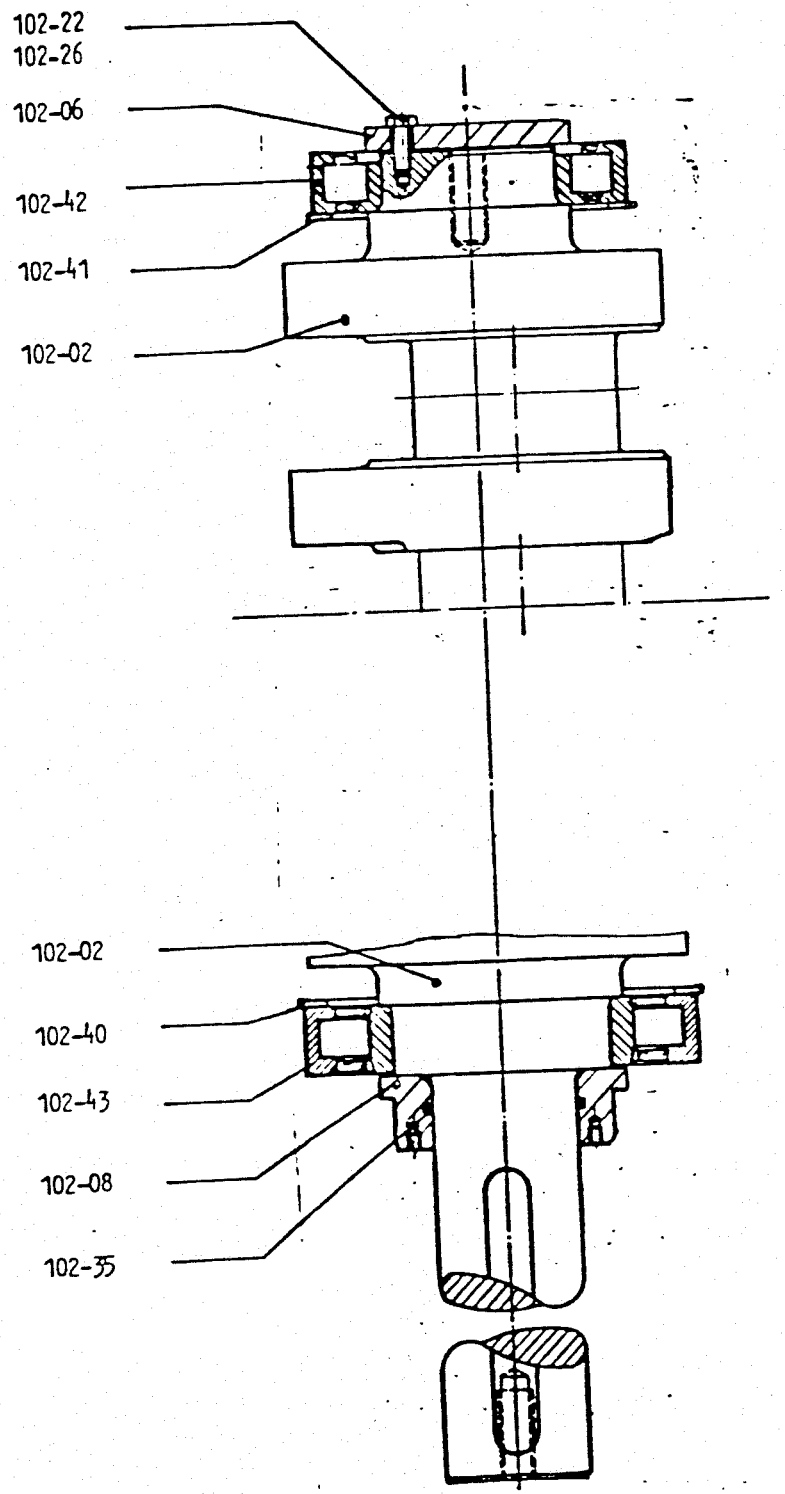
LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 101
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
101-38	4 018 0040-29	Tube clip Schlauchschelle	SA 50-70 DIN 3017		1		
101-39	4 844 0193-65	Hose Schlauch	∅ A 58x5x 2000		1		
101-44	4 305 0012-50	Radial sealing ring Radialwellendichtring	A 125x150x12	Perbunan	1		
101-45	4 307 4250-09	Grooved sealing ring Nutring	1 20-70		3		
101-47	4 350 0426-27	Pipe double nipple Rohrdoppelnippel	3/4"x60 DIN 2982		2		
101-48	4 844 0193-25	Hose Schlauch	∅ A34 x4,5x1000		1		
101-49	4 018 0040-12	Tube clip Schlauchschelle	LA 25 40 DIN 3017		2		
101-50	4 320 0401-04	Drain cock Entwässerungshahn	MM 3/4" DIN 361		1		
101-51	4 648 0000-05	Plug Verschlußstopfen	F 5 D=14, d=10,7		3		
101-54	4 000 0008-01	Hexagon screw 6kt. Schraube	M 10x75 DIN 933		2		
101-55	4 010 0201-50	Hexagon nut 6kt. Mutter	M 10 DIN 934		2		
101-56	4 000 0001-54	Hexagon screw 6kt. Schraube	M 16x60 DIN 933		4		
101-57	4 015 0017-00	Washer Scheibe	B 17 DIN 125		4		
101-58	4 010 0201-80	Hexagon nut 6kt. Mutter	M 16 DIN 934		4		
101-30	4 301 5000-11	Dichtung f. Gehäusedeckel Sealing f. housing cover			1		
101-60	4 015 0008-04	Washer Unterlegscheibe	B 8,4 DIN 125		14		

102

CRANKSHAFT
KURBELWELLE
VILEBREQUIN
EIXO DE MANIVELAS
VEVAXEL
КОЛЕНЧАТЫЙ ВАЛ



TYPE: SHL 20-40
DRAW.NO.: 4 722 1072/ 0301/ 1226/ 1376
REQ.NO.: 102-01.02
SHEET:
12/82
ED.

11/78 EO.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

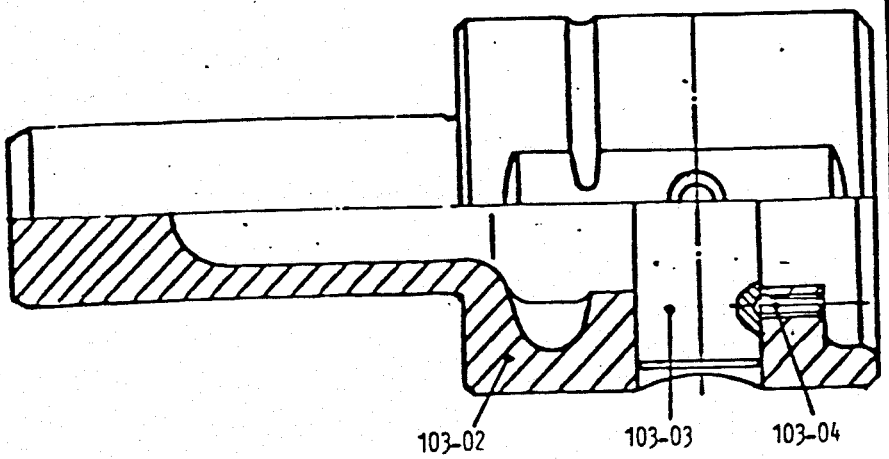
CONSTR.-GROUP
BAUGRUPPE : 102

SHEET: 1
REG.No.: 102-01.03
DRAW.No.: 4 722 0959
TYPE: SHL 20

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0959-80	Drive gear compl. Triebwerk kompl.	SZO 140		1		
102-00		Crankshaft compl. Kurbelwelle kompl.			1		
102-02	4 722 1072-02	Crankshaft Kurbelwelle			1		
102-06	4 722 0971-01	Disk Scheibe			1		
102-08	4 722 0973-01	Distance ring Distanzring			1		
102-22	4 000 0001-09	Hexagon screw for disk 6kt. Schraube f. Scheibe	M 12x25 DIN 933		3	see Po.-No 101-26	
102-35	4 302 0075-05	O-ring Runddichtring	ϕ75 x 4	Perbunan	1		
102-40	4 016 0302-15	Locking ring Sicherungsring	J 215 x 5 DIN 472		1		
102-41	4 016 0301-80	Locking ring Sicherungsring	180 x 4 DIN 472		1		
102-42	4 241 2200-02	Cylindrical roller bearing Zylinderrollenlager	NUP 220 DIN 5412		1		
102-43	4 241 0010-57	Cylindrical roller bearing Zylinderrollenlager	NU 224 DIN 5412		1		
101-26	4 016 0151-10	Spring ring Federring	B 12 DIN 127		15	for Pos.20,22	

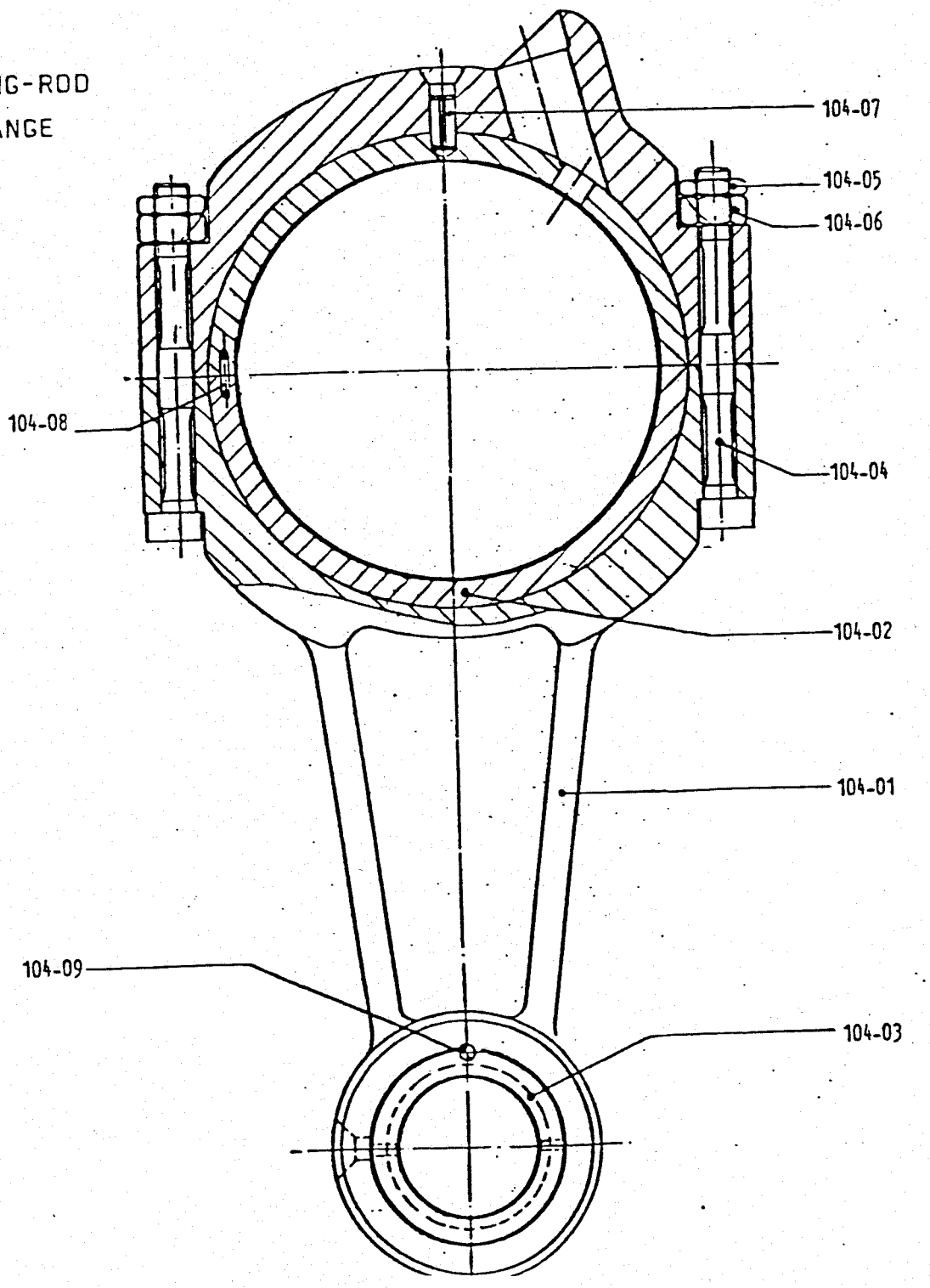
103

GROSS-HEAD
KREUZKOPF
CROSSE
CRUZETA
TVÄRSTYCKE
КРЕЙЦКОПФ



104

CONNECTING-ROD
LEUELSTANGE
BIELLE
BIELA
VEVSTAKE
ШАТУН



TYPE: SHL 20-40
DRAW.NO.: 4 722 0965/ 0302/ 1228/ 1411
4 722 0961/ 0303/ 1237/ 1415
REG.NO.: 103-01.02
104-01.02
SHEET: 1
12/82 EC

