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THE TECHNOLOGY ADVANTAGE

LEWA

Ein Unternehmen der
HERBERT OTT-GRUPPE

Operating Manual

Betriebshandbuch

Operating Manual

Manuel de service

Manual de servicio

Manuale di esercizio

Εγχειρίδιο λειτουργίας

Instructiehandboek

Betjeningsvejledning

Driftsanvisning

Käyttöohjekirja

Manual de serviço

Руководство по эксплуатации

取扱説明書

操作使用説明

A 90 · 090100.1272

LEWA®

Betriebshandbuch / Operating Manual	
Kunde / Customer	Amersham Biosciences Umea Plant Mariehemsvägen 12 90654 Umea SE
Kunden-Nr. / Customer no.	502994
Kunden Bestell-Nr. / Purchase order no.	763272
Kunden Ident-Nr. / Purchase Id-no.	
Kunden Hinweise / Customer comments	
LEWA Fabrik-Nr. / LEWA serial-no.	**436438**
LEWA Produkt/ Ident-Nr./ LEWA product / Ident-no.	**ESC0025-13**

LEWA Herbert Ott GmbH + Co Ulmer Strasse 10, D-71229 Leonberg Telefon + 49 (7152) 14-0 Telefax + 49 (7152) 14-1303 E-mail lewa@lewa.de
internet www.lewa.de
V 050_1 / 11.98 / OV

LEWA®

Operating Handbook

This operating handbook gives information on safety, installation, operation, servicing, maintenance and spare parts.

Each assembly/system has its own, complete operating instruction with covering indexed page.

The structure for all individual operating instructions for sub-assemblies is identical:

1 **General information / safety**
2 **Transportation and intermediate storage**
3 **Product information**
4 **Erection and assembly**
5 **Commissioning / operation / shut down**
6 **Maintenance and repairs**
7 **Faults; symptoms, remedial action**

Further details on design and use can be found on the reverse of this page.



Avoid damages by absolutely observing the text in heavy printing before commissioning.

B 0.050 en, Issue September 2000

Technical Data Sheet
LEWA Commission No. / LEWA Serial No.
Customer's Order No., Customer's Item No.

Dimensional Drawing
P/D

Metering Stations Metering Systems	Operating Instruction	**B 00**
	Sectional Drawings Product List	
Metering Pumps, Assembly Drawing	Operating Instruction	**B 0**
	Assembly Drawing Product List	
Pump Drive Units, Lubricating system	Operating Instruction	**B 1**
	Sectional Drawings Parts Lists	
Pump Heads, Diaphragm positioning	Operating Instruction	**B 2**
	Sectional Drawings Parts Lists	
Motors, Gears, Base Plates Couplings	Operating Instruction	**B 3**
	Sectional Drawings Parts Lists	
Electric and Pneumatic Actuators Attachments	Operating Instruction	**B 4**
	Sectional Drawings Parts Lists	
Accessories Fittings Pipe Lines	Operating Instruction	**B 5**
	Sectional Drawings Parts Lists	
Certificates	e.g. Ex-EC declaration of conf. (76/117/EEC)	**B 6**
Regulating and Control Systems	Operating Instruction	**B 7**
	Sectional Drawings Parts Lists	
LEWA® **International** Sales and Service		**B 8**

Structure and use of the operating handbook

Dear customer,

you have received a metering pump/metering system which we have designed to suit your specific application using the LEWA modular system.
The operating handbook is also arranged to such a system, it is a combination of the individual operating instructions for the assemblies of your metering pump/process pump/metering system.
This arrangement of the operating instruction is the only possibility to make up individual operating instructions inspite of to the enormous number of possible combinations and should the metering pump/process pump/metering system be converted to adapt the operating handbook. Therefore it cannot be avoided that you have to read various sections to gain comprehensive information. We have endeavoured to make reading and finding the information required easy for you by using a uniform and clear order.

Structure within the modular system

- Main documents
  They contain the "Technical Data Sheet" with
  - permissible operating data,
  - LEWA order number, LEWA commission number, design, scope of supply,
  - product list(s) with the compilation of all items supplied.

- Operating instructions - assemblies B ..
  Each operating instruction for an assembly
  - is separated by a divider,
  - consists of a descriptive section "Operating instruction" as well as drawings and lists.

- Operating instructions B .. (descriptive section)
  All operating instructions have the same sequence of the contents (see front page, left hand column).
  Example: General instructions for "Commissioning" will always be found in section 5 of all individual operating instructions B ..

- Drawings
  The assembly drawing resp. the drawing of the metering system shows a schematic presentation of the complete unit.
  Sectional drawings and wiring diagrams show the mechanical (resp. electrical) design of the assemblies concerned with all parts and item numbers corresponding to the operating instruction.

- Lists
  The product list contains all items of the scope of supply.
  The parts lists belonging to the assemblies are found under the corresponding index number, e. g. pumphead following index B 2.
  The group parts lists contain all single parts of the appropriate assembly and additional sub-assemblies following under the appropriate index. In column 6 you will either find the identification number of the single part or the number of a sub-assembly. In the foot column you will find the numbers of the associated sub-assembly or sectional drawing whose item numbers correspond to those of the parts lists.

Sub-supplied assemblies
Information for assemblies not manufactured by LEWA frequently do not coincide with sequence followed in LEWA operating instructions. May we ask for your kind understanding.

Spare parts
All single parts and their ident number are found in the group parts lists. We recommend that you stock the parts designed with "V" or "E" in column A there.
Spare parts orders. Please address orders to LEWA in Leonberg, department VE or the representative in charge (see index B 8, LEWA-International). Details required: Number, designation, ident no. In case of missing ident no.: Number, designation, parts list no., LEWA commission number (Order number).

Customer service
Refer to LEWA Leonberg, dept. ES or the representative in charge (see index B 8, LEWA-International).

Requests for additional operating handbooks, querries
Please contact LEWA headquarters stating the LEWA serial no. in case of additional requirements or querries. If you request complete operating handbooks at a later date we must charge for them. The time required can be compared to a repeat processing of the order. May we ask for your kind understanding.

Issue September 2000

Technisches Datenblatt Ecodos / Technical Datasheet ecodos

LEWA®

Kunde / customer 502994 Land / country SE Amersham Pharmacia Biotech AB Umea Plant Mariehemsvägen 12 SE-90124 Umea	Kunden-Referenz / customer-reference 763272 LEWA-Angebots-Nr. / LEWA-quotation no. - LEWA-Auftrags-Nr. / LEWA-commission no. P22 - 436438 LEWA-Position / LEWA-pos. 010

1	Pumpenelement / pump element :	a	b	c
	Betriebsdaten / enquiry data - bei unvollständigen Angaben keine Gewähr für die Auslegung If operating data are incomplete LEWA takes no responsibility for the pump selection !			
2	Förderfluid / fluid :			
3	Anmerkungen / remarks:			
4	Konzentration / concentration : (%)			
5	Betriebstemperatur / operating-temp.: (°C)			
6	Viskosität / viscosity max. : (mPa·s)	1	1	1
7	Erforderlicher Dosierstrom / required flow : (l/h)	25	25	25
8	Betriebsdruck / operating pressure max : (bar)	max.10	max.10	max.10
	Auslegungsdaten / design			
	Anzahl/quantity **3** **Erzeugnis-Nr.**/product **ESC0025-13** **LEWA-Fabrik-Nr.**/serial no. **436438-010.001-003** **Typ**/Type **25S1/25S1/25S1 sanitary** **Kunden-Pos-Nr.**/customer pos. **56312584**			
	Triebwerk / drive element			
9	Hubverstellart / stroke adjustment:	manual	manual	manual
10	Exzenterversatz / eccentricity:	0	120	240
11	Getriebeuntersetzung / gear reduction : (i =)	17		
12	Hubzahl / stroke frequency : (min^{-1})	80	80	80
13	Zwischenelement / intermediate element:			
14	Kontaktgeber / contactor :			
	Pumpenkopf / pump head	Membran / diaphragm		
15	Dosierstrom max. / flow max. : (l/h)	25	25	25
16	Betriebsdruck max. zul. / operating pressure max.: (bar)	10	10	10
17	Ventile Bauart / DN / valve type / size :	ball valve DN10	ball valve DN 10	ball valve DN 10
18	Anschluß Saug-/ Druckseite / connection suct./ discharge:	Triclamp 1/2	Triclamp 1/2	Triclamp 1/2
19	Membranbruchsignalisierung / diaphragm rupture monitoring:	pressure switch	pressure switch	pressure switch
	Werkstoffe / materials			
20	Pumpen- und Ventilkörper / pumphead and valve body :	1.4571	1.4571	1.4571
21	Oberflächenanforderungen / surface req. : (Ra ≤ 0,5 µ)	X	X	X
22	Membrane / diaphragm :	PTFE	PTFE	PTFE
23	Ventilsitz / -einsatzring / valve seat / - insert ring :	1.4571	1.4571	1.4571
24	Ventilkugel / -platte / valve ball / plate :	oxide ceramics	oxide ceramics	oxide ceramics

Antrieb / driver

25	Ident-Nr. / Id-No.	103501.1140			Zündschutzart / EEx.	-		
26	Leistung / power (kW)	0.75	Polzahl / number of poles	4	Schutzart / protect	IP55	Isolation / isolation	F
27	Spannung / voltage (V)	400	Phasen / phase	3	Frequenz / frequency	3	Baugröße / size	80
28	Bauform / mounting	V18	Flansch-Ø / flange-Ø (mm)	120	Welle-Ø / shaft-Ø (mm)	19	-länge / -lenght	40
29	Zusatzangaben / remarks: 3 Kaltleiterfühler für FU-Betrieb/3 thermistors for frequency control							

Allgemein / general

30	Standard-Lack / painting	X	blau / blue	Schalldruckpegel / sound pressure level :	< 70 dB(a)
31	Sonder-Lackierung / special painting				
32	Gewicht / weight : (kg)	Anzahl Betriebsanleitungen / no. of operating manuals 3		Sprache / language	e
33	Explosionsschutz Pumpe / explosion protection pump			Typenschild / nameplate language :	e

Wir empfehlen in die Druckleitung ein externes Sicherheitsventil einzubauen / we recom. to install an external safety valve in the disch. line !

Zubehör/ accessories / Zusätzliche Dokumentation/ add. Documentation / Bemerkungen / remarks

ECODOS sanitary design

max. flowrate 50l/h each pumphead at 100 Hz

3-Punkte-Förderdiagramm/ flowrate-curve

Werkszeugnis 2.1/ material certificate EN 10204-2.1

34	Ersteller / issued by: VS-WI	Datum / date: 26.02.02	Rev.① Name / name / Datum / date:

Table of contents

1 General information / safety

1.1 Important preliminary information

1.2 Application

1.3 Performance and applicabilities
1.3.1 Pump performance
1.3.2 Accuracy
1.3.3 Operating pressure $p_{min.}$
1.3.4 Fluid temperature

1.4 Safety

1.5 Supply connections

2 Transportation and intermediate storage

2.1 Condition as supplied
2.2 Inspection of the packing at the destination
2.2.1 Duration of storage (< 3 months)
2.2.2 Duration of storage (< 24 months)
2.2.3 Exceeding the permissible storage time

3 Product information

3.1 General description
3.2 Construction and method of operation
3.2.1 Drive
3.2.2 Drive unit
3.2.3 Diaphragm pump head
3.2.4 Sandwich diaphragm with rupture indication
3.2.5 Sensor with hose nipple
3.2.6 Diaphragm rupture signaller IE 4
3.2.7 Diaphragm rupture indication via pressure gauge
3.2.8 Diaphragm rupture signalling via contact pressure gauge
3.2.9 Contactor K 1

4 Erection and assembly

4.1 Permissible ambient influences
4.2 Space requirements
4.3 Foundation
4.4 Erection
4.5 Installation
4.5.1 Electrical
4.5.2 Hydraulical
4.5.3 Sizing the suction line
4.5.4 Installation of the pipeline
4.5.5 Connecting the pipeline
4.5.6 Installation examples

5 Commissioning / operation / shut down

5.1 Operation
5.1.1 Drive units with manual stroke adjustment

5.2 Lubricants for drive units
5.2.1 Lubricant for pump drive elements
5.2.2 Lubricant volume
5.2.3 Others

5.3 Commissioning, start-up, venting

5.4 Adjustment and control

5.5 Shut-down

5.6 Removal and return transportation

6 Maintenance and repairs

6.1 Maintenance
6.2 Repairs
6.2.1 Dismantling, general information
6.2.1.1 Sealing aids
6.2.1.2 Cleaning materials required
6.2.1.3 Cleaning
6.2.1.4 Spare parts
6.2.1.5 Checking
6.2.1.6 Slip agents, lubricants

6.2.2 Tools required for dismantling/assembly
6.2.3 Suction and discharge valves (3.9 + 3.13)
6.2.4 Diaphragm (3.27)
6.2.5 Grooved ring (1.12)
6.2.6 Complete dismantling
6.2.7 Additional assembly instructions

6.3 Filling

6.4 Setting up the manual stroke adjustment

7 Faults

8 Graphs/diagrams

8.1 Valve pressure loss diagram

8.2 Friction losses in the piping

9 Spare parts

B0

1 General information / safety

1.1 Important preliminary information

This metering pump is a precision machine and must be treated as such. As a favour for it and, of course, you, please read this operating instruction before start-up. The reward will be dependable operation and a long operating life.
In addition to the safety and caution instructions in this operating instruction also observe all general occupational safety and health regulations!
The metering pumps and process pumps must only be used in proper technical condition and for the application intended, special attention must be paid to any safety risk observing the operating instruction! Specially problems impairing the safety must be corrected immediately.
Proper use includes observation of the operating instruction and maintaining of all inspection and maintenance requirements.
The metering pumps and process pumps are only intended for the conditions and fluid stated in the technical data sheet. Any deviating use or a use exceeding these conditions is considered to be improper use. The risk rests with the user exclusively.
The operator must assure that all commissioning, service preventive maintenance and installation work is carried out by authorized and qualified expert personnel only which has gained sufficient information by studying the operating instruction in detail.
In addition to the safety ⚠ and caution instructions △ in this operating instruction also observe all general occupational safety and health regulations!
The operator must assure that at least one copy of the operating instruction always is available near the pump!

⚠ **Because of the high spring pre-compression (danger of injury) the diaphragm drive housing (11) must be dismantled only using special LEWA tools!**
(refer to section 6.2.2.1, spring tensioning unit for thrust spring (1.16)



- **The LEWA *ecodos*® diaphragm metering pump is delivered filled with lubricant.**
  The bore for the air filter is closed with a plug.
  Replace plug by air filter also supplied before start-up.
- **Check lubricant level in drive unit.**
- **Is the power supply for the drive correct?**
- **Are suction and discharge lines open?**
  (Open valves in suction and discharge line).
- **Is the supply of the metering fluid assured?**
- **Are all connections hooked-up correctly (no tension and tight)?**
- **Is the discharge line protected by e.g. a safety valve?**

1.2 Application

This operating instruction applies to diaphragm metering pumps type **LEWA** *ecodos*® **2, 4, 6, 12, 25** and **50.** The LEWA serial number can be found in the specification sheet and on the name plate of the drive unit.

1.3 Performance and applicabilities

This metering pump was designed to handle the application given in the specification sheet. LEWA will not accept any responsibility when these conditions are changed as this could lead to serious problems which can result in the destruction of the diaphragm metering pump. In this case danger to persons or the environment cannot be prevented. LEWA accepts no responsibility when the fluid handled or important operating conditions were not given or given incompletely only.

Refer to specification sheet for additional data.

1.3.1 Pump performance

The frame size (BG, e.g. LEWA *ecodos*® 12) in the type designation gives the minimum effective flowrate in l/h at maximum backpressure and a frequency of 50 Hz (refer to fig. 1).

1.3.2 Accuracy

Within an adjustment range of 5 : 1 the flow variation is < ± 1% based on the desired value.

1.3.3 Operating pressure $p_{min.}$

The operating pressure $p_{min.}$ of the pump should be at least 1 bar above the suction pressure. If this is not assured under all operating conditions an external pressure retaining valve can solve the problem.

1.3.4 Fluid temperatures

Standard temperature range: - 10/0 to + 40° C. For temperatures between + 40° and + 80° C (PVC + 60° C) reduced operating pressures as per figure 2 are valid to amintain long diaphragm operating times.

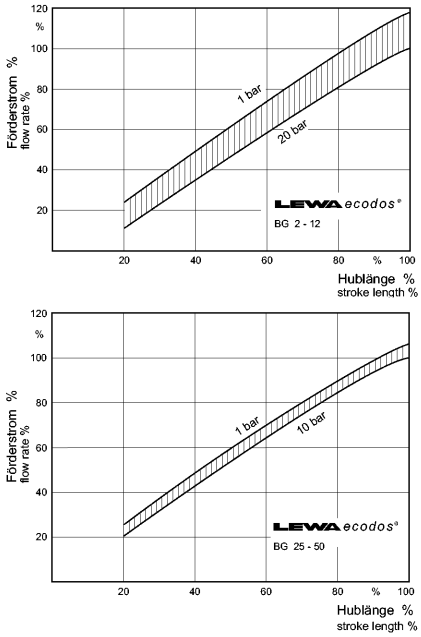


Fig. 1 Typical output caracteristic

1.4 Safety

LEWA products meet the occupational safety and health requirements. The noise emission is mainly caused by the drive and is within the usual range of oscillating positive displacement pumps.

The user must prevent danger to the operating personnel by the fluids used by corresponding accident prevention measures. This means all seals and screwed connections must be checked for tightness regularly. Attention: Flush or clean wetted parts thoroughly before disassembly.

To protect the diaphragm metering pump a safety device against overpressure is required if there is a danger that the permissible

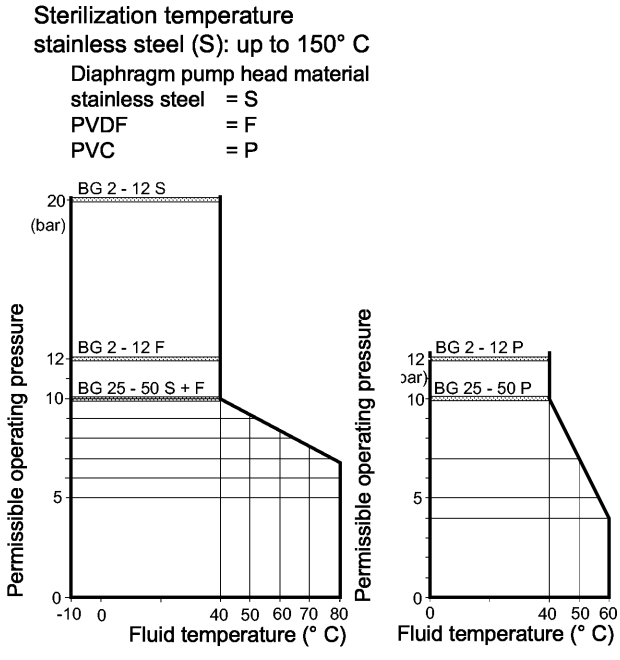


Fig. 2 Permissible pressure as function of the temperature

pressure of the diaphragm metering pump is exceeded.
This is the case e.g. if shut-off valves are installed in the discharge line which can be closed by mistake.

The following can be used as safety device against overpressure:
- Safety relief valves
- A contact pressure gauge installed on a damper.
  The damper must be sized to accept the volume metered before the pump comes to a stop (approx. 2 strokes) (after pump was shut-down).

1.5 Supply connections
Diaphragm metering pumps with electric drive require an adquate power supply. The connecting values result from the drive power stated in the specification sheet.
Additional supply connections are required for electric stroke actuators as well as a drain pipe for collecting the leakage at the diaphragm rupture monitoring (hose nipple).
The dimensions of the connections are given in the specification sheet and the general arrangement drawing.

2 Transportation and intermediate storage

2.1 Condition as supplied
LEWA products are checked for proper function and quality before shipment.
LEWA *ecodos*® diaphragm metering pumps are supplied with lubricant.

2.2 Inspection of the packing at the destination
Please check packing for damages upon receipt. External damages must be reported to the corresponding forwarder immediately and a report on the damages must be requested. The packing must be in a condition which assures protection during the storage period following. The shipment must be opened if packing damage is noticed or if the permissible storage time has been exceeded (see section 2.2.3).
Otherwise the packing should be opened only when the diaphragm metering pump is about to be installed.
For drives and accessories please observe the instructions of the corresponding manufacturers.

2.2.1 Storage period (< 3 months)
Standard packing will protect the pump during transportation overland and against corrosion acc. to DIN 50014 (normal Middle-European climate) during storage in dry buildings for at least three months. Storage for longer periods will necessite special measures for corrosion protection.

2.2.2 Storage period (< 24 months)
Seaworthy packing including special conservation will protect the pump during transportation overland or by sea and during dry storage (under cover or in an enclosed building) for at least two years.

2.2.3 Exceeding the permissible storage time
The packing must be opened if the permissible storage period is exceeded. Please check if the shipment is complete and undamaged.
Switch box heaters fitted to electrical components must be connected.
The internal parts of the pump drive unit must be turned over quarterly by operating the drive for a short period of time. The lubricant levels must be checked in adequate time intervals and topped up if required. Protect bright metal parts against corrosion.

3 Product information

3.1 General description
Diaphragm metering pumps are oscillating positive displacement pumps with a device for stepless adjustment of the stroke length during operation and at rest. The metered flow can be set to any value desired between zero and maximum by this.
The stroke length is adjusted via a handwheel or an electric stroke actuator.

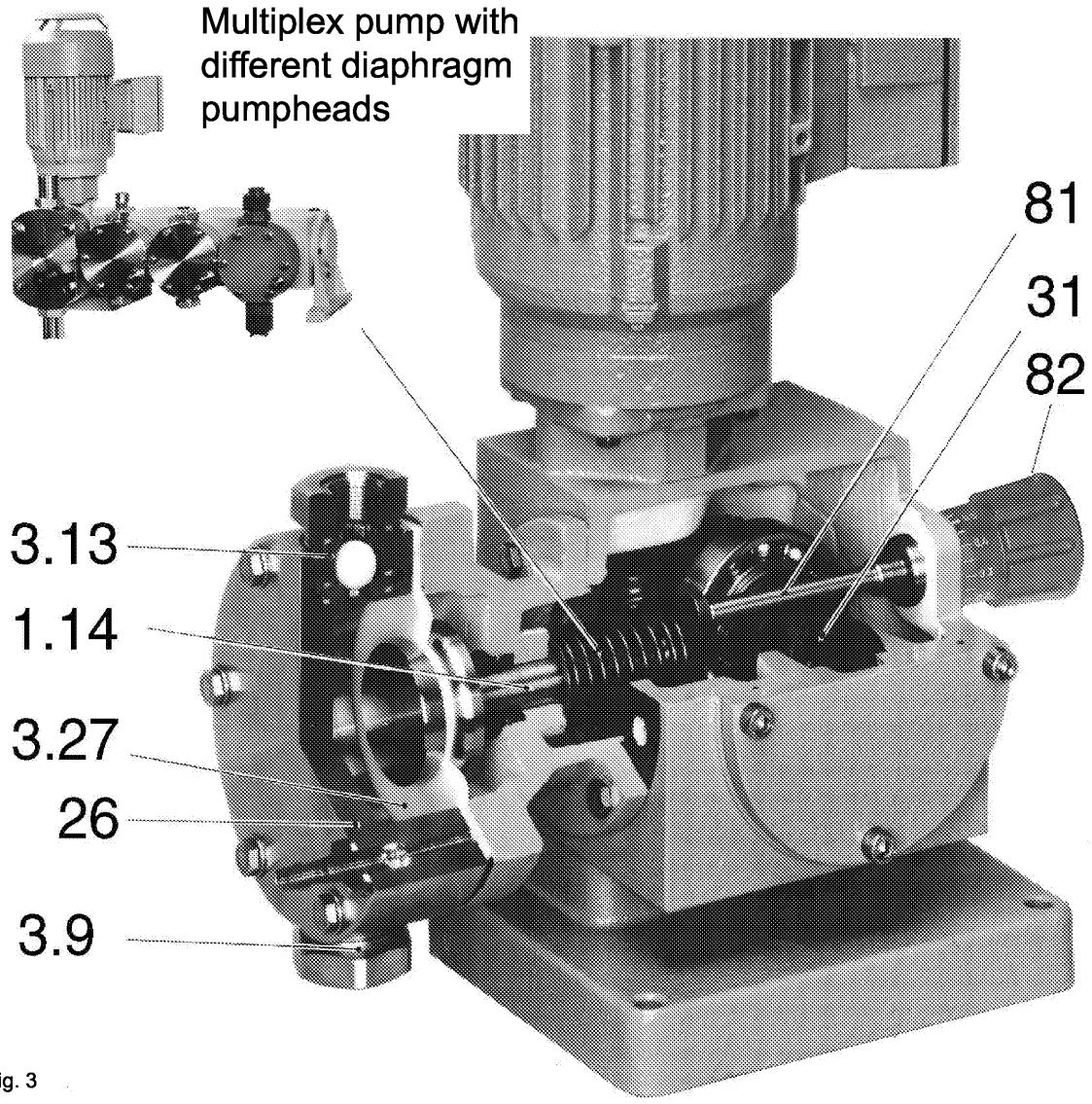


Fig. 3

B 0

3.2 Construction and method of operation

The position numbers placed in brackets ( ) are indentical to the position numbers in the sectional drawing and the spare parts list (refer to section 9).
The diaphragm metering pump consists of the assemblies drive, drive unit and the diaphragm pumphead. Multiplex pumps consist of 2 or more drive units and diaphragm pumpheads.

