

**Spare parts list and working instruction**

**SBS High Pressure Pump PAN-DA**

**Model**

an, bn, bb, cn, dn, pn



Clever & Co.  
Elektro- und Maschinenfabrik GmbH  
Laubenhof 14-18  
45326 Essen

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**Identification data****Machine / Plant**

Plant code: SBS High Pressure Pump PAN-DA

Type:

Order number / consignment:

Year of manufacture:

**Customer entries:**

Company name:

Company address:

**Manufacturer's address:**Company name: Clever & Co.  
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# **I Working instruction**

## **PAN-DA** **High Pressure Pump**

The last page in the manual can be folded out so that the machine drawings are alongside the text pages.

In any enquiries or requests concerning the machine and its application, always state the machine model and its Serial No. as given on the data plate. Also when ordering spare parts.

## **1. FOREWORD**

### **IMPORTANT**

Before commissioning or operating the SBS PAN-DA pump for the first time, read through these operating instructions and acquaint yourself with all of the controls and features of the system.



The operating instructions contain safety regulations, essential information on operation and servicing as well as useful tips concerning the handling and application of shotcrete.

Make sure that all of the instructions on operation and servicing are followed so as to ensure full safety on site and to obtain maximum service life from the machine.




## **MACHINE RATINGS**

The SBS PAN-DA pump is built to be operated on a particular mains voltage (see data plate). The use of other voltages can cause major damage to the electric motor and switchgear. Always make sure that the mains voltage is correct.




## **SAFETY**

-  Observe the relevant safety regulations at all times.
-  Make sure that all electrical, compressed air and high-pressure supplies are undertaken according to the laws and regulations of the country of operation, and in accordance with general jobsite/ engineering rules and working practices.

## **DO NOT**

-  open any high-pressure water lines or shotcrete lines that are still under pressure
-  switch on the machine or any service supplies (electricity, air etc.) while people are working on or around the machine
-  start up the shotcrete machine or high-pressure pump without the nozzleman's permission

## **ALWAYS**

-  follow the instructions given in this manual
-  check equipment for suitability before using it
-  use safe and certified equipment (e.g. platforms, ladders etc.) when working on the machine or when using the shotcrete nozzle

Persons working with and on the shotcrete machine or PAN-DA pump must be aware of the possible dangers involved when working with electrical supplies, compressed air, high-pressure fluids and caustic/corrosive chemicals (such as concrete accelerators and additives).

Appropriate measures must be taken, and appropriate safety apparatus and clothing worn at all times.

**Electrical power supplies** must always be suitably protected against short circuit and overload. The main junction box must have a fast-acting circuit breaker. Suitable earthing is to be provided

## 2. APPLICATION

The PAN-DA system has been specially designed to provide a flow of high-pressure water (or water and chemical additives) to mix dry shotcrete (gunitite) material in the high-pressure KAPILLAR mixing nozzle.

The PAN-DA pump provides a flow of water at a constant pressure of up to 100 bar.

In order to ensure maximum efficiency (good mixing effect with no dust and only minimum rebound) it is necessary to match the size of shotcrete hose and KAPILLAR nozzle to the rate of output of the shotcrete machine.

Shotcrete hose diameter (mm)	Shotcrete output (m <sup>3</sup> /h)	Model of PAN-DA
25	0.3-1.0	an
32	1.0-2.0	an
38/40	1.5-2.5	an
50	3.0-6.0	bn (dn)
65	5.0-6.0	bn (dn)
65	8.0-15.0	cn or bb

Whatever the model or type of PAN-DA, one basic rule applies to efficient shotcrete operation:

**Rule of thumb:**

The higher the volume of dry shotcrete mix in the shotcrete line, the higher the efficiency of the PAN-DA nozzle system.

The SBS PAN-DA nozzle systems can be used to mix wither kilon-dried (pre-bagged) materials or also moist, site mixtures.

For certain types of materials (with high fines contents or low cement contents), various special nozzle tubes are also avialable. Advice can be obtained from SBS or your SBS dealer.

All models of PAN-DA water pump can also be combined with a KOMBI-MIX to form a twin unit to pump water and other types of liquid additives (accelerators, slurries etc.).

**3. FUNCTION OF THE PAN-DA PUMP**

Mains water supply (or other source of flowing water) is connected to the input connection on tank (4).

**Note: maximum pressure in the inlet line must not exceed 10 bar.**

The high pressure water pump (2) provides a flow of water to the nozzle (6) at pressures of up to 100 bar.

**For this reason, use ONLY SBS high-pressure hoses (15).**

An accumulator (7) coupled to the pump outlet ensures a constant level of pressure and flow without any pressure spikes.



An unloader valve (3) also acts as a pressure relief valve to prevent overloading of the motor in case of any blockages in the water system.

The driving motor has a cut-out to prevent overload.

Unloader valve (3) regulates the flow of water to the nozzle depending upon the pressure in the HP line.

What this means is that when the nozzleman closes the valve (5) on the nozzle, a certain amount of water is cracked off in the unloader valve and is dumped back to the tank (4).

If the nozzleman closes valve (5) completely, unloader valve (3) opens fully and dumps all of the water coming from the pump back to the tank. The tank is large enough to permit this type of "short-circuit" operation for periods of up to 1 hour or more.

This type of operation is, however, not a standard procedure.

The PAN-DA pump should be switched off whenever it is not needed.

This saves wear and tear in the pump and also saves electricity.

The water needed to mix the shotcrete material is pumped through HP hoses to the KAPILLAR nozzle (6) where it is forced through the jet bores (9).

The jet bores (9) are arranged in such a way that the resulting water jets form a mesh of water through which the shotcrete material has to pass. The jets have such a high velocity that they "cut through" the flow of shotcrete mix material in the nozzle hammer (8).

Because the water jets penetrate into the centre of the mix material, they fully saturate the mix material (essentially the cement and fine material).

All of the fine particles are bound into the wet concrete so that no dust can escape at or around the nozzle.

In order to maintain the high velocity of the jets, it is essential that:

- a) sufficient water is flowing to the nozzle
- b) sufficient mix material is flowing to the nozzle

If flows of water and/or material are low, the drop in water volume will reduce the velocity of the jets. Dust will be the result (see also following instructions).

## **4. COMMISSIONING**

### First-time commissioning procedures

Before commissioning the PAN-DA pump for the first time (and after changing position to a new jobsite or working area), check:

- ↗ Level of oil in water pump on oil gauge (12) (25) → pneumatic motor see page 27 to 31 ↖. Oil should reach half way up the bullseye.
- ↗ That tank is full of water and that sufficient water is flowing to the PAN-DA.  
Open drain cock (18), water should flow out.
- ↗ That electrical power is ON and that motor is turning in correct direction.  
Use a CE type electrical plug fused at 16 Amps.

### Standard preparation procedures:

Connect the water supply to inlet connection (1). Inlet connection on all PAN-DA models is 3/4" except for model "bb" which has a 1" connection.

The pressure on the inlet side of the pump must not exceed 10 bar.

If water is being drawn from a cistern, water well etc., a filter and check valve must be fitted to the free end of the intake/suction hose. The water pump in the PAN-DA can only draw in water down to a max. depth of 4 m (0.4 bar suction head).

Connect high-pressure hoses (15) to the pressure outlet (14) and to the KAPILLAR mixing nozzle (6). The PAN-DA pump has sufficient output reserves to allow a considerable length of high-pressure hose to be connected.

Open drain cock (18), switch on main water supply and let water flow until tank (4) is full and water flows out of cock (18).

If the PAN-DA needs to draw in its own water (e.g. from a cistern or well below the level of the PAN-DA), prime the system by filling tank (4) and intake hose with water from another source. This makes it easier for the pump to prime itself.

Switch on the PAN-DA and check that water flows out of the nozzle (6).

If water does not flow, check inlet and pressure hoses for blockages or leaks. Change any blocked or damaged hoses.

Once water is flowing correctly to the nozzle, prepare other machinery to start work.

In shotcrete and guniting applications, it is usually necessary to wash down the wall or surface onto which shotcrete/guniting is to be applied.

Switch on the PAN-DA so that water is flowing to the nozzle.

Switch on the supply of compressed air to the nozzle and use the air/water spray to wash down the working wall.