5/80 eo.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 103/104
BAUGRUPPE

SHEET: 1

103-01. REQ.-No.: 104-01.04

DRAW-NO.: 4 722 0959

TYPE: SHL 20

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0959-80	Drive gear compl. Triebwerk kompl.	SZO 140		1		
103-00	4 722 0965-80	Cross-head with connecting rod compl. Kreuzkopf mit Pleuelstange kompl.			1		
103-02	4 722 0966-02	Cross-head Kreuzkopf			1		
103-03	4 722 0967-01	Cross-head pin Kreuzkopfbolzen			1		
103-04	4 003 4400-69	Threaded pin Stiftschraube	DIN 914		2		
104-00	4 722 0961-80	Connecting rod compl. Pleuelstange kompl.			1		
104-01	4 722 0962-02	Connecting rod Pleuelstange	2 parts		1		
104-02	4 722 1467-01	Bearing brasses Lagerschale	2 parts		1		
104-03	4 722 0964-01	Bush Buchse			1		
104-04	4 002 0000-70	Screw for connecting rod Pleuelschraube			2		
104-05	4 010 4302-02	Locking nut Sicherungsmutter	M 12 DIN 7967		2		
104-06	4 010 0201-60	Hexagon nut 6kt. Mutter	M 12 DIN 934		2		
104-07	4 016 0504-57	Expansion pin Spannhülse	8 x 10 DIN 1481		1		
104-08	4 002 6400-06	Stud bolt Stiftschraube	M 6x10 DIN 551		1		
104-09	4 110 3500-10	Socket pin Zylinderstift	3 x 10 DIN 7		1		

105

OEL COOLER

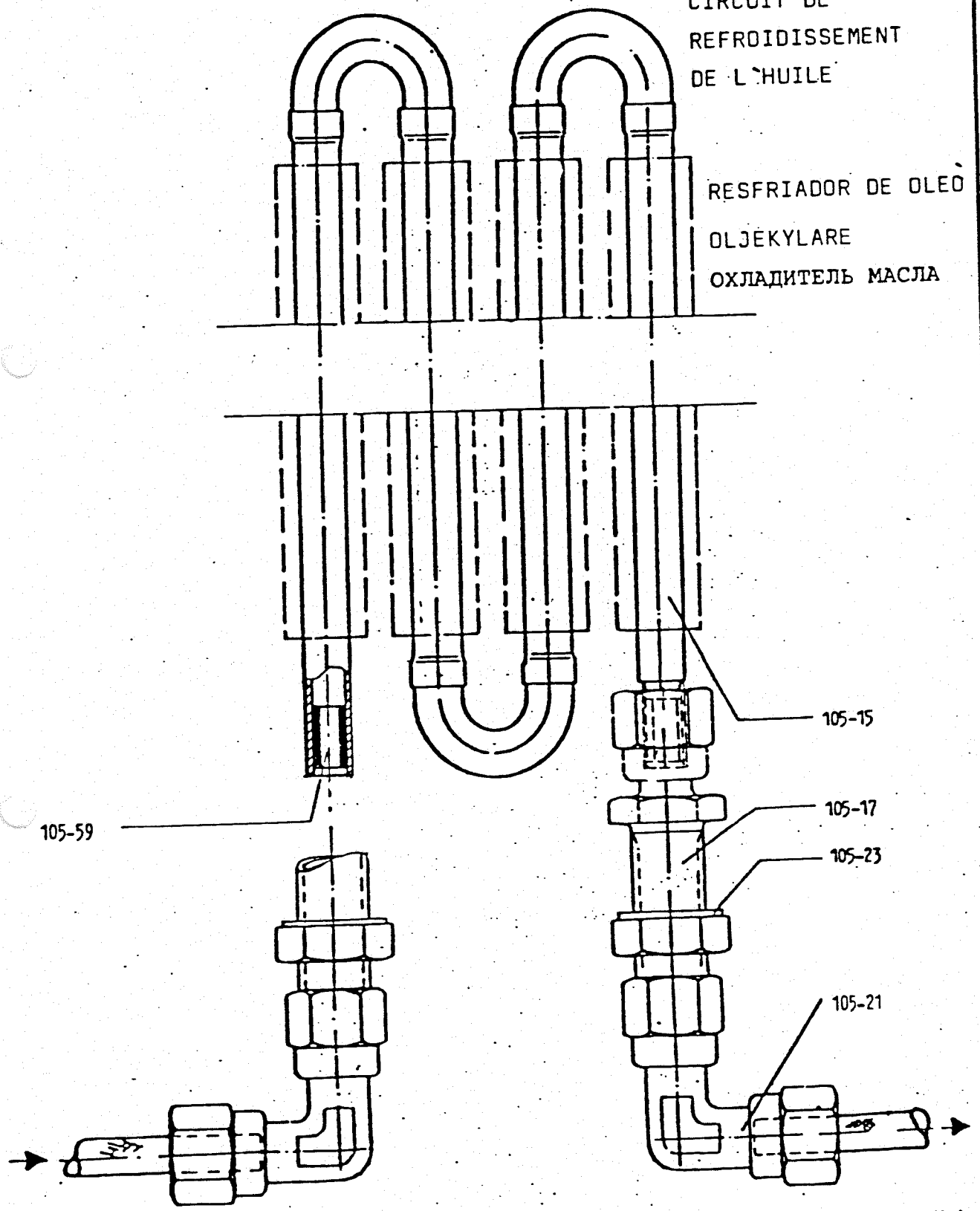
ÖLKÜHLER

CIRCUIT DE REFROIDISSEMENT DE L'HUILE

RESFRIADOR DE OLEO

OLJEKYLARE

ОХЛАДИТЕЛЬ МАСЛА



TYPE: SHL 30-40
DRAW.NO.: 4 722 0959/0300/1243/1637
REQ.NO.: 105-01.02
SHEET: 1
10/83 EC

8/82 ED.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

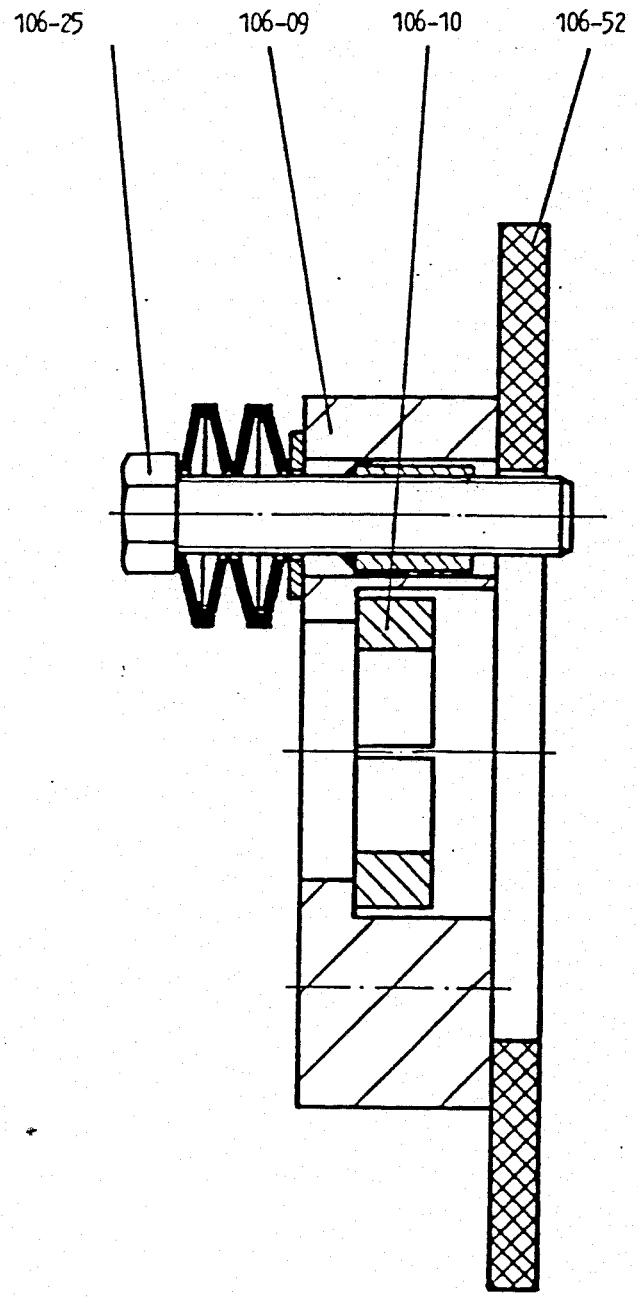
CONSTR.-GROUP
BAUGRUPPE : 105

SHEET: 1
REG.-NO.: 105-01.03
DRAW-NO.: 4 722 0959
TYPE: SHL 20

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100-00	4 722 0959-80	Drive gear compl. Triebwerk			1		
105-00		Oil cooler compl. Ölkühler			1		
105-15	4 722 0975-01	Oil cooler Ölkühler			1		
105-17	4 350 8402-18	Bulk-head srew Schottverschraubung	SV 12 L		2		
105-21	4 353 8401-31	Elbow srewing Winkelverschraubung	e V W 12 L		2		
105-23	4 300 0018-04	Flat sealing Flachdichtung		Aluminium	2		
105-59	4 350 0004-59	Reinforcing bush Verstärkungshülse	vsh 12x1		2		

106

PISTON CONNECTION
KOLBENVERBINDUNG
CONNEXION DU PISTON
CONEXCÃO DO PISTÃO
KOLVANSLUTNING



TYPE: SHL 20-40
DRAW.NO.: 4 722 0959/0300/1243/1637
REQ.NO.: 106-01.02
SHEET: 1
12/78 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

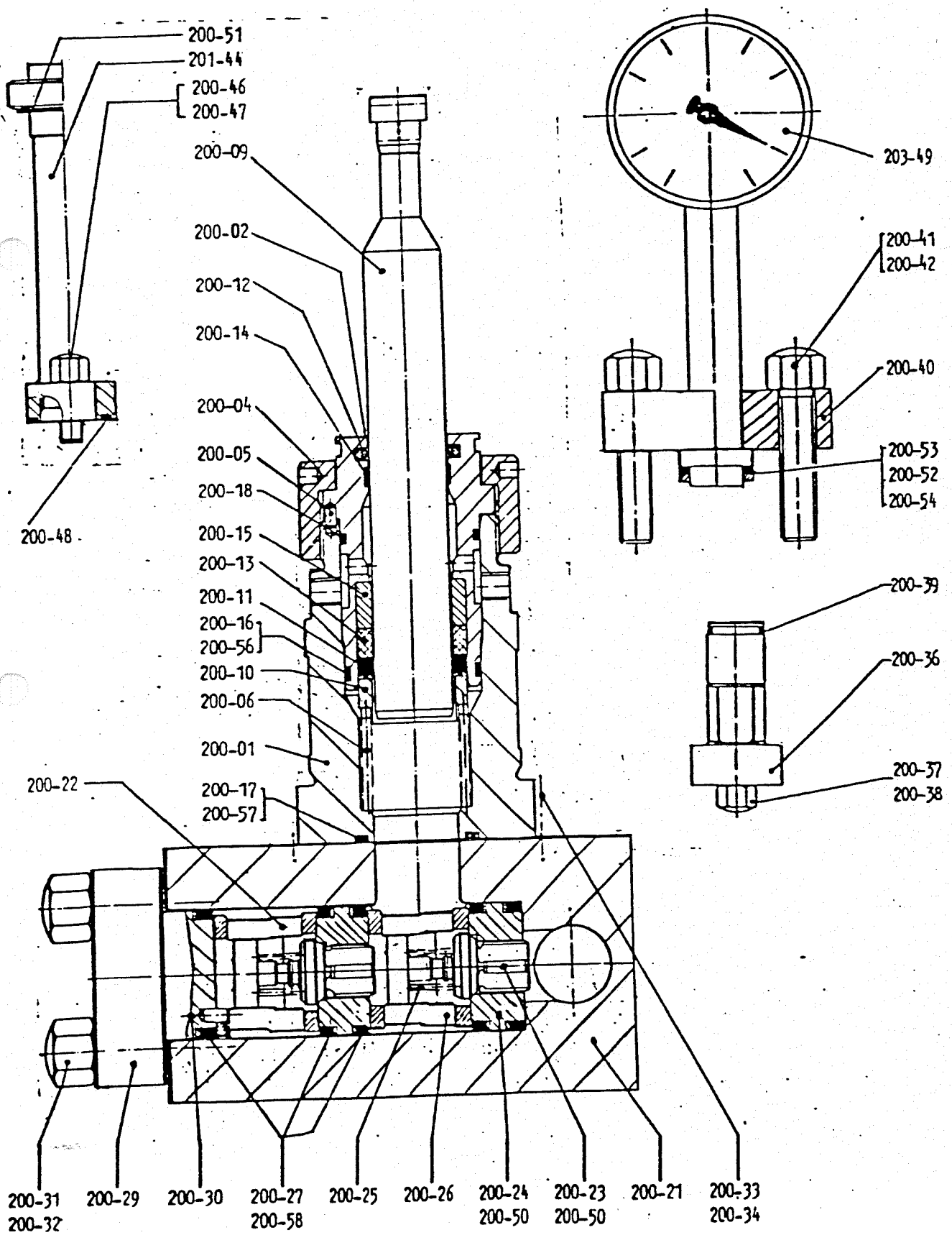
CONSTR.-GROUP
BAUGRUPPE : 106

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
100	4 722 0959-80	Drive gear compl. Triebwerk kompl.			1		
106-00		Piston connection compl. Kolbenverbindung kompl.			1		
106-09	4 722 1131-01	Bushing Buchse			3		
106-10	4 722 0820-01	Ring Ring	2 parts geteilter Ring		3		
106-25	4 722 1538-80	Hexagon screw w. cup spring 6kt. Schraube m.Tellerfeder			9		
106-52	4 300 0901-80	Splash protection Spritzwasserabweiser	D=115, d=61		3		