3.2.1 Driver

The driver (usually an electric motor) supplies the power required to raise the fluid conveyed from suction to discharge pressure.
For this make sure to read paragraph 1.4.

3.2.2 Drive unit: (refer to fig. 3)

The drive unit is a cam and spring-return drive unit. The motor drives the eccentric shaft (31) via the worm gear and thus effects the discharge stroke of the thrust rod (1.14). The suction stroke is produced by the action of the return spring (1.16).
The stroke adjustment is linear and carried out by adjusting the adjusting spindle (81) via the adjusting handwheel (82) or the electric stroke actuator.
The stroke length of the different sizes can be set steplessly as follows:

LEWA *ecodos* ® **2, 4, 6,** and **12** from 0 - 2,5 mm
LEWA *ecodos* ® **25** and **50** from 0 - 5 mm.
A stop limits the rear dead centre of the thrust rod (1.14). The front dead centre remains constant. The

velocity and acceleration behaviour, which is characteristic of cam and spring return drives, results from this particular stroke adjustment system.
The stroke frequency results from the motor speed and the reduction ratio of the built-in worm gear.
The stroke length can be adjusted at rest and with the pump in operation.
Multiplex pumps are formed by joining up to 6 individual drives horizontally. The eccentric shafts are slotted into each other.

3.2.3 Diaphragm pumphead: (see fig. 3)
The thrust rod (1.14) transmits the displacer movement to the diaphragm (3.27). This diaphragm acts directly on the metered fluid and produces the pumping process. The suction and discharge valves (3.9 and 3.13) open and close as the pressure
changes.

3.2.4 Sandwich diaphragm with rupture indication
The sandwich diaphragm allows a fast detection of a possible diaphragm rupture.
When the two-layer working diaphragm ruptures the fluid metered is carried to the rupture indication by the monitoring diaphragm. In connection with a diaphragm rupture indication which is tight towards the atmosphere (diaphragm rupture switch, pressure gauge) the metering pump can be operated for a limited time (not longer than 24 hours if possible!) using the back-up diaphragm.

The metering pump should be shut-down immediately after diaphragm rupture when the fluid pumped is hazardous.

3.2.5 Sensor with hose nipple
In case of diaphragm rupture the fluid pumped will exit at the hose nipple. Diaphrgm rupture can be recognized visually when the fluid is in the hose. It also can be signalled by a float switch installed in a leakage receptacle.

The design must be used for harmless, non-hazardous fluids only (danger of accidents by leaking or squirting-out fluid in case of diaphragm rupture).

In case of high suction lifts or low discharge pressure it is also possible that air from the atmosphere is drawn in via the hose nipple in event of diaphragm rupture.

3.2.6 Diaphragm rupture signaller IE 4
The pressure switch is operated when the diaphragm ruptures. The release pressure has been works set to 1 bar.
Electric data: NC contact
recommended load 24 V/2 A
(permissible 220 V/ 1 A)

The operating pressure must be at least 1.5 bar above the ambient pressure.

When the discharge pressure is too low a pressure retaining valve (e.g. 1.6 bar setting pressure) must be installed.
Refer to fig. 4 for connecting diagram.

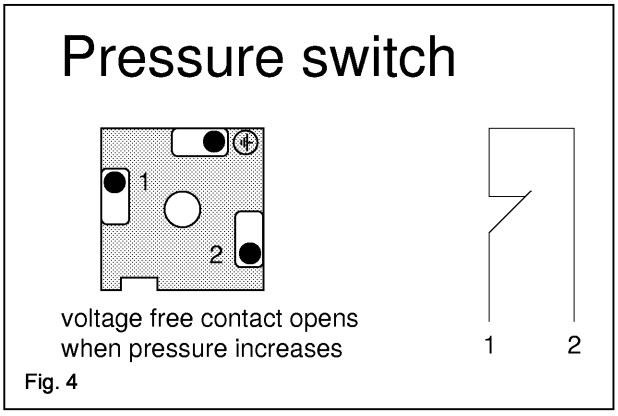


Fig. 4

3.2.7 Diaphragm rupture indication via gauge (6 bar, 25 bar)
The rated pressure of the pressure gauge should be at least 10% above the operating pressure. In case of diaphragm rupture the pressure gauge will show approx. 50% of the operating pressure due to a built-in throttling element.

3.2.8 Diaphragm rupture signalling via contact pressure gauge (6 bar, 25 bar)
Technical design as described earlier however including adjustable contact (inductive proximity switch to DIN 19234 / NAMUR).
Recommended settings:
for 6 bar - contact pressure gauge - 0,5 bar
(min. discharge pressure 1,5 bar)
for 25 bar - contact pressure gauge - 1,0 bar

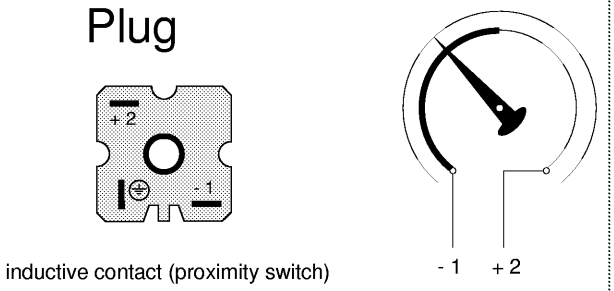
(min. discharge pressure 3 bar).
Refer to figure 5 for connecting diaphragm.

3.2.9 Contactor K 1

The K 1 contactor has a built-in inductive proximity switch emitting one impulse per revolution.
Enclosure IP 54.
The proximity switch corresponds to DIN 19234/NAMUR. The contactor can be fed intrinsically safe via a transistor relay and then meets protection class EExia II C (refer to catalogue accessories D7-610).

The contactor is mounted to the diaphragm metering pump. The cover (2, refer to figure 6) is fixed to the eccentric shaft.
The proximity switch emits one impulse per revolution of the eccentric shaft when the front dead end was reached.
Electric wiring must be carried out according to the following wiring diagram (figure 6).

Fig. 5



Transistor relay	
Ex protection:	EExia II C PTB-no. Ex-79/2043x
Supply voltage:	220 V +/- 15%, 45 to 65 Hz
Power absorbed:	approx. 1.5 VA
Output:	1 reversible contact
Load:	250 V, 4 A, 500 VA
Frequency:	max. 10 Hz
	pick-up approx. 10 ms, release approx. 20 ms.

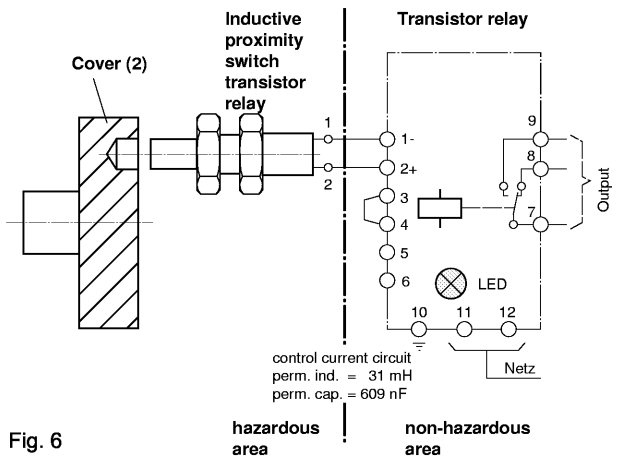


Fig. 6

4 Erection and assembly

4.1 Permissible ambient influences

In standard design the diaphragm metering pump is suitable for installation in dry rooms with non-agressive atmosphere.
Other ambient conditions are permissible only when stated in the specification sheet and when the diaphragm metering pump was designed for this.

4.2 Space requirements

The space requirements for the diaphragm metering pump and the location of the mounting bores can be taken from the general arrangement drawing.

4.3 Foundation

Oscillating positive displacement pumps exert-pulsating forces and movements onto the foundation. The foundation therefore must be designed so that in addition to stability, freedom from oscillations is assured.
Damages caused by inadequate foundation are excluded from the guarantee.

When designing the foundation please make sure that the oil drain screw is easily accessible. Also it is of advantage when operating and maintenance work can be carried out standing upright.

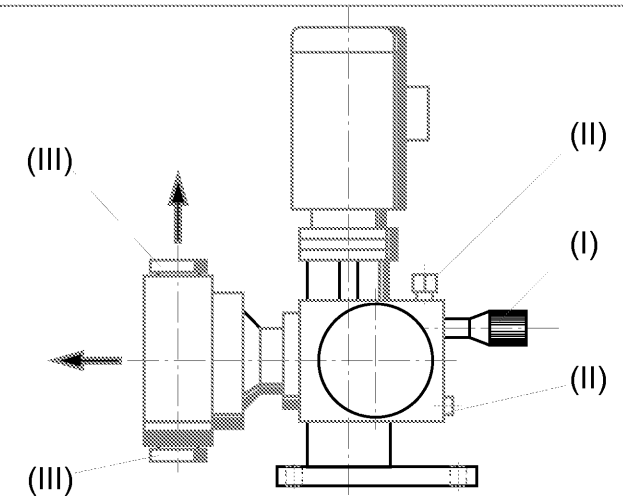


Fig. 7 Erection of the diaphragm metering pump

4.4 Erection

The pump must be set up so that the centre line of the thrust rod (1.14) is horizontal and the centre line of the valves is vertical (see fig. 7).

The following parts should be readily accessible (refer to fig. 7):
Handwheel for stroke adjustment and indicating scale (I), lubricant filling and draining plugs (II) and valves (III).
Maintain assembly space stated in general arrangement drawing.

4.5 Installation

4.5.1 Electrical

The electric motor must be connected acc. to local regulations. Adhere to connecting information in motor terminal box.

Observe the direction of rotation shown on the drive unit housing when connecting the motor.

For overload protection a bi-metallic relay or thermistors must be provided (also refer to LEWA *ecodos* ® electronic-prospectus D 7 - 610).

4.5.2 Hydraulical

Pipelines for reciprocating positive displacement pumps must be designed against other criteria than for centrifugal pumps. If this is not observed serious problems may arise, e.g. metering errors, severe noises or damages on the diaphragm metering pump. Therefore the following criteria must be checked: - Cavitation, overload and overmetering (also refer to fig. 8).

You reduce the risk of such harmful operating conditions occuring if you
- **avoid high suction lifts**
- **keep the pipelines as short as possible**
- **select an adequate nominal width**
- **avoid unnecessary restrictions**
- **install pulsation dampers**
- **reduce viscosity (heat, dilute)**
- **install safety valves.**

4.5.3 Sizing the suction line

(refer to figure 9)

When sizing the suction line for fluids similar to water (density ρ = 1 kg/l, viscosity $\eta \leq$ 10 mPas, vapour pressure $\leq$ 0,1 bar) the following length of the suction line L_{max} is permissible at the stated pipeline diameters DN.

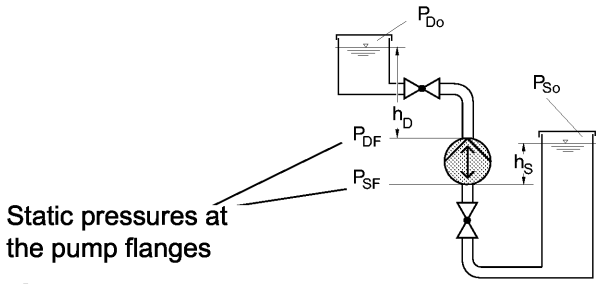


Fig. 8

	pump connection				L_{max} a DN suction line = DN pump			
	S		P + F		flooded suction (A)		1,5 m suction lift (B)	
BG	DN		DN		S	P + F	S	P + F
2-50	3/8	10	12	8	2,5 m			

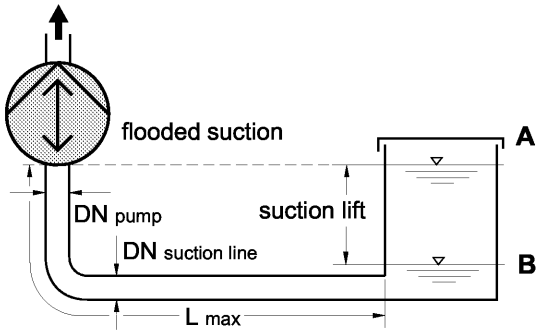


Fig. 9 Installation suction side

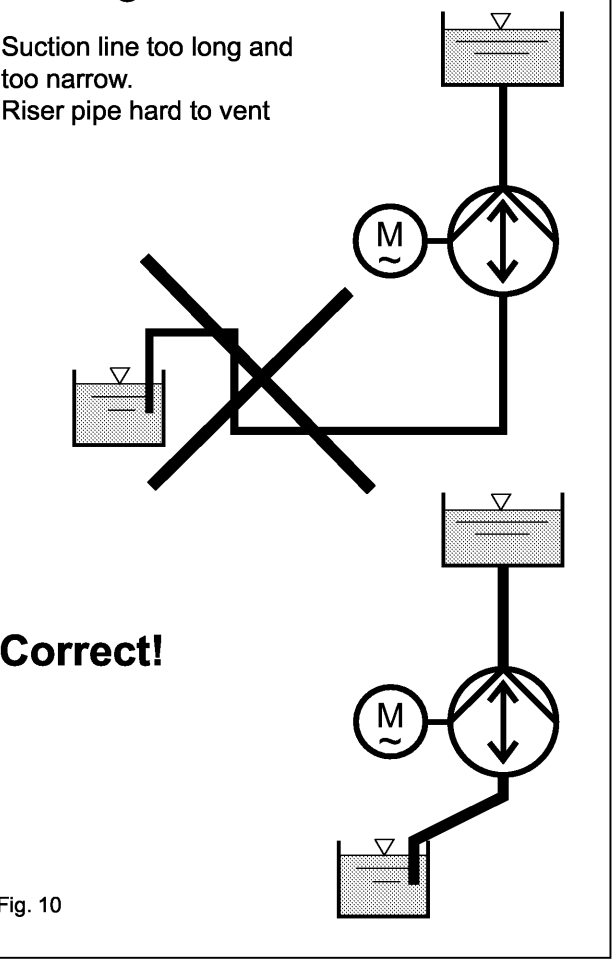


Fig. 10

Note material selection S, P and F!

4.5.4 Installation of the pipeline

Avoid the following!

- **Hoses with thin walls as suction line which can contract during the suction stroke.**
- **Riser pipes which are hard to vent. The air trapped is carried along and leads to metering errors** (see fig. 10).
- **Drawing from the lowest point of a tank with no adeqate filtration (suction basket and dirt trap)**
- **Long vertical risers immediatly after the discharge flange of the pump. During shut-downs dirt particles will be deposited in the discharge valve and cause problems.**

Installation example:
1 suction vessel
2 suction basket
3 shut-off valves
4 dirt trap
5 pulsation damper
6 pressure gauge
7 metering pump
8 safety valve
9 pressure vessel

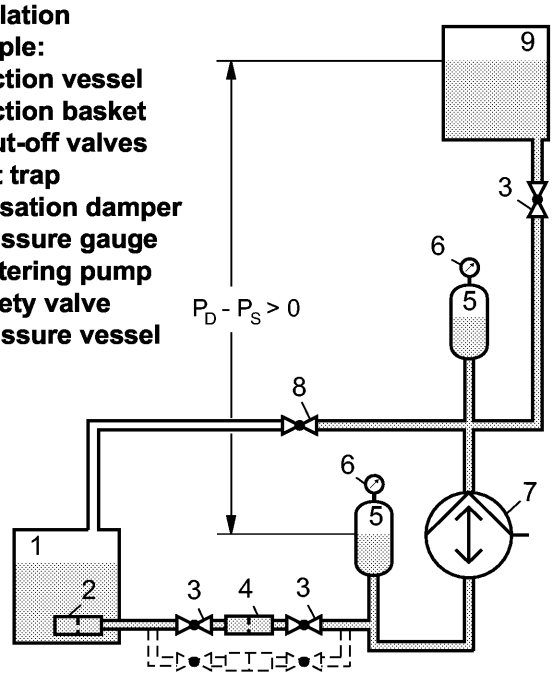


Fig. 11

4.5.5 Connecting the pipeline

The suction and discharge pipeline must be attached to the diaphragm head free of tension.

4.5.6 Installation examples

Fig. 11 shows a general example of a metering pump installation including accessories.

5 Commissioning / operation / shut down

5.1 Operation

5.1.1 Drive units with manual stroke adjustment

The stroke length can be adjusted via the handwheel with the pump in operation or at rest and can be read-off at the scale.

5.2 Lubricants for drive units

5.2.1 Lubricant for pump drive elements

Note danger of burns by hot lubricant when draining the pump drive element.

The drive unit must be charged with mineral oil.
Start-up temperature of drive unit: > + 5° C
Max. drive unit temperature + 60° C
Ambient temperature: - 20° to + 40° C

Consult LEWA in case of deviating conditions.

Classification:

Designation to	DIN 51502	CLP 220
	ISO 6743	ISO - L - CKC 220
ISO viscosity class to	DIN 51519	ISO VG 220
Symbol to	DIN 51502	CLP 220
Temperature range of the lubricant	-20 °C bis +50 °C	

Use recommended lubricants only (refer to attached operating instruction B 1.001).

We recommend sythetic lubricants with a quality of PGLP 150 when pump is installed outdoors (start-

up temperature < 20° C) (e.g. Shell Tivela oil WA, LEWA order refer 076000.0031).
In this case the drive motor should always be sized one step bigger
(e.g. *ecodos* 2, 6, 25 (simplex pump) = 0,37 kw/4-pole
or *ecodos* 4,12 50 (simplex pump) = 0,55 kw/2 pole).

5.2.2 Lubricant volume per drive unit:

1. element	0,45 l
each further element	0,35 l

5.2.3 Others

Hydraulic fluids, heating-, cooling- and flushing fluids, supply lines of stroke actuators see “Technical Data Sheet” and operating instruction “Pump Head/Stroke Actuator”.

5.3 Commissioning, start-up, venting

- **Please check if the pressure conditions in suction and discharge line correspond to the data given in the specification sheet.**
- **Replace transportation plug of drive unit by air filter also supplied.**
- **Check lubricant level in drive unit (level of lubricant should be approx. 1 cm below filling bore).**
- **Set diaphragm metering pump to zero stroke.**
- **Open shut-off valves in suction and discharge line.**
- **Switch-on diaphragm metering pump at low rpm for variable speed pump.**
- **slowly increase stroke length and, where applicable, speed.**
- **Let diaphragm metering pump deliver at zero pressure to ensure good venting of pipelines and dia-phragm pumphead.**
- **Slowly raise pressure. If the diaphragm metering pump does not prime itself (because of high suction lift or high discharge pressure), the suction line and the diaphragm pumphead must be vented as follows:**
  - **Create pressure on suction side which forces suction line and diaphragm pumphead to fill.**

5.4 Adjustment and control

The metered flow can be adjusted by a change in stroke length or by changing the stroke frequency of variable speed drives.

5.5 Shut-down

If the diaphragm metering pump is shut-down for a longer period of time you must remove all residual fluid from the pump head by flushing, disassemble and clean if required.

5.6 Removal and return transportation

If you remove and transport the diaphragm metering pump e.g. for repairs the following measures are required before shipment:

- Remove all residues of the fluid from the diaphragm pump head, clean thoroughly, neutralize or decontaminate.
- Drain lubricant from drive unit.
- Replace air filter by plug.

The sender is responsible for all damages caused on pump or other goods by leaking lubricants or fluid residues.

6 Maintenance and repairs

6.1 Maintenance

Observe section 1.4 "Prevention of accidents and emissions" of this operating instruction before doing any maintenance work!

Weekly: Check lubricant level in drive unit. Lubricant level must be approx. 1 cm below filling bore.

Change lubricant after every 4000 h of operation or, at least, once yearly.

Please assure that the old lubricant (oil) is beeing disposed off environmentally safe.

- Open lower screwed plug (71) and drain lubricant. Screw plug back in and unscrew air filter (66).
- Fill lubricant into drive unit. Take lubricant volume and grade from section 5.2.
- Screw air filter back in.

For safety reasons we recommend to replace the diaphragm **once a year** (also refer to section 6.2.4. for this).

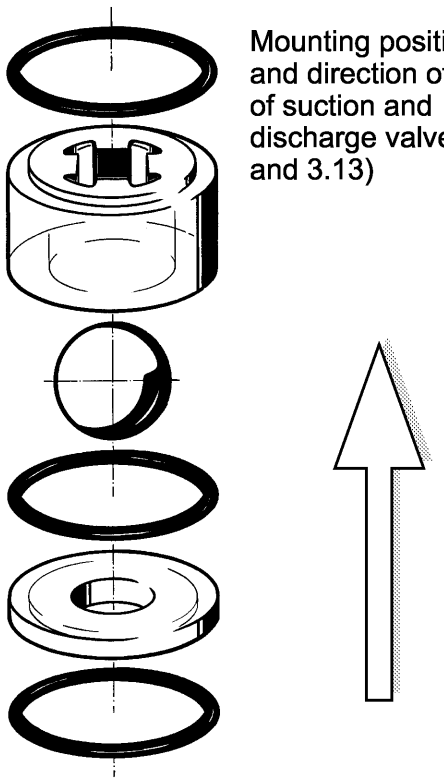


Fig. 12

6.2 Repairs

The operating chamber of the diaphragm pumphead contains the fluid metered even after the diaphragm metering pump has been shut-down. Therefore the safety and handling instructions for the fluid metered must be observed by all means.

Before starting disassembly/assembly work pull electric connection or secure the diaphragm metering pump against unintentional starting!

6.2.1 Dismantling, general information

6.2.1.1 Sealing aids
You will require a liquid, non-hardening sealing compound (e.g. Curil K2, Elring Dichtungswerke, Stuttgart) especially for fixing the gasketes.

6.2.1.2 Cleaning materials required
Use suitable solvents for removing residues of lubricants.

6.2.1.3 Clean all parts to be used again thoroughly, with the above mentioned material, however, if possible, do so only just before re-assembly.

6.2.1.4 Spares
For reasons of safety the re-use of e.g. gaskets and seals should only be practised in exceptional cases and after a thorough examination. For details please refer to section 10.

6.2.1.5 Inspect all parts before assembly to ensure perfect condition.

6.2.1.6 Slip agents, lubricants
a) Radial seal rings and 0-rings to be thinly coated with silicone grease or the lubricant specified before assembly.
b) Screws and threaded shafts must be coated with MoS2 greases or any other lubricant specified before assembly.

6.2.2 Tools required for dismantling/ assembly

Open end spanners:	size 8, 10, 13, 19, 24, 27 mm
Allen keys:	size 6, 8, 10, 12 mm
Screw driver:	2,5, 7
Circlip pliers (inside):	J3
Circlip pliers (outside):	A2
Torque wrench for external hexagon	head size 19 mm (24 Nm)
Torque wrench for internal hexagon	head size 8 mm (2 Nm, size 10 mm (2 Nm)
hammer,	

soft drift max. 10 mm Ø
Dial gauge with support to set stroke length (7, 5 mm stroke length)
Extractor (for outer bearing 72 mm dia. and worm wheel 55 mm dia)

6.2.2.1 Special tools (available from LEWA)

- assembly punch for mounting radial seal ring (1.12), LEWA order ref.: 103525.0320
- assembly punch for mounting tapered ball bearing (1.16), LEWA order ref.: 103525.0322
- assembly punch for mounting radial seal ring (1.31), LEWA order ref.: 103525.0321
- spring tensioning unit for thrust spring (1.16), LEWA order ref.: 109052.0002

6.2.3 Suction and discharge valves (3.9 + 3.13)

- refer to sectional drawing on the last page -.

The pipeline must be flushed if toxic, agressive or flammable fluids are involved.
Caution: If system is not flushed sufficiently the fluid metered will run out.

- Unscrew valve body (3.4) and remove discharge valve (3.13)
- When removing suction valve (3.9) from the diaphrag pumphead make sure that valve does not fall out after the valve body (3.3) has been loosened.
- When dismantling valves make sure that no sealing faces are damaged.