## **Shotcrete applications**

### **IMPORTANT**

In order to ensure correct operation of the PAN-DA pump and the KAPILLAR mixing nozzle, always follow the following sequence:

Starting operation:

- Switch on PAN-DA pump and let water flow
- Switch on compressed air to nozzle

- Switch on supply of shotcrete mix

Finishing operation:

- Switch off supply of shotcrete mix
- Switch off compressed air
- Switch off PAN-DA pump

At the end of operation, always let the PAN-DA pump run for 1 or 2 minutes with the nozzle valve open. This keeps the jet bores in the nozzle free and prevents cement dust (from the shotcrete) from settling and hardening in the nozzle.

- ☞ When this sequence is followed, it is impossible for the jet bores in the nozzle to get blocked.

When valve (5) on the nozzle is closed, pressure valve (3) opens and dumps all water coming from the pump back to the PAN-DA tank (4).

The motor can continue running in this phase for a short time (e.g. breaks in work). During long breaks, it is better to switch the motor off (reduces wear in the pump).

## **5. NOZZLE HANDLING**

When using the PAN-DA system with high-pressure KAPILLAR nozzle, it is not necessary to "wobble" the nozzle to re-mix shotcrete material on the working wall.

With the KAPILLAR nozzle, it is only necessary to make those movements that are needed to back-fill behind re-bars, tunnel arches etc.

In other phases, the nozzle should be held steady to follow the pattern of shotcrete spraying.

Sudden, jerky and wobbling movements increase the amount of rebound off the wall.

The nozzle should be held at an angle of 90° to the wall.

The distance between nozzle tip and wall should be between 50 cm and 1.5 m (depending upon the speed and output of material leaving the nozzle).

The nozzleman should choose a "stand-off" suitable to the actual operation and which gives the lowest possible rebound.

The nozzleman must alter the flow of water using valve (5) so that

- a) No dust emerges from the nozzle
- b) The shotcrete does not run off the wall

## **6. WINTER OPERATION**

If frost threatens, the PAN-DA pump and all water hoses should be stored in heated or warm areas when not in use.

After operation, open the connections (1), (14) and (21) to drain all water. Switch the PAN-DA pump on for a few seconds to pump all remaining water out of connection (14).

Use an air jet to blow all remaining water out of intake, high-pressure hoses and KAPILLAR nozzle.

## **7. MAINTENANCE**

- ☞ For pneumatic motor see Page 27 to 31
- ☞ Check oil level in the high-pressure water pump every day before starting work.
- ☞ Change oil every 300 operating hours.
- ☞ Use a suitable gear oil, e.g. SAE 90.  
Quantity required: 0.9 litres.

A filter screen (17) on the intake connection stops dirt/sand etc. getting into the pump.

Clean the filter screen in regular intervals.

Use a jet of compressed air to blow through any hoses before connecting them to the PAN-DA pump. This removes any dirt or sand that could later cause blockages.

## **8. ADD-ON PUMPS**

All 5 standard models of PAN-DA pump (models "an", "bn", "cn", "bb" and „dn“) can be combined with an SBS KOMBI-MIX pump to form a unit for the addition of water and liquid accelerator, water and silica slurry, etc.

The PAN-DA pumps can also be used as high-pressure cleaners to wash down concrete surfaces, jobsite equipment etc.

For such purposes, the high-pressure water hose (15) is to be connected to a standard pressure gun.

## **9. TROUBLE-SHOOTING**

### **CAUTION**

Observe safety rules and regulations at all times!

Do NOT open any hydraulic, water or air lines until the drive systems have been shut down and pressure dumped from the circuits.

Electrical systems should ONLY be worked on by the responsible electrician.

When lifting any heavy equipment, use ONLY certified lifting gear that is capable of bearing the load.

Always refer to the spare parts list and circuit diagrams when trouble-shooting the electrical, or high-pressure systems systems.

The following trouble-shooting guide assumes that basic principles are adopted to check systems before major work is started.

A "Question & Answer" session is the first thing to do:

**PAN-DA not running:**

- is power ON?
- are fuses OK?

**Motor running, but no water flowing:**

- are cocks open?
- is water flowing into PAN-DA?

Following simple procedures like above can save a lot of work and expense later on.

**Dust emerges from nozzle-Shotcrete not wet enough-High rebound**

Cause	☞	Some of jet bores (9) in nozzle (10) are blocked.
Remedy	☞	Clean out with needles (23).
Basic cause	☞	Jet bores (9) can only get blocked if nozzle is not used properly, e.g. water switched off while air is still flowing through hose/nozzle.

**Correct procedure is:****Starting operation:**

1. Switch on PAN-DA pump
2. Switch on air to nozzle
3. Switch on shotcrete mix

**Finishing operation:**

1. Switch off shotcrete mix
2. Switch off compressed air
3. Switch off PAN-DA pump

Cause	☞	KAPILLAR mixer tube (10) in nozzle is worn - water flow therefore intermittent.
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Remedy	☞	Fit a new mixer tube (10).
Cause	☞	Shotcrete machine is working erratically. No constant flow to nozzle.
Remedy	☞	Check shotcrete machine.

### **Shotcrete mix material is not being saturated with water. Insufficient water flowing.**

Cause	☞	Strainers (17 or 20) blocked.
Remedy	☞	Check/clean strainers.
Cause	☞	Insufficient inlet water.
Remedy	☞	Check mains flow.  If water is being drawn from cistern or well, check that filter/check valve is free.
Cause	☞	Pressure valve (3) dumping water to tank (4).
Remedy	☞	With valve on nozzle closed, pressure gauge must show 100 bar: Check unloader valve and reset or change if necessary.
Cause	☞	Ice or other material blocking high-pressure hoses (15) or KAPILLAR nozzle (10).
Remedy	☞	Check hoses and nozzle. Clean out or replace as required.



Cause	☞	Valves in high-pressure pump (2) worn or blocked.  See spare parts list (Items 27 and 27A on Page 2).
Remedy	☞	Remove plugs (Item 32) and check valves.  Clean or replace the valves as necessary.

### **Water flowing out between KAPILLAR nozzle and shotcrete hose.**

Cause	☞	O-rings (19) worn or damaged.  Or shotcrete hose has not been cut straight.
Remedy	☞	Check/change O-rings. Cut hose to a straight edge at 90°.

### **IMPORTANT**

When fitting the KAPILLAR mixing tube (10) into the nozzle, it is important to clean out all traces of sand or dirt from the area between the O-rings (19). Sand or dirt can otherwise block the jet bores (9)