200

FLUID END
FLÖSSIGKEITSTEIL
UNITE DE TRAIMENT
EXTREMIDADE DO FLOÍDO
VÄTSKEDEL

НАПОРНАЯ СТОРОНА



INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP. BAUGRUPPE: 200

REG.-No.: 200-01.02

DRAW.NO.: 4 722 1064

TYPE: SHL 20 Gleichteile

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1064-80	Fluid end (Constant parts) Flüssigkeitsteil (Gleichteile)					
200-01	4 722 0982-01	Cylindrical bush Zylinderbuchse			3		
200-04	4 722 0986-01	Scew-down nut Druckmutter			3		
200-05	4 017 4010-75	Cylindrical pin Zylinderstift	Ø 5 m 6 x 12		3		
200-06	4 600 0050-16	Spring Feder	Ø 5 x 55 x 80		3		
200-21	4 722 1066-01	Cylinderblock Zylinderblock			1		
200-29	4 722 1692-01	Cover Deckel			3		
200-30	4 110 6810-12	Cylindrical pin Zylinderstift	Ø 6 m 6 x 12		6		
200-31	4010 6240-01	Cup nut Hutmutter	M 20		12		
200-32	4 001 5020-06	Extention screw Dehn-Stiftschraube	GP M 20 x 97		12		
200-33	4 010 6240-02	Cup nut Hutmutter	M 24		8		
200-34	4 001 5020-07	Extention screw Dehn-Stiftschraube	GP M 24 x 188		8		
200-35	4 015 0025-25	Washer Scheibe	A 25		8		
200-36	4 722 1074-80	Cover for suction pipe Deckel für Saugleitung			1		
200-37	4 010 6101-84	Cup nut Hutmutter	M 16		2		
200-38	4 001 4000-40	Stud bolt Stiftschraube	M 16 x 40		2		
200-40	4 722 1522-01	Pressure gauge flange Manometerflasch			2		
200-41	4 010 6101-84	Cup nut Hutmutter	M 16		4		

ED. 1/83

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 200

SHEET: 2 of 2

REG.-No.: 200-01.02

DRAW-NO.: 4 722 1064

PE: SHL 20 Gleichteile

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-42	4 001 4000-40	Stud bolt Stiftschraube	M 16 x 40		4		
201-44		Suction flange Saugleitung Anschlußflansch				see extra list	
200-46	4 010 6101-84	Cup nut Hutmutter	M 16		2		
200-47	4 001 4000-40	Stud bolt Stiftschraube	M 16 x 40		2		
200-53	4 722 1523-01	Bush for Pos. 40 Buchse			1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP: 200
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1064-98	Fluid end Flüssigkeitsteil	Dichtung kompl. Seals compl.				
200-16	4 302 0490-81	O-ring Runddichtring	⌀ 65 x 4		3		
200-17	4 302 0490-82	O-ring Runddichtring	⌀ 53 x 4		3		
200-18	4 302 0490-81	O-ring Runddichtring	⌀ 65 x 4		3		
200-27	4 722 0492-02	Sealing Dichtung			15		
200-39	4 302 0490-83	O-ring Runddichtring	⌀ 32 x 4		1		
200-43							
200-48	4 302 0490-85	O-ring Runddichtring	⌀ 50 x 3		1		
200-51	4 302 0042-00	Sealing for Pos.44 Dichtung für Pos.44	⌀ 42 x ⌀ 52 x 5	G 40	1		
200-52	4 302 0492-26	O-ring for Pos. 40 Runddichtring für Pos. 40	⌀ 24,2 x 3		1		
200-53							
200-56	4 722 1178-21	Back-up ring for Pos. 16 Back-up Ring für Pos. 16			3		
200-57	4 722 1178-20	Back-up ring for Pos. 17 Back-up Ring für Pos. 17			3		
200-58	4 722 1178-18	Back-up ring for Pos. 27 Back-up Ring für Pos. 27			15		
200-54	4 300 0902-06	Supported ring for pos. 40 Stützring	SRI ⌀ 24 x 29,2 x 1		1		

*) SHL 20 , Dichtung kompl., Neoprene

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS -
ERSATZTEILLISTE

CONSTR.-GROUP:
BAUGRUPPE: 200

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIALS	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1064-49	Fluid end Flüssigkeitsteil	Kegelventil Cone valve	Stellite/ 1.4542			
200-22	4 722 1076-02	Valve cage Ventilkäfig	Head Druck		3		
200-23	4 722 1079-02	Valve cone Ventilkegel			6	see Pos. 50	
200-24	4 722 1876-01	Valve seat Ventilsitz			6	see Pos. 50	
200-25	4 600 0000-15	Valve spring Ventilfeder			6		
200-26	4 722 1076-03	Valve gage Ventilkäfig	Suction Saug		3		
200-50	4 722 1064-50	Cone valve compl. Kegelventil kompl.			6	Pos. 23 + 24	

1/84

SHEET: 1 of 1

REG.No.: 200-01.02

DRAW.NO.: 4 722 1064

ME: SHL 20, Kegelventil

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 200

REG.No.: 200-01.02

DRAW.NO.: 4 722 1064

TYPE: SHL 20, Kolben-Dichtung, Nutring, ∅ 36

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00	4 722 1064-89	Fluid end Flüssigkeitsteil	K ∅ 36 Nutring				
200-02	4 722 1543-01	Bush Buchse			3		
200-09	4 722 0985-01	Piston Kolben	∅ 36		3		
200-10	4 722 0386-02	Header ring Stützring	Form B		3		
200-11	4 722 0931-02	Grooved sealing ring Nutring			3		
200-12	4 722 1421-01	Turcon-stepseal Turcon-stepseal			3		
200-13	4 722 1419-04	Follower Kolbenführungsring			3		
200-14	4 722 1418-11	Guide Führungsring			6		
200-15	4 722 1552-03	Header ring Stützring			3		

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP: 201
BAUGRUPPE

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00		Liquid part compl. Flüssigkeitsteil kompl.					
201-44	4 722 1612-80	Suction conn. flange compl. Saugl./Anschlußflansch kompl.	SMS 38		1		

ED. 7/80
SHEET: 1
REG.-NO.: 201,01-02
DRAW.NO.:
TYPE: SHL 20

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

203

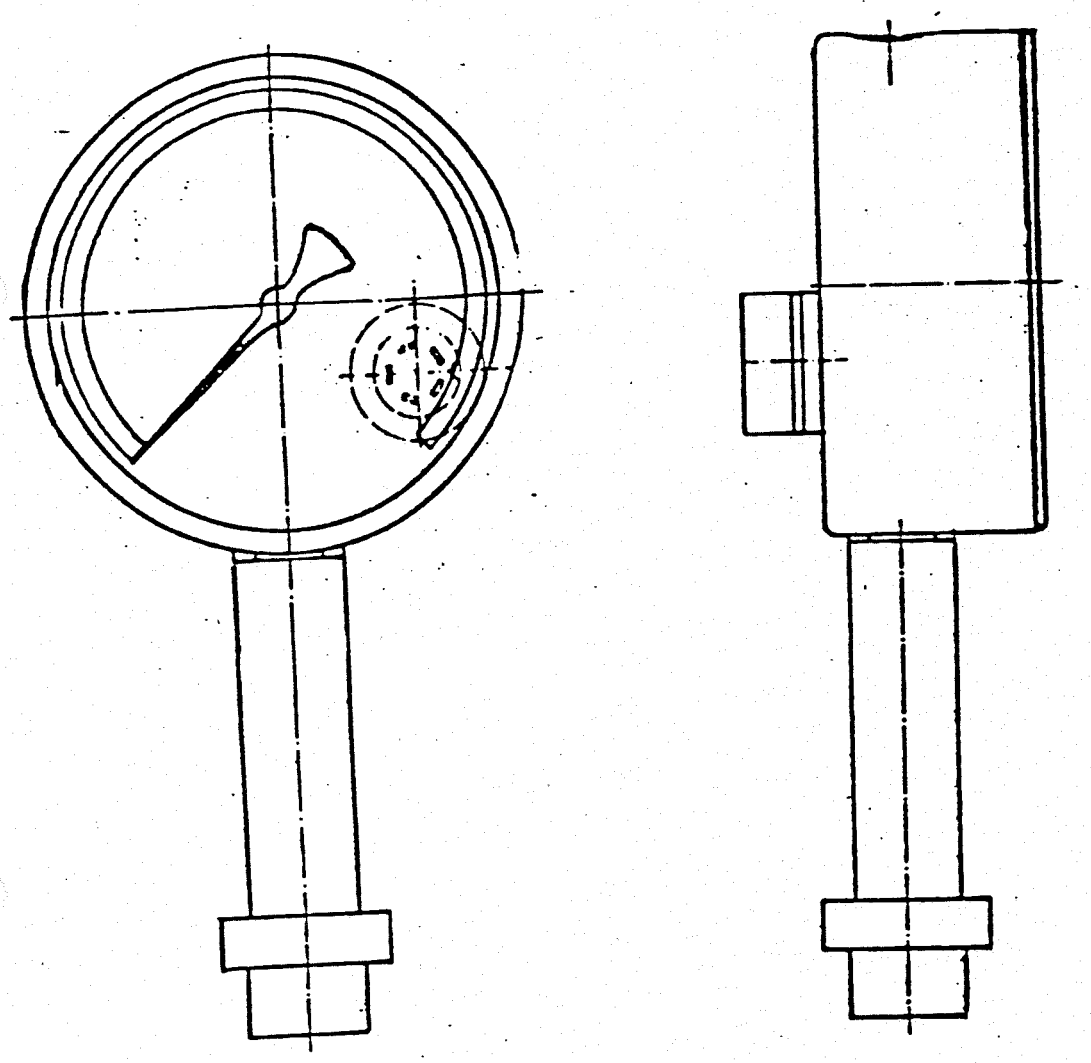
PRESSURE GAUGE W. TR

MANOMETER M. GEBER

MANOMETRE

MANÔMETRO

MANOMETER



TYPE: SHL

DRAW.NO.: 4 932 2002

REG.NO.: 203-01.02

SHEET: 1

12/78 E

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :203

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
200-00		Liquid part compl. Flüssigkeitsteil kompl.					
203-49	4 932 2002-20	Pressure gauge w.transmitter Manometer mit Geber	0-300/600 bar		1		