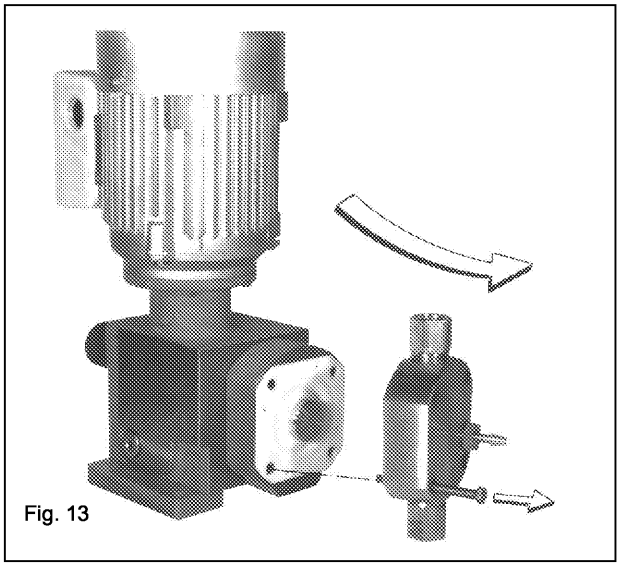
Reinstallation:
Observe mounting position of valves acc. to fig. 12.
The sealing faces must be clean and undamaged.

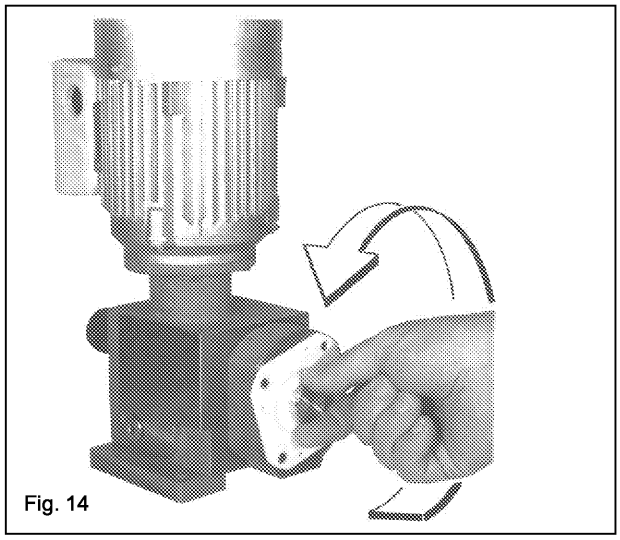
6.2.4 Diaphragm (3.27)

- refer to sectional drawing on the last page -.
In case of aggressive fluids the pipelines should be flushed. Close shut-off valves and remove pipelines.

The pipeline must be flushed if toxic, agressive or flammable fluids are involved.
If flushing was not sufficient metered fluid can escape during dismantling

- Unscrew hexagon head screws (36). Make sure diaphragm body (26) does not drop down during this.
- Remove diaphragm body (26) (refer to fig. 13).
- Loosen diaphragm by hand by turning ccw (see fig. 14).
- Unscrew diaphragm by hand and remove (see fig. 15).
- For safety reasons the diaphragm can not be dismantled and can be replaced as complete item only.


Fig. 13


Fig. 14

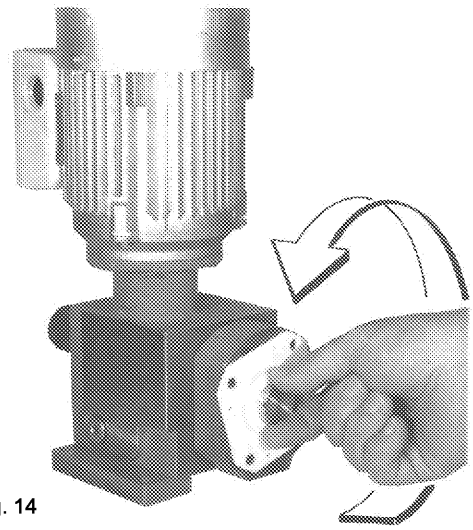
Reassembly:
Make sure sealing faces are clean before mounting diaphragm (3.27).

- Move thrust rod (1.14) to rear dead centre (by turning motor fan wheel
- Turn diaphragm (3.27) onto drive unit thrust rod (1.14) by hand until it locks. To match the holes for the mounting bores turn diaphragm ccw until holes fit the first time.
- Move thrust rod (1.14) to rear dead centre (by turning motor fan wheel)
- Place diaphragm body (26) in position.

- Tighten hexagon head screws (36) evenly across corners up to a torque of 5 Nm - refer to sectional drawing.
- When the diaphragm clamping area is not tight the torque can be increased to 150% of the rated torque.

6.2.5 Grooved ring (1.12) - see sectional drawing on last page -

- Dismantle diaphragm body (26) and diaphragm (1.27) as described in section 6.2.4.
- Remove V-shaped ring (1.13)
- Remove grooved ring (1.12) using a pointed object (it is completely destroyed in the process).

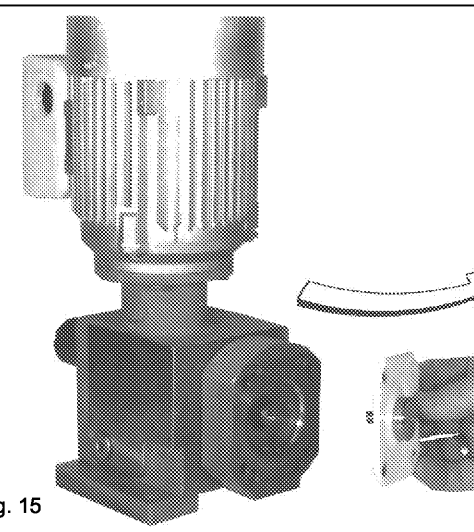

Fig. 14

Reassembly:
All sealing faces must be completely clean.
Check thrust rod (1.14) for surface damage, replace if required.
Install new grooved ring (1.12) without damaging it.

6.2.6 Complete dismantling

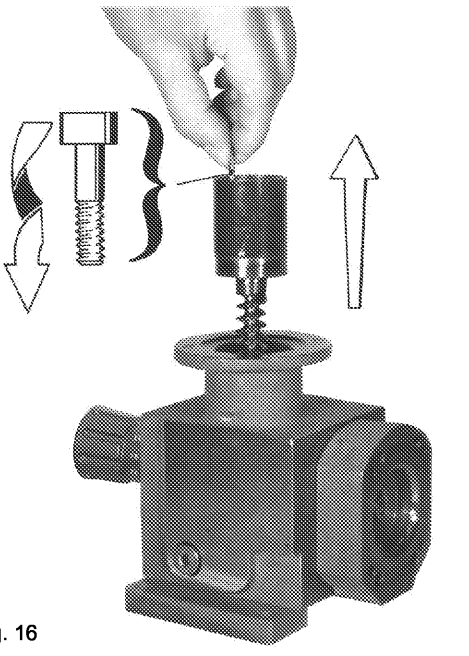
Carry out dismantling acc. to sections 6.2.3 through 6.2.5.

- Disconnect drive motor and remove
- Remove circlip (1.61)
- Turn screw (M4) into coupling half and lift out worm shaft (1.60) complete with spacer pipe (62) and shims (1.37, 1.38) (see fig. 16)
- Turn adjusting handwheel (82) ccw until the complete adjusting unit can be removed (see fig. 17).
- Do not dismantle adjusting handwheel (82) and scale (87) unless required.
- Re-setting is carried out according to section 8.2!
- Remove end flange (3 hexagon head screws) (see fig.18 and 19).
- Carefully remove cylindrical screws (18) - opposite - (see fig. 20). Turn two threaded bolts M 6 (approx. 80 mm long with washer and hexagon nut) into the threaded bores. Turn hexagon head nuts out equal and do not jam diaphragm drive. Then remove the remaining two cylindrical screws (18).


Fig. 15



Because of the high spring pre-compression the special tool (109052.0002) must be used for removing the plunger rod guide.!


Fig. 16

- Lift off diaphragm drive (11) with thrust rod (1.14) and thrust spring (1.16).
- Pull eccentric shaft (31) from housing guide (see fig. 21 below).
- Pull eccentric shaft (31) through thrust rod bore (see fig. 21 top).
- For further dismantling of eccentric shaft (31) first remove worm wheel (1.7) and pull grooved ball bearing (1.32) off.

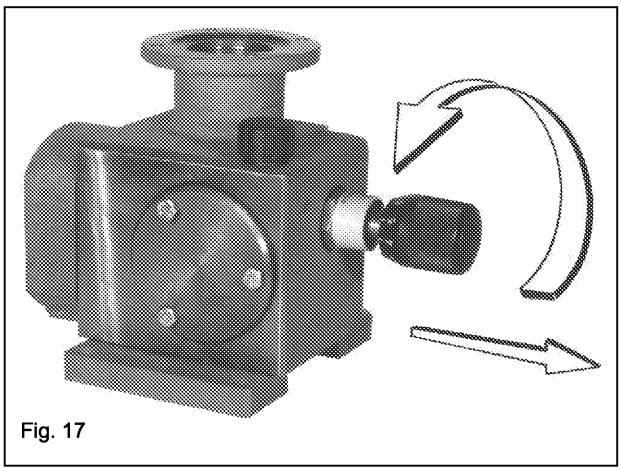


Fig. 17

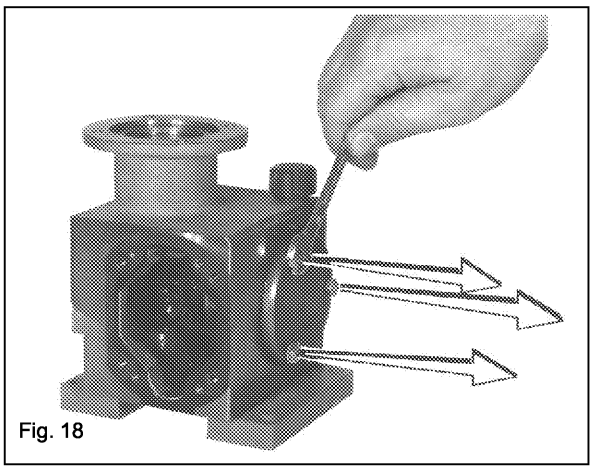


Fig. 18

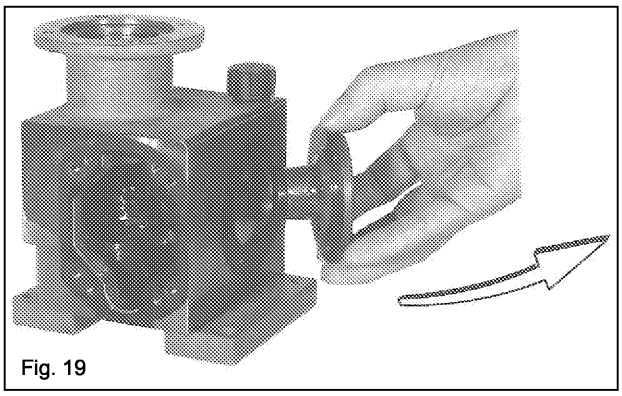


Fig. 19

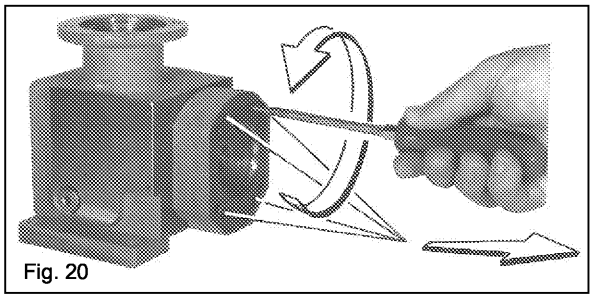


Fig. 20

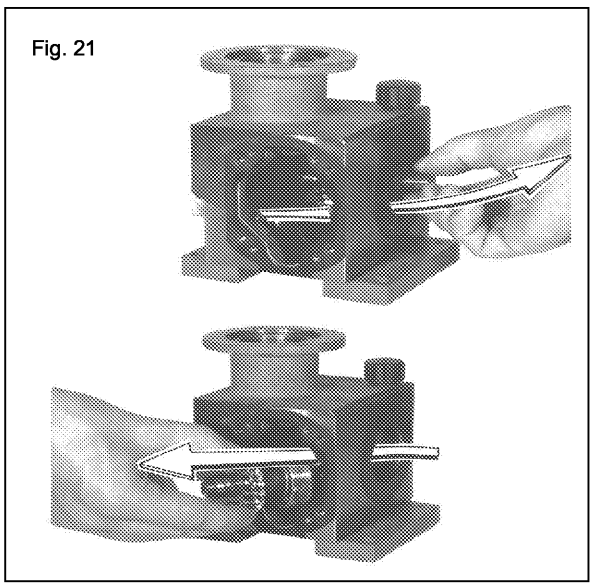


Fig. 21

6.2.7 Additional dismantling instructions

6.2.7.1 Apply gasket (1.17) before installing diaphragm drive (11).

6.2.7.2 The position of the thrust rod (1.14) which must be installed requires special attention: First screw the two threaded bolts back into the diaphragm drive (11) and pre-stress the diaphragm drive (11) and the drive unit housing with a screw clamp. The thrust rod (1.14) must be installed so that the flat area points towards the worm reduction gear. The clamp pin must enter the groove in the diaphragm drive (11).The leakage bore in the diaphragm drive (11) must point downwards (see fig. 22).

6.2.7.3 Don't forget gasket (1.5) before installing end flange.

6.2.7.4 Zero stroke must be set before the diaphragm (3.27) is installed. For this refer to section 6.4 "Setting up the manual stroke adjustment".

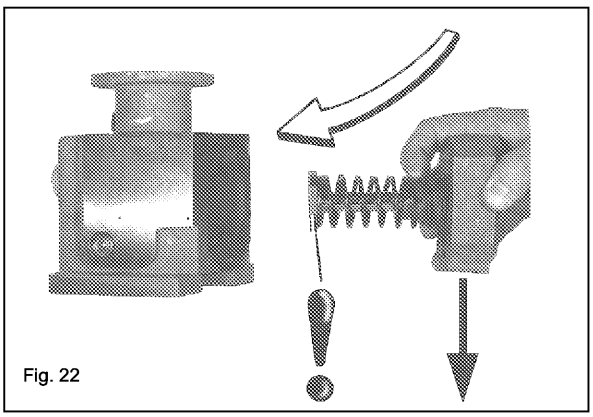


Fig. 22

6.2.7.5 Make sure sealing **faces are clean** before mounting diaphragm (3.27). Turn diaphragm (3.27) onto drive unit thrust rod (1.14) by hand until it blocks. To match the holes for the mounting bores turn diaphragm ccw until the holes fit the first time. Mount diaphragm pumphead with suction and discharge valve (3.9 + 3.13). Note that the hexagon head screws (36) must be tightened evenly and across corners. The torque required is stated in the sectional drawing.

6.2.7.6 When connecting power to drive motor for the first time not direction of rotation of motor shaft.The direction of rotation is marked with an arrow on the casting of the drive element housing.

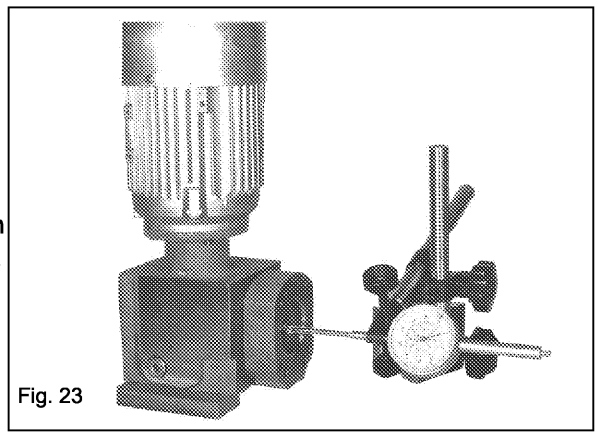
6.2.7.7 For multiplex pumpes the uniform shifting of the eccentric shafts (31) as stated on the specification sheet must be maintained when slotting them together.

6.2.7.8 Test-run the diaphragm metering pump. If no undue noises can be heard and it operates quietly turn motor off again. Check diaphragm metering pump for possible external leakages (observe tightening torques).

6.2.7.9 Install suction and discharge pipeline without tension.

6.3 Filling

Unscrew air-filter (66) and fill lubricant through this bore. For volume and grade refer to section 5.2. Please note that in case of multihead pumps the drive elements are connected with each other and that the lubricant needs a certain time to distribute evenly. For improved venting slacken the top plug on each drive element and the air filter of drive element "a". Fill-in the new lubricant through the air filter bore and check the corresponding lubricant level via the plug bores of the other drive elements.


Fig. 23

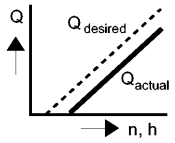
6.4 Setting the manual stroke adjustment

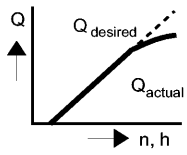
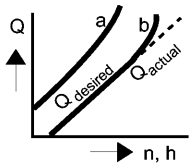
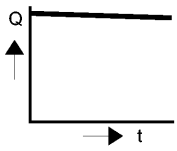
- Screw out adjusting spindle (81) until the thrust rod (1.14) just stops stroking with the diaphragm metering pump switched on. This is measured with a dial gauge installed against the face of the thrust rod (1.14) (see fig. 23).
- Shut diaphragm metering pump off.
- Slide adjusting wheel (82) onto adjusting spindle (81) - splined teeth - until the zero marks match. Turn allen screw (83) until the zero mark of the scale ring lines up with the zero mark of the handwheel.
- Mount cover of adjusting handwheel (82).

The diaphragm metering pump is now ready for operation.

7 Faults; symptofms, remedial action

Refer to table following.

Fault	Possible cause	can be recognized by	corrective action
pump drive does not deliver, pump drive does not run	interruption in supply current	no power at motor	find reason for failure and repair
	motor gear defective	drive motor does not run even when separated from pump	dismantle motor and check, repair if necessary
	pump is blocked by closed shut-off valve in discharge line	pump can be turned via motor fan wheel at zero stroke, but locks at increased stroke	open valve
	pump drive unit has seized due to running dry		repair pump drive unit
pump does not deliver, pump does not stroke although drive motor is running	broken components in pump drive unit, built-in worm gear defective	disconnected drive motor runs normal	check pump drive unit and repair
	broken components in gear, coupling defective		check gear and coupling and repair
increased running noise	cavitation or overmetering taking place	noise only occurs at increased stroke length or speeds	check pipeline (see 4.5.2) and alter accordingly
	gear is defective		remove gear and repair
	axial play of worm shaft has increased		reset
	shaft connection or coupling components worn out due to overload		replace key and possibly shafts and coupling, remove cause of overload
	drive unit components damaged due to overload		dismantle pump drive unit and replace damaged part. Remove cause of overload.
pump does not deliver	discharge shut-off valve closed		open shut-off valve
	back pressure too high (see specification sheet)		reduce discharge pressure
	discharge valve (3.13) wrongly fitted or jammed	knocking noise in stroke rhythm	remove discharge valve (3.13), inspect and fit correctly
	suction shut-off valve closed		open shut-off valve
	dirt trap or line blocked		clean dirt trap or pipeline
	metered fluid solidified		improve heating of pump head
	suction valve (3.9) wrongly fitted, jammed or damaged		remove suction valve (3.9) inspect and fit correctly
	suction pressure too low (see specification sheet)		check suction conditions
	air in operating chamber		vent pump
	gas in fluid metered		check installation
pump output over whole range too low 	suction and/or discharge valve (3.9) (3.13) leaking due to dirt or wear		clean or repair valves, check dirt trap

Fault	Possible cause	can be recognized by	corrective action
pump output too low at long stroke or high stroking rates 	pressure drop in discharge line too high		re-calculate pipeline and modify if appropriate
	suction shut-off valve not fully open, dirt trap fouled up	unusual operating or piping noise possible	open all valves completely, clean dirt trap
	pressure losses in suction line too high, or suction pressure is too low, metered fluid gassing off or cavitating		re-calculate pipeline, modify if appropriate
pump output excessive  metered flow fluctuates at or above $Q_{desired}$	a) static pressure at suction flange higher than at discharge flange	metered fluid passing through diaphragm pump head with pump at rest	reduce suction pressure, elevate pump, provide positive differential pressure
	b) inertia forces in the pipeline cause pressure in suction line momentarily to exceed pressure in discharge line		re-calculate pipeline, modify if appropriate
metered flow fluctuates, but remains smaller then Q_{des}	metered flow contaminated or gas entrained		check dirt trap and improve, de-gas metered fluid
	valves defective		replace defective valve components
metered flow falls off 	gas formation in operating chamber. Generally causes difficulties at metered flows < 50 l/h	full metered flow restored after brief increase in stroke length or frequency	optimize piping installation

8 Graphs/diagrams

8.1 Valve pressure loss diagrams

——— valid for 50 Hz
--------- valid for 60 Hz

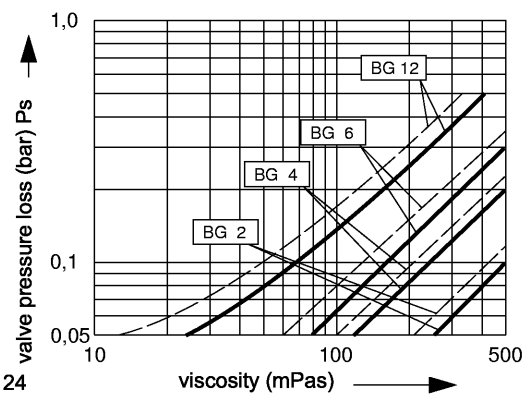


Fig. 24

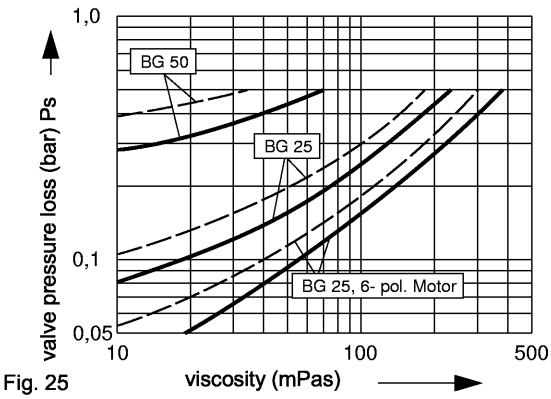


Fig. 25

8.2 Friction losses in the piping

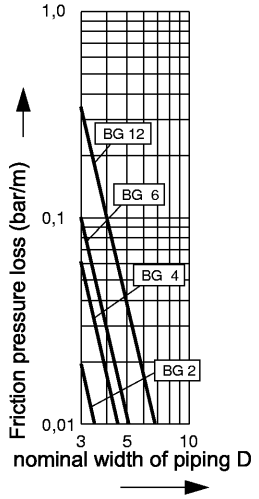


Fig. 26

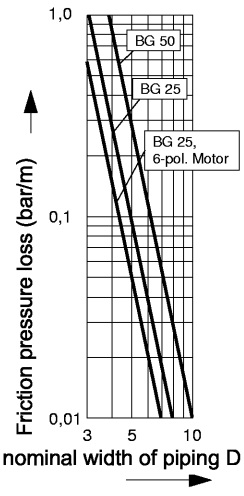


Fig. 27

9 Spare parts

All spare parts required and their corrsponding ident number can be found in the spare parts lists following.
They are divided into

set of wear parts (complete)
spare parts - diaphragm pump head -
spare parts - diaphragm rupture indication -
spare parts - drive unit and
spare parts - contactor.

Please address spare parts orders to LEWA at Leonberg/Germany dept. VE or to the office in charge of your area (refer to listing of addresses on the back of this operating instruction).

Make sure that the following data is given when ordering spare parts:

number of spare parts required
designation of spare parts
ident number of spare part.