## 10. TECHNICAL DATA

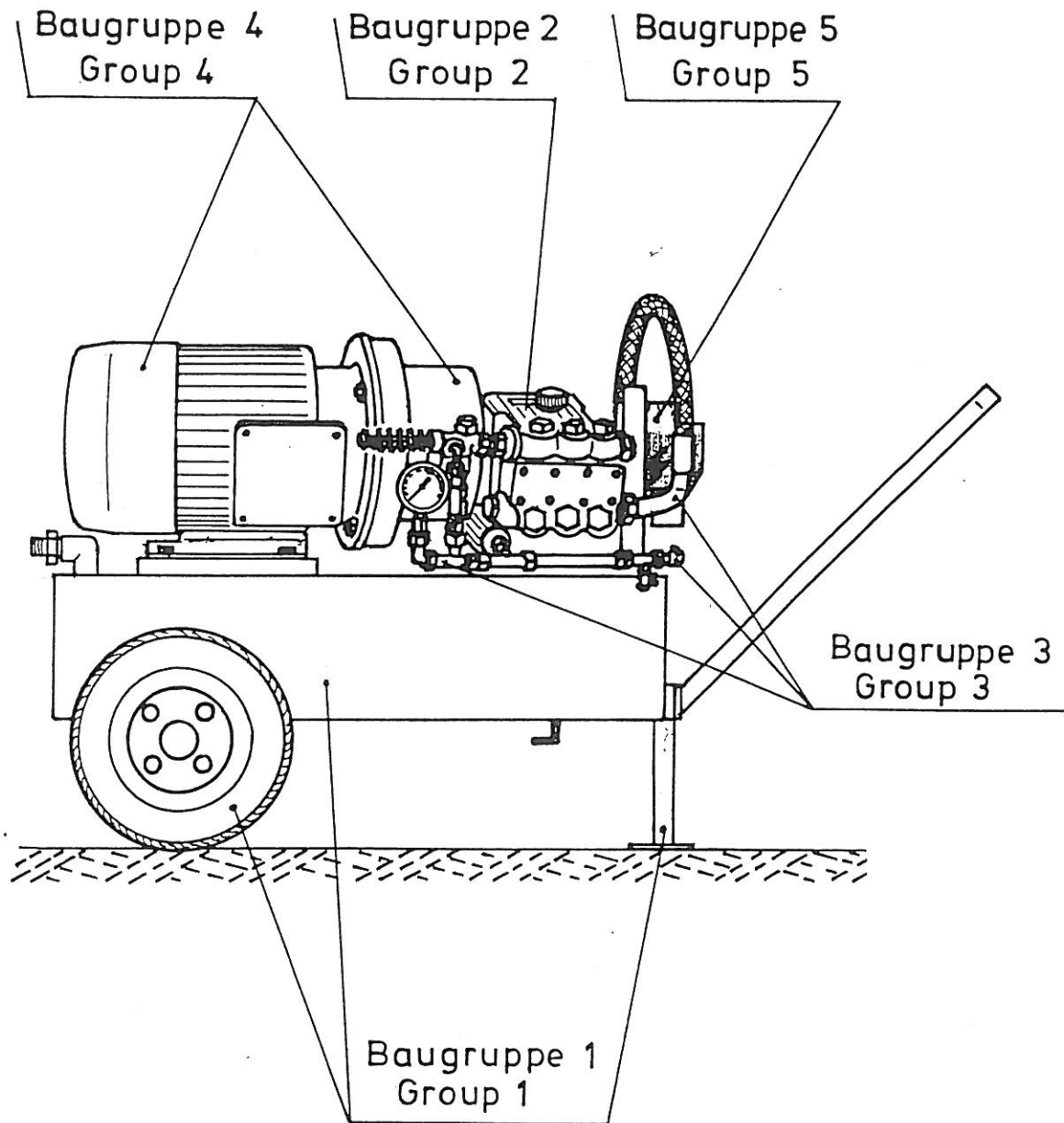
		Model an E-Motor	Model bn E-Motor	Model pn E-Motor	Model dn L-Motor
Water output	(l/h)	800	1200	1800	1200
Pressure	(bar)	100	100	120	100
Motor output	(kW)	3	4	7.5	6.5 kW, 6 bar
Motor overload set to 7 A	(A)	10	14	10	---
Compressed air consumption	(m <sup>3</sup> /min)	---	---	---	4,5
Weight (without water)	(kg)	125	130	155	180
Tank volume	(l)	40	40	40	40

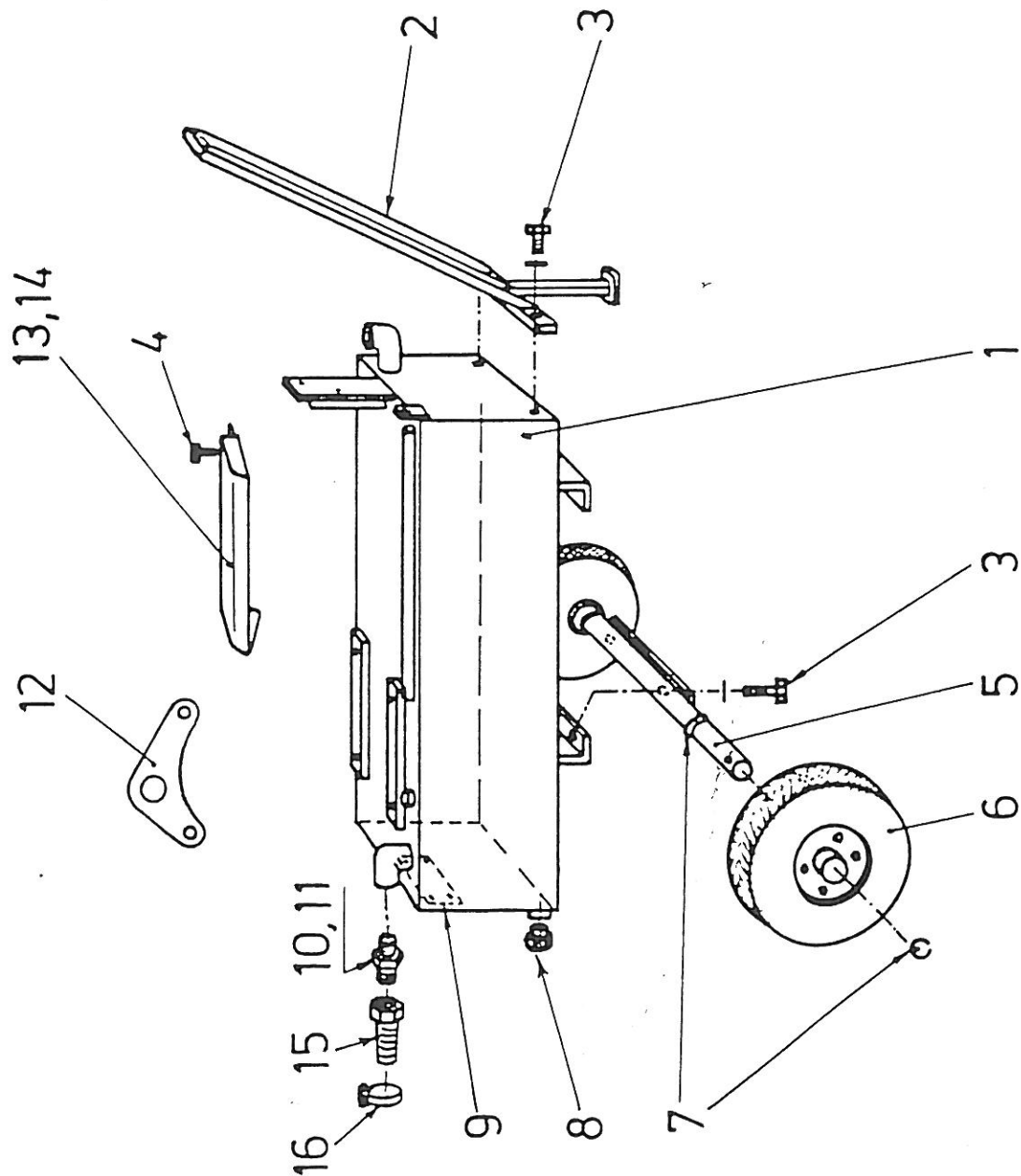
## **11. SYSTEM OVERVIEW**

- 1      Wasseranschluß - Eingang // Water inlet
- 2      Hochdruck-Wasserpumpe // High pressure pump
- 3      Mengenregelventil // Unloader valve
- 4      Wassertank // Water tank
- 5      Regulierventi // Regulating valve
- 6      Hochdruck-Wirbelmischdüse // KAPILLAR mixing unit
- 7      Druckspeicherm // Accumulator
- 8      Mischzylinder // Mixing housing
- 9      kleine Kanäle // Jet bores
- 10     KAPILLAR-Mischrohr // KAPILLAR mixing tube
- 11     Wassergitter // Water mesh
- 12     Öleinfüllschraube / Meßstab // Oil filler / Dipstick
- 13     Motorschutzschalter mit Steckdose, 16 A, CE ↵  
       Socket with motor overload
- 14     Druckwasser - Ausgang // High pressure connection
- 15     Hochdruckwasserschlauch // High pressure water hose
- 17     Schmutzfänger 1/2" // Strainer
- 19     O-Ringe // O-rings
- 20     Schmutzfänger 1" // Strainer
- 21     Wasserablaßstopfen // Drain plug
- 22     Gummitülle // Rubber spout
- 23     Düsenreiniger // Nozzle cleaner
- 24     Ölkontrolle / Oil control
- 25     Öler / Oiler (1 l)