204

COOLING CIRCULATION

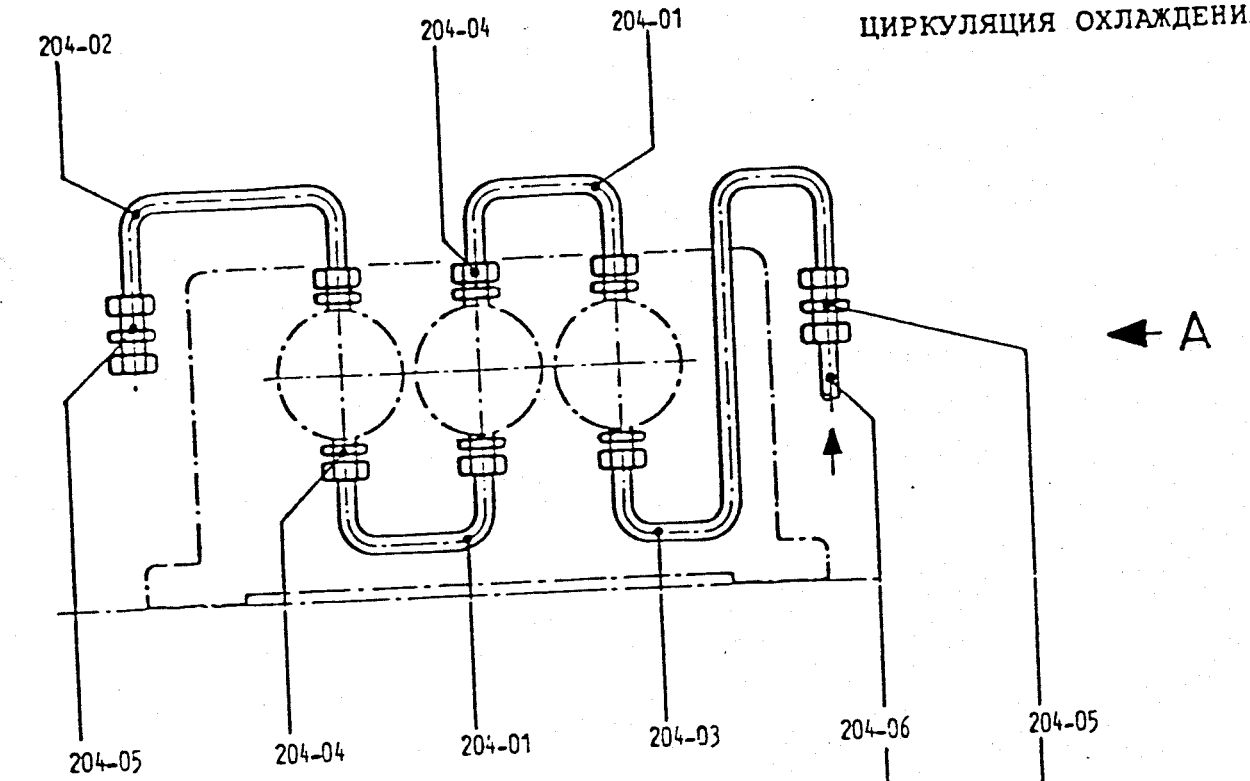
KÜHLKREISLAUF

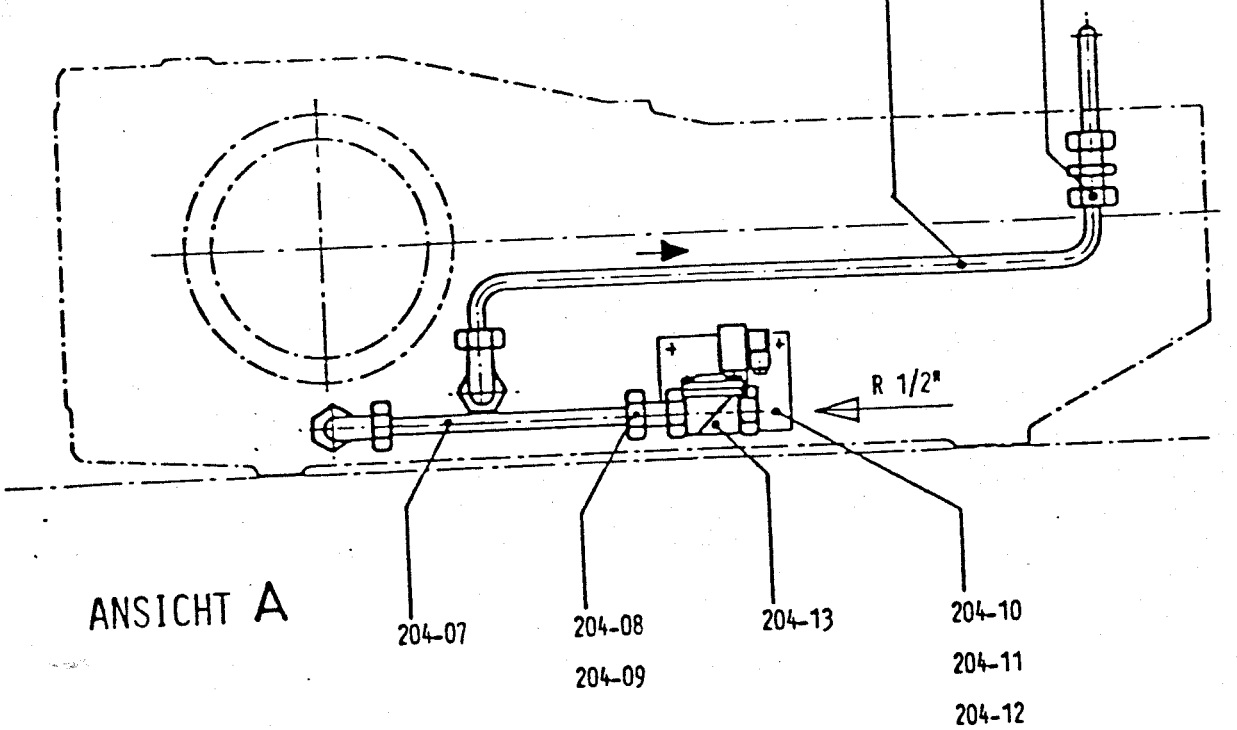
CIRCUIT DE REFROIDISSEMENT

CIRCULACAO (RESFRIAMENTO)

KYLKRETS

ЦИРКУЛЯЦИЯ ОХЛАЖДЕНИЯ





SHL 20-40 standard und Magnetventil
DRAW.NO.: 4 722 1170
REG.No.:
SHEET:
4/83
EO.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 204

SHEET:

REQ.-No.: 204.01-04

DRAW-NO.: 4 722 1170

TYPE: SHL 20-40 standard, Magnetventil 48 V

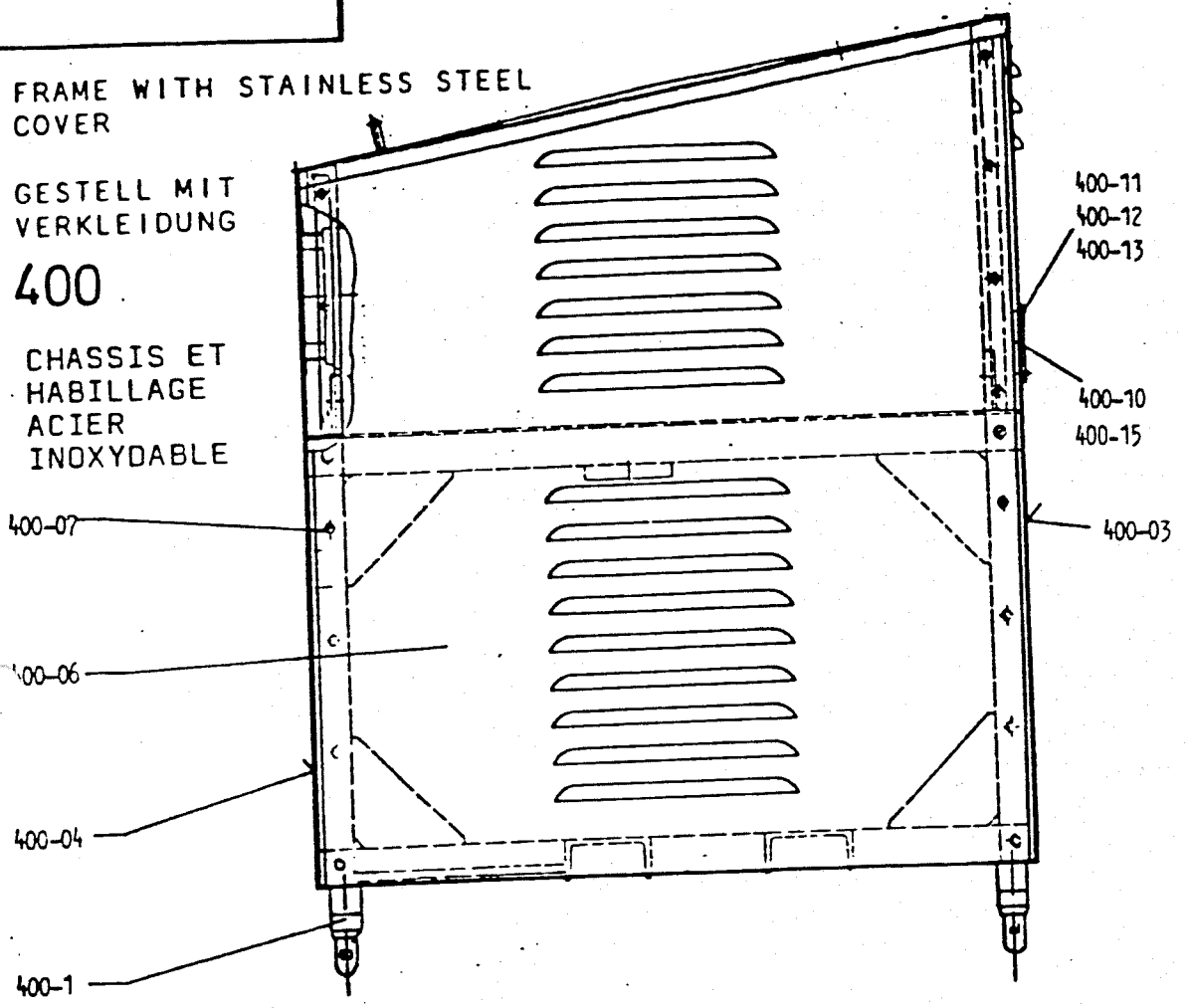
1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ODER/MENGE
200-00		Fluid end compl. Flüssigkeitsteil kompl.			1		
204-00	4 722 1170-	Cooling circulation compl. Kühlkreislauf kompl.	Magnet valve 48 V Magnetventil 48 V		1		
204-01	4 722 1169-	Connection pipe Verbindungsrohr			2		
204-02	4 722 1071-	Connection pipe Verbindungsrohr			1		
204-03		Pipe Rohr	⌀ 10 x 1		1		
204-04	4 350 8400-87	Pipe union Einverschraubung	GE 10 - LM		6		
204-05	4 350 8407-45	Screwing Verschraubung	GE 12 - 10 L		2		
204-06		Pipe Rohr	⌀ 12 x 1		1		
204-07		Pipe Rohr	⌀ 12 x 1		1		
204-08	4 350 0921-42	Srewing Reduzierverschraubung	R 1/2" - 3/8"		1		
204-09	4 350 8400-78	Srcewing Verschraubung	GE 12-LR		1		
204-10	4 324 2101-02	Holding-plate Halteblech	Typ 38-713-1		1		
204-11	4 000 0006-01	Hexagon nut 6kt. Schraube	M 6 x 10 DIN 933		2		
204-12	4 015 0006-09	Washer Scheibe	6,4 A DIN 125		2		
204-13	4 324 2001-07	Magnet valve Magnetventil	48 V		1		

FRAME WITH STAINLESS STEEL COVER

GESTELL MIT VERKLEIDUNG

400

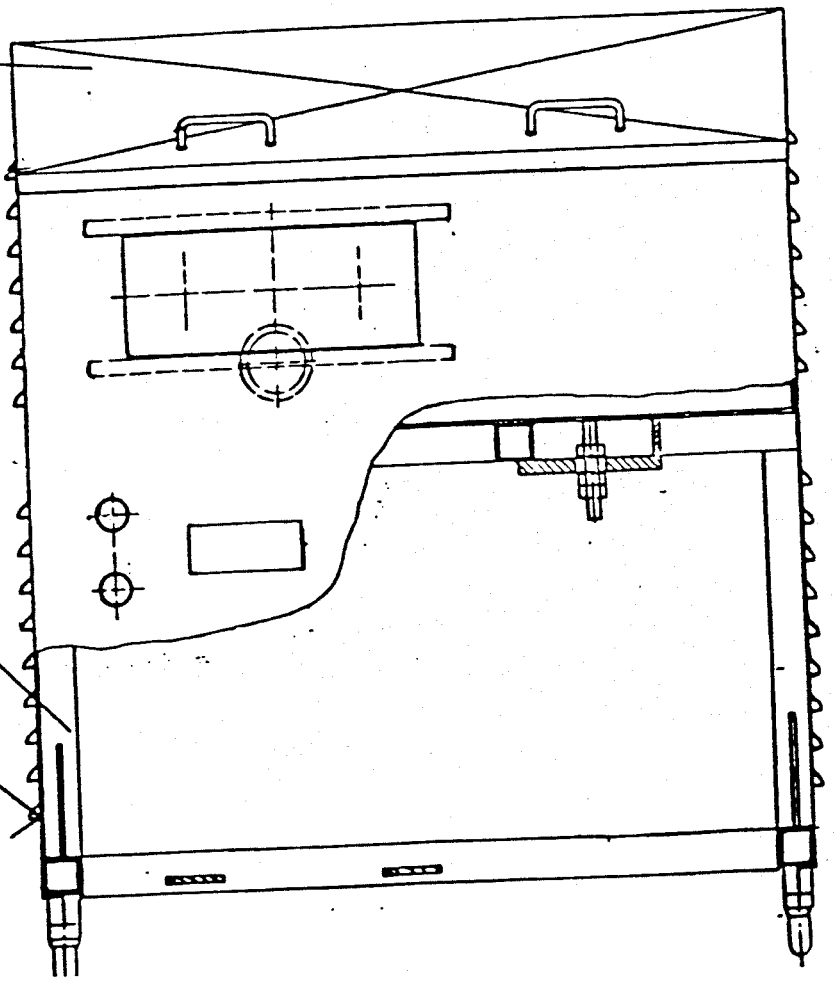
CHASSIS ET HABILLAGE ACIER INOXYDABLE



400-02

ESTRUTURA COM TAMPA DE AÇO INOXIDÁVEL

RAM MED KÅPA AV ROSTFRITT STÅL



СТАНИНА С КРЫШКОЙ ИЗ НЕРЖ. СТАЛИ

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 400

SHEET: 1
REG.NO.: 400-01.03
DRAW.NO.: 4 722 1134
TYPE: SHL 20

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
400-00	4 722 1134-80	Frame with stainless steel cover compl. Gestell m.Verkleidung kompl.			1		
400-01	4 722 1138-80	Frame compl. Gestell kompl.	incl. 4 adjust-able foot		1		
400-1	4 661 1000-03	Ball feet, adjustable Kalottenfuß	NW 40		4		
400-02	4 722 1140-01	Cover Verkleidungsdeckel			1		
400-03	4 722 1174-80	Back wall Rückwand			1		
400-04	4 722 1139-80	Front wall Vorderwand			1		
400-05	4 722 1176-80	Side wall Seitenwand	left		1		
400-06	4 722 1175-80	Side wall Seitenwand	right		1		
400-07	4 000 6100-03	Cheese head screw Flachkopfschraube	AM 6x16 DIN 85		36		
400-10	4 722 1438-81	Oil inspektion pipe Ölstandsrohr			1		
400-11	4 000 2000-39	Cheese head screw Zylinderschraube	AM 6x16 DIN 84		4		
400-12	4 010 0201-24	Hexagon nut 6kt. Mutter	M 6 DIN 934		4		
400-13	4 016 0150-73	Spring ring Federring	B 6 DIN 127		4		
400-15	4 846 8630-00	U-Profile U-Profil	b=2; h=10; s=6; 311 long		1		