Also please give the **serial number** of the pump to avoid any delay caused by additional questions we may have.
The serial number is given on the pump name plate or the specification sheet.
As safety package for 2 years operation we recommend complete sets of spare parts. The ident (order) numbers required can be taken from table.
The wear parts sets listed are valid for standard valve designs.
For special valve designs (refer to specification sheet) the spare parts numbers can be found in the spare parts lists attached.

ecodos	pump head material		Ident- (p.o.) number
2 - 12	S	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 2 valve balls of oxide ceramics 8 seal rings (GYL) valve 1 grooved ring (thrust rod)	106017.1002
2 - 12	P	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats PVC-H 2 valve balls of oxide ceramics 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	101326.1003
2 - 12	F	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats PVDF 2 valve balls of oxide ceramics 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	101326.1004
2 - 12	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4122 2 valve balls 1.3541 hard 8 seal rings (GYL) 1 grooved ring (thrust rod)	106017.1003
2 - 12	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / PTFE 2 valve balls of oxide ceramics 8 seal rings (GYL) valve 1 grooved ring (thrust rod)	106017.1004
2 - 12	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / VU 2 valve balls of oxide ceramics 8 seals rings PTFE (valve) 1 grooved ring (thrust rod)	106017.1005
2 - 12	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / VITON 2 valve balls of oxide ceramics 8 seals rings (GYL) valve 1 grooved ring (thrust rod)	106017.1006

ecodos	Pump head material		Ident- (p. o.) number
25 - 50	S	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 2 valve balls of oxide ceramics 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	106026.1002
25 - 50	P	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 2 valve balls of oxide ceramics 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	101026.1003
25 - 50	F	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats PVDF 2 valve balls of oxide ceramics 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	101026.1004
25 - 50	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4122 2 valve balls 1.3541 hard 6 seal rings (GYL) valve 1 grooved ring (thrust rod)	101326.1008
25 - 50	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / PTFE 2 valve balls of oxide ceramics 6 seal rings GYL (Ventil) 1 grooved ring (thrust rod)	101326.1009
25 - 50	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / VU 2 valve balls of oxide ceramics 6 seal rings GYL (valve) 1 grooved ring (thrust rod)	101326.1010
25 - 50	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 / VITON 2 valve balls of oxide ceramics 8 seal rings (GYL) valve 1 grooved ring (thrust rod)	101326.1011
25 - 50	S/SA	1 complete set of wear parts consisting of: 1 sandwich diaphragm PTFE 2 valve seats 1.4571 rd 2 valve balls of oxide ceramics 6 seals rings (GYL) valve 1 1 grooved ring (thrust rod)	101326.1012

Issue October 2000

Betriebsanleitung / Operating Instruction / Notice de service

Schmierstofftabelle / Lubrication chart / Tableau de Graissage — B 1.001 de/en/fr

(de) **Schmierstoffe für LEWA - Triebwerke:**
Zur Schmierung der Dosierpumpentriebwerke nur nachfolgend aufgeführte oder nachweislich gleichwertige Schmierstoffe verwenden. Alle Schmiermittel müssen den Anforderungen nach DIN 51517 Teil 3 Schmieröle CLP entsprechen. Angaben zur Schmierstoff - Sorte, Füllmenge, Schmiermittelwechselintervalle siehe LEWA - Betriebsanleitung „Triebwerk“

LEWA - Triebwerke werden im Normalfall OHNE Schmiermittel ausgeliefert!

(en) **Lubricants for LEWA - Drives**
Permissible lubricants are either as per the tabulation shown below or evident proven equivalents. All lubricants should comply with the requirements of DIN 51517 part 3, lubricants CLP.
For information regarding the specification of the lubricant, the content and the oil change intervals please refer the O & I. M. (owners manual) section "drive".

The LEWA - drive is normally delivered WHITHOUT oil.

(fr) **Lubrifiants pour parties mécaniques LEWA:**
Pour la lubrification des parties mécaniques de nos pompes doseuses n’utiliser que les lubrifiants listés dans le tableau ci-dessous ou bien des équivalents prouvant les mêmes qualités. Tous les lubrifiants doivent être conformes aux règlements DIN 51517 partie 3, lubrifiants CLP. Pour information quant au type de lubrifiant, contenu et intervalle d’échange veuillez consulter la notice de service LEWA référant à la partie mécanique.

Dans notre procédé standard, les parties mécaniques LEWA sont fournies SANS plein d'huile.

Bezeichnung nach DIN 51502 ISO 6743	ISO-Viskositäts-klasse nach DIN 51519	Einsatz-bereich °C	ARAL	BP	FUCHS	elf	Esso	FINA	Klüber	Mobil	Shell	TEXACO	WINTERSHALL	LEWA Ident-Nummer
CLP 220 ISO-L-CKC 220 (Mineral-Oil)	ISO VG 220	-20 - + 50	Degol BG 220 DIN 51517 T3	Energol GR-XP 220 DIN 51517 T3	Falkon CLP 220 DIN 51517 T3	RENOLIN CLP 220 DIN 51517 T3	Reducelf SP 220	SPARTAN EP 220 DIN 51517 T3	FINA-Giran L ISO-VG 220 DIN 51517 T3	Klüberoil GEM 1-220 DIN 51517 T3	Mobil-Gear 630 DIN 51517 T3	Omala Oil 220 DIN 51517 T3	MEROPA 220 DIN 51517 T3	Ersolan 220 GF DIN 51517 T3	**076000.0412**
CLP PG 150 ISO-L-CKS 150 (Polyglycole-Oil)	ISO VG 150	-35 - +100	Degol GS 150	———	Polydea PGLP 150	RENOLIN UNISYN CLP 150		———	FINA-Giran S ISO-VG 150	SYNTHESO D 150 EP	Glygoyle 22	Shell Tivela Oil WA	SYNELUPE-CLP 150		**076000.0031**
CLP PG 220 ISO-L-CKS 220 (Polyglycole-Oil)	ISO VG 220	-35 - +100	Degol GS 220	Enersyn SG-XP 220	Polydea PGLP 220	RENOLIN UNISYN 220		Glycolube 220	FINA-Giran S ISO-VG 220	SYNTHESO D 220 EP	Glygoyle 30 Glygoyle HE 220	Shell Tivela Oil WB	SYNELUPE-CLP 220		**076000.0254**

Ausgabe Oktober 2001

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1	2	3	A	4	5	B	D	6	7
1	001	1,000	PCS	TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25 A 17 V.FED	0157/0198	GE	110978.0002 S.GR.-L.	B 1.600
2	002	2,000	PCS	TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25-45BX	0010/0198	GE	110592.0002 S.GR.-L.	B 1.600
3	006	2,000	PCS	EXZENTERWELLE M.LAGER ECC.SHAFT W.BEARG.	ECO.25-50EL.B-F120GR 47DX85	1.0503-2.2	GE	101320.0005 S.GR.-L.	
4	010	1,000	PCS	ZUGANKER TIE ROD	FC3,FCH3,FCD3 10X11X187	0001/0067	GE	045246.0024 S.GR.-L.	
5	019	1,000	PCS	LACKIERUNG PAINTING	ECODOS BLAU	0363/1693	UE	120200.0015	
6	032	3,000	PCS	MEMBRAN-BRUCHANZEIGE DIAPH.RUPT.INDICAT	ECODOS IE4 SCHALTER 405 63X32X69	0001/0065	GE	046001.0548 S.GR.-L.	
7	040	2,000	PCS	FUSS FOOT	FC,FCH,FCD 105X40X15	0101/0193	GE	045247.0002 S.GR.-L.	
8	045	1,000	PCS	ANTRIEBSFLANSCH FLANGE DRIVE SIDE	LDB/FC BGR.80 D120 120DX106	0018/0198	GE	045249.0004 S.GR.-L.	
9	050	1,000	PCS	DREHSTROMMOTOR 3-PHASE MOTOR	1395/400V/0,75KW/IP55/B14		GF	103501.1140	100000.0414
10	051	1,000	PCS	ABSCHLUSSDECKEL END COVER	FC/FCD/ECODOS 2-50 78DX30	0092/0198	GE	045248.0004 S.GR.-L.	
11	070	3,000	PCS	MEMBRAN-PUMPENKOPF DIAPHR.PUMP HEAD	ECOD25-50S VO RA0,5TRI-C 65X79X190	0001/0065	GE	109060.0003 S.GR.-L.	
12	090	1,500	KG	HYDRAULIKFLUID LUBRICATING OIL	CLP 220 DIN 51517-T3 210MM²/S-40°C	M-220 EP	WF	076000.0412	
13									
14									
15									
16		1,000	PCS	DOSIERPUMPE METERING PUMP	ECODOS/3V 0025 APB	ESC0025-13	EE		

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1	2	3	A	4	5	B	D	6	7
16	1,000	PCS		DOSIERPUMPE METERING PUMP	ECODOS/3V 0025 APB	ESC0025-13	EE		

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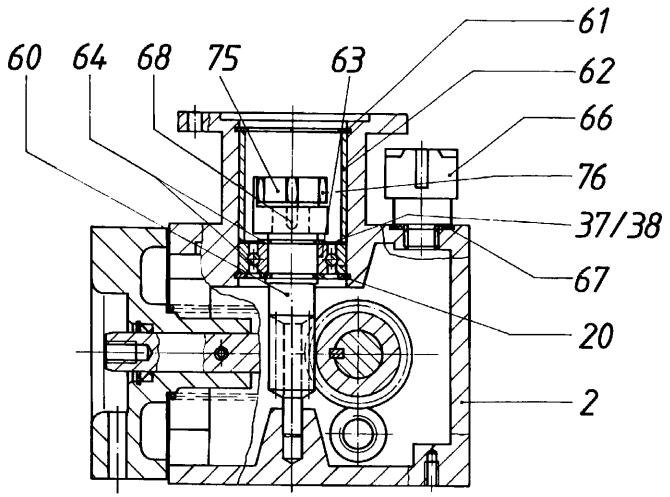
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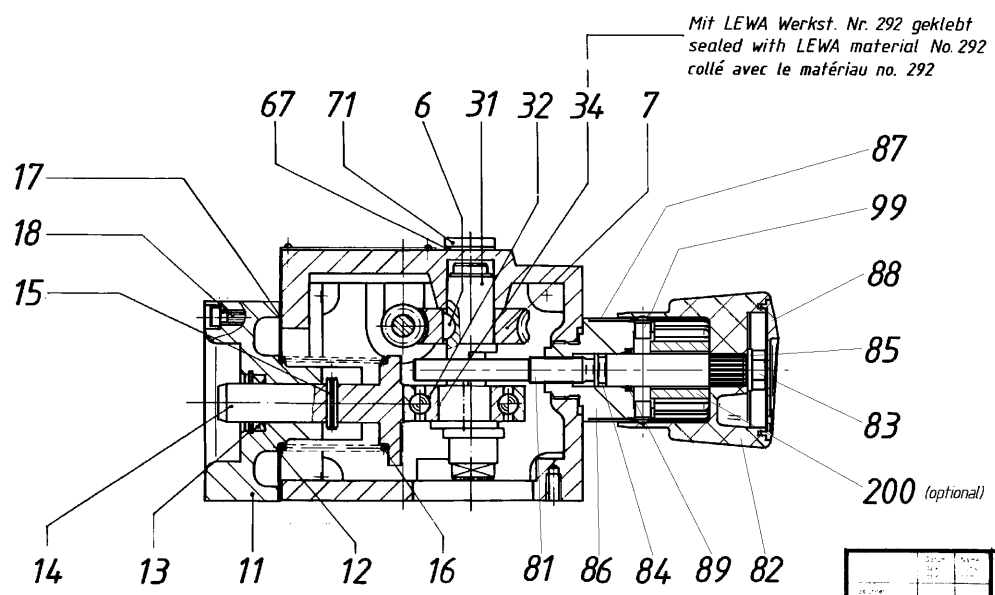
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B1.600

Triebwerkselement
drive element
élément partie mécanique

LEWA ecodos® 2-50 C7-C150

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D-71229 Leonberg, Ulmer Str.10

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1	002	1,000	PCS		TRIEBWERKSGEHAEUSE DRIVE ELEMENT HOUSING	FC EL.A 104X113X116	EN-JL1040	TE	101257.0198	
2	006	1,000	PCS	E	SCHEIBENFEDER WOODRUF-KEY	4X5 DIN 6888	1.0503 K	TF	072654.0126	
3	007	1,000	PCS	E	SCHNECKENRAD WORM WHEEL	I=17 Z=17 FC/FCD/FCH 43,75DX14	CC483K	TE	042905.0157	
4	011	1,000	PCS		MEMBRANANTRIEBSGEH. DIAPHRAGM DRIVE	ECODOS 25-50 98,5X78X62	EN-JL1040	TE	106387.0198	
5	012	1,000	PCS	V	NUTRING GROOVED RING	14-22-5,5 NI 150 878	NBR-80	TF	080532.0272	
6	013	1,000	PCS	E	SICHERUNGSRING CIRCLIP	J 22X1,0 V	FST	TF	080544.0130	
7	014	1,000	PCS		SCHUBSTANGE THRUST ROD	ECODOS 2-50 F.VERST.FEDER 45DX72	1.4122	TE	106189.0010	
8	015	1,000	PCS		SPANNSTIFT CLAMP PIN	4X20-A ISO 8752	FST	TF	072961.0130	
9	016	1,000	PCS	E	DRUCKFEDER THRUST SPRING	ECODOS 90-350/ECOPLEX 34,3DX63,1	1.1250	TE	105529.0221	
10	017	1,000	PCS	V	FLACHDICHTUNG GASKET	FCD/FCH 76X99X0,5	AFM 33/2	TE	042941.0092	
11	018	4,000	PCS		ZYLINDERSCHRAUBE M.INN ALLEN SCREW	M4X30 ISO 4762	A4-70	TF	070008.0482	
12	020	1,000	PCS	E	SICHERUNGSRING CIRCLIP	42X1,75 DIN 472	FST	TF	071420.0130	
13	031	1,000	PCS		EXZENTERWELLE ECCENTRIC SHAFT	ECO.25-50EL.A HUB5,0 24X26,5X85	1.0503-2.2	TE	101288.0158	
14	032	1,000	PCS	E	RILLENKUGELLAGER GRVE.BALL BEARING	6204 DIN 625 20/47DX14		TF	080823.0000	
15	034	0,001	PCS		KLEBER ADHESIVE	DELO-ML 5268 (116)	FK-01	WF	075000.0292	
16		1,000	PCS		TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25 A 17 V.FED	0157/0198	GE	110978.0002	

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1	2	3	A	4	5	B	D	6	7
1	037	1,000	PCS	PASSSCHEIBE SHIM DISC	30X42X0,3 DIN 988	ST	TF	070129.0122	
2	038	2,000	PCS	PASSSCHEIBE SHIM DISC	30X42X0,1 DIN 988	ST	TF	070128.0122	
3	060	1,000	PCS	E	SCHNECKENWELLE WORM SHAFT	FC/FCD/FCH I=17,0 20DX90	1.7131-2.2	TE	042907.0178
4	061	1,000	PCS	E	SICHERUNGSRING CIRCLIP	42X1,75 DIN 472	FST	TF	071420.0130
5	062	1,000	PCS		DISTANZROHR SPACER PIPE	FC/FCD/FCH 42,4DX43	1.0254	TE	042924.0165
6	063	1,000	PCS	E	RILLENKUGELLAGER GRVE.BALL BEARING	20/42DX12 NR.6004 RS		TF	080533.0000
7	064	2,000	PCS	E	SICHERUNGSRING CIRCLIP	20X1,2 DIN 471	FST	TF	071515.0130
8	066	1,000	PCS		LUFTFILTER AIR FILTER	M14X1,5 27DX30		GF	090013.0044
9	067	2,000	PCS	V	DICHTRING SEAL RING	A14X18X1,5 DIN 7603	POM	TF	070165.0135
10	068	1,000	PCS	E	PASSFEDER KEY	A5X5X10 DIN 6885	1.0503 K	TF	072518.0126
11	071	2,000	PCS		VERSCHLUSSSCHRAUBE SCREWED PLUG	M14X1,5 DIN 908	5.8-A2B	TF	075204.0099
12	075	1,000	PCS		NABE HUB	GR.14 14D M.ABZGEW. 30DX22,5	AL	TF	080877.0134
13	076	1,000	PCS	V	ZAHNKRANZ TOOTHEDRIM	ZU ROTEX GR.14 30DX10	AU-90	TF	073379.0096
14	081	1,000	PCS		VERSTELLSPINDEL ADJUSTING SPINDLE	ECODOS 2-50 12,5DX127	1.4104	TE	110584.0014
15	082	1,000	PCS		HANDRAD HANDWHEEL	LDB / LDC / ECODOS 59,5DX58	PA/GLF	TE	109262.0408
16		1,000	PCS		TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25 A 17 V.FED	0157/0198	GE	110978.0002

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	Pos.Nr. Item no.	Menge Quantity	Mengen-einheit Unit of quantity	1)	Benennung Designation	Nenngröße,Normteilkurzbezeichnung Fremdteilkennzeichen und Abmessungen Nominal size, denomination of standard Parts sub-contractor designation and dimension	Gruppen-Teilelisten-Nr. oder Werkstoff 2) Group-parts-list no. or material 2)	Material-art LEWA-intern	Ident-Nr. 2) Ident-no.	Bemerkungen Remarks
	1	2	3	A	4	5	B	D	6	7
1	083	1,000	PCS		SECHSKANTSCHRAUBE HEXAGON HEAD SCREW	M8X20 ISO 4017	A4-70	TF	072722.0482	
2	084	1,000	PCS	V	DICHTRING SEAL RING	FK-012-N90B326GR 9,25X12,6X1,68	NBR-90(85)	TF	082153.0061	
3	085	1,000	PCS		SCHEIBE WASHER	8 ISO 7089	A4-70	TF	073458.0482	
4	086	1,000	PCS	E	GEWINDEBUCHSE THREADED BUSHING	TYP FC/FCD/ECODOS 2-350 39,5DX42	1.4571	TE	110555.0001	
5	087	1,000	PCS		SKALA SCALE	ECODOS 25-50 / 5.0HUB 39,4X16	PA/GLF	TE	110559.0408	
6	088	1,000	PCS		SCHUTZKAPPE PROTECTIVE CAP	LDB/LDC/ECODOS PA 53,5DX7	PA/GLF	TE	109504.0408	
7	089	1,000	PCS	V	DICHTRING SEAL RING	GR12/16DX3 FA.INA	ST/NBR-75	TF	080842.0090	
8	099	2,000	PCS		DRUCKSTUECK THRUST PAD	GN 614-6-NI 6,5DX8,5		GF	090400.4100	
9										
10										
11										
12										
13										
14										
15										
16		1,000	PCS		TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25 A 17 V.FED	0157/0198	GE	110978.0002	

LEWA®	B 1.600	1109770000/1G/00	110978.0002	436438 00010	von 3 of 3
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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3) Änderungs-Index / Revision

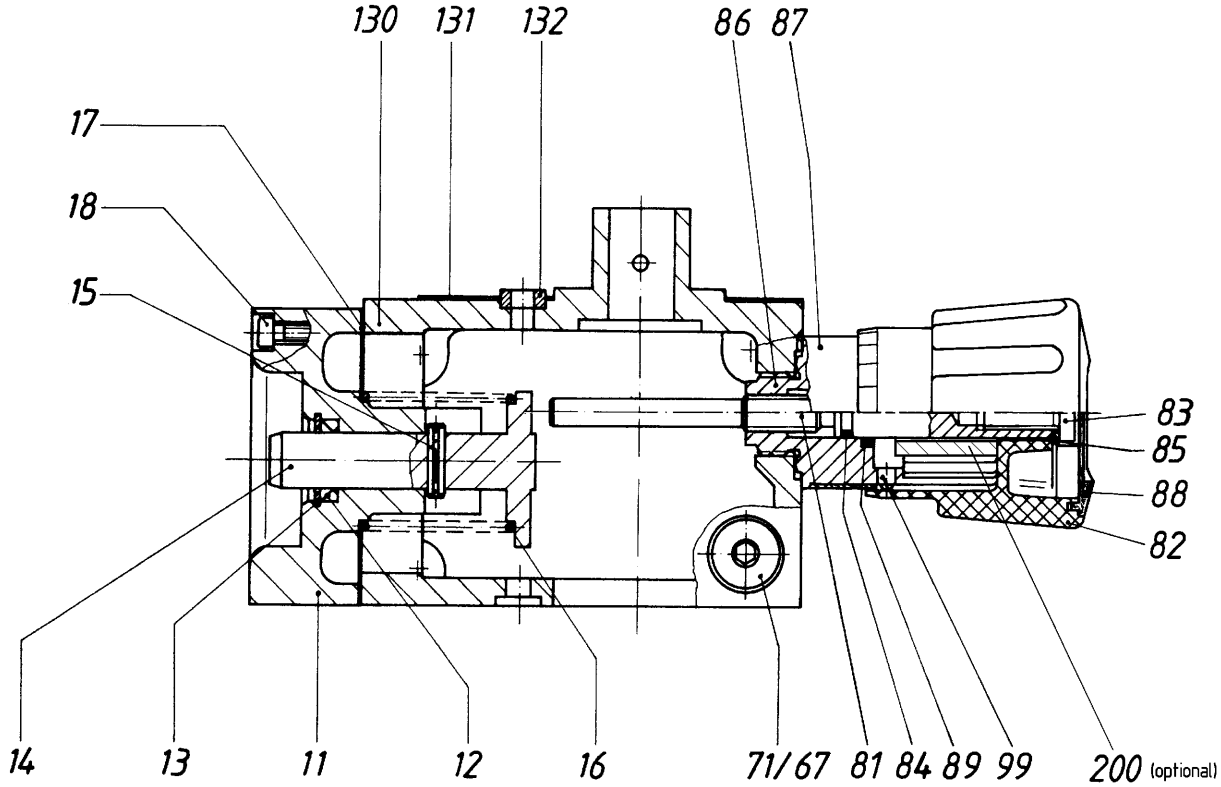
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Änderung	Datum	Änderungstext	Mitteilungs-Nr.

Text siehe Blatt
Instructions see sheet
Texte voir feuille

B 1.600

Triebwerkselement
drive element
élément partie mécanique

LEWA ecodos® 2 - 50 C7 - C150

LEWA

Schnittbild -Nr.
Section drawing-no.
Plan coupe-no.

110592 00002G00

	Pos.Nr. Item no.	Menge Quantity	Mengen-einheit Unit of quantity	1)	Benennung Designation	Nenngröße,Normteilkurzbezeichnung Fremdteilkennzeichen und Abmessungen Nominal size, denomination of standard Parts sub-contractor designation and dimension	Gruppen-Teilelisten-Nr. oder Werkstoff 2) Group-parts-list no. or material 2)	Material-art LEWA-intern	Ident-Nr. 2) Ident-no.	Bemerkungen Remarks
	1	2	3	A	4	5	B	D	6	7
1	011	1,000	PCS		MEMBRANANTRIEBSGEH. DIAPHRAGM DRIVE	ECODOS 25-50 98,5X78X62	 EN-JL1040	TE	106387.0198	
2	012	1,000	PCS	V	NUTRING GROOVED RING	14-22-5,5 NI 150 878	 NBR-80	TF	080532.0272	
3	013	1,000	PCS	E	SICHERUNGSRING CIRCLIP	J 22X1,0 V	 FST	TF	080544.0130	
4	014	1,000	PCS		SCHUBSTANGE THRUST ROD	ECODOS 2-50 F.VERST.FEDER 45DX72	 1.4122	TE	106189.0010	
5	015	1,000	PCS		SPANNSTIFT CLAMP PIN	4X20-A ISO 8752	 FST	TF	072961.0130	
6	016	1,000	PCS	E	DRUCKFEDER THRUST SPRING	ECODOS 90-350/ECOPLEX 34,3DX63,1	 1.1250	TE	105529.0221	
7	017	1,000	PCS	V	FLACHDICHTUNG GASKET	FCD/FCH 76X99X0,5	 AFM 33/2	TE	042941.0092	
8	018	4,000	PCS		ZYLINDERSCHRAUBE M.INN ALLEN SCREW	M4X30 ISO 4762	 A4-70	TF	070008.0482	
9	067	1,000	PCS	V	DICHTRING SEAL RING	A14X18X1,5 DIN 7603	 POM	TF	070165.0135	
10	071	1,000	PCS		VERSCHLUSSSCHRAUBE SCREWED PLUG	M14X1,5 DIN 908	 5.8-A2B	TF	075204.0099	
11	081	1,000	PCS		VERSTELLSPINDEL ADJUSTING SPINDLE	ECODOS 2-50 12,5DX127	 1.4104	TE	110584.0014	
12	082	1,000	PCS		HANDRAD HANDWHEEL	LDB / LDC / ECODOS 59,5DX58	 PA/GLF	TE	109262.0408	
13	083	1,000	PCS		SECHSKANTSCHRAUBE HEXAGON HEAD SCREW	M8X20 ISO 4017	 A4-70	TF	072722.0482	
14	084	1,000	PCS	V	DICHTRING SEAL RING	FK-012-N90B326GR 9,25X12,6X1,68	 NBR-90(85)	TF	082153.0061	
15	085	1,000	PCS		SCHEIBE WASHER	8 ISO 7089	 A4-70	TF	073458.0482	
16		1,000	PCS		TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25-45BX	 0010/0198	GE	110592.0002	
	LEWA®				B 1.600	1105920000/2G/00	110592.0002	436438 00010		1 von 2
	Hersteller Manufacturer				Betriebsanleitung Instruction manual	Zeichnungs-Nr. Drawing-no.	Gruppen-Teilelisten-Nr.2) Group parts list no.2)	Auftrags-Nr. Order-no.		Blatt / Page / Blättern / Pages