## **II Spare parts list**

### **PAN-DA** **High Pressure Pump**





Baugruppe 1

Rahmen(Tank)-Fahrgestell

Blatt 1

Group 1

Frame (Tank)-Chassis

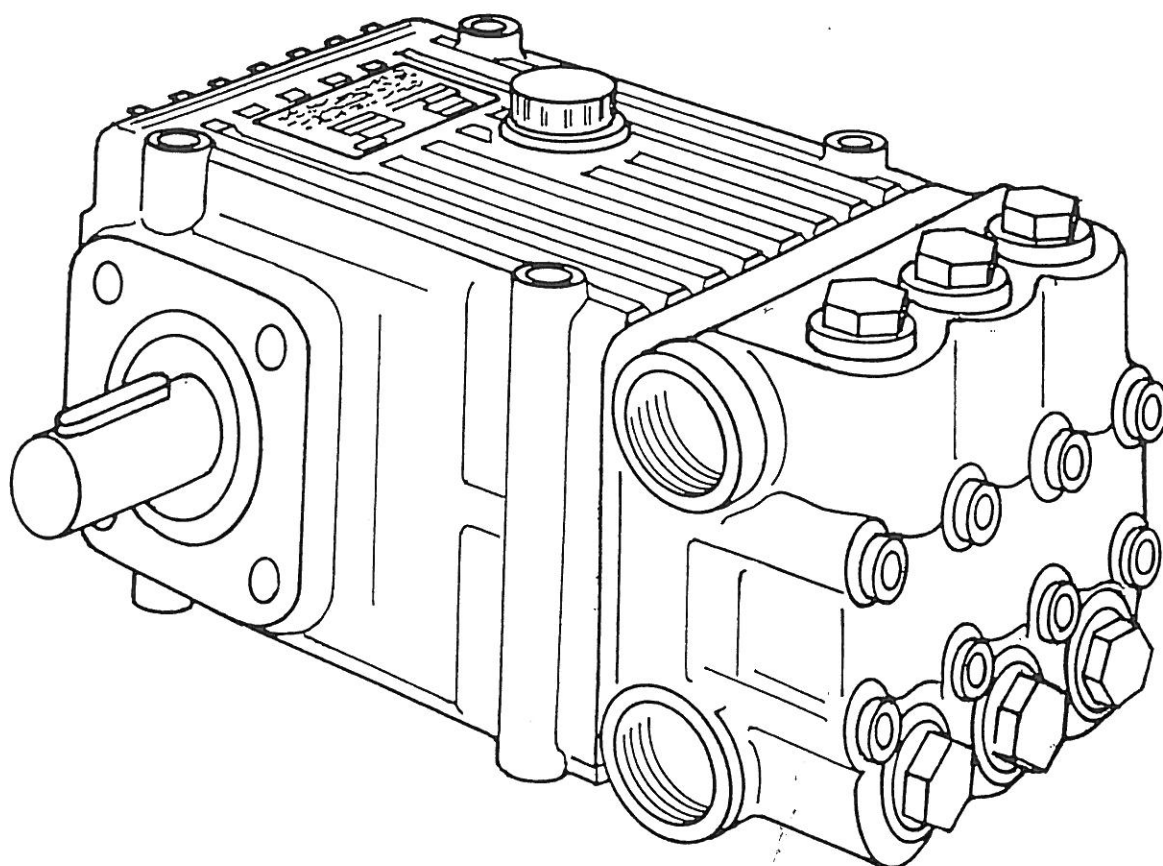
Sheet 1

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
1	Rahmen (Tank) für an, bn, bb, cn, pn Frame (tank)	1	102649
	Rahmen (Tank) für dn Frame (tank)	1	102650
2	Deichsel mit Stütze Drawbar with foot	1	101733
3	Schraube M 12 x 35 Bolt	4	105293
4	Schraube M 10 x 16 Bolt	2	104305
5	Achse Wheel shaft	1	101627
6	Lufrad für PAN-DA an, bn, cn, pn Air wheel	2	102310
7	Radsicherung Wheel lock	4	102648
8	Verschlußstopfen Plug screw	1	103158
9	Typenschild Data plate	1	103092
10	Wasseranschluss - Eingang 3/4", für Typ an, bn, Fitting	1	103273
11	Kordelgewinde-Verschraubung, 1", für Typ cn, bb, pn Fitting	1	102227
12	Aufhängung Lifting eye	1	101660
13	Abdeckplatte, für Typ an, bn, cn Plate	1	101610
14	Abdeckplatte, für Typ bb, pn Plate	1	101612
Baugruppe 1		Rahmen (Tank) - Fahrgestell	
Group 1		Frame (Tank) - Chassis	
		Blatt 2	
		Sheet 2	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
15	Verschraubung mit Tülle 3/4" für Typ an und bn Hose nipple 3/4" for model an and bn	1	103204
	Verschraubung mit Tülle 1" für Typ cn, bb, pn Hose nipple 1" for model cn, bb, pn	1	103206
16	Schelle 3/4" für Typ an und bn Clip 3/4" for model an and bn	1	102819
	Schelle 1" für Typ cn und bb, pn Clip 1" for model cn, bb, pn	1	102818
Baugruppe 1		Rahmen (Tank) - Fahrgestell	
Group 1		Frame (Tank) - Chassis	
		Blatt 3	
		Sheet 3	



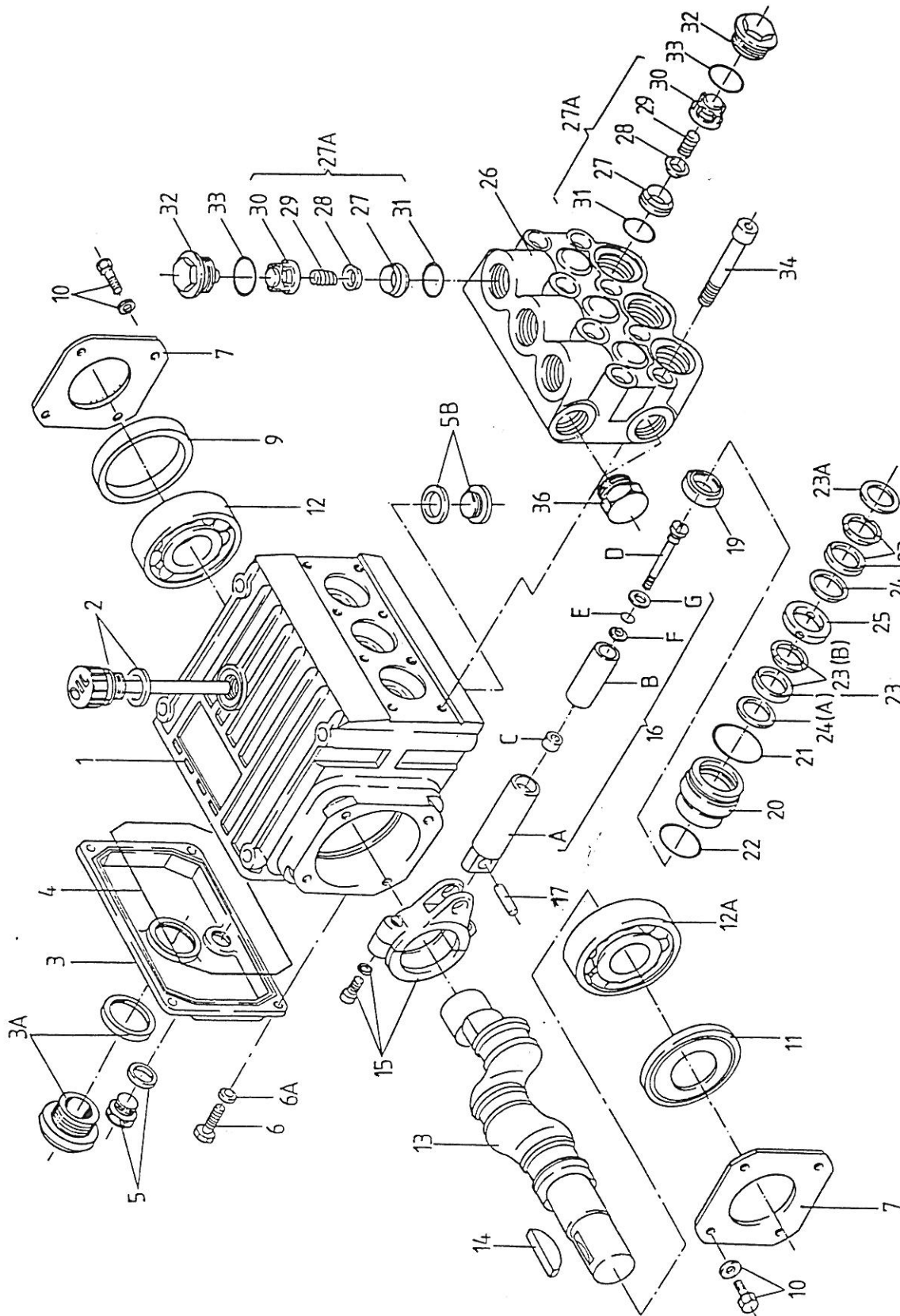
Hochdruckpumpe komplett  
 High pressure pump, complete



für Typ / for model an  
 für Typ / for model bn, pn  
 für Typ / for model cn  
 für Typ / for model bb