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

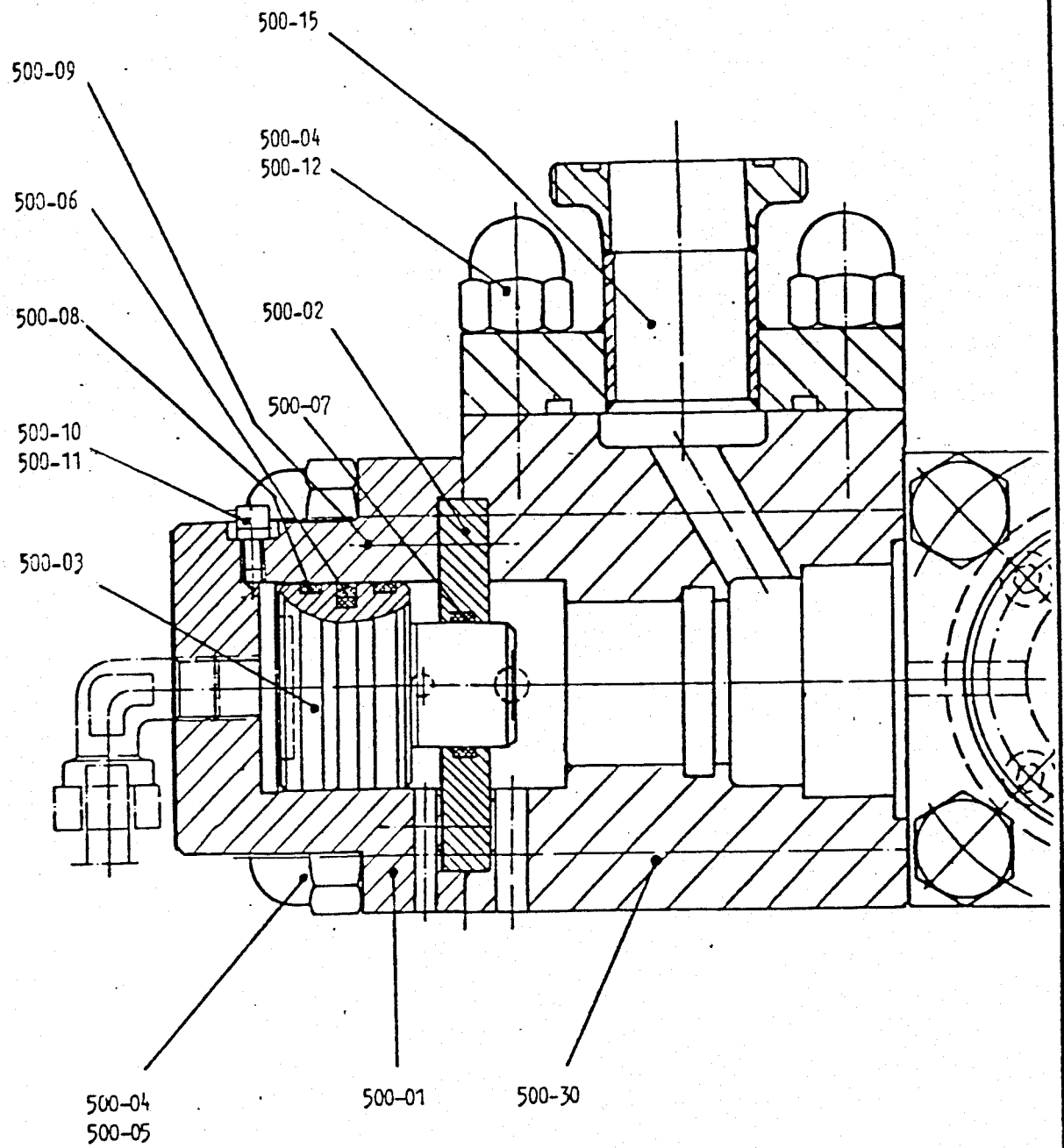
501

DOUBLE STAGE HOMOGENZING HEAD

DOPPEL – HOMOGENISIERKOPF

ДВУХСТУПЕНЧАТАЯ ГОМОГЕН.ГОЛОВКА

ATT JAMIE



TYPE: SHL 20-40 Doppelhomogen.kopf SHS

DRAW.NO.: 4 722 0958 / 1307 / 1356

REQ.-NO.: 500-01.02

SHEET: 1

11/82 E

8/82 EO.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 501

SHEET: 1

REQ.-NO.: 501-01.04

DRAW.NO.: 4 722 0958

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
501-00	4 722 0958-99/74	Double stage homogenizing head compl. Doppel-Homogenisierkopf kpl.	SMS connection		1		
501-01	4 722 1014-01	Piston bush Kolbenbuchse			2		
501-02	4 722 1017-01	Centering ring Zentrierring			2		
501-03	4 722 1016-01	Hydraulic piston Hydraulikkolben			2		
501-04	4 010 6101-84	Cup nut Hutmutter	M 16 DIN 917		12		
501-05	4 001 5020-05	Stud bolt Stiftschraube			8		
501-06	4 309 9000-06	TURCON-Stepseal TURCON-Stepseal			2		
501-07	4 306 0000-03	Rod-guide Stangenführungsring			2		
501-08	4 306 0000-02	Piston-guide ring Kolbenführungsring			4		
501-09	4 000 2300-97	Socket screw Zylinderschraube	M 8x16 DIN 912		8		
501-10	4 000 2302-07	Socket screw Zylinderschraube	M 6x12 DIN 912		2		
501-11	4 300 0096-16	Flat sealing ring Flachdichtung	A 6,5 x 10 x 1 DIN 7603		2		
501-12	4 001 4002-06	Stud bolt Stiftschraube	M 16 x 30 DIN 938		4		
					1		
501-15	4 7221513-80	Outlet flange Austrittsflansch	SMS 38		1		
-00		Homogenizing device compl. Homogenisiervorrichtg.kompl.				see extra list	
-00		Set of sealings compl. Dichtungssatz kompl.				see extra list	
501-30	4 722 1015-01	Housing Gehäuse	N		2		

PE: SHL 20

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

502

HOMOGENZING DEVICE

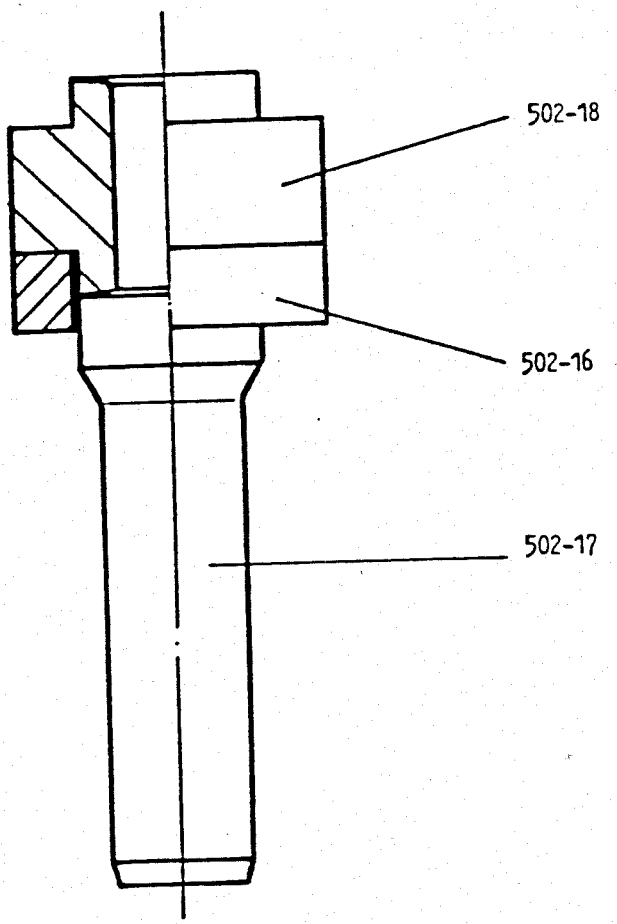
HOMOGENISIERVORRICHTUNG

DISPOSITF D´HOMOGENEISATION

DISPOSITIVO HOMOGENEIZADOR

HOMOGENISERINGSANORDNING

ГОМОГЕНИЗИРУЮЩЕЕ УСТОЙСТВО



TYPE: SHL 20-40

DRAW.NO.: 4 722 0958 / 1307 / 1356

REQ.NO.: 502-01.02

SHEET: 1

11/82 EC

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

503

SET OF SEALINGS

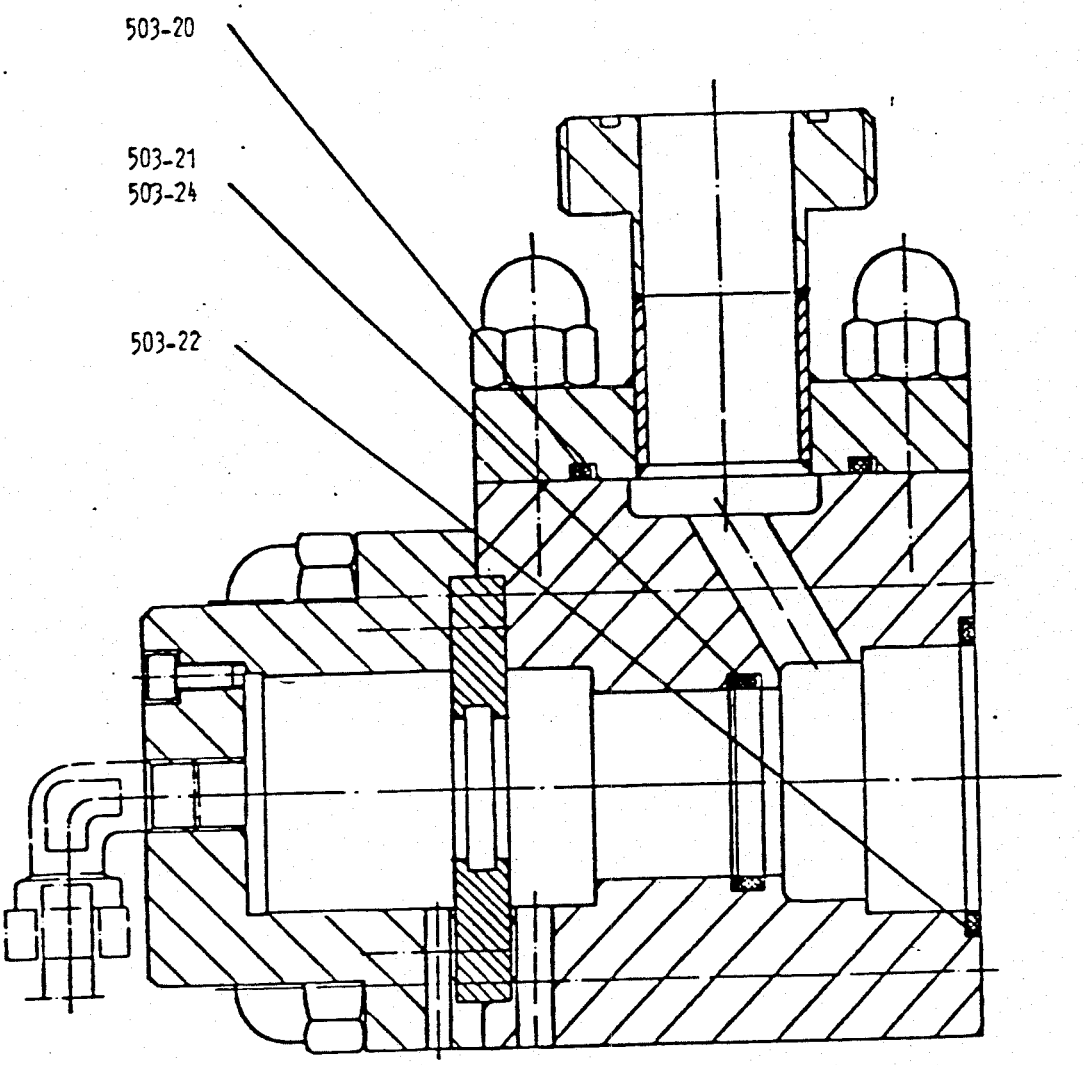
DICHTUNGSSATZ SMS

JOINTS D'ETANCHEITE

JOGO DE VEDAÇÕES

TÄTNINGSSATS

НАПОР УПЛОТНЕНИЙ СМС



ATT JAMIE

TYPE: SHL 20-40 SMS

DRAW.NO.: 4 722 0958 / 1307 /1356

REG.NO.: 503.02-02

SHEET: 1

11/82

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 502

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
		1 - stage 1 - Stufe					
502-00	4 722 0958-98	Homogenizing device compl. Homogenisiervorricht.kompl.			1		
502-16	4 722 1120-01	Impact ring Prallring	∅ 10 / ∅ 18		1		
502-17	4 722 1573-01	Forcer Stempel	∅ 10 / ∅ 18		1		
502-18	4 722 1118-01	Seat Sitz	∅ 10 / ∅ 18		1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 502