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1	2	3	A	4	5	B	D	6	7
1	086	1,000	PCS	E	GEWINDEBUCHSE THREADED BUSHING	TYP FC/FCD/ECODOS 2-350 39,5DX42	1.4571	TE	110555.0001	
2	087	1,000	PCS		SKALA SCALE	ECODOS 25-50 / 5.0HUB 39,4X16	PA/GLF	TE	110559.0408	
3	088	1,000	PCS		SCHUTZKAPPE PROTECTIVE CAP	LDB/LDC/ECODOS PA 53,5DX7	PA/GLF	TE	109504.0408	
4	089	1,000	PCS	V	DICHTRING SEAL RING	GR12/16DX3 FA.INA	ST/NBR-75	TF	080842.0090	
5	099	2,000	PCS		DRUCKSTUECK THRUST PAD	GN 614-6-NI 6,5DX8,5		GF	090400.4100	
6	130	1,000	PCS		TRIEBWERKSGEHAEUSE DRIVE ELEMENT HOUSING	FC EL.B-D 116X104X100	EN-JL1040	TE	101259.0198	
7	131	1,000	PCS	V	FLACHDICHTUNG GASKET	FC/FCD/FCH 98X90X0,5	AFM 33/2	TE	042943.0092	
8	132	1,000	PCS		ARRETIERBUCHSE LOCKING BUSHING	FC,FCD,FCH 12DX5	1.0715	TE	042930.0091	
9										
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14										
15										
16		1,000	PCS		TRIEBWERKSELEMENT HHV DRIVE ELEMENT	EEC25- 50EAC25-45BX	0010/0198	GE	110592.0002	

LEWA®	B 1.600	1105920000/2G/00	110592.0002	436438 00010	von 2 2 of
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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	1	2	3	A	4	5	B	D	6	7
1	031	1,000	PCS		EXZENTERWELLE ECCENTRIC SHAFT	ECO.12-50HUB5,0 120G 24X26,5X85	1.0503-2.2	TE	101292.0158	
2	032	1,000	PCS	E	RILLENKUGELLAGER GRVE.BALL BEARING	6204 DIN 625 20/47DX14		TF	080823.0000	
3	034	0,001	PCS		KLEBER ADHESIVE	DELO-ML 5268 (116)	FK-01	WF	075000.0292	
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16		1,000	PCS		EXZENTERWELLE M.LAGER ECC.SHAFT W.BEARG.	ECO.25-50EL.B-F120GR 47DX85	1.0503-2.2	GE	101320.0005	

LEWA®		101320.0005	436438 00010	1 von 1
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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	1	2	3	A	4	5	B	D	6	7
1	135	3,000	PCS		ZUGANKER TIE ROD	FC3 6DX187	 1.4571	TE	042932.0001	
2	136	3,000	PCS		MUTTER NUT	M6 MIT BUND	 ST/PA	TF	080389.0452	
3	137	3,000	PCS		SCHUTZKAPPE PROTECTIVE CAP	SW10-1-G11 H5 15DX12	 PE	TF	084814.0067	
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16		1,000	PCS		ZUGANKER TIE ROD	FC3,FCH3,FCD3 10X11X187	 0001/0067	GE	045246.0024	

Hersteller Manufacturer	Betriebsanleitung Instruction manual	Zeichnungs-Nr. Drawing-no.	Gruppen-Teilelisten-Nr.2) Group parts list no.2)	Auftrags-Nr. Order-no.	Blatt Page	Blättern Pages
LEWA®			045246.0024	436438 00010	von 1 of	1

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	1	2	3	A	4	5	B	D	6	7
1	057	1,000	PCS		FUSS FOOT	FC/FCD/FCH 105X40X15	1.0120 K	TE	042947.0193	
2	058	2,000	PCS		ZYLINDERSCHRAUBE M.INN ALLEN SCREW	M6X16 ISO 4762	A4-70	TF	070021.0482	
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16		1,000	PCS		FUSS FOOT	FC,FCH,FCD 105X40X15	0101/0193	GE	045247.0002	

LEWA®		045247.0002	436438 00010	1 von 1
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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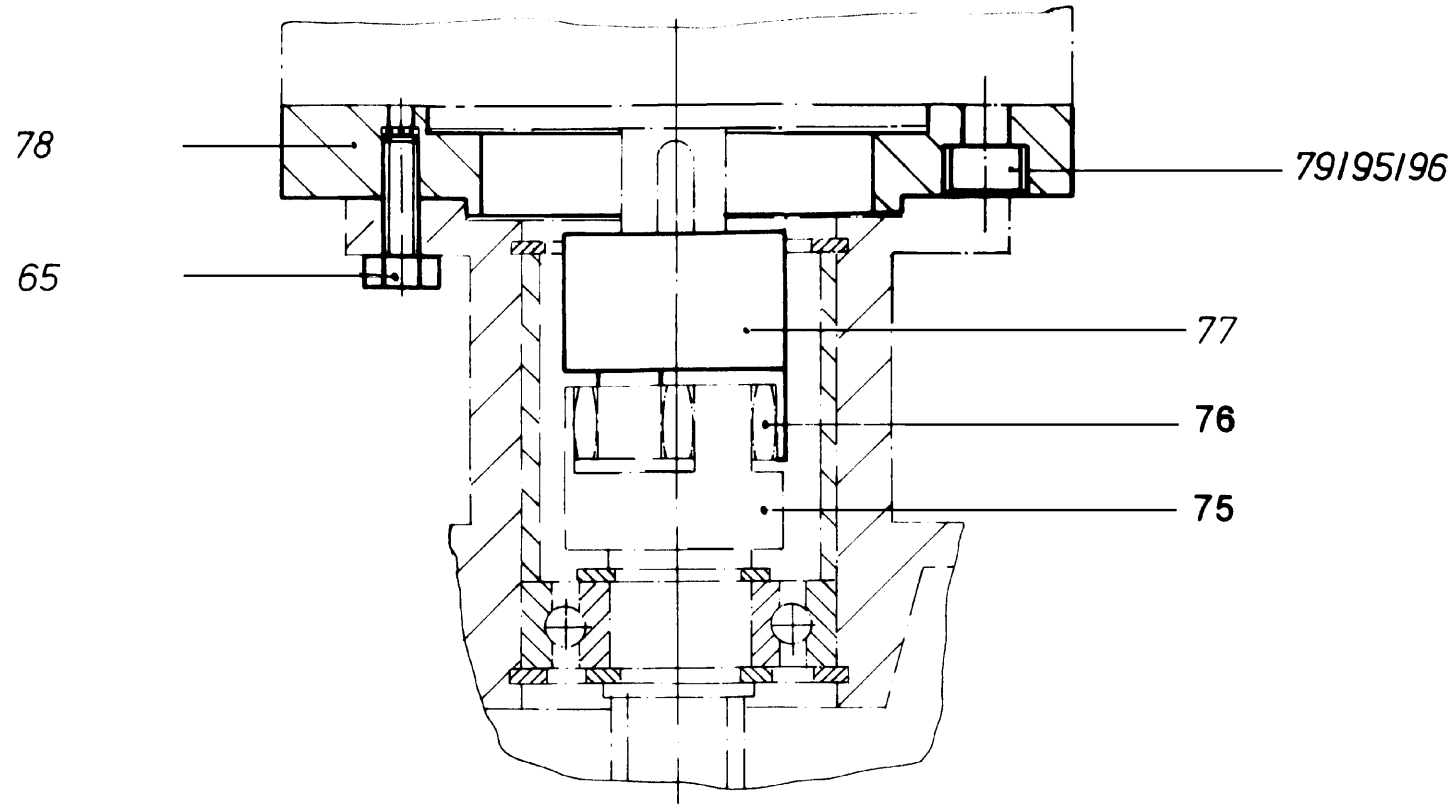
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Änderung	Datum	Änderungstext	Mitteilungs-Nr.
2	17.06.98	Pos. 75/76 neu	14393
1	19.12.84	Pos. 96 neu	9862

Text s. Blatt
Instructions
see sheet

Antriebsflansch Typ LDB / FC
flange drive side type LDB / FC
Bride d'entrainement type LDB/FC

LEWA

0452490000/4G/02

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	1	2	3	A	4	5	B	D	6	7
1	065	4,000	PCS		SECHSKANTSCHRAUBE HEXAGON HEAD SCREW	M5X16 ISO 4017	A4-70	TF	072710.0482	
2	075	1,000	PCS		NABE HUB	GR.19/24 14D L1=50 40DX64	ST	TF	082930.0122	
3	076	1,000	PCS	V	ZAHNKRANZ TOOTHEDRIM	ZU ROTEX GR.19 40DX12	AU-90	TF	073380.0096	
4	077	1,000	PCS		NABE HUB	GR.19/24 19D M.STEL. 40DX39	ST	TF	081089.0122	
5	078	1,000	PCS		ANTRIEBSFLANSCH FLANGE DRIVE SIDE	LDB / FC, BGR.80 120DX60,5	1.0503-2.2	TE	047234.0158	
6	079	4,000	PCS		SECHSKANTSCHRAUBE HEXAGON HEAD SCREW	M6X20 ISO 4017	A4-70	TF	072715.0482	
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16		1,000	PCS		ANTRIEBSFLANSCH FLANGE DRIVE SIDE	LDB/FC BGR.80 D120 120DX106	0018/0198	GE	045249.0004	

LEWA®		0452490000/4G/02	045249.0004	436438 00010	von 1 1 of
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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	1	2	3	A	4	5	B	D	6	7
1	003	1,000	PCS		DECKEL COVER	FC/FCD/ECODOS 2-50 78DX30	EN-JL1040	TE	101299.0198	
2	005	1,000	PCS	V	FLACHDICHTUNG GASKET	FC,FCD,FCH 78DX0,5	AFM 33/2	TE	042942.0092	
3										
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11										
12										
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16		1,000	PCS		ABSCHLUSSDECKEL END COVER	FC/FCD/ECODOS 2-50 78DX30	0092/0198	GE	045248.0004	

LEWA®		045248.0004	436438 00010	von 1 1 of
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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1	2	3	A	4	5	B	D	6	7
1	001	1,000	PCS		SCHALTER SWITCH	TYP 405 OEFFNER 63X32X69	0001/VA70	GF	090198.0014	100000.0312X
2	004	1,000	PCS	V	DICHTRING SEAL RING	A12X17X1,6(DIN 7603)	GYL	TF	077002.0065	
3										
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16		1,000	PCS		MEMBRAN-BRUCHANZEIGE DIAPH.RUPT.INDICAT	ECODOS IE4 SCHALTER 405 63X32X69	0001/0065	GE	046001.0548	

LEWA®		046001.0548	436438 00010	von 1 1 of
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.	**Blatt** Page **Blättern** Pages

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When ordering ident-no., group-parts-list and order-no.

3) Änderungs-Index
Revision

Formular entspr. DIN 24420
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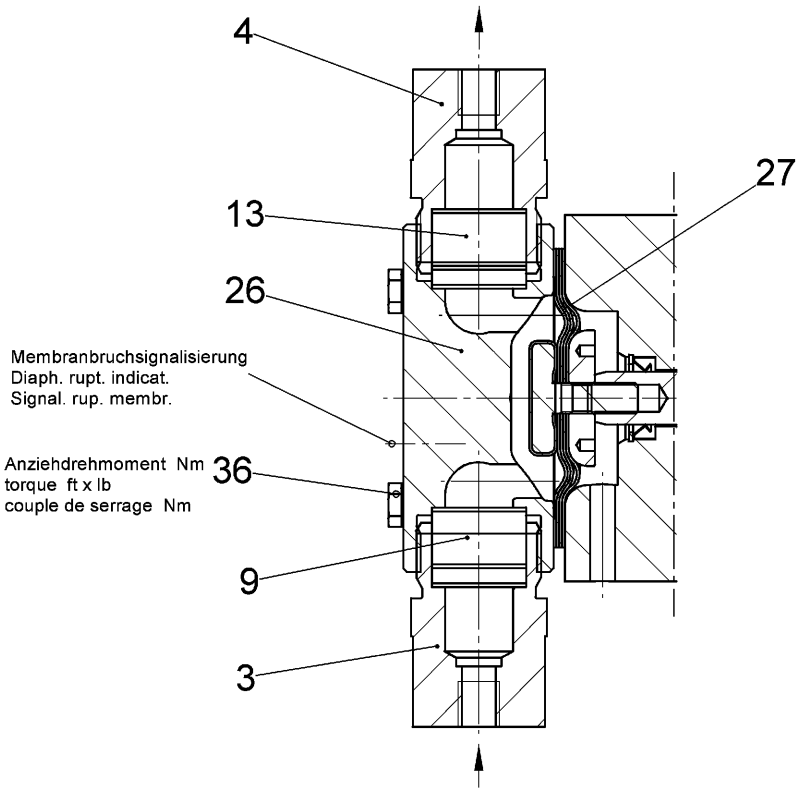
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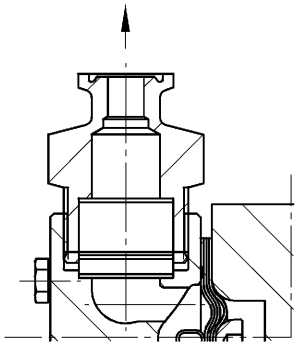
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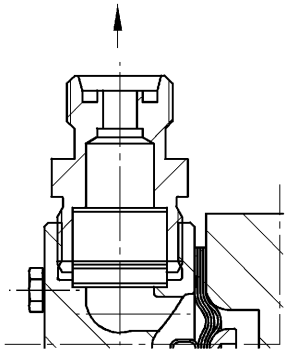
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Drehmoment siehe Gruppenteileliste
torque see group parts list
couple de serrage voir nomenclature des sous-ensembles







Werkstückkanten nach DIN 6784 /corners of workpiece acc. DIN 6784							
Freimaßtoleranzen in mm bzw. Grad (DIN 7168-m) Tolerances of free dimensions in mm resp. degrees (DIN 7168-m)							
Bezugsmaße in mm bei Winkel Schenkellänge / Ref. dimensions in mm for side length	≤3	>3 ≤6	>6 ≤30	>30 ≤120	>120 ≤400	>400 ≤1000	>1000 ≤2000
Längenmaße, Durchm. u. Symmetrie Length dim., diameter a. symmetry	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2
Rundungen, Fasen Round parts, chamfers	± 0,2	± 0,5	± 1	± 2	± 4	—	—
Winkel Angles	± 1°	± 1°	± 30'	± 20'	± 10'	± 5'	± 5'
Rund-, Planlauf u. Koaxialität Circular, plane rotation a. coaxiality	0,1	0,1	0,2	0,3	0,5	0,8	1
Gerad- und Ebenheit Straightness and planeness	0,008	0,008	0,02	0,04	0,08	0,15	0,2

Rev.	Änderungstext/Rev. description	Datum	Name
1	2894: Darstellung auf CAD	28.02.00	hem

B2

CAD
S.E.

Maßstab/Scale

	Datum/Date	Name/Name
Gezeichnet Drawn	25.02.00	sca
Geprüft Checked	28.02.00	hem
Fertig.-Prüf. Manuf.-check		

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LEWA Herbert Ott GmbH & Co
D - 71229 Leonberg

MEMBRAN-PUMPENKOPF
DIAPHR.PUMP HEAD
ECODOS2-350S / C7-C150 / K280-K900

Zeichnungs-Nr./Drawing No.
1060140000/2G/01

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	Pos.Nr. Item no.	Menge Quantity	Mengen-einheit Unit of quantity	1)	Benennung Designation	Nenngröße,Normteilkurzbezeichnung Fremdteilkennzeichen und Abmessungen Nominal size, denomination of standard Parts sub-contractor designation and dimension	Gruppen-Teilelisten-Nr. oder Werkstoff 2) Group-parts-list no. or material 2)	Material-art LEWA-intern	Ident-Nr. 2) Ident-no.	Bemerkungen Remarks
	1	2	3	A	4	5	B	D	6	7
1	003	1,000	PCS		VENTILKOERPER VALVE BODY	DN10EH 1/2Z TRI RA0,5 DF 36X41,5X50	1.4571	TE	108604.0001	
2	004	1,000	PCS		VENTILKOERPER VALVE BODY	DN10EH 1/2Z TRI RA0,5 DF 36X41,5X50	1.4571	TE	108604.0001	
3	009	1,000	PCS	E	1-KUGELVENTIL 1-BALL VALVE	DN10 K1DSA EK-EH RA0,5 25DX24,5	0001/0078	GE	025406.0060 S.GR.-L.	
4	013	1,000	PCS	E	1-KUGELVENTIL 1-BALL VALVE	DN10 K1DSA EK-EH RA0,5 25DX24,5	0001/0078	GE	025406.0060 S.GR.-L.	
5	026	1,000	PCS		MEMBRANPUMPENKOERPER DIAPHRAGM BODY	ECODOS25-50S VO RA0,5 92X78X40	1.4571	TE	109045.0001	
6	027	1,000	PCS	E	SANDWICH-MEMBRANE SANDWICH-DIAPHRAGM	ECOD 25-50S LEBENS.RA0,5 79X79X28	0071/0604	UE	104722.0003	
7	036	4,000	PCS		SECHSKANTSCHRAUBE HEXAGON HEAD SCREW	M6X80 ISO 4014	A4-70	TF	072319.0482	Drehmom. 5 Nm torque 4 ftxlb
8										
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13										
14										
15										
16		1,000	PCS		MEMBRAN-PUMPENKOPF DIAPHR.PUMP HEAD	ECOD25-50S VO RA0,5TRI-C 65X79X190	0001/0065	GE	109060.0003	

Hersteller Manufacturer	Betriebsanleitung Instruction manual	Zeichnungs-Nr. Drawing-no.	Gruppen-Teilelisten-Nr.2) Group parts list no.2)	Auftrags-Nr. Order-no.	Blatt Page	von of	Blättern Pages
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3) Änderungs-Index / Revision

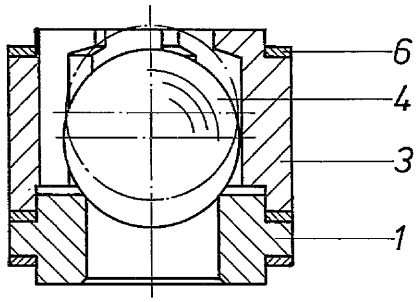
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Änderung	Datum	Änderungstext	Mitteilungs-Nr.

Text s. Blatt
Instructions
see sheet
B 2

1- Kugelventil DN 10-40

mit Flachdichtungen Typ H/HL/FR

1- ball valve DN 10-40

with flat sealing rings
type H/HL/FR

LEWA
LEWA Herbert Ott GmbH + Co
D-7250 Leonberg bei Stuttgart

025407 0000/3G/01

	Pos.Nr. Item no.	Menge Quantity	Mengen-einheit Unit of quantity	1)	Benennung Designation	Nenngröße,Normteilkurzbezeichnung Fremdteilkennzeichen und Abmessungen Nominal size, denomination of standard Parts sub-contractor designation and dimension	Gruppen-Teilelisten-Nr. oder Werkstoff 2) Group-parts-list no. or material 2)	Material-art LEWA-intern	Ident-Nr. 2) Ident-no.	Bemerkungen Remarks
	1	2	3	A	4	5	B	D	6	7
1	001	1,000	PCS	V	VENTILSITZ VALVE SEAT	K1D 10 RA0,5 25DX9	 1.4571	TE	106767.0001	
2	003	1,000	PCS	E	VENTILFUEHRUNG VALVE GUIDE	K1D10 EH SA RA0,5 25DX17	 1.4571	TE	107567.0001	
3	004	1,000	PCS	V	KUGEL BALL	14D DIN 5401	 OK 1	TF	074402.0078	
4	006	3,000	PCS	V	DICHTRING SEAL RING	A18X25DX1 AEHNL.DIN 7603	 GYL	TF	070336.0065	
5										
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15										
16		1,000	PCS	E	1-KUGELVENTIL 1-BALL VALVE	DN10 K1DSA EK-EH RA0,5 25DX24,5	 0001/0078	GE	025406.0060	

LEWA®		0254070000/3G/01	025406.0060	436438 00010
Hersteller Manufacturer	**Betriebsanleitung** Instruction manual	**Zeichnungs-Nr.** Drawing-no.	**Gruppen-Teilelisten-Nr.2)** Group parts list no.2)	**Auftrags-Nr.** Order-no.

von 1 1 of

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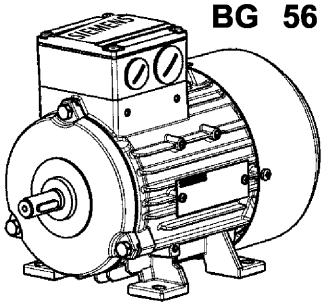
Drehstrommotoren CE
Three-phase AC Motors
Moteurs triphasés
Motores trifásicos
Motori trifasi
Trefasmotorer

1LA6, 1LA7/9, 1LP7/9, 1PP7/9

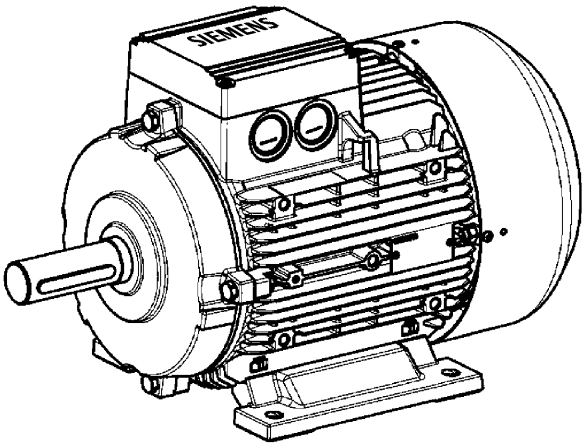
1MA6/7, 1MF6/7 Ex

Betriebsanleitung Operating instructions
Instructions de service
Instrucciones para el manejo
Manuale d'uso
Bruksanvisning

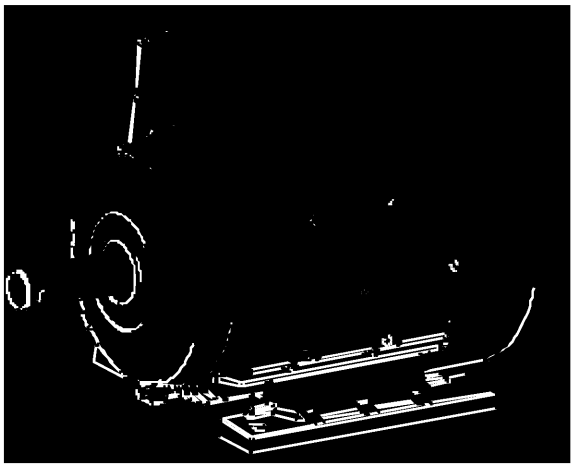
BG 56 ... 90 L - IM B3



BG 100 ... 160 L - IM B3



BG 100 ... 160 L - IM B3
1LA6, 1MA6



B3

Baugrößen (BG) / Frame sizes (BG) / Désignation de carcasse (BG)
Tamaños constructivos (BG) / Grandezza costruttiva (BG) / Konstruktionsstorlekar (BG)

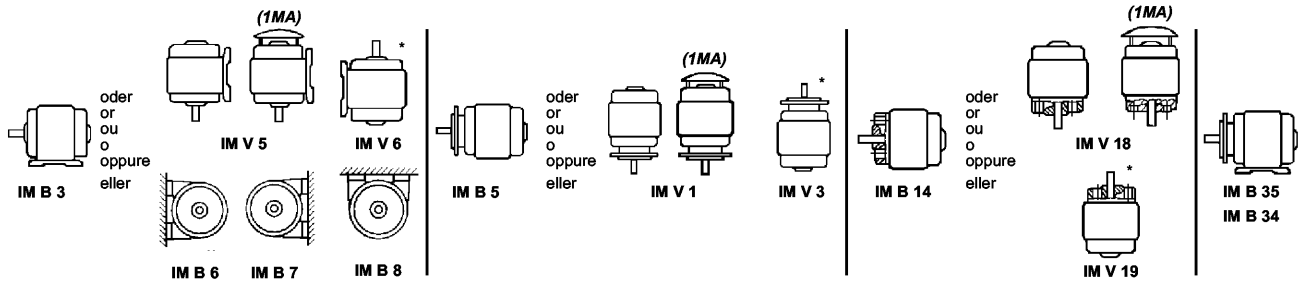


Fig. 1 Bauformen / Types of construction / Formes de construction
Formas constructivas / Forme costruttive / Monteringssätt

** s. "4 EEx e Motoren"/see "4 EEx e motors"/voir "4 Moteurs EEx e " / véase "4 Motores EEx e "/cfr. "4 Motori EEx e " / se "EEx e-Motorer"*

Ausgabe / Edition 10.01
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Bestell - Nr. / Order No.: 610.43 428.21.d
DEUTSCH / ENGLISH / FRANÇAIS / ESPAÑOL / ITALIANO / SVENSKA

gegen unzulässige Erwärmung zu schützen. *Die Schutzeinrichtung ist auf den Bemessungsstrom einzustellen. Bei Wicklungen in Dreieckschaltung werden die Auslöser in Reihe mit den Wicklungssträngen geschaltet und auf den 0,58fachen Bemessungsstrom eingestellt. Ist diese Schaltung nicht möglich, sind zusätzliche Schutzmaßnahmen erforderlich (z. B. Thermischer Maschinenschutz).*

Die ***Schutzeinrichtung*** *muß bei blockiertem Läufer innerhalb der für die jeweilige Temperaturklasse angegebenen t_E-Zeit abschalten.*

Elektrische Maschinen für ***Schweranlauf*** *(Hochlaufzeit > 1,7 x t_E-Zeit) sind entsprechend den Angaben der Konformitätsbescheinigung durch eine Anlaufüberwachung zu schützen.*

Thermischer Maschinenschutz *durch direkte Temperaturüberwachung der Wicklung ist zulässig, wenn dies bescheinigt und auf dem Leistungsschild angegeben ist.*

Bei ***polumschaltbaren Motoren*** *sind für jede Drehzahlstufe getrennte, gegenseitig verriegelte Schutzeinrichtungen erforderlich. Empfohlen werden Einrichtungen mit dem Prüfbericht einer zugelassenen Prüfstelle.*

In Deutschland wird beim Errichten elektrischer Anlagen in explosionsgefährdeten Bereichen auf DIN 57165/VDE 0165 und ElexV hingewiesen! Im Ausland sind die entsprechenden Landesvorschriften zu beachten!