ET-Nr. / P/N 101996  
 ET-Nr. / P/N 101999  
 ET-Nr. / P/N 101997  
 ET-Nr. / P/N 101998

Baugruppe 2	Hochdruckpumpe	Blatt 1
Group 2	High Pressure pump	Sheet 1



Baugruppe 2

Hochdruckpumpe

Blatt 2

Group 2

High Pressure Pump

Sheet 2

Hochdruckpumpe komplett  
High pressure pump, complete

für Typ / for model an	ET-Nr. / P/N 101996
für Typ / for model bn, pn	ET-Nr. / P/N 101999
für Typ / for model cn	ET-Nr. / P/N 101997
für Typ / for model bb	ET-Nr. / P/N 101998

Baugruppe 2	Hochdruckpumpe	Blatt 1
Group 2	High Pressure pump	Sheet 1

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
1	Antriebsgehäuse Crankcase	1	101651
2	Ölmeßstab Oil dipstick	1	102529
3	Getriebedeckel Crankcase cover	1	101959
3A	Ölschauglas komplett, G1 Oil sight glass assy	1	102532
4	O-Ring O-ring	1	105629
5	Ölablassstopfen komplett mit Dichtung Oil drain plug, complete	1	102523
6	Zylinderschraube Cylinder screw	4	103323
6A	Federring M6 Spring washer	4	104645
7	Lagerdeckel Bearing cover	2	102270
9	Verschlußkappe Lid	1	103153
10	Sechskantschraube Hexagon screw	8	102969
11	Radialwellendichtring Radial shaft seal	1	102642
12	Rillenkugellager (25/21-12) Ball Bearing	1	102689
12A	Zylinderrollenlager Roller bearing	1	103322
13	Kurbelwelle für Typ an, bn, cn und pn Crankshaft for model an, bn, cn and pn	1	102267
	Kurbelwelle für Typ bb Crankshaft for model bb	1	102266
Baugruppe 2		Hochdruckpumpe	
Group 2		High Pressure pump	
		Blatt 3	
		Sheet 3	

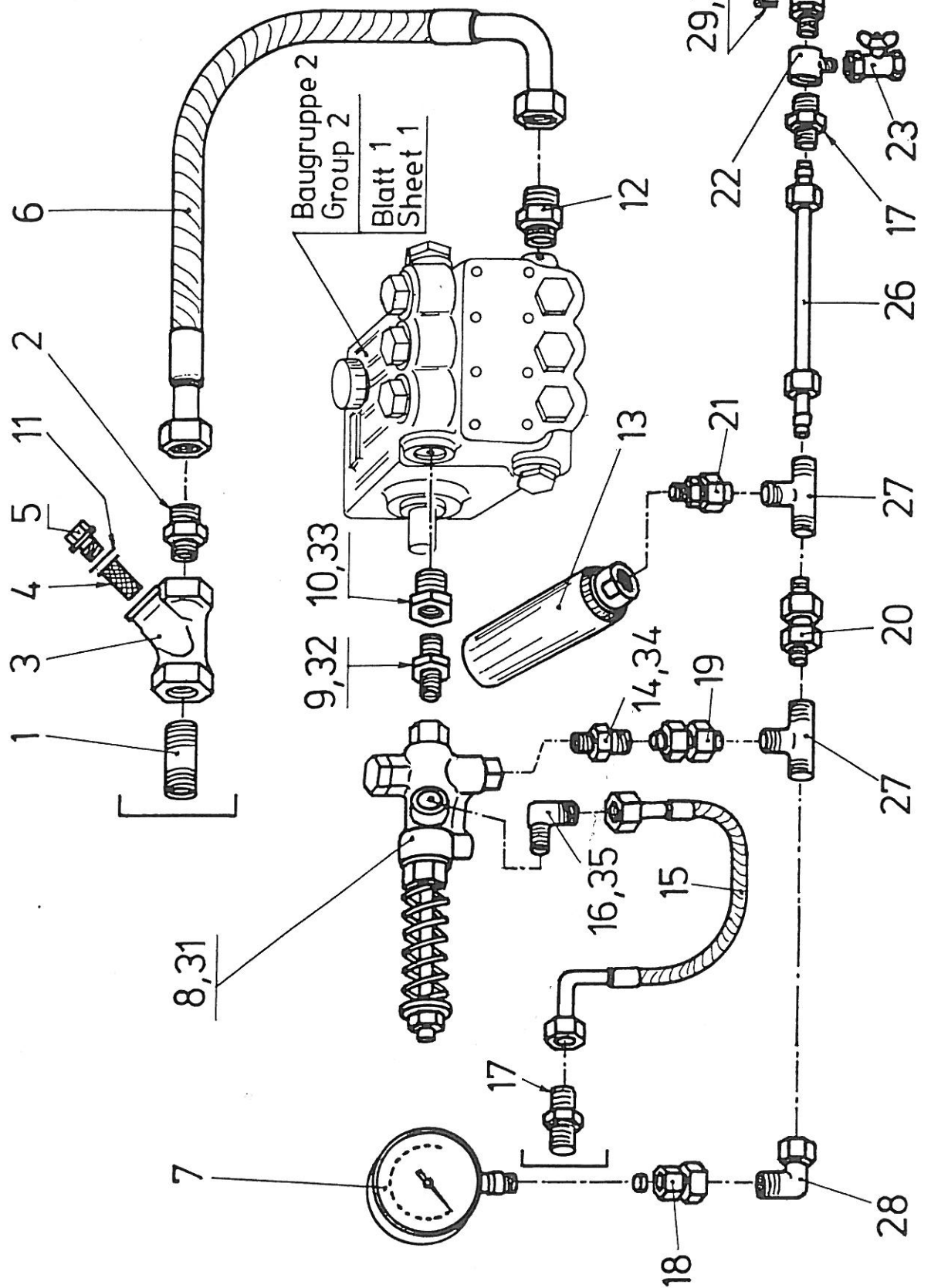
Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
14	Scheibenfeder Woodruff Key	1	102811
15	Gleitlagerpleuel komplett Connecting Rod assy	1	101968
16	Plunger komplett, D18 für an Plunger assy D18 for an	3	102614
	Plunger, komplett, D22 für bn, bb und pn Plunger assy D22 for bn, bb and pn	3	102613
	Plunger komplett, D25 für cn Plunger assy D25 for cn	3	102615
17	Kreuzkopfbolzen Crosshead pin	3	102230
19	Getriebedichtring, HS 100 Gear seal	3	101960
20	Dichtungsaufnahme für Typ an Seal adaptor for model an	3	101763
	Dichtungsaufnahme für Typ bn, bb und pn Seal adaptor for model bn, bb and pn	3	101762
	Dichtungsaufnahme für Typ cn Seal adaptor for model cn	3	101764
21	O-Ring O-ring	3	105630
22	O-Ring O-ring	3	105631
23	Nutringdichtsatz für Typ an Seal packing for model an	3	102519
	Nutringdichtsatz für Typ bn, bb und pn Seal packing for model bn, bb and pn	3	102521
	Nutringdichtsatz für Typ cn Seal packing for model cn	3	102522
Baugruppe 2		Hochdruckpumpe	
Group 2		High pressure pump	
		Blatt 4	
		Sheet 4	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
24	Stützring für Typ an Support ring for model an	6	103071
	Stützring für Typ bn, bb und pn Support ring for model bn, bb and pn	6	103072
	Stützring für Typ cn Support ring for model cn	6	103073
25	Leckagerückführung für Typ an Drip-Return ring for model an	3	102277
	Leckagerückführung für Typ bn, bb und pn Drip-Return ring for model bn, bb and pn	3	102278
	Leckagerückführung für Typ cn Drip-Return ring for cn	3	102279
26	Ventilgehäuse für Typ an Valve casing for model an	1	103128
	Ventilgehäuse für Typ bn, bb und pn Valve casing for model bn, bb and pn	1	103129
	Ventilgehäuse für Typ cn Valve casing for model cn	1	103130
27A	Ventil komplett für Typ an Valve assy for model an	6	103121
	Ventil komplett für Typ bn, bb, cn und pn Valve assy for model bn, bb, cn and pn	6	103122
27	Ventilsitz für Typ an Valve seat for model an	6	103139
	Ventilsitz für Typ bn, bb, cn und pn Valve seat for model bn, bb, cn and pn	6	103140
28	Ventilplatte für Typ an Valve plate for model an	6	103133
	Ventilplatte für Typ bn, bb, cn und pn Valve plate for model bn, bb, cn and pn	6	103134
Baugruppe 2		Hochdruckpumpe	
Group 2		High Pressure Pump	
		Blatt 5	
		Sheet 5	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
29	Ventilfeder für Typ an Valve spring for model an	6	103126
	Ventilfeder für Typ bn, bb, cn und pn Valve spring for model bn, bb, cn and pn	6	103127
30	Federspannschale für Typ an, Spring Tension cap for model an	6	101903
	Federspannschale für Typ bn, bb, cn und pn Spring Tension cap for model bn, bb, cn and pn	6	101904
31	O-Ring für Typ an O-ring für model an	6	102575
	O-Ring für Typ bn, bb, cn und pn O-ring for model bn, bb, cn and pn	6	102577
32	Stopfen für Typ an (M 24 x 1,5) Plug for model an	6	103062
	Stopfen für Typ bn, bb, cn und pn (M 30 x 1,5) Plug for model bn, bb, cn and pn	6	103063
33	O-Ring für Typ an O-ring for model an	6	102574
	O-Ring für Typ bn, bb, cn und pn O-ring for model bn, bb, cn and pn	6	102576
34	Innensechskantschraube Inner hexagon screw	8	102176
36	Stopfen G3/4" Plug	2	103064
37	Reparatursatz - Dichtungen für Typ an Seal repair kit for model an	1	102675
	Reparatursatz - Dichtungen für Typ bn, bb und pn Seal repair kit for model bn, bb and pn	1	102676
	Reparatursatz - Dichtungen für Typ cn, pl Seal repair kit for model cn, pl	1	102677
Baugruppe 2		Hochdruckpumpe	
Group 2		High Pressure Pump	
		Blatt 6	
		Sheet 6	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
B	Plungerrohr für Typ bn, pn, bb Plunger pipe for model bn, pn, bb	1	102619
	Plungerrohr für Typ a Plunger pipe for model a	1	102617
	Plungerrohr für Typ cn Plunger pipe for model cn	1	102620
Baugruppe 2		Hochdruckpumpe	
Group 2		High Pressure Pump	
		Blatt 7	
		Sheet 7	