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
		2 - stage 2 - Stufe					
502-00	4 722 0958-98	Homogenizing device compl. Homogenisiervorricht.kompl.			1		
502-16	4 722 1120-01	Impact ring Prallring	∅ 10 / ∅ 18		1		
502-17	4 722 1573-01	Forcer Stempel	∅ 10 / ∅ 18		1		
502-18	4 722 1118-01	Seat Sitz	∅ 10 / ∅ 18		1		

ED. 5/81

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP : 503
BAUGRUPPE

SHEET: 1

REQ.-No.: 503-01.14

DRAW-NO.:

TYPE: SHL 20 D

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
500-00	4 722 0958-99	Double- stage homog. head cpl. Doppel- -Homogenisierkopf kpl.					
503-00	4 722 0958-88	Set of sealing Dichtungssatz	D-Perbunan-SMS				
503-20	4 302 0057-05	O-ring Runddichtring	57 x 4	Perbunan	1		
503-21	4 302 0492-14	O-ring Runddichtring	18,2 x 3	Perbunan	2		
503-22	4 302 0042-03	O-ring Runddichtring	42 x 4	Perbunan	2		
503-24	4 300 0902-14	Supported ring Stützring	18 x 2,6 x 1,0	PTFE	2		

ALFA-LAVAL

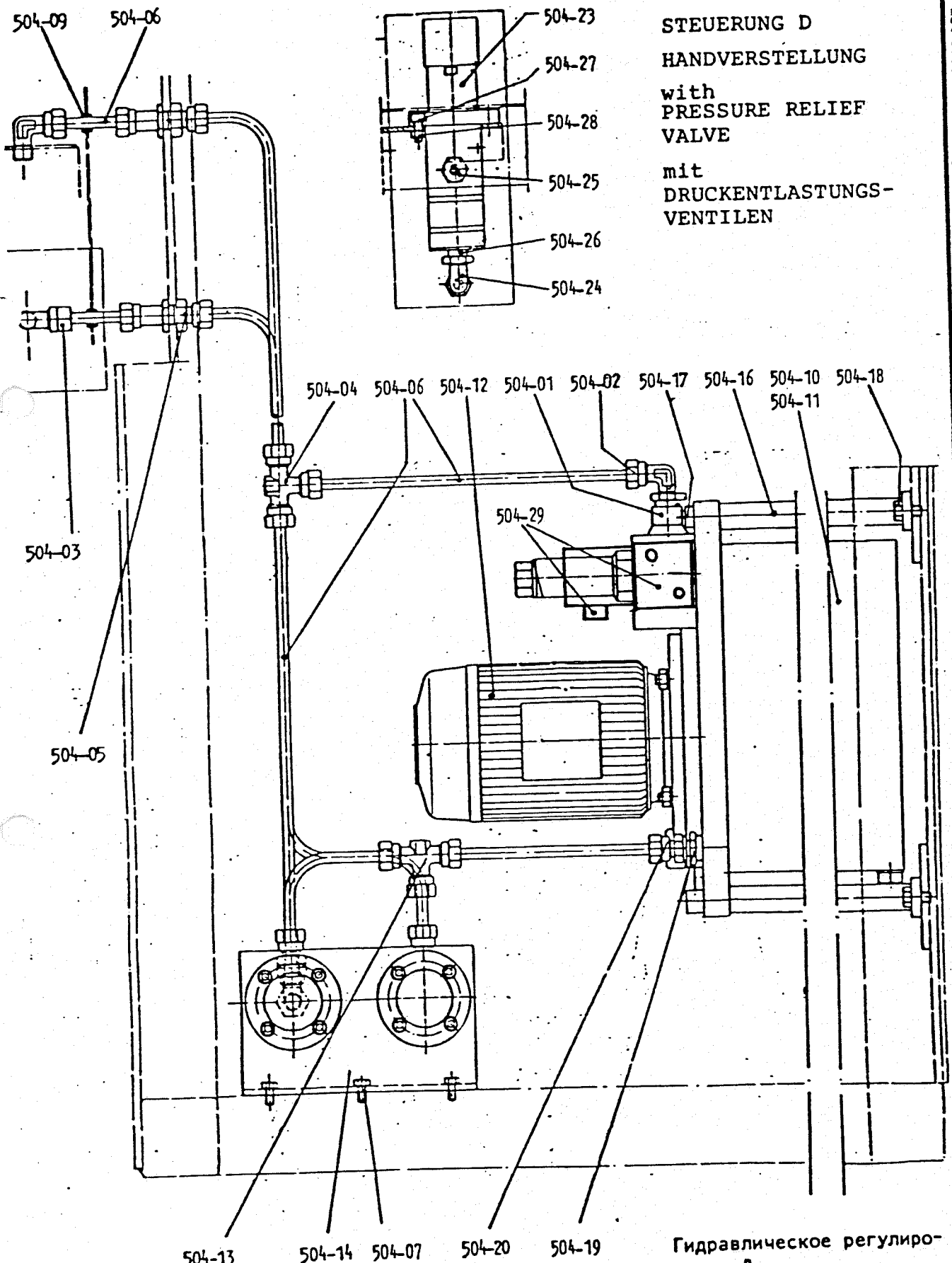
INSTRUCTION MANUAL – BETRIEBSHANDBUCH

504

HYDRAULIC CONTROL FOR DOUBLE STAGE HOMOGEIZING HEAD WITH HAND CONTROL

HYDRAULISCHE STEUERUNG D HANDVERSTELLUNG with PRESSURE RELIEF VALVE

mit DRUCKENTLASTUNGS-VENTILEN



Гидравлическое регулирование Д

ручное управление

с разгруженными клапанами

SHL 20-40 D mit Druckentlastungsventilen

DRAW-NO.: 4 722 1254

REQ.-No.: 504-01.02

SHEET: 1

11/82

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 504

REQ.No.: 504-01.1

DRAW.No.: 4 722 1254

PE: SHL 20-40 D (mit Druckentlastungsventil)

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
504-00	4 722 1254-81/ -82/-85	Hydraulic control f. double stage homog. head with Hydraul. Steuerung Handverstellung D kompl.	hand control cpl. Pressure relief valve Druckentlastungsventil 48 V ~		1		
504-01	4 350 4893-01	Reducer Reduzierstutzen	ri 1/2" x 1/4"		2		
504-02	4 353 8302-03	Elbow screwing Winkelverschraubung	WE 8-SR		2		
504-03	4 353 8400-33	T-screwing T-Verschraubung	WE 8-SR		2		
504-04	4 354 8241-11	T-screwing T-Verschraubung	T 8 - S		2		
504-05	4 350 8243-13	Screwing Gerade Verschraubung	SV8 - S		2		
504-06		Pipe Rohr	8x1,5 DIN 2391		6		
504-07	4 015 0006-09	Washer Scheibe	A 6,4 DIN 125		6		
504-08	4 000 0006-04	Hexagon screw 6kt. Schraube	M 6x16 DIN 933		6		
504-09	4 625 9000-03	Protection ring Durchführungstülle			2		
504-10		Hydraulic oil Hydrauliköl	ARAL Vitan DE 46 9 Liter		1		
504-11	4 708 5160-05	Hydraulic unit Hydraulik-Aggregat	RM 0,27		1		
504-12		Drive motor Antriebsmotor	0,25 KW		1	see techn. data	
504-14	4 722 1032-01	Holding angle Haltewinkel			1		
504-16	4 722 1018-80	Holding Halter	f.hydr.unit		4		
504-17	4 000 2300-20	Socket srew Zylinderschraube	M 10x30 DIN 912		4		
504-18	4 000 0000-23	Hexagon screw 6kt. Schraube	M 8x20 DIN 933		8		
504-19	4 350 4893-01	Reducer Reduzierstutzen	ri 1/2"x1/4"		1		
504-20	4 350 8302-07	Pipe union Einschraubverschraubung	GE 8—SR		1		

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 504

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
504-23	4 323 0000-06	Pressure valve Druckventil			2		
504-24	4 353 8302-03	Elbow-screwing Winkelverschraubung	WE 8 - SR		2		
504-25	4 350 8302-07	Pipe union Einschraubverschraubung	GE 8 - SR		2		
504-26	4 350 8407-46	Reducer Reduzierstutzen	ri 3/8"x1/4"		2		
504-27	4 000 2301-13	Socket screw Zylinderschraube	M 6x16 DIN 912		8		
504-28	4 010 0201-25	Hexagon nut 6kt. Mutter	M 6 DIN 934		8		
504-29	4 320 8870-16	Pressure relief valve Druckentlastungsventil	control voltage: 48 V~ 50-60 Hz		2		
504-13	4 354 8241-11	T-screwing T-Verschraubung	T 8 - S		1		