Der ***Betrieb am Umrichter*** *muß ausdrücklich bescheinigt sein. Die gesonderten Herstellerhinweise sind unbedingt zu beachten. Für die Zündschutzart EExe müssen Motor, Umrichter und Schutzeinrichtungen als zusammengehörig gekennzeichnet und die zulässigen Betriebsdaten in der gemeinsamen Prüfbescheinigung festgelegt sein (VDE 0165).*

Die vom ***Umrichter erzeugten Spannungsspitzen*** *können durch das installierte Verbindungskabel zwischen Umrichter und elektrischer Maschine in ihrer Größe ungünstig beeinflußt werden. In dem System Umrichter-Kabel-elektrische Maschine darf der Maximalwert der Spannungsspitzen an den Anschlußklemmen der Maschine den in den gesonderten Herstellerhinweisen genannten Wert nicht überschreiten. Des weiteren ist die* ***EMV-Richtlinie*** *einzuhalten.*

Reparaturen *müssen in* ***Siemens-Werkstätten*** *durchgeführt oder von einem amtlich* ***anerkannten Sachverständigen*** *abgenommen werden. Die Arbeiten sind durch ein zusätzliches Reparaturschild zu kennzeichnen.*

Ersatzteile *mit Ausnahme genormter, handelsüblicher und gleichwertiger Teile (z. B. Wälzlager) dürfen nur* ***Originalersatzteile*** *(s. Ersatzteilliste) verwendet werden: dies gilt insbesondere auch für Dichtungen und Anschlußteile.*

General note

⚠ The data and recommendations specified in all the instructions supplied (**"Information on safety and commissioning"**), and in **all other related instructions**, must always be observed in order to avoid **hazardous situations** and the **risk** of possible injury or damage.

Furthermore, the **pertinent national, local** and **plant-specific regulations** and **requirements** should be kept in mind!

Special designs and **other versions** may vary in technical details! If in doubt, be sure to contact the manufacturer, quoting the **type designation** and **serial number (No. E ..., see rating plate)**, or have maintenance work done by one of the SIEMENS Service Centres.

1 Description

1.1 Application

Normal use of the standard motors:

The motors are designed to comply with degree of protection IP55 (degree of protection indicated on rating plate). They are suitable for installation in dusty and damp environments. The insulation is tropicalized. If they are properly stored or installed outdoors, special weatherproofing measures are not usually required for these motors. They must however be protected against intense sunlight, e.g. by means of a canopy.

Ambient temperature	-30°C ... +60°C
Site altitude	≤ 1000 m

1.2 Construction and mode of operation

Motor types:

1LA- and *1MA* motors are self-ventilated (with fans). 1PP motors are self-ventilated either by separate fans arranged on the rotors, such as for service as fan motors, or by external fans.

1LP and *1MF* motors are non-ventilated (without fans).

The feet on **foot-mounted motors** are bolted onto the frame (see Fig. 2).

For this reason, **rearranging the feet** (such as for changing the position of the terminal box - see Fig. 5) is only possible with frame sizes 100L to 160L. In this case, threads will have to be cut in the existing drilled holes in the frame to receive the feet. However, the support faces of the feet may have to be remachined or provided with shims to ensure that the motor is level.

Where **brake motors** are concerned, please also observe the brake operating instructions.

2 Operation

⚠ **Before starting any work on the machine, be sure to isolate it from the power supply.**

2.1 Transport, storage

The motors should always be lifted at **all lifting eyes** during transport.

⚠ **For lifting machine sets (such as built-on gearboxes, fan units), always use the lifting eyes or lifting pegs provided! Machine sets may not be lifted by suspending the individual machines! Check the lifting capacity of the hoist!**

If, after delivery, the motors are stored for more than 4 years under favourable conditions (kept in a dry place free from dust and vibration) prior to commissioning, the **rolling-contact bearings** should be regreased. Under unfavourable conditions, this period is considerably shorter.

If necessary, any **unprotected, machined surfaces** (flanging surface, shaft end, etc.) should be treated with an **anti-corrosion agent.**

If necessary, the **insulation resistance** of the winding should be checked, see Section 2.5.

2.2 Installation

After installation, **screwed-in lifting eyes** should either be removed or tightened down.

In the case of **motors installed vertically**, additional measures must be taken to ensure that no water can penetrate along the shaft.

Quiet running: Exact alignment of the coupling and a well-balanced transmission element (coupling, pulleys, fans, etc.) are essential for quiet vibration-free running. If necessary, the whole motor and transmission element should be balanced.

BG90S/L: The rear feet of motors of type of construction IM B3 have double holes in order to ensure that these machines adhere to the standard foot dimensions. On the other hand, all feet of motors of type of construction IM B3 with side-mounted terminal box (special designs) have double holes. This enables the standard hole clearances to be maintained even when the terminal box is arranged on the left-hand side (see Fig. 10).

BG71...90L: In the case of 1LA, 1LP and 1LP motors, **the top part of the terminal box** can be turned through 4x90 degrees.

BG100...160L: The terminal box moulded onto the motor frame cannot be turned. If the **top part of the terminal box is retrofitted** (Fig. 2 - 5.90), the box can be turned through **4 x 90 degrees.**
In the case of **motors with a bolted-on terminal box**, the top part of the box can be turned through **4 x 90 degrees.**

2.3 Balancing, transmission elements

A suitable device should always be used for fitting and removing the transmission elements (couplings, pulleys, pinions, etc.) (Fig. 7).

As standard, the rotors are dynamically balanced with the half featherkey.

When fitting the transmission element, keep the type of balance in mind! (Option: F = balanced with **full** featherkey)

The transmission elements must be balanced in accordance with ISO 1940!

If the transmission elements are balanced with a half featherkey, the visible, protruding part of the featherkey T_P must be cut back (see Fig. 9).

⚠ **The usual measures should be taken to guard transmission elements from touch. If a motor is started up without the transmission element attached, the featherkey should be secured to prevent it being thrown out.**

2.4 Electrical connection

NOTE: If the **openings for cables and leads in the terminal box** are sealed with a "skin" of cast iron, it must be shaken out using a suitable tool (see Fig. 4)!

Care must be taken not to damage the terminal box, the terminal board, the cable connections, etc. inside the terminal box!

See Fig. 4 for details of the screwed connections for cables and leads. **An adapter must be screwed in for PTC thermistor connections!**

The **terminal box** must be sealed so that it is **dust and water-tight.**

The system voltage and the frequency must agree with the data given on the rating plate. Voltage or frequency deviations of ±5% and ±2% respectively from the rated voltage and frequency values are permitted without needing to derate the output. The connection and arrangement of the terminal links must agree with the diagram provided in the terminal box.
Connect the earthing conductor to the terminal with the ⏚ marking.

Wherever terminal clips are used (for example, to DIN 46282), arrange the conductors so that the clips are virtually level on both sides. This method of connection means that the ends of single conductors must be bent in the shape of a U or be fitted with a cable lug (see Fig. 6.1). This also applies to the green-yellow protective earthing conductor and the outer earthing conductor (see Fig. 6.2).

Please refer to Fig. 5 for the tightening torques for the screwed electrical connections - terminal board connections (except for terminal strips).

The anti-condensation heater must not be switched on during operation.

2.5 Checking the insulation resistance

The insulation resistance of the windings must be measured prior to initial startup of the motor, or after long periods of storage or standstill (approx. 6 months).

While the measurement is being taken and immediately afterwards, some of the terminals carry dangerous voltages and must not be touched.

Insulation resistance
- The **minimum insulation resistance** of new, cleaned or repaired windings with respect to ground is 10 Mohms.
- The **critical insulation resistance R_{crit}** is calculated first by multiplying the rated voltage U_N, e.g. 0.69 kV AC, with the constant factor (0.5 Mohms/kV):
  R_{crit} = 0.69 kV * 0.5 Mohms/kV = 0.345 Mohms.

Measurement
The **minimum insulation resistance** of the windings to ground is measured with 500 V DC. The winding temperature should then be $25^{o}C \pm 15\ ^{o}C$.
The **critical insulation resistance** should be measured with 500 V DC with the winding at operating temperature.

Checking
If the **minimum insulation resistance** of a new, cleaned or repaired motor, which has been stored or at standstill for a prolonged period of time, is less than 10 Mohms, this may be due to humidity. The windings must then be dried.

After long periods of operation, the **minimum insulation resistance** may drop to the **critical insulation resistance**. As long as the measured value does not fall below the calculated value of the **critical insulation resistance**, the motor may continue in operation. If it does, the motor must be stopped immediately.

The cause must be determined, and the windings or winding sections repaired, cleaned or dried as necessary.

2.6 Commissioning

NOTE: Electromagnetic compatibility

Emitted interference: Where the **torque is very uneven** (the drive of a piston-type compressor, for example), the inevitable result is a non-sinusoidal motor current, whose harmonics can lead to excessive system perturbation and thus excessive emitted interference.

In the case of **converter-fed motors**, interference is emitted to a greater or lesser degree, depending on the converter version concerned (type, interference suppression measures, manufacturer). The instructions of the converter manufacturer regarding electromagnetic compatibility must be heeded at all times. If the use of a shielded motor cable is recommended, the shield will have the greatest effect if it is conductively connected over a large area on the metal terminal box of the motor (with a screwed metal conduit thread). Noise voltages may occur on the sensor leads of motors with integrated sensors (e.g. PTC thermistors) as a result of the converter.

Noise immunity: If the **motor has an integrated sensor** (e.g. a PTC thermistor), the owner is responsible for ensuring adequate **noise immunity** by choosing a suitable sensor signal lead (possibly with shielding, connected like the motor supply lead) and evaluator.

The data and recommendations specified in all the instructions supplied (**"Information on safety and commissioning"**), and in **all other related instructions**, must always be observed **prior to commissioning!**

After motor installation, the brake, if fitted, should be checked for proper functioning.

3 Maintenance

Safety precautions

⚠ **Before starting any work on the motor or other equipment, particularly before opening covers over live parts, the motor must be properly isolated from the power supply. Besides the main circuits, any additional or auxiliary circuits that may be present must also be isolated.**

The usual "5 safety rules" (as set forth in DIN VDE 0105) are:
- Isolate the equipment
- Take effective measures to prevent reconnection
- Verify equipment is dead
- Earth and short-circuit
- Cover or fence off adjacent live parts

The precautions listed above should remain in force until all maintenance work is finished and the motor has been fully assembled.

NOTE: Where motors are fitted with closed condensed water openings, these should be opened from time to time to allow any accumulated condensed water to drain away.

Condensed water openings should always be at the lowest point of the motor!

Fitting new bearings, type of grease
Under normal operating conditions, with horizontally mounted motors and the following coolant temperatures and motor speeds, the bearings should be changed at the intervals [h] specified below:

Frame sizes		25°C	40°C
71...160L:	... 1800 rev/min	approx. 40,000 h	approx. 20,000 h
	... 3600 rev/min	approx. 20,000 h	approx. 10,000 h

NOTE: The permissible axial and transverse forces (see Catalog) must **not** be exceeded!
Irrespective of the number of operating hours, the rolling-contact bearing should be renewed every 3 years because of grease ageing.

In the case of motors **operating under special conditions**, such as a vertical motor position, heavy vibration, sudden load changes, frequent reversing operation, etc., the bearing should be changed at considerably more frequent intervals than the operating hours stated above.

The motors feature deep-groove ball bearings which are provided with cover plates (2ZC3 version). The cover plate material should withstand temperatures from -30 °C to +150 °C, e.g. polyacryl-rubber (ACM).

Type of grease for standard machines: UNIREX N3 (Esso); synthetic greases must conform to DIN 51825-K3N.

Special greases should be indicated on the rating plate or on a separate plate.

Dismantle the motor to the extent necessary. Pull off the rolling-contact bearing with a suitable device (see Fig. 7). Clean the journal!

Heat the rolling-contact bearing evenly to about 80-100 °C and press on. Heavy blows (such as with a hammer, etc.) should be avoided.

Any **worn sealing elements** (such as the shaft sealing ring, etc.) should also be renewed.

If **springless radial shaft sealing rings** are used, the replacement sealing rings must also be of the springless type.

Regreasing device

In the case of **motors with a regreasing device**, take note of the information given on the rating plate or the lubrication instruction plate! The bearings should be relubricated while the motor is running!

4 1MA and 1MF motors with increased EExe protection

The information in italics is intended to serve as supplementary or special information on these types of motors.
The increased hazards in areas which are exposed to the danger of explosion or firedamp necessitate that the general notes on safety and commissioning are carefully complied with.
Electrical machines which are protected against explosion are in line with the standards EN 60034 (VDE 0530) and EN 50014 to 50020. It is permitted to use these machines in areas exposed to the danger of explosion only in accordance with the stipulations of the responsible authority which also determines whether a danger of explosion exists (division into zones).
If the relevant certification is supplemented by an X, any special stipulations in the certificate of conformity are to be complied with.
The cable entries must be approved for the explosion-endangered area and be secured to prevent accidental loosening. Unused openings are to be closed with approved plugs.
In the case of 1MA-motors, a cover to prevent foreign bodies from falling into the motor-fan cowl (see DIN EN 50014) is to be located on the end of the shaft at the top, e.g. types of construction IMV3, IMV6 and IMV19 (see Fig. 1). This cover must not hinder cooling of the motor by its fan.
Unless other information regarding type of operation and tolerances is given on the test certificate or on the rating plate, electrical machines are designed for continuous operation and normal, rarely recurring starting procedures during which no excessive temperature increases occur. The motors must only be used for the type of operation indicated on the rating plate.
Section A in EN 60034-1 (VDE 0530, Part 1) - voltage ± 5 %, frequency ± 2 %, waveform, power-system symmetry - must be complied with in order to ensure that any increase in temperature remains within the permitted limits. Greater deviations from the rated values can lead to non-permissible increases in the temperature of the machine and must be indicated on the rating plate.
The temperature class of the motor given on the rating plate must agree with the temperature class of the inflammable gas which may occur.
Each machine is to be protected in all phases against non-permissible temperature increases by means of a current-dependent, time-delayed circuit-breaker with phase-failure protection to VDE 0660 or an equivalent device. The protective device is to be set to the rated current. In the case of delta-connected windings, the trips are to be connected in series with the winding phases and set to 0.58 times the rated current. If such a circuit is not possible, additional protective measures are necessary (e.g. thermal machine protection).
If the rotor is blocked, the protection device must switch off the machine within the time t_E indicated for the respective temperature class.
***Electrical machines for heavy starting** (power-up time > 1.7 x t_E) are to be protected according to the stipulations of the certificate of conformity by means of a starting-cycle monitoring circuit.*
Thermal machine protection by means of direct temperature monitoring of the winding is permissible if this is certified and indicated on the rating plate.
***In the case of pole-changing motors**, separate and reciprocally locked protective devices are necessary for each speed step. Devices with the test report of an approved testing agency are recommended.*
In Germany, please refer to DIN 57165/VDE 0165 and ElexV when erecting electrical installations in areas exposed to the danger of explosion. In countries other than Germany, the relevant national regulations are to be complied with in each case!
***Operation on a converter must be certified.** The separate instructions of the manufacturer must be complied with. For EExe type of protection, the motor, converter and protective devices must be marked to show they belong together and the permissible operating data must be specified in the shared test certificate (VDE 0165).*

ANHANG / APPENDIX / APPENDICE / ANEXO / APPENDICE / BILAGA

DEUTSCH

Ersatzteile, vom Werk lieferbar (s. Bestellbeispiel)

1.00 Lagerung AS
.40 Lagerschild
.43 Wellendichtring
.47 Dichtung
.58 Federscheibe
.60 Wälzlager
.61 Federband für Lagerschildnabe (nicht immer vorhanden)

3.00 Läufer, komplett
.88 Paßfeder für Lüfter

4.00 Ständer, komplett
.07 Gehäusefuß, rechts
.08 Gehäusefuß, links
.18 Leistungsschild
.19 Schraube
.20 Abdeckung
.30 Kontaktwinkel
.31 Erdungswinkel

5.00 Klemmenkasten, komplett
.03 Dichtung
.10 Klemmenbrett, komplett
.11 Klemmleiste (z. B. für Kaltleiteranschluß)
.44 Klemmenkasten-Oberteil
.53 Verschlußstopfen
.70 Klemmbügel
.71 Klemmbügel
.83 Dichtung
.84 Klemmenkasten-Deckel
.85 Dichtung
.89 Schraube
.90 Klemmenkastenoberteil 4x90 Grad drehbar, komplett (für nachträglich Anbau)
.92 Klemmenkasten-Deckel
.93 Dichtung
.95 Klemmenkasten-Oberteil
.98 Dichtung

6.00 Lagerung BS
.10 Wälzlager
.11 Federband für Lagerschildnabe (nicht immer vorhanden)
.20 Lagerschild
.23 Wellendichtring

7.00 Belüftung, komplett
.04 Lüfter
.40 Lüfterhaube

Auf- und Abziehvorrichtungen für Wälzlager, Lüfter und Abtriebselemente sind nicht lieferbar!

ENGLISH

Spare parts, available from the works (see order example)

1.00 Bearing, drive end
.40 Endshield
.43 Shaft sealing ring
.47 Seal
.58 Resilient preloading ring
.60 Rolling-contact bearing
.61 Spring band for endshield hub (not always provided)

3.00 Rotor, complete
.88 Featherkey for fan

4.00 Stator, complete
.07 Frame foot, right
.08 Frame foot, left
.18 Rating plate
.19 Bolt
.20 Cover
.30 Contakt angele
.31 Earthing angele

5.00 Terminal box, complete
.03 Seal
.10 Terminal board, complete
.11 Terminal strip(e.g. for PTC thermistor connection)
.44 Top part of terminal box
.53 Plug
.70 Terminal clip
.71 Terminal clip
.83 Seal
.84 Terminal box cover
.85 Seal
.89 Screw
.90 Top part of terminal box, can be turned through 4 x 90 degrees, complete (for retrofitting)
.92 Terminal box cover
.93 Seal
.95 Top part of terminal box
.98 Seal

6.00 Bearing, non-drive end
.10 Rolling-contact bearing
.11 Spring band for endshield hub (not always provided)
.20 Endshield
.23 Shaft sealing ring

7.00 Ventilation, complete
.04 Fan
.40 Fan cowl

The devices for pressing on and pulling off the rolling-contact bearings, the fan and the transmission elements cannot be ordered!

FRANÇAIS

Pièces de rechange, livrables par l'usine (voir exemple de commande)

1.00 Palier côté entraînement
.40 Flasque-palier
.43 Bague d'étanchéité
.47 Joint
.58 Rondelle élastique
.60 Roulement
.61 Lame élastique pour moyeu du flasque (pas toujours présente)

3.00 Rotor, complet
.88 Clavette pour ventilateur

4.00 Stator, complet
.07 Patte de la carcasse, droite
.08 Patte de la carcasse, gauche
.18 Plaque signalétique
.19 Vis
.20 Recouvrement
.30 Equerre de contact
.31 Equerre de mise à la terre

5.00 Boîte à bornes, complète
.03 Joint
.10 Plaque à bornes, complète
.11 Bornier (par ex. pour sonde CTP)
.44 Partie supérieure de la boîte à bornes
.53 Bouchon
.70 Etrier de serrage
.71 Etrier de serrage
.83 Joint (torique sur (HA 180...200)
.84 Couvercle de la boîte à bornes
.85 Joint
.89 Vis
.90 Parie supérieure de la boîte à bornes, orientable de 4 x 90 °, complète (pour montage ultérieur)
.92 Couvercle de la boîte à bornes
.93 Joint
.95 Partie supérieure de la boîte à bornes
.98 Joint

6.00 Palier côté opposé à l'entraînement
.10 Roulement
.11 Lame élastique pour moyeu du flasque (pas toujours présente)
.20 Flasque-palier
.23 Bague d'étanchéité

7.00 Ventilation, complète
.04 Ventilateur
.40 Capot du ventilateur

Les dispositifs d'emmanchement et d'extraction pour roulements, ventilateurs et organes de transmission ne sont pas livrables.

B3

Normteile sind nach Abmessung, Werkstoff und Oberfläche im freien Handel zu beziehen.

Standard commercially available parts are to be purchased in accordance with the specified dimensions, material and surface finish.

Les **pièces normalisées** peuvent être obtenues dans le commerce d'après leurs dimensions, le matériau et l'état de surface.

Las **piezas estándar** se comprarán en comercios del ramo según las dimensiones, material y superficie especificados.

Le **parti standard** sono reperibili sul mercato secondo le dimensioni, il materiale e la finitura della superficie.

Normerade detaljer kan erhållas i öppna handeln, och skall specificeras beträffande storlek, material och ytbehandling.

4.05 (s. Fig. 3) DIN 125

4.10 4.38 5.78 DIN 128

7.12 DIN 471

6.02 DIN 472

4.04 (s. Fig. 3) DIN 580

1.49 4.11 4.39 5.19 5.49 5.79 5.91 5.94 6.29 7.49 DIN 912 DIN 931 DIN 933 DIN 7985

3.38 DIN 6885

5.52 5.54 5.96 5.97 DIN 46 320

1.60 6.10 DIN 625 Lagertyp: Type of bearing: Type de roulement: Tipo de cojinete: Tipo di cuscinetto: Lagertyp:

Fig. 2

ESPAÑOL

Piezas de recambio, suministro desde fábrica (v. ejemplo de pedido)

1.00 Rodamiento D
.40 Escudo portacojinetes
.43 Anillo obturador
.47 Sello
.58 Arandela flexible
.60 Rodamiento
.61 Cinta elástica para el cubo del escudo portacojinetes (no se emplea siempre)

3.00 Rotor, completo
.88 Chaveta para ventilador

4.00 Estator, completo
.07 Pata derecha de la carcasa
.08 Pata izquierda de la carcasa
.18 Placa de características
.19 Tornillo
.20 Tapa
.30 Angular de contacto
.31 Angular exterior de puesta a tierra

5.00 Caja de bornes, completa
.03 Sello
.10 Placa de bornes, completa
.11 Regletero (p. ej. para conexión con termistor PTC)
.44 Parte superior de la caja de bornes
.53 Tapón
.70 Pisacables
.71 Pisacables
.83 Sello
.84 Tapa de la caja de bornes
.85 Sello
.89 Tornillo
.90 **Parte superior de la caja de bornes, girable en 4 x 90 grados, completa** (para montaje posterior)
.92 Tapa de la caja de bornes
.93 Sello
.95 Parte superior de la caja de bornes
.98 Sello

6.00 Rodamiento N
.10 Rodamiento
.11 Cinta elástica para el cubo del escudo portacojinetes (no se emplea siempre)
.20 Escudo portacojinetes
.23 Anillo obturador

7.00 Sistema de ventilación, completo
.04 Ventilador
.40 Capota del ventilador

¡No se pueden suministrar los dispositivos para calar y extraer los rodamientos, ventiladores y órganos de accionamiento!

ITALIANO

Parti di ricambio disponibili da magazzino (vedere esempi di ordinazione)

1.00 Cuscinetti lato albero
.40 Coperchio del cuscinetto
.43 Anello di tenuta dell'albero
.47 Anello di tenuta
.58 Anello elastico
.60 Cuscinetto a rotolamento
.61 Nastro elastico per il mozzo dello scudo di supporto (non sempre inserito)

3.00 Rotore completo
.88 Chiavetta per ventilatore

4.00 Statore completo
.07 Piede di sostegno destro
.08 Piede di sostegno sinistro
.18 Targhetta dei dati
.19 Vite
.20 Coperchio
.30 Angolare di contatto
.31 Angolare di messa a terra

5.00 Cassetta terminale completa
.03 Guarnizione
.10 Morsettiera completa
.11 Morsettiera ad es. per il collegamento di termistori PTC
.44 Parte superiore della cassetta terminale
.53 Tappon
.70 Staffa
.71 Staffa
.83 Anello di tenuta
.84 Coperchio della cassetta terminale
.85 Guarnizione
.89 Vite
.90 **Parte superiore della cassetta orientabile 4 volte di 90°, completa (per montaggio successivo)**
.92 Coperchio della cassetta terminale
.93 Guarnizione
.95 Parte superiore della cassetta terminale
.98 Guarnizione

6.00 Cuscinetti lato opposto albero
.10 Cuscinetti a rotolamento
.11 Nastro elastico per il mozzo dello scudo di supporto (non sempre inserito)
.20 Coperchio dei cuscinetti
.23 Anello di tenuta dell'albero

7.00 Ventilatore completo
.04 Ventilatore
.40 Cappa del ventilatore

I dispositivi per il calettamento e l'estrazione di cuscinetti, ventilatori e elementi di trasmissione non possono essere ordinati!