Baugruppe 3

Rohrleitung - Verschraubungen

Blatt 1

Group 3

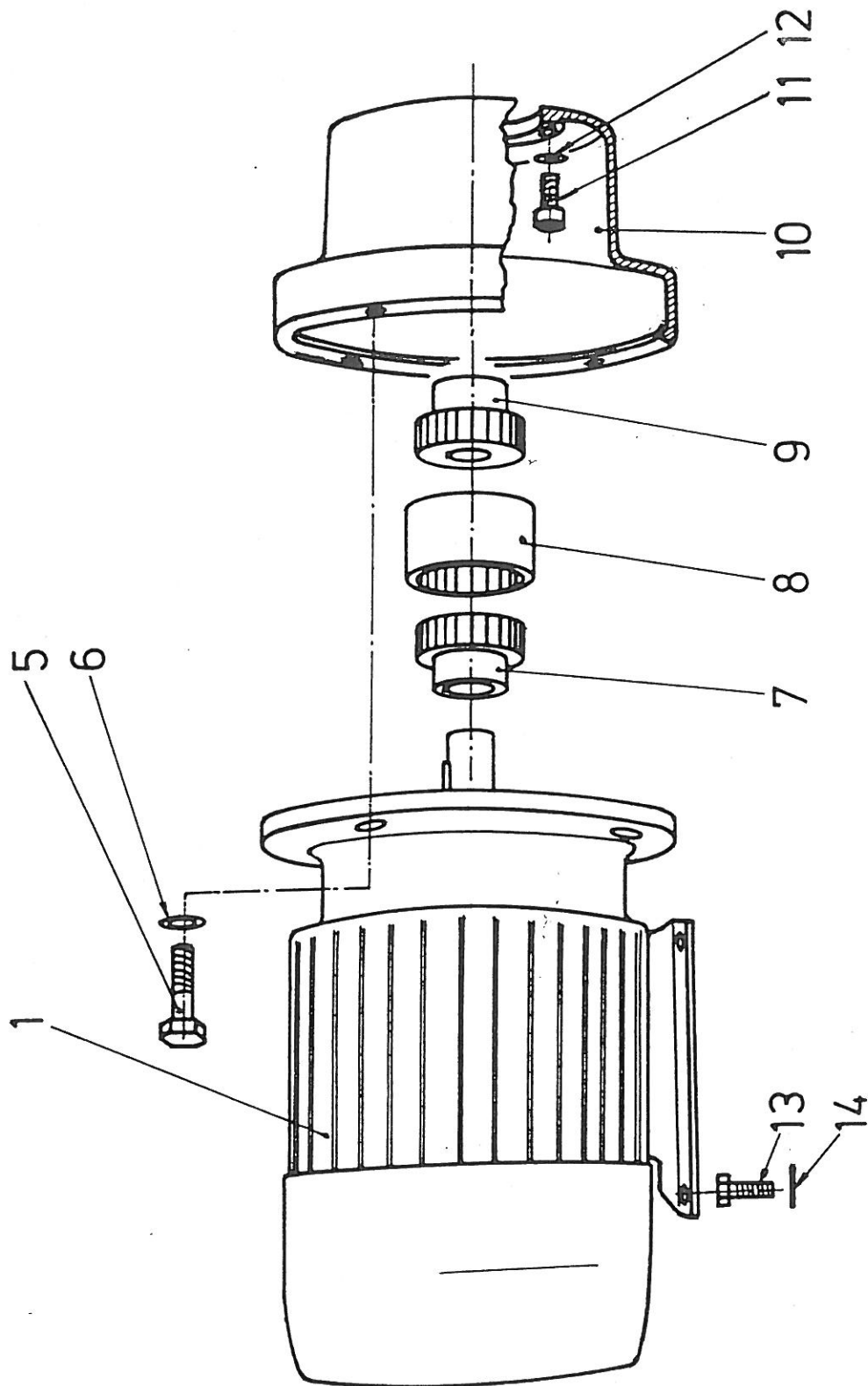
Line - Fittings

Sheet 1

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
1	Rohnippel 1" Pipe nipple 1"	1	102718
2	Gerade Einschraubverschraubung VR ¾" NW 25 HL Fitting	1	101949
3	Schmutzfänger 1" Strainer 1"	1	102925
4	Sieb für 1" Strainer insert	1	102995
5	Verschlussstopfen, 1" mit Dichtung Plug	1	103160
6	Ansaugschlauch PHD Intake hose	1	101642
7	Manometer Pressure gauge	1	102323
	Manometer für Typ bb und pn Pressure gauge for bb and pn	1	102331
8	Ventil Valve	1	103114
9	Doppelnippel, 3/8" Double nipple	1	101782
10	Reduzierverschraubung, 3/4 - 3 / 8" Fitting	1	102666
11	Dichtring für Pos. 5 Seal for item 5	1	101741
12	Gerade Einschraubverschraubung VR ¾" NW 25 HL Fitting	1	101950
13	Speicher (Vorspeicherdruck 40 bar) Accumulator	1	103010
Baugruppe 3		Verrohrung - Armaturen - Ventil - Speicher	
Group 3		Line - Fittings - Valve - Accumulator	
		Blatt 2	
		Sheet 2	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
14	Gerade Einschraubverschraubung VR Fitting	1	101951
15	Druckschlauch PHD für Typ an, bn und cn High pressure hose for an, bn and cn	1	101804
16	Winkelverschraubung WR ¼" Fitting	1	103294
17	Gerade Einschraubverschraubung, VR- NW 08 HS – ¼" Fitting for model an, bn and cn	1	101952
18	Manometerverschraubung, für an, bn und cn XMVE-NW 10 HL Pressure gauge fitting for an, bn and cn	1	102335
19	Rohr mit Mutter und Schneidring für an, bn, cn Pipe with nut and cutting ring for an, bn, cn	1	102699
20	Rohr mit Mutter und Schneidring Pipe with nut and cutting ring	1	102700
21	Einschraubverschraubung, mit Mutter AVR-NW 08 HS Fitting	1	101848
22	Reduzierstück AH NW 13 S08	1	103228
	Reduzierstück MVR NW 08 HS Reducer	1	
23	Verteiler Nipple	1	101615
24	Ablasshahn ¼" (Entwässerungshahn) Drain cock	1	103043
	Steckkupplung für DN 10/ Wasserausgang Water - outlet		
Baugruppe 3		Rohrleitung - Verschraubungen - Ventil - Speicher	
Group 3		Line - fittings - valve - Accumulator	
		Blatt 3	
		Sheet 3	