ALFA-LAVAL

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

600

D R I V E

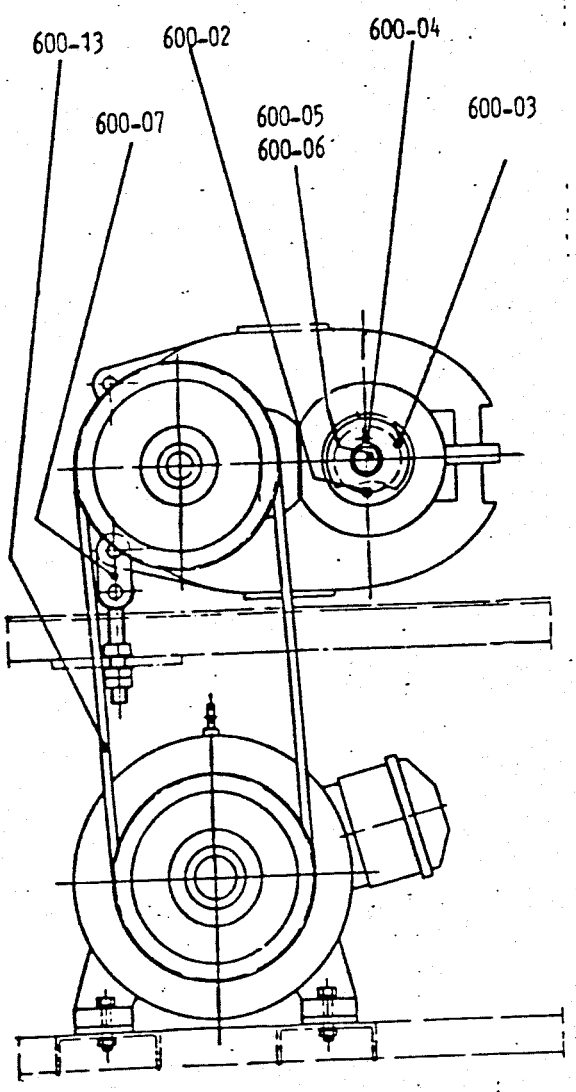
ANTRIEB

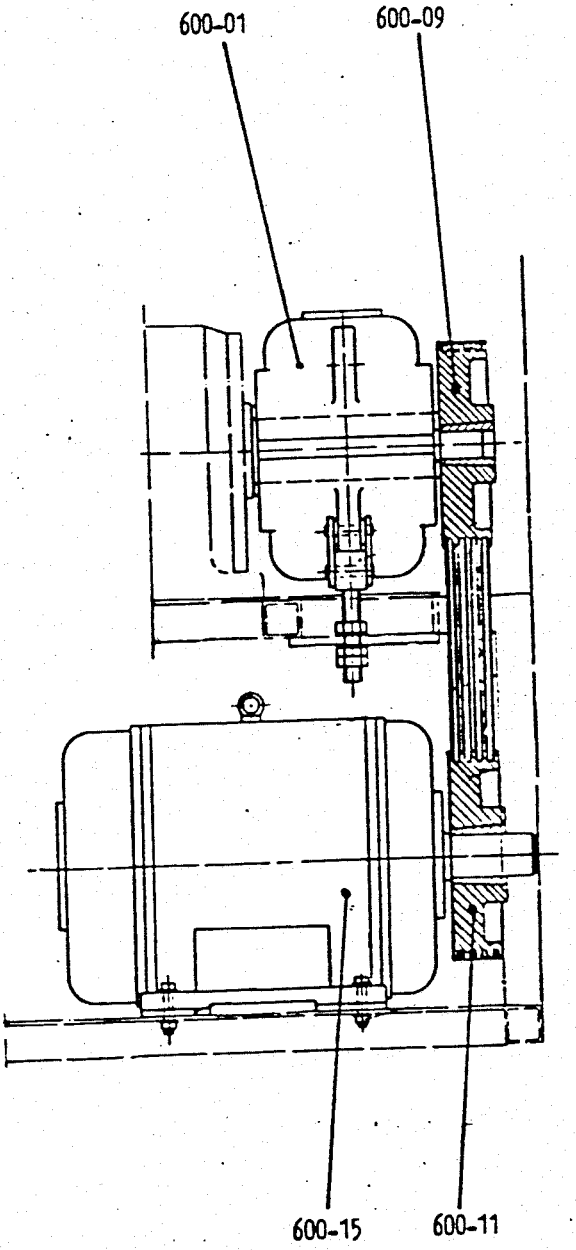
ENTRAIMENT

TRANSMISSÃO

TRANSMISSION

ПРИВОД





TYPE: SHL 20-30

DRAW-NO.: 4 722 1396 / 1198

REQ.-NO: 600-01.02

SHEET: 1

4/83 EO

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE :600

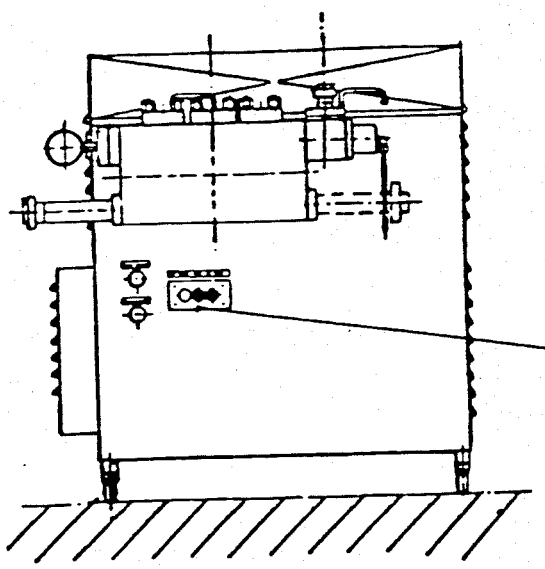
1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
600-00	4 722 1396-81	Drive Antrieb	SZO 140		1		
600-01	4 722 1048-01	Drive gear Aufsteckgetriebe	SZO 140		1		
600-02	4 016 2509-37	Fitting key Paßfeder	AS 20x12x230 lg DIN 6885/1		1		
600-03	4 722 1089-01	Disk Endscheibe			1		
600-04	4 110 6800-20	Cylindrical pin Zylinderstift	6m6 x 20 DIN 7		1		
600-05	4 016 0011-30	Locking washer Sicherungsscheibe	21 DIN 432		1		
600-06	4 000 0001-78	Hexagon. screw 6kt. Schraube	M 20 x40 DIN 933		1		
600-07	4 722 1390-81	Torque-supporting Drehmomentenstütze			1		
600-09		Belt-pulley Riemenscheibe	for gear		1	see techn. data	
600-11		Belt-pulley Riemenscheibe	for motor		1	see techn. data	
600-13		V-belts Keilriemen	SPA		4	see techn. data	
600-15		E-motor E-Motor				see page 1/2 s. Seite 1/2	

700

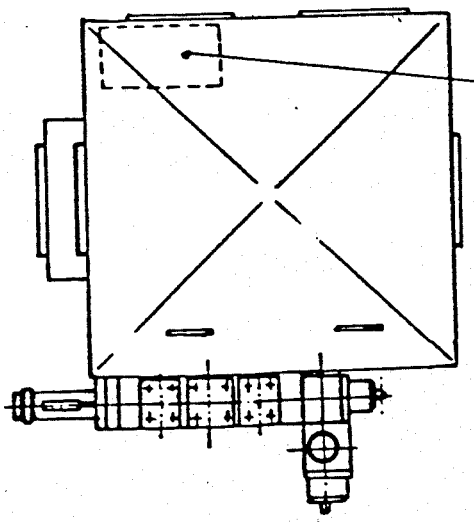
ELECTRIC CONTROL

ELEKTRISCHE STEUERUNG

ЕЛЕКТРИЧЕСКОЕ
УПРАВЛЕНИЕ



700-01



700-02

TYPE: SHL 20-40 (E,D)

DRAW.NO.:

REQ.NO.:

SHEET: 1

5/83 ED.

8/82 ED.

INSTRUCTION MANUAL - BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP
BAUGRUPPE : 700

1	2	3	4	5	6	7	8
Pos.-No	IDENT. NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
700-00	4 722 1586-80	Electric control for pressure hand control for two-stage homog. head Elektrische Steuerung Druckhandverstellung	hand control		1		
700-1	4 622 0010-15	3-stage key-board 3fach Taster	Ø 22, type K3/eh		1		
700-02	4 625 8900-54	Terminal box compl. Klemmenkasten kompl.			1		

TYPE: SHL 20 - 40 E/D Druckhandverstellung DRAW.NO.: without draving REG.No.: 700-01. · SHEET:

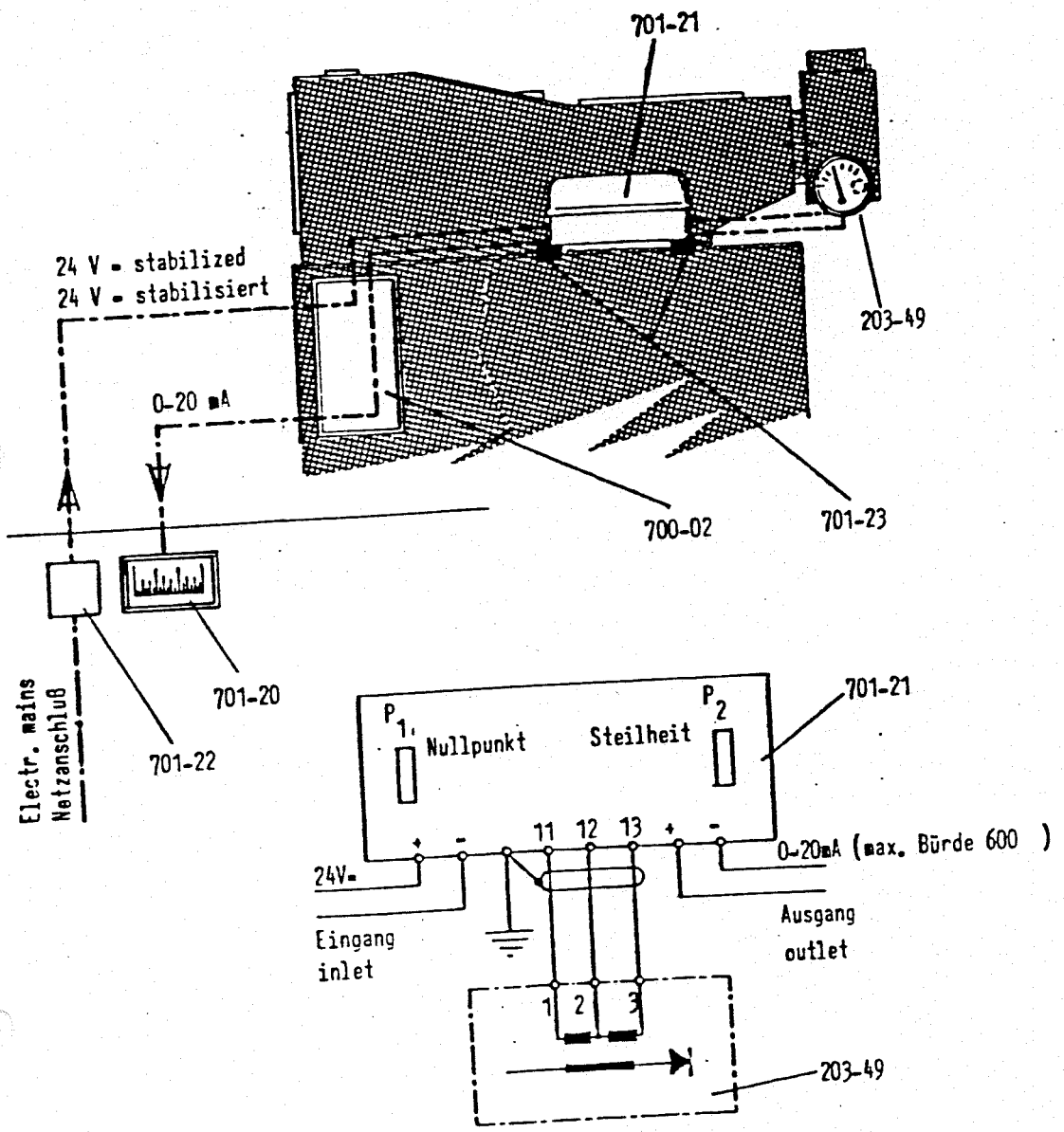
ELECTRIC CONTROL

ELEKTR. STEUERUNG

CONSTR. GROUP

BAUGRUPPE

701



1. Bei Druckanzeige 0 bar den Ausgangsstrom mit dem Potentiometer "Null" auf 0 mA abgleichen.
2. Bei einer möglichst hohen Druckanzeige den Ausgangsstrom, bzw. den elektr. Fernanzeiger mit dem Potentiometer "Steilheit" auf den am Manometer angezeigten Wert abgleichen.
3. Ausgangsstrom bei 0 bar nochmals kontrollieren und eventuell nachstellen.
4. Druck wie bei Pos. 2 einstellen und Ausgangsstrom kontrollieren und eventuell nachstellen.

Der Ausgangsstrom von 20 mA entspricht immer dem Skalenwert des Manometers.

1. At pressure indication 0 bar, turn output current with poteniometer P_1 "NULLPUNKT" to 0 mA.
2. At pressure indication maximum possible value, turn output current, respectively electrical remote pressure indicator, according to pressure gauge reading by means of potentiometer P_2 "STEILHEIT".
3. Check output current at 0 bar position again, and adjust if necessary.
4. If readjustment according to 3. was necessary, procedure according to 2. has to be repeated. Note: output current of 20 mA corresponds with the maximum pressure value and the pressure gauge scale.

Typ: SHL 20-40 Ferndruckanzeige
DRAW.NO.: 4722 1586
REQ.NO.: 701-01.02
SHEET:
8/82 ED.