SVENSKA

Reservdelar, kan levereras från fabriken (se beställningsexempel)

1.00 Lager AS
.40 Lagersköld
.43 Axeltätring
.47 Packning
.58 Fjäderbricka
.60 Rullager
.61 Fjäderband för lagersköldsnav (finns ej alltid)

3.00 Rotor, komplett
.88 kil för fläkt

4.00 Stator, komplett
.07 Fot för hus, höger
.08 Fot för hus, vänster
.18 Märkskylt
.19 Skruv
.20 Lock
.30 Kontaktvinkel
.31 Jordingsvinkel

5.00 Uttagslåda, komplett
.03 Packning
.10 Kopplingsplint, komplett
.11 Kontaktplint (t.ex. för anslutning av PTC-termistor)
.44 Överdel till uttagslåda
.53 Avslutningspropp
.70 Klämbygel
.71 Klämbygel
.83 Packning
.84 Lock till uttagslåda
.85 Packning
.89 Skruv
.90 **Överdel till uttagslåda 4 x 90 grader vridbar, komplett (för montering i efterhand)**
.92 Lock till uttagslåda
.93 Packning
.95 Överdel till uttagslåda
.98 Packning

6.00 Lager BS
.10 Rullager
.11 Fjäderband för lagersköldsnav (finns ej alltid)
.20 Lagersköld
.23 Axeltätring

7.00 Ventilation, komplett
.04 Fläkt
.40 Fläktkåpa

På- och avdragningsanordningar för rullager, fläkt och drivdonselement kan inte levereras!

Bestellbeispiel
Order example
Exemple de commande
Ejemplo de pedido
Esempio di ordinazione
Beställningsexempel

1.40 Lagerschild
1LA7 163-4AA60
Nr. E4A6 4567 890077

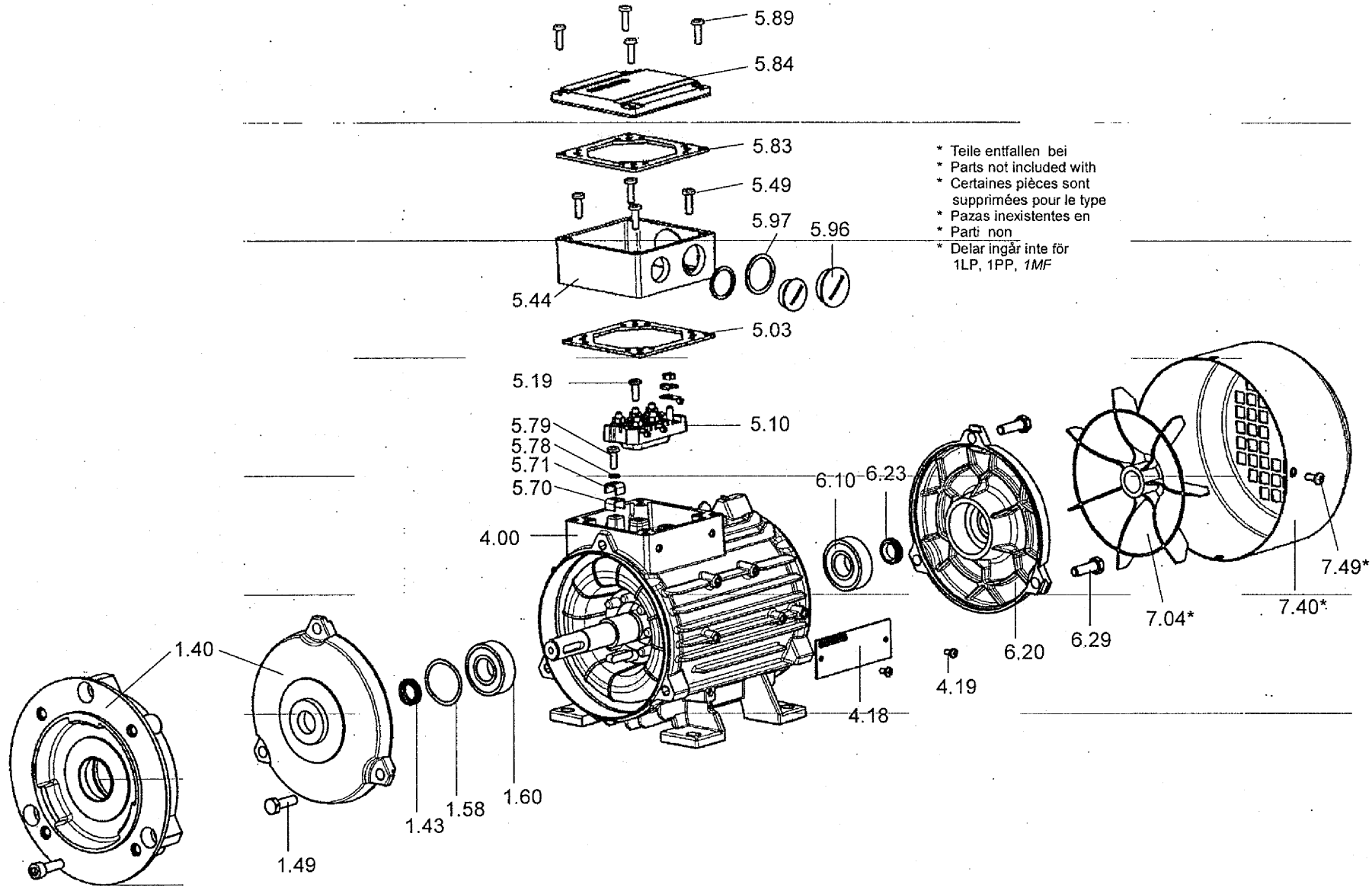


Fig. 2 BG 71...90L

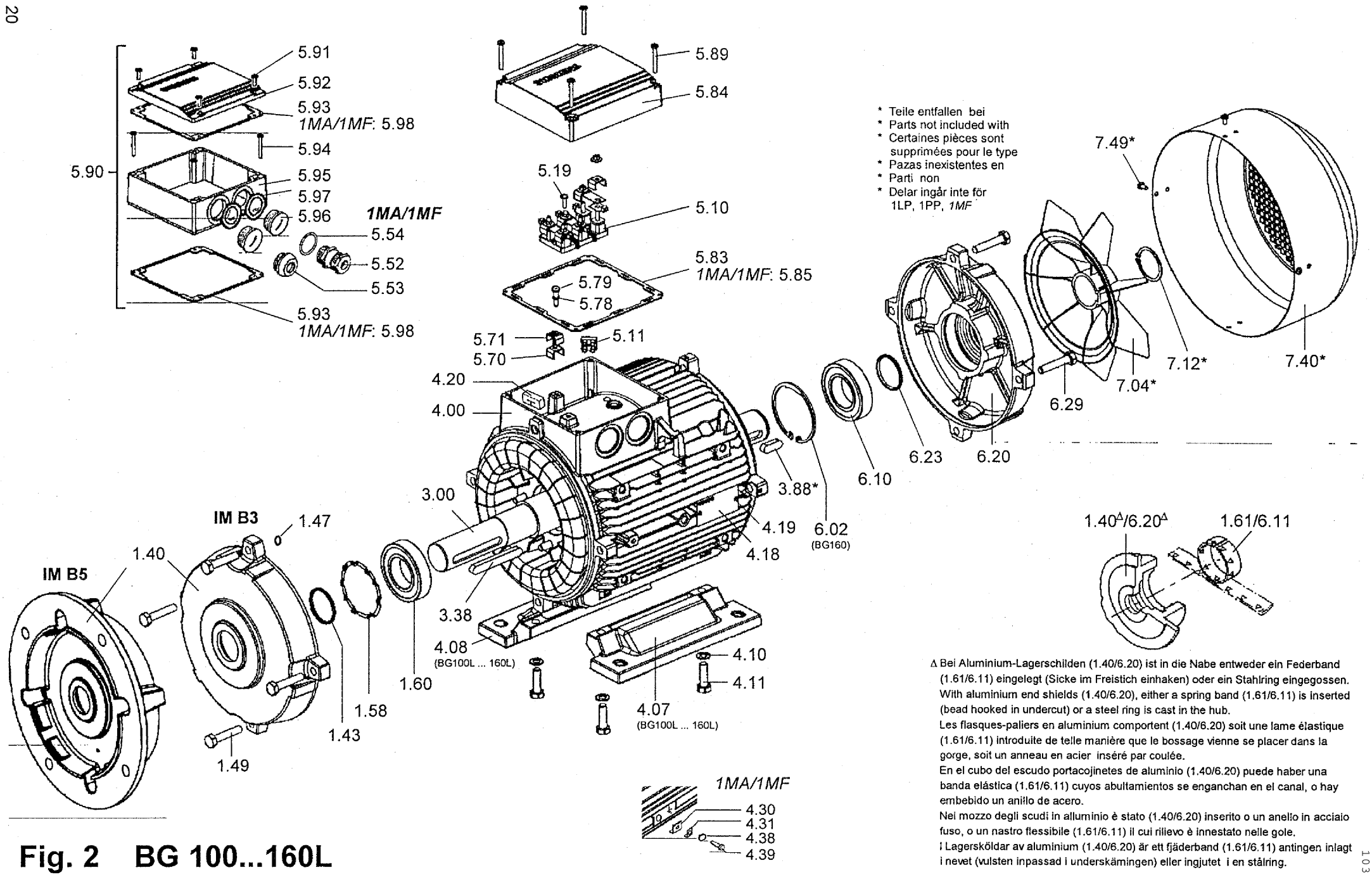
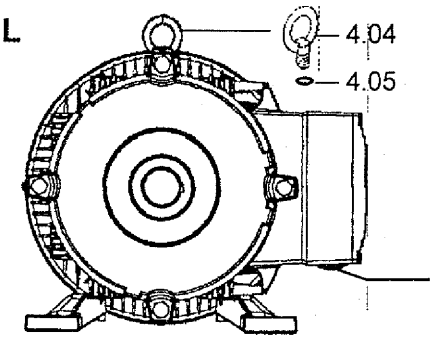


Fig. 2 BG 100...160L

Δ Bei Aluminium-Lagerschilden (1.40/6.20) ist in die Nabe entweder ein Federband (1.61/6.11) eingelegt (Sicke im Freistich einhaken) oder ein Stahlring eingegossen.
With aluminium end shields (1.40/6.20), either a spring band (1.61/6.11) is inserted (bead hooked in undercut) or a steel ring is cast in the hub.
Les flasques-paliers en aluminium comportent (1.40/6.20) soit une lame élastique (1.61/6.11) introduite de telle manière que le bossage vienne se placer dans la gorge, soit un anneau en acier inséré par coulée.
En el cubo del escudo portacojinetes de aluminio (1.40/6.20) puede haber una banda elástica (1.61/6.11) cuyos abultamientos se enganchan en el canal, o hay embebido un anillo de acero.
Nei mozzo degli scudi in alluminio è stato (1.40/6.20) inserito o un anello in acciaio fuso, o un nastro flessibile (1.61/6.11) il cui rilievo è innestato nelle gole.
I Lagersköldar av aluminium (1.40/6.20) är ett fjäderband (1.61/6.11) antingen inlagt i nevet (vulsten inpassad i underskämingen) eller ingjutet i en stålring.

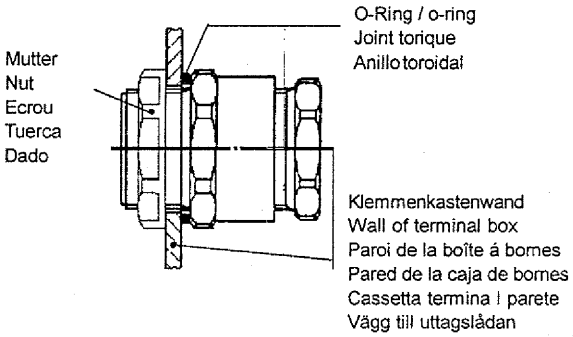
BG 100...160L



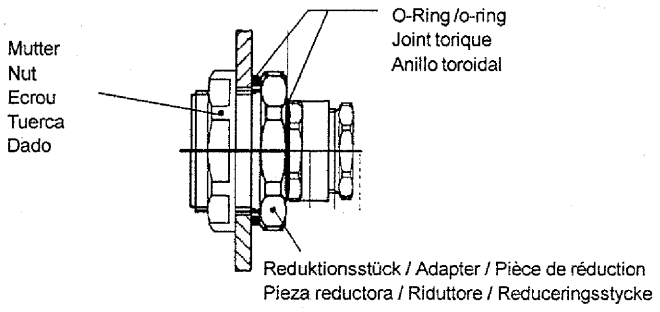
z. B. Öffnung für Kabel und Leitungen - unten
e.g. opening for cables and leads - bottom
p. e. traversées pour câbles et conducteurs - en bas
p. ej abertura pasacables - abajo
ad es. passaggio per conduttori e cavi - parte inferiore
t.ex. öppning för kabel och ledningar - nedtill

Fig. 3 **Ausführung mit seitlich angeordnetem Klemmenkastenoberteil (4x90° drehbar)**
Motor with top part of terminal box mounted on side (can be turned through 4x90°)
Exécution avec partie supérieure de la boîte á bornes disposé sur le côté
Motor con la parte superior de la caja de bornes adosada lateralmente (puede girarse 4x90°)
Esecuzione con parte superiore della cassetta terminale disposta lateralmente (orientabile 4x90°)
Utförande med överdel till uttagslådan (4x90° vridbar) monterad på sidan

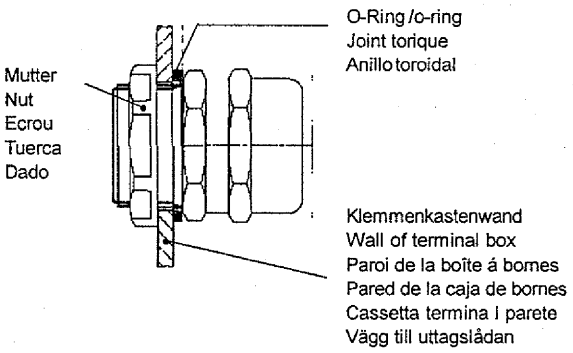
Verschraubungen mit Mutter (z. B. DIN 46 320)
Screwed connections with nut (e.g. DIN 46 320)
Presse-étoupe avec écrou (p.e. DIN 46320)
Uniones atornilladas con tuerca (p. ej DIN 46329)
Collegamenti a vite con dado (es DIN 46 320)
Skruvförband med mutter (t.ex. DIN 46 320)



Kaltleiterverschraubungen mit Reduktionsstück und Mutter (z. B. DIN 46 320)
Screwed PTC thermistor connections with adapter and nuts (e.g. DIN 46 320)
Presse-étoupe pour sonde CTP avec pièce de réduction (p. e. DIN 46320)
Conexión de termistor PTC con reductor y tuercas (p.ej. DIN46320)
Collegamenti a vite per termistori PTC con riduttore e dado (ad es. DIN 46 320)
Skruvförband för PTC-termistor med reduceringsstycke och mutter (t.ex. DIN 46 320)



1MA/1MF: EEx e - bescheinigte Verschraubung mit Mutter
1MA/1MF: EEx e - certify screwed connections with nut
1MA/1MF: EEx e - certifier presse-étoupe avec écrou
1MA/1MF: EEx e - certificar uniones atornilladas con tuerca
1MA/1MF: EEx e - certificare collegamenti a vite con dado
1MA/1MF: EEx e - intyga skruvförband med mutter



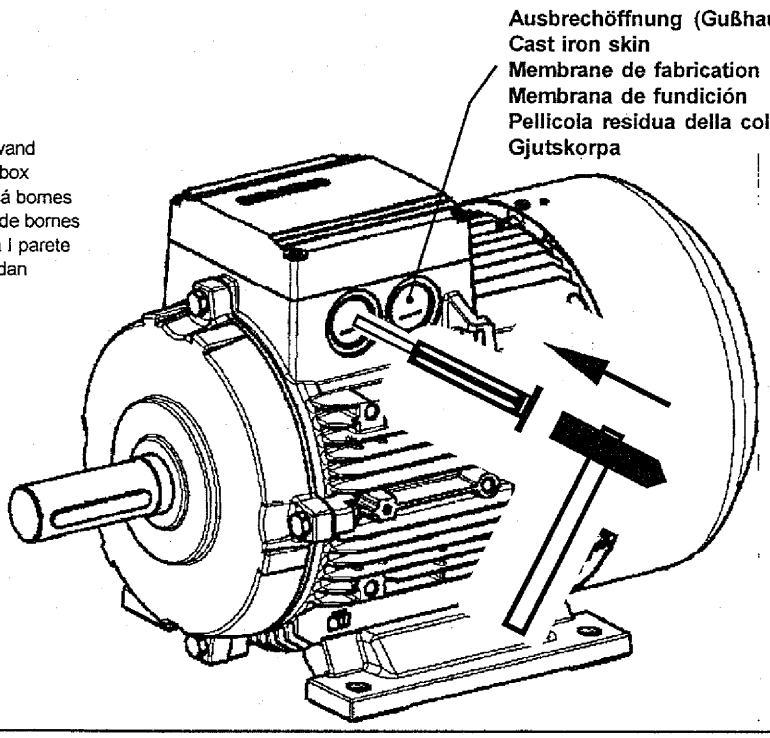


Fig. 4 BG 100...160L

Ausschlagen der Öffnungen für Kabel und Leitungen im Klemmenkasten
Knocking out the openings for cables and leads in the terminal box
Rupture des membranes de fabrication aburant les entées de câbles et de conducteurs sur la boîte á bornes
Martillando las aberturas pasacables de la caja de bornes
Asportare la pellicola per cavi e conduttori nella cassetta terminale
Utslagning av öppningarna för kabel och ledningar i uttagslådan

B 3

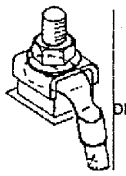


Gewinde-⌀ / Thread-⌀ ⌀ du filetage / ⌀ de la rosca Diametro del filetto / Gängdimeter		M4	M5	M6	M8	M10	M12	M16
Anziehdrehmoment Tightening torque Couple de serrage Par de apriete Coppia di serraggio Åtdragningsmoment N m	min	0,8	1,8	2,7	5,5	9	14	27
	max	1,2	2,5	4	8	13	20	40

Die obigen Anziehdrehmomente gelten soweit keine anderen Werte angegeben sind!
The above values of tightening torque are applicable unless alternative values are given elsewhere.
Les couples de serrage indiqués ci-dessus sont valables pour autant qu'aucune valeur spécifique ne soit donnée.
Estos pares de apriete rigen mientras no se indiquen otros.
Le coppie di serraggio indicate qui di sopra sono valide se non sono indicati altri valori.
Ovanstående åtdragningsmoment gäller om ej andra värden angivits!

Fig. 5 **Anziehdrehmomente für Schraubenverbindungen der elektrischen Anschlüsse - Klemmenbrettanschlüsse** (außer Klemmenleisten)
Tightening torques for screwed electrical connections - terminal board connections (except for terminal strips)
Couples de serrages des bornes de la plaque à bornes (ne concerne pas les borniers)
Pares de apriete para uniones atornilladas de las conexiones eléctricas en la placa de bornes (exceptuando las regletas de bornes).
Coppie di serraggio per le viti di attacco di collegamenti elettrici / dei portamorsetti (escluse morsettiere)
Åtdragningsmoment för de elektriska anslutningarnas skruvförband (utom på kontaktplintar)

... 25 mm²



Bei Anschluß mit DIN- Kabelschuh ist dieser nach unten abzuwinkeln!

If connections are made with DIN cable lugs, bend the cable lugs downwards.

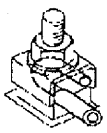
Lorsque le raccordement est réalisé par cosses DIN, celles-ci doivent être pliées vers le bas.

Si la conexión se efectúa con terminales para cables DIN, habrá que doblarlos hacia abajo.

Nel collegamento con capocorda conforme alle norme DIN, questo va piegato verso il basso.

Vid anslutning med kabelsko enl. DIN skall denna bockas nedåt.

... 10 mm²



Anschluß eines einzelnen Leiters mit Klemmbügel.

Connecting a single conductor with a terminal clip.

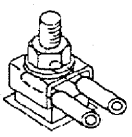
Raccordement d'un seul conducteur à une borne à étrier.

Conexión de un solo conductor con un pisacables.

Allacciamento di ogni singolo conduttore con staffa.

Anslutning av en enkelledare med klämbygel.

... 25 mm²



Anschluß von zwei etwa gleich dicken Leitern mit Klemmbügel.

Connecting two conductors of almost equal thickness with a terminal clip.

Deux conducteurs de diamètre à peu pré équivalents, raccordés à une borne à étrier.

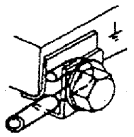
Conexión de dos conductores de diámetro aproximadamente igual, con un pisacables.

Allacciamento di due conduttori di stesso o pressocchè indentico spessore con staffa.

Anslutning av två ungefär lika tjocka ledare med klämbygel.

Fig. 6.1

... 10 mm²



Anschluß eines einzelnen Leiters unter äußerem Erdungswinkel.

Connecting a single conductor under the outer earthing angle.

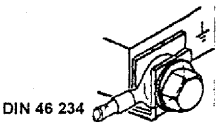
Raccordement d'un seul conducteur à une équerre extérieure de mise à la terre.

Conexión de un solo conductor bajo el angular exterior de puesta a tierra.

Allacciamento di ogni singolo conduttore sotto angolare di messa a terra esterno.

Anslutning av en enkelledare under extern jordningsvinkel.

... 25 mm²



Bei Anschluß mit DIN- Kabelschuh unter äußerem Erdungswinkel.

If connections are made with DIN cable lugs, under the outer earthing angle.

Lorsque le raccordement est réalisé par cosses DIN, à une équerre extérieure de mise à la terre.

Si la conexión se efectúa con terminales para cables DIN, bajo el angular exterior de puesta a tierra.

Nel collegamento con capocorda conforme alle norme DIN, sotto angolare di messa a terra esterno.

Vid anslutning med kabelsko enl. DIN under extern jordningsvinkel.

Fig. 6.2

Fig. 6 **Anschließbare Querschnitt je nach Klemmengröße** (ggf. reduziert durch Größe der Leitungseinführungen)
Conductor cross-sections connectable to the various terminals (may be reduced by size of cable entries)
Sections raccordables suivant la taille de la borne (réduction éventuelle par la taille des entrées de câbles)
Sección conectable según tamaño del borne (en caso dado, más pequeña debido al tamaño de las entradas de línea)
Diametri dei collegamenti a sec. delle misure dei morsetti (eventualmente sono ridotte le dimensioni delle aperture per i conduttori) **Anslutningsbara ledarareor för olika klämstorlekar** (ev. reducerat med hänsyn till genomföringens storlek)

Zwischenscheibe (Schutz der Zentrierung im Wellenende)
Spacer washer (to protect centring bore in shaft end)
Rondelle (protection du centrage en bout d'arbre)
Disco intermedio (protege el centrado en el extremo del eje)
Spessore (protezione della centratura null'estremità d'albero)
Distansbricka (skydd av centreringen I axeltappen)

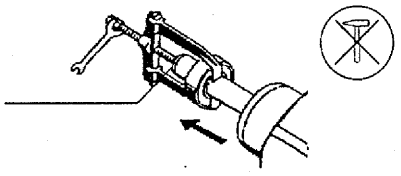
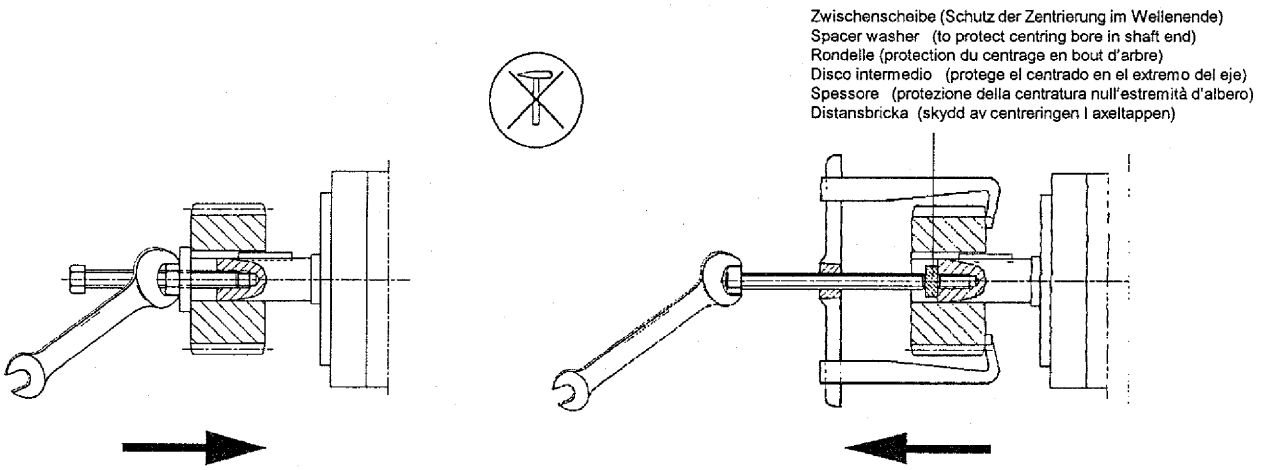


Fig. 7 **Lagerwechsel / Changing bearings / Remplacement des roulements**
Cambio de cojinetes / Sostituzione dei cuscinetti / Lagerbyte



Zum Aufziehen von Abtriebselementen (Kupplung, Zahnrad, Riemenscheibe usw.), Gewinde im Wellenende benutzen und - sofern möglich - Abtriebselemente nach Bedarf erwärmen. Zum Abziehen geeignete Vorrichtung verwenden. Es dürfen beim Auf- und Abziehen keine Schläge (z.B. mit Hammer oder ähnlichem) oder größere als die laut Katalog zulässigen radialen oder axialen Kräfte über das Wellenende auf die Motorlager übertragen werden.