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
25	Steckkupplung für DN 13, 1/2", Wasserausgang Water outlet	1	103045
26	Rohr mit Mutter und Schneidring Pipe with nut and cutting ring	1	102701
27	T-Stück für an, bn und cn T-fitting for an, bn and cn	2	103087
	T-Stück für bb und pn VEL-NW 13 HS T-fitting for bb and pn	2	105634
28	Winkelverschraubung VEW-08 HS für an, bn und cn. Fitting for an, bn and cn	1	103289
	Winkelverschraubung W-NW 13 HS für bb und pn Fitting for bb and pn	1	
29	Federstecker für DN 10 Spring connector	1	101906
30	Federstecker für DN 13 Spring connector	1	101907
31	Ventil 221, für bb und pn Valve for bb and pn	1	103116
32	Doppelnippel, 1/2", für an und bn Double nipple, 1/2" für an and bn	1	101780
33	Reduzierschraubung 3/4-1/2", für bb, pn Fitting	1	102664
34	Gerade Verschraubung VR-NW 13 HS, für bb und pn Fitting for bb and pn	1	103165
35	Winkelstück WR NW 13 HS für bb und pn Angle for bb and pn	1	103287
36	Rohr für Kabel Pipe for wire	1	
Baugruppe 3		Verrohrung - Armaturen - Ventil - Speicher	
Group 3		Line - Fittings - Valve, Accumulator	
		Blatt 4	
		Sheet 4	