INSTRUCTION MANUAL – BETRIEBSHANDBUCH

ALFA-LAVAL

LIST OF SPARE PARTS
ERSATZTEILLISTE

CONSTR.-GROUP. BAUGRUPPE : 701

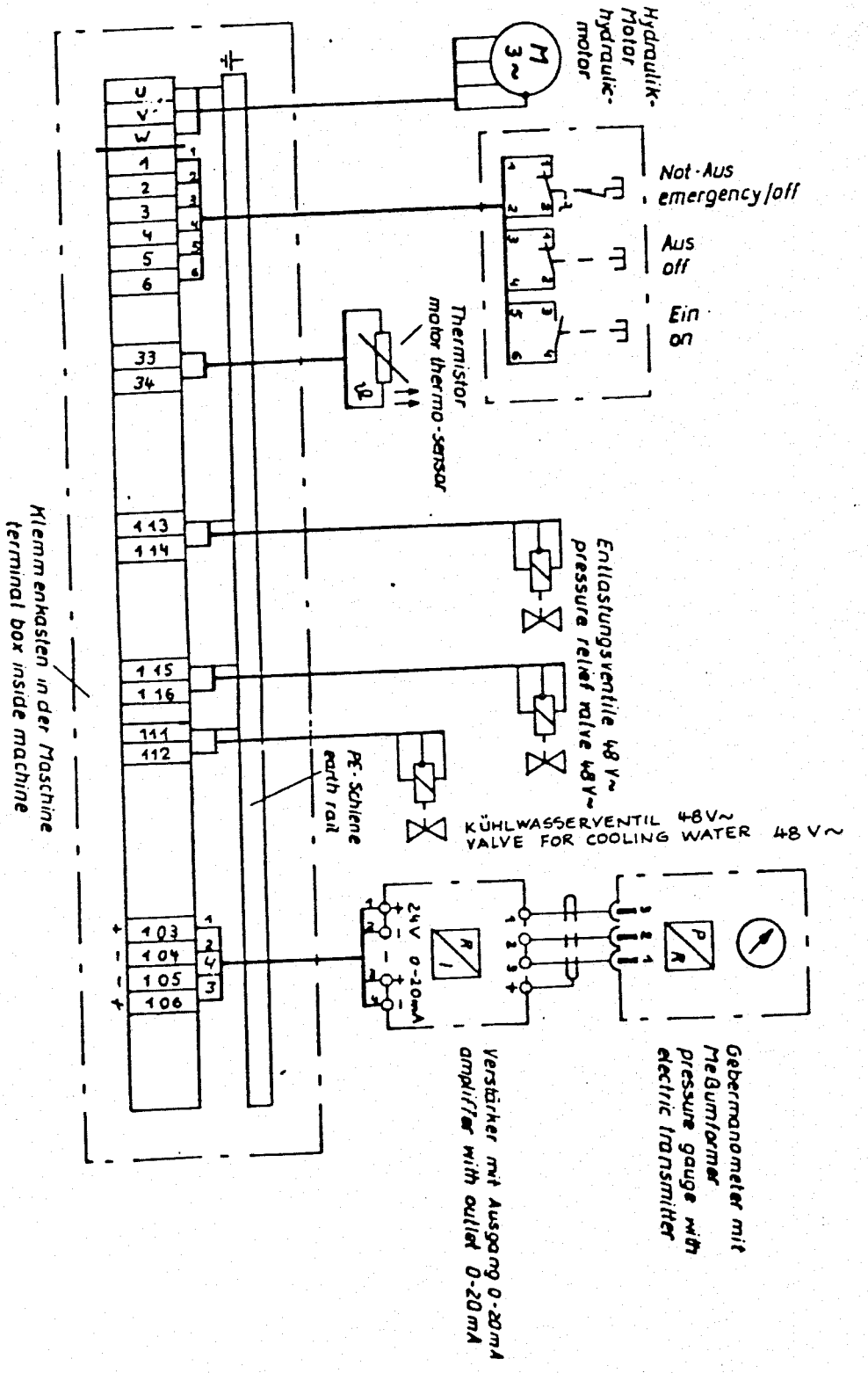
SHEET:

REQ.-No.: 701-01.b

DRAW.NO.:

1	2	3	4	5	6	7	8
Pos.-No	IDENTY NUMBER IDENTITÄTS-NR	DESIGNATION BEZEICHNUNG	DIMENSION	MATERIAL	PIECE NUMBER STÜCKZAHL	NOTES BEMERKUNGEN	ORDER/MENGE
701-00	4 722 1586-84	Remote pressure indication Ferndruckanzeige	0-300 bar				
701-20	4 937 5110-07 * 4 937 5110-09	Milli-Ampermeter Milli-ammeter	0-300 bar		1 1	excluded from scope of supply	
701-21	4 932 2002-21	Elektronik-Teil Electronic box			1	excluded from scope of supply	
701-22	4 623 9020-01	Power supply unit Netzgerät					
701-23	4 661 8120-03	Damper Puffer	∅ 15		3		
203-49	4 932 2002-20	Pressure gauge with electric transmitter Gebermanometer	0-300 / 600 bar		1	see extra list	
700-32		Terminal box Klemmenkasten					

TYPE: 20-40 Ferndruckanzeige 0-300/600



Änderungen				Datum	Name	Maßstab
1		3		gepruft		
2		4		gezeichnet 25290	LOS	

ALFA-LAVAL
ALFA-LAVAL Industrietechnik GmbH

Verdrahtungsplan SHL Doppelhomokopf

Zeichn.-Nr. 5910185

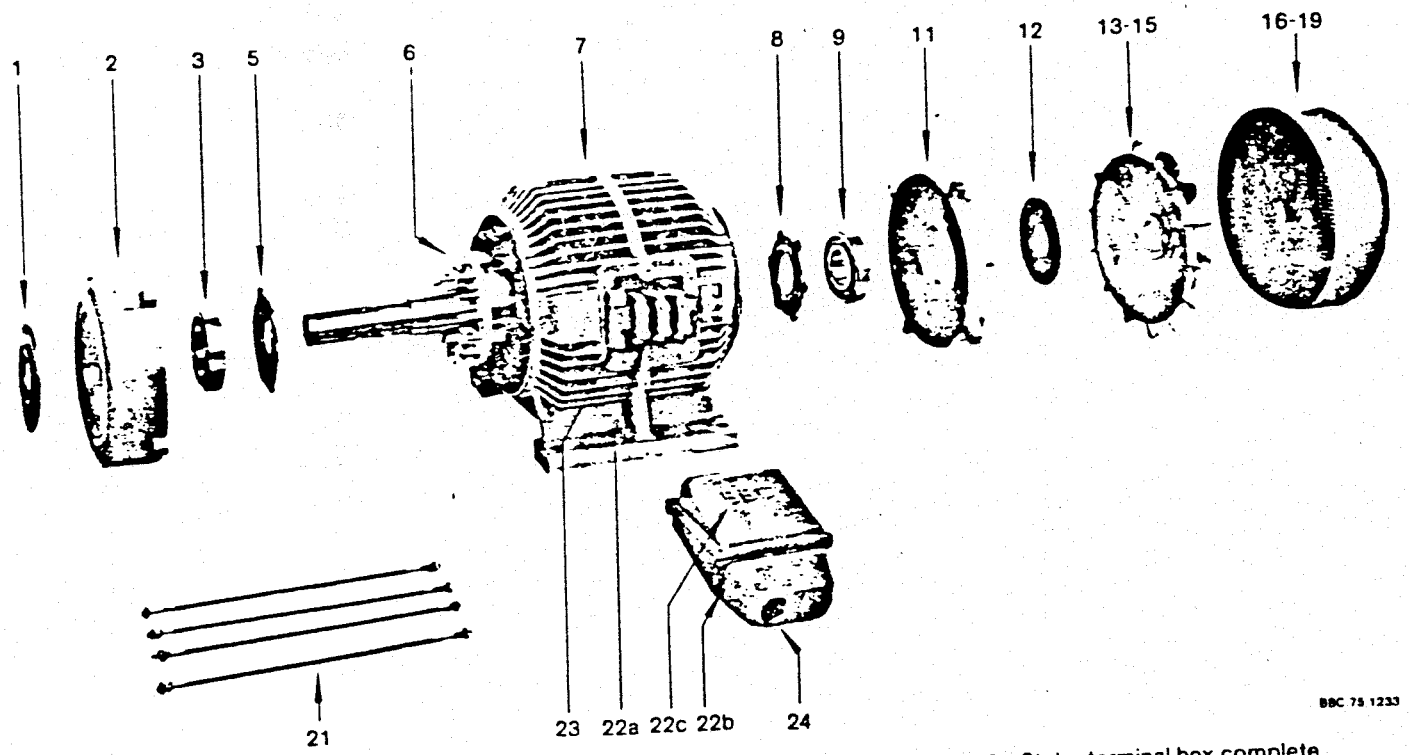
Spare Parts List

BBC BROWN BOVERI

Three-phase squirrel-cage motors type QU, vQU

surface-cooled
enclosure IP 44

Publication No.
D EM 60303 E



1. Outside bearing-cap driving-end
2. Driving-end endshield
3. Roller bearing driving-end
4. Spring plate for roller bearing driving-end. Only for frame size 160 to 200. – No. fig. –
5. Inside bearing-cap driving-end from frame size 160
6. Rotor
7. Stator
8. Inside bearing-cap non-driving-end from frame size 160
9. Roller bearing non driving-end
10. Spring plate for roller bearing non-driving end. Only for frame size 56 to 132 and 280 to 315 two-pole. No fig.
11. Non-driving-end endshield
12. Outside bearing-cap non-driving-end
13. Fan
14. Tolerance ring for fan. Only for frame size 56 to 90. – No fig. –
15. Disc spring. Only for frame size 56 to 90. – No fig. –
16. Fan cover. Frame size 56 to 315
17. Fan cover with protecting hood. Valve motors frame size 56 to 315 – No fig. –
18. End plate. Only for frame size 355 – No fig. –
19. Protecting hood. Only for frame size 355 – No fig. –
20. Oil seal – No fig. –
21. Stud bolts (1 set = 4 pieces)
22. Stator terminal box complete (without cable sealing box)

22a Terminal board complete

22b Terminal box frame

22c Terminal box cover

23. Thermistor terminals (special design)
24. Double cable sealing box
25. Single cable sealing box – No fig. –
26. Cable support for compound filling – No fig. –
    1 entry (only for frame sizes 280 and 3
    2 entries (special design)

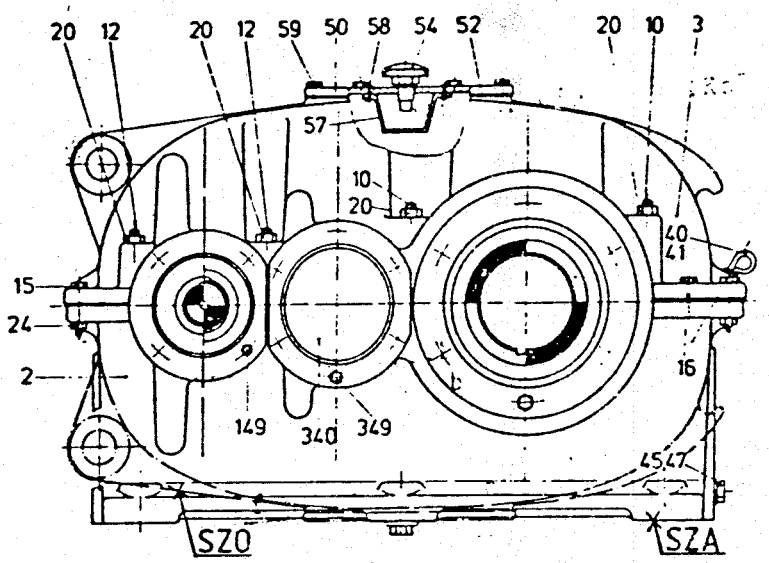
The following information is required when making an inquiry or placing an order:

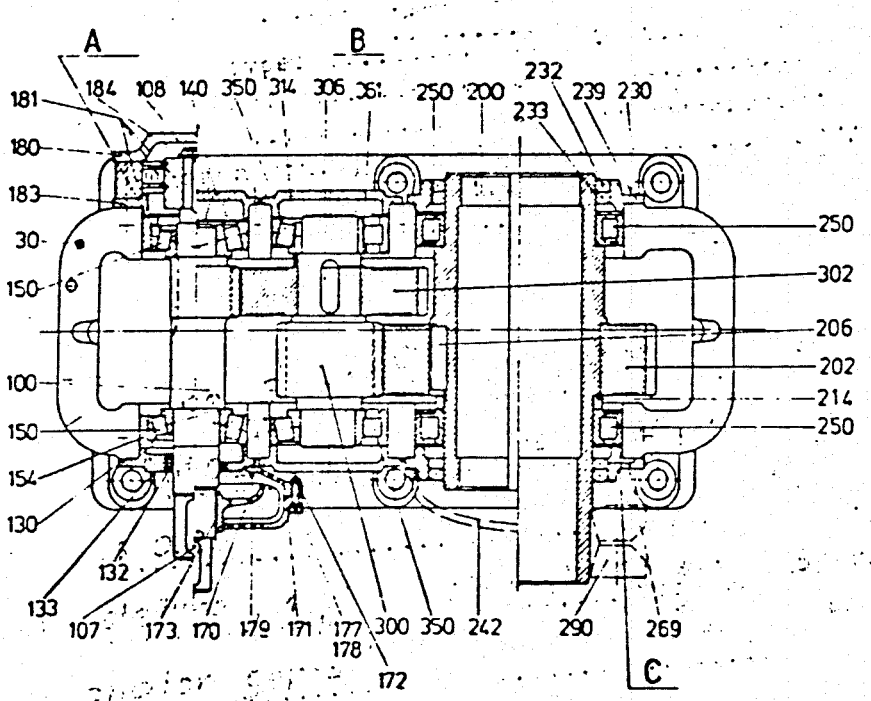
1. Spare parts designation
2. Type of motor and mounting arrangement
3. Machine number

Example:

1 endshield, drive end,
for motor QU 100 L 4 AC B 3
machine number GS 891 2521 BO 1

BBC MOTORENTECHNIK





A,B,C = Paßscheibe / Shim / Rondelle d'ajustement / Arandela de ajuste / Spessore di rasamento / Arruela de ajuste