Baugruppe 4

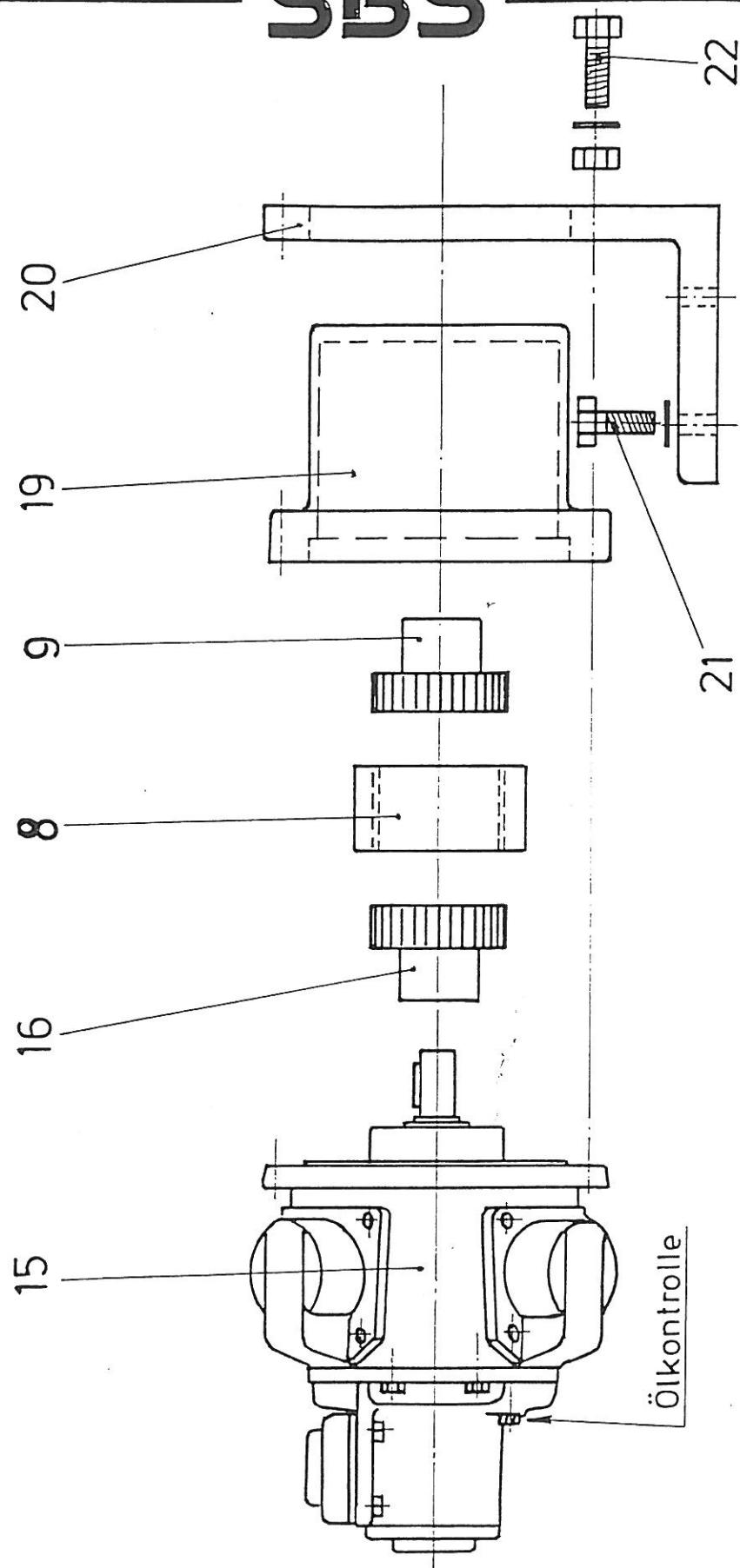
Antrieb

Blatt 1

Group 4

Power Pack

Sheet 1



Baugruppe 4

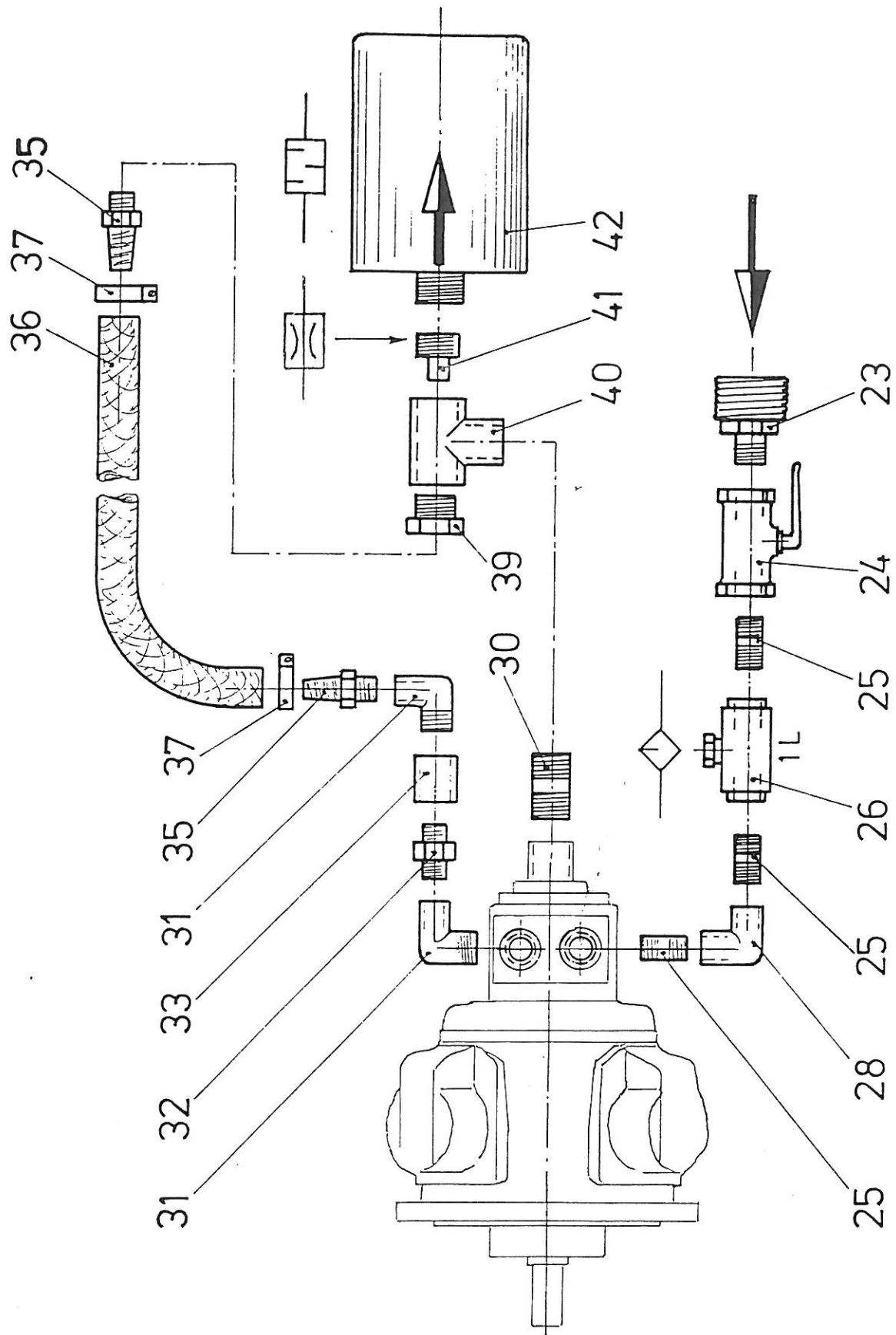
Antrieb

Blatt 2

Group 4

Power Pack

Sheet 2



Baugruppe 4

Antrieb

Blatt 3

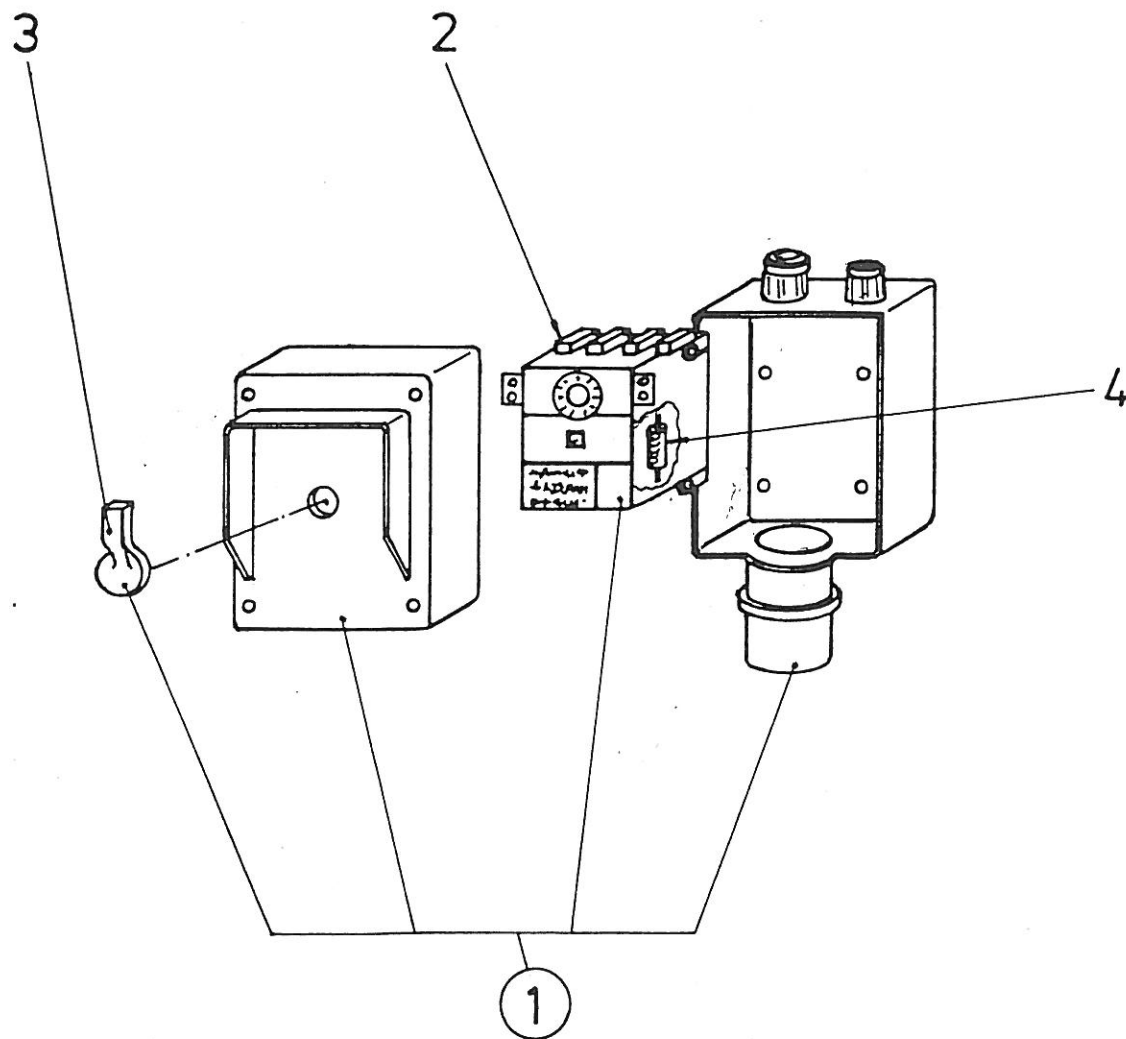
Group 4

Power Pack

Sheet 3

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
1	Elektromotor, 3 kW, 400/690 V, 50 Hz für Typ an Electric motor for model an	1	101870
	Elektromotor, 4 kW, 400/690 V, 50 Hz für Typ bn Electric motor for model bn	1	101872
	Elektromotor, 5,5 kW, 400/690 V, 50 Hz für Typ cn Electric motor for model cn	1	101873
	Elektromotor, 7,5 kW, 400/690 V, 50 Hz für Typ bb und pn Electric motor for model bb and pn	1	101876
5	Schraube Bolt	2	105653
6	Federring Spring washer	4	105651
7	Nabe - E-Motor Hub - electric motor	1	102489
8	Kunststoffhülse Plastic coupler	1	102242
9	Nabe - Pumpe Hub - pump	1	102490
10	Pumpenträger - E-Motor Pump carrier - electric motor	1	102637
11	Schraube Bolt	4	105453
12	Scheibe Washer	4	104563
13	Schraube Bolt	4	105654
14	Federring Spring washer	4	105650
Baugruppe 4		Antrieb	
Group 4		Power pack	
		Blatt 4	
		Page 4	





Baugruppe 5	Elektrik	Blatt 1
Group 5	Electrics	Sheet 1

Pos. Item	Benennung Description	Menge Qty.	Artikel-Nr. Part No.
	Motorschutzscharter „Ein/Aus“ komplett für Typ an ON/OFF switch complete, for model an	1	102475
	Motorschutzscharter „Ein/Aus“ komplett für bn, bb, cn, pn ON/OFF switch, complete, for model bn, bb, cn and pn	1	102476
	Scharter-Einsatz für Typ an Switch for model an	1	102797
	Scharter-Einsatz für Typ bn, bb, cn und pn Switch for model bn, bb , cn and pn	1	102799
	Knebel Toggle	1	102215
	Spule Coil	1	103028
	<b><u>Ab Baujahr 2004</u></b>		
	Motorschutzscharter Ein/Aus“ für Typ SAN 780 ON/OFF switch for model SAN 780	1	105635
	Motorschutzscharter “Ein/Aus” für Typ bn ON/OFF switch, for model bn	1	105636
	Motorschutzscharter “Ein/Aus” für Typ pn und SAN 1.100 ON/OFF switch, for model pn und SAN 1.100	1	105637
	Scharter-Einsatz für Typ SAN 780 Switch for model SAN 780	1	105644
	Scharter-Einsatz für Typ bn Switch for model bn	1	105645
	Scharter-Einsatz für Typ pn und SAN 1.100 Switch for model pn und SAN 1.100	1	105646
Baugruppe 5		Elektrik	
Group 5		Electrics	
		Blatt 2	
		Sheet 2	