Use the tapped hole provided in the end of the shaft for fitting drive components such as couplings, gearwheels, belt pulleys, etc. and, if possible, heat the components as necessary. Use a suitable puller tool for removing the components. Do not strike the components, e.g. with a hammer or similar tool, when fitting or removing them and do not exert more than the maximum value of radial or axial force - according to the catalog - transmitted to the motor bearings through the shaft extension.

Pour monter les organes de transmission (accouplements, roues dentées, poulies à courroie, etc.), utiliser le taraudage du bout d'arbre. Au besoin et lorsque cela est possible, chauffer les organes de transmission. Pour le démontage, utiliser un dispositif approprié. Aucun coup (par ex. marteau) supérieur aux efforts axiaux et radiaux admissibles mentionnés au catalogue ne doit être transmis par l'arbre aux roulements en cours de montage ou de démontage.

Para calar los órganos de transmisión (acoplamientos, rueda dentada, polea, etc.) utilizar la rosca en el extremo del eje y - siempre que sea posible - calentar convenientemente dichos órganos. Utilizar el dispositivo adecuado para la extracción. Durante las operaciones de calado o extracción no golpear (p. ej. con martillo o similar) ni ejercer sobre los cojinetes del motor a través del extremo del eje fuerzas axiales o radiales superiores a las admisibles según catálogo.

Per calettare gli elementi di transmissione (giunti, ruote dentate, pulegge, ecc.), utilizzare il foro filettato nell'estremità d'albero e, se possibile, riscaldare gli elementi di transmissione . Per l'estrazione vanno adoperati attrezzi adatti. Sono da evitare colpi o martellate, e forze radiali o assiali trasmesse dall'estremità d'albero ai cuscinetti maggiori di quelle consentite sec. il catalogo.

Använd axeltappens gänga vid pådragning av drivdon (koppling, kugghjul, remskiva etc) och värm om möjligt upp drivdonen om så behövs. Använd lämpliga verktyg för avdragningen. Några slag (t.ex. med hammare e.dyl.) får aldrig förekomma vid på- och avdragning, och radiella och axiella krafter som är större än de som anges i katalogen får inte överföras till motorlagren via axeltappen.

Fig. 8 **Auf- und Abziehen von Abtriebselementen / Pressing on and pulling off drive elements**
Emmanchement et extraction d'organes de transmission / Calado y extracción de órganos de transmisión
Calettamento ed estrazione degli elementi di transmissione / På- och avdragning av drivdon

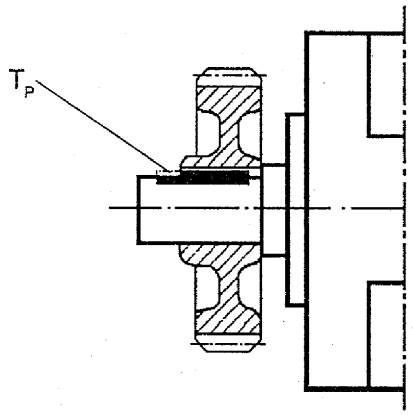
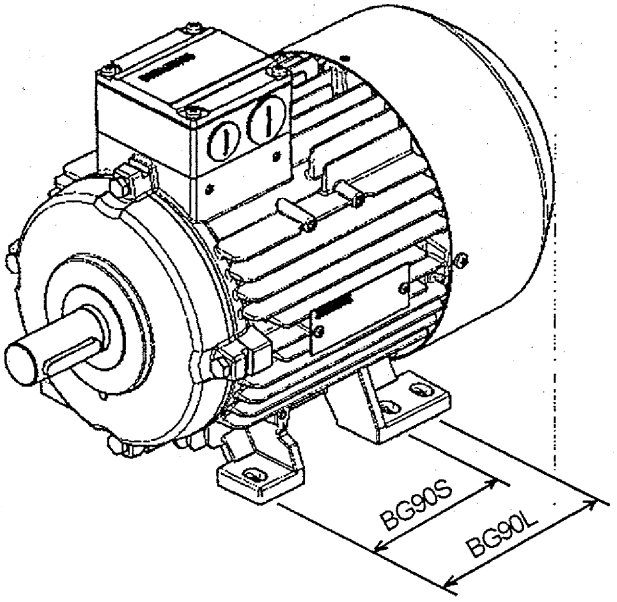
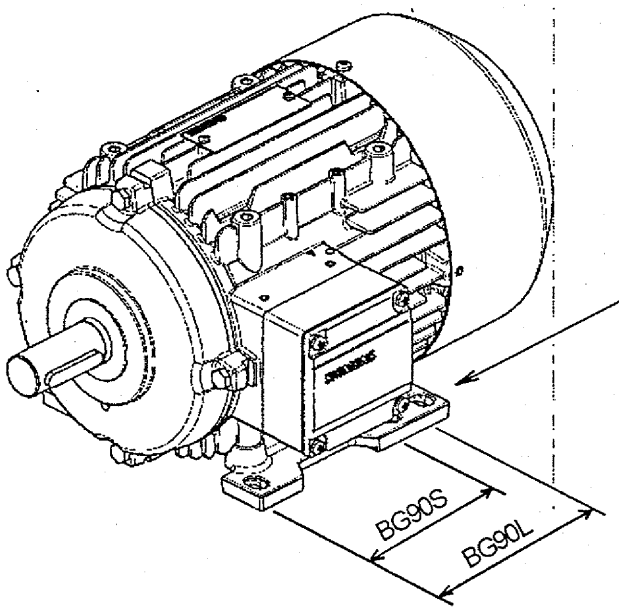


Fig. 9 **Auswuchtung mit halber Paßfeder / Balancing with half featherkey**
Equilibrage avec demi-clavette / Equilibrado con media chaveta
Equilibratura con mezza chiavetta / Balansering med halv kil





Fußloch ermöglicht 90S/L - Anbaumaße bei Klemmenkasten-anordnung links.

Hole in foot permits 90S/L mounting dimensions with terminal box arrenged on the left.

Le trou d'embase perment les cotes de fixation 90S/L quand la boîte à bornes est disposée à gauche.

El taladro en la pata posibilita el montaje según las medidas 90S/L cuando la caja de bornes se encuentra en el lado izquierdo.

Nei motori di gradezza 90S/L con cassetta morsetti disposta a sinistra, i fori nei piedini permettono il rispetto delle distanze normalizzate.

Genom hålet i foten erhålles 90S/L-mått när anslutningslådan är monterad på vanster sida.

Fig. 10 BG 90S,L

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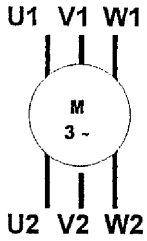
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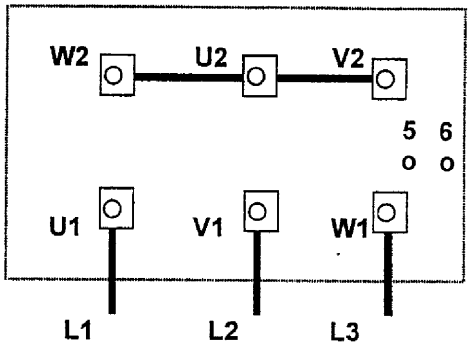
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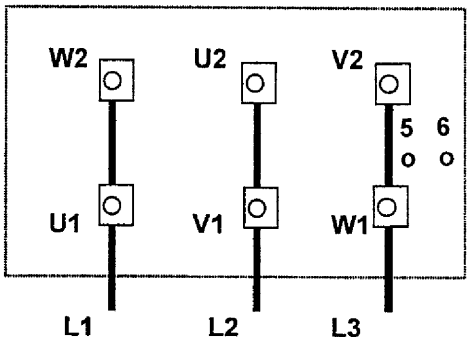
Motor-Klemmbrett
Terminal board

Y **Stern-Schaltung**
Star - connection





△ **Dreieck-Schaltung**
Delta - connection



5 - 6 **Kaltleiter – Temperaturfühler**
Nicht mehr als 2,5 V anlegen

5 - 6 **PTC thermistor sensors**
Do not apply more than 2.5 V

Klemmen-Anschlußplan
Connecting three-phase-motors

Ausführung / design 1LA, 1MA, 1MJ, 1PP, 1PQ,

B3

LEWA

A Unit of the
HERBERT OTT-GROUP

LEWA worldwide

Headquarters

LEWA Herbert Ott GmbH + Co
Ulmer Straße 10
71229 Leonberg
Germany
Phone +49/71 52/14-0
Fax +49/71 52/14-13 03
lewa@lewa.de
www.lewa.de

Affiliated Companies

AMERICAN LEWA, INC.
132 Hopping Brook Road
Holliston, MA 01746
USA
Phone +1/508/429-7403
Fax +1/508/429-8615
sales@amlewa.com
www.americanlewa.com

LEWA ASIA HERBERT OTT PTE LTD
45 Gul Drive, Jurong
Singapore 629492
Singapore
Phone +65/68 61 71 27
Fax +65/68 61 65 06
info@lewa-asia.com.sg

LEWA SULAMERICANA Ltda.
Av. Santa Catarina 2153
Vila Santa Catarina
04378-400 São Paulo - SP
Brazil
Phone +55/11/56 77 04 66
Fax +55/11/55 64 68 27
info@lewa-sulamericana.com.br

Herbert Ott AG
Nenzlingerweg 5
4153 Reinach 1
Switzerland
Phone +41/61/7 17 94 00
Fax +41/61/7 17 94 01
info@herbert-ott-ag.ch
www.herbert-ott-ag.ch

HOV
Herbert Ott Vertriebs-GmbH + Co
Daimlerstraße 17
71229 Leonberg
Germany
Phone +49/71 52/60 91-0
Fax +49/71 52/60 91-59
hov@hov.de
www.hov.de

LEWA Herbert Ott KG
Wattmanngasse 49
1130 Vienna
Austria
Phone +43/1/8 77 30 40-0
Fax +43/1/8 77 30 40-29
info@lewa.at
www.lewa.at

POMPES LEWA S.A.R.L.
43-49, rue Léon Jouhaux
78500 Sartrouville
France
Phone +33/1/30 86 74 80
Fax +33/1/39 57 06 08
info@pompes-lewa.fr
www.pompes-lewa.fr

POMPE LEWA S.R.L.
Via Marconi, 28/1
20020 Arese
Italy
Phone +39/02/93 58 26 60/1
Fax +39/02/93 58 26 57
info@pompe-lewa.it
www.pompe-lewa.it

Representatives Abroad
Europe

Albania
LEWA Herbert Ott KG, Austria

Austria
LEWA Herbert Ott KG
Wattmanngasse 49
1130 Vienna
Phone +43/1/8 77 30 40-0
Fax +43/1/8 77 30 40-29
info@lewa.at
www.lewa.at

Baltic Nations
Johnson Pump Oy, Finland

Belgium
Geveke Proquip nv/sa
Leuvensesteenweg 250 A
1800 Vilvoorde
Phone +32/2/2 57 02 30
Fax +32/2/2 57 02 39
info@proquip.geveke.be

Belorussia
LEWA Herbert Ott KG, Austria

Bosnia-Herzegovina
LEWA Herbert Ott KG, Austria

Bulgaria
LEWA - Technical Office Sofia
Str. Johan Eksarch 2 b
1421 Sofia
Phone +359/2/65 40 88
Fax +359/2/9 63 34 09
lewa.bg@lewa.at

CIS
Klaus Union
Dokuchaev per. 2
Hotel complex Volga
Building 2, room 3-090
107078 Moscow
Phone +7/0 95/2 80 35 01
Phone +7/0 95/2 80 35 01

Croatia
LEWA Herbert Ott KG, Austria

Czech. Rep.
LEWA Herbert Ott s.r.o.
Sedlákova 19
60 200 Brno
Phone +420/5/43 23 60 52
Fax +420/5/43 23 60 53
lewa.cz@lewa.at

Denmark
AxFlow A/S
Solvang 6
3450 Alleroed
Phone +45/70/10 35 50
Fax +45/70/10 35 55
axflow@axflow.dk

Finland
Johnson Pump Oy
Palotie 3
01610 Vantaa
Phone +358/9/3 48 38 00
Fax +358/9/34 83 84 95
kari.louho@johnson-pump.com

France
POMPES LEWA S.A.R.L.
43-49, rue Léon Jouhaux
78500 Sartrouville
Phone +33/1/30 86 74 80
Fax +33/1/39 57 06 08
info@pompes-lewa.fr
www.pompes-lewa.fr

Germany
LEWA Herbert Ott GmbH + Co
Ulmer Straße 10
71229 Leonberg
Phone +49/71 52/14-0
Fax +49/71 52/14-13 03
lewa@lewa.de
www.lewa.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Kirchhainer Damm 110
12309 Berlin
Phone +49/30/76 49 18-0
Fax ++49/30/76 49 18-30
hov-b@hov.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Wichmannstrasse 4
22607 Hamburg
Phone +49/40/89 96 72-0
Fax +49/40/89 96 72-30
hov-hh@hov.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Bayernstrasse 13
30855 Langenhagen
Phone +49/5 11/9 78 53-0
Fax +49/5 11/9 78 53-30
hov-h@hov.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Hilgenhofstrasse 22
34270 Schauenburg
Phone +49/56 01/92 54 78
Fax +49/56 01/92 54 22
hov-ks@hov.de

Ingenieurbüro Schmedding KG
Steinhof 39
40699 Erkrath
Phone +49/2 11/9 24 85-0
Fax +49/2 11/9 24 85-49
ing.buero.schmedding@t-online.de

Ingenieurbüro Rudolf Risch
Friedrichstrasse 71
61476 Kronberg
Phone +49/61 73/95 55-0
Fax +49/61 73/95 55-30
ing.buero-risch@t-online.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Richard-Lenel-Weg 4
69151 Neckargemünd
Phone +49/62 23/92 36-0
Fax +49/62 23/92 36-30
hov-hd@hov.de

Ingenieurbüro E. Huber & Co.
Am Heilbrunnen 115
72766 Reutlingen
Phone +49/71 21/14 83-0
Fax +49/71 21/14 83-20
hubergmbh.reutlingen@t-online.de

Zettl Ingenieur- und Vertriebs-
gesellschaft mbH & Co. KG
Oldenbourgstrasse 11
81247 München
Phone +49/89/8 18 09-1
Fax +49/89/8 18 09-33
vertrieb@zettl-munich.de

HOV
Herbert Ott Vertriebs-GmbH + Co
Tannenweg 11
99428 Weimar-Gaberndorf
Phone +49/36 43/48 15-0
Fax +49/36 43/48 15-30
hov-we@hov.de

Great Britain
Kinder Janes Engineers Ltd.
Porters Wood
St. Albans, Herts. AL3 6HU
Phone +44/17 27/84 44 41
Fax +44/17 27/84 42 47
lewa@kinder-janes.co.uk

Greece
KSB TESMA AG
Handel-Vertretungen-Anlagenbau
R. Melodou Str. 3
15125 Amaroussion Attikis
Phone +30/10/6 10 80 71-8
Fax +30/10/6 10 80 79
ksbtesma@acci.gc

Hungary
LEWA Herbert Ott Kft.
Lovas ut. 19, fsz. 3
1012 Budapest
Phone +36/1/2 24 04 03
Fax +36/1/4 89 08 33
lewa.hu@lewa.at

Ireland
H. R. Holfeld (Hydraulics) Ltd.
2-4 Merville Road, Stillorgan
Dublin
Phone +353/1/2 88 73 61
Fax +353/1/2 88 73 80

Italy
POMPE LEWA S.R.L.
Via Marconi, 28/1
20020 Arese
Phone +39/02/93 58 26 60
Fax +39/02/93 58 26 57
info@pompe-lewa.it

Liechtenstein
Herbert Ott AG, Switzerland

Luxembourg
Geveke Proquip nv/sa, Belgium

Macedonia
LEWA Herbert Ott KG, Austria

Netherlands
Geveke Werktuigbouw B. V.
Barajasweg 60
1043 CP Amsterdam
Phone +31/20/5 82 91 11
Fax +31/20/6 86 16 04
info@wtb.geveke.nl

Norway
Fly- & Industri-Instrumenter AS
Hauketoveien 11,
Postboks 4 Hauketo
1206 Oslo
Phone +47/22 61 14 80
Fax +47/22 75 47 81
firmapost@flyindustri.no

Poland
LEWA Polska Sp.z o.o.
ul. Andersa 13
00-159 Warsaw
Phone +48/22/6 35 82 04
Fax +48/22/6 35 89 88
lewa.pl@lewa.at

Portugal
J. Ventura de Oliveira
(Quimica) Lda.
Rua Sacadura Cabral, 10, Atel. Dto. Qta.
Borel
2720 Amadora
Phone +351/21/4 95 22 09
Fax +351/21/4 95 35 07
jvoquimica@mail.telepac.pt

Romania
LEWA Romania s.r.l.
str. Sfânta Vineri nr. 21
bl. 102, ap. 12
Bucharest-sector 3
Phone +40/1/3 23 75 98
Fax +40/1/3 23 75 98
lewa.ro@lewa.at

Slovenia
LEWA Herbert Ott KG, Austria

Slovak. Rep.
LEWA Herbert Ott KG, Austria

Spain
TECNOSA,
Nuevas Tecnologias, S/A
C/de les Roses, 99-101
08980 Sant Feliu de Llobregat
Phone +34/93/4 73 46 76
Fax +34/93/4 73 25 67
tecnosa@tecnosa.es

Sweden
Chemo-Invest AB
P. O. Box 22145
250 23 Helsingborg
Phone +46/42/15 08 10
Fax +46/42/15 64 62
info@chemo-invest.se

Switzerland
Herbert Ott AG
Nenzlingerweg 5
4153 Reinach 1
Phone +41/61/7 17 94 00
Fax +41/61/7 17 94 01
info@herbert-ott-ag.ch
www.herbert-ott-ag.ch

Turkey
METRANS, Makina Endüstrisi Ürünleri
Sanayi ve Ticaret Ltd. Sti.
Karanfil Sokak 49 Kat. 1
06640 Kizilay-Ankara
Phone +90/312/4 18-91 60
Fax +90/312/4 18-85 47
mailbox@metrans.com.tr

Ukraine
LEWA – Representation Office Ukraine
Grushevskogo st. 28/2, ap. 71
01021 Kiev
Phone +380/44/2 53 88 01
Fax +380/44/2 53 96 70
lewa.ua@lewa.at

Yugoslavia
LEWA Herbert Ott KG, Austria

Representatives Abroad
North- and Central America

Canada
PEACOCK, INC.
2360 Millrace Court
Mississauga, Ontario L5N 1W2
Phone +1/905/8 12 71 00
Fax +1/905/8 12 00 69
torontoproducts@peacock.ca

Mexico
INVENTEC S.A. de C.V.
Lauro Villar No. 36
Providencia C.P.
02440 Mexico D.F.
Phone +52/5/3 19 88 67
Fax +52/5/3 19 88 69
ctella@ticsa.com.mx

USA
AMERICAN LEWA, Inc.
132 Hopping Brook Road
Holliston, MA 01746
Phone +1/508/429-7403
Fax +1/508/429-8615
sales@amlewa.com
www.americanlewa.com

Representatives Abroad
South America

Argentine
Hidro-Mecanica Argentina S. A.
Coronel Charlone 958
1870 Avellaneda
Provincia de Buenos Aires
Phone +54/11/42 28 16 39
Fax +54/11/42 09 23 67
hidromecar@overnet.com.ar

Brazil
LEWA SULAMERICANA Ltda.
Av. Santa Catarina 2153
Vila Santa Catarina
04378-400 São Paulo - SP
Phone +55/11/56 77 04 66
Fax +55/11/55 64 68 27
info@lewa-sulamericana.com.br

Chile
BRAYCO Ltda.
Bulnes 368, Of. 801/E
Temuco
Phone +56/45/21 07 51
Fax +56/45/21 13 38

Colombia
Penline Ltda.
Carrera 15 No. 95 - 51 Of. 302
Santafe de Bogota, D.C.
Phone +57/1/6 10-15 92
Fax +57/1/6 10-21 02
penline@andinet.lat.net

Venezuela
Representaciones Servitec
de Venezuela C.A.
Calle 6 con Calle 9 - Edificio Fant
P.B., La Urbina
Caracas 1070
Phone +58/2/2 42 08 06
Fax +58/2/2 42 73 63
camalgas@cantv.net

Representatives Abroad
Asia

Bangladesh
KSB Pumps Ltd., India

Brunei
Joffren Omar Co. SDN. BHD.
P. O. Box 105, Lot. No. 23,
G-25 Area, Simpang 81-4
Seria 7001, Negara Brunei Darussalam
Phone +673/3/22 38 63, 22 21 83
Fax +673/3/22 33 09
josks@brunei.bn

China (P.R.C.)
Dalian Acid Proof Pump Plant
No. 250 Huabei Road
Shahekou District
116022 Dalian
Phone +86/4 11/4 44 18 20
Fax +86/4 11/4 43 16 03
deneb@denebcn.com

India
KSB Pumps Ltd.
Mumbai - Pune Road
Pimpri, Pune 411 018
Phone +91/20/7 47 33 76
Fax +91/20/7 47 61 20
pofran@ksb.co.in

Indonesia
P.T. Bumi Cahaya Unggul
Jl. Rawa Kepiting No. 3
Jakarta Industrial Estate Pulogadung
Jakarta 13920
Phone +62/21/4 60 57 50
Fax +62/21/4 60 57 51
info@bumicahayaunggul.com

Japan
Teikoku Electric Mfg. Co. Ltd.
Room 206, Kyodo Building,
18-7, 2-Chome
Higashiueno, Taito-Ku
Tokyo 110-0015
Phone +81/3/38 32 43 11
Fax +81/3/38 32 93 07
ibd-tokyo@teikokudenki.co.jp

Malaysia
Allied Calibration Engineering Services
SND BHD
60 Jalan PS 1/10
Bandar Pinggiran Subang
Section 1, 40150 Shah Alam
Selangor Darul Ehsan
Phone +60/3/7 48 30 28
Fax +60/3/7 48 30 18
aces_sb@tm.net.my

Philippines
LEWA ASIA
HERBERT OTT PTE LTD, Singapore

Singapore
LEWA ASIA
HERBERT OTT PTE LTD
45 Gul Drive, Jurong
Singapore 629492
Singapore
Phone +65/8 61 71 27
Fax +65/8 61 65 06
info@lewa-asia.com.sg

South Korea
New Seoul Trading Co., Ltd.
Room 508, Business A-Building
Chung Ang Circulation
Complex 1258,
Kurobon-Dong, Kuro-Ku
Seoul
Phone +82/2/6 88 76 32
Fax +82/2/6 81 50 53

Sri Lanka
KSB Pumps Ltd., India

Taiwan
Taiwan Teikoku Pump Co., Ltd.
3F-1, No. 225, Pateh Rd. Sec. 3
Taipei
Phone +886/2/25 77 20 18
Fax +886/2/25 77 20 28

Thailand
Kanit Engineering Corp. Ltd.
800/3-4 Asoke Dindaeng Road
Dindaeng
Bangkok 10320
Phone +66/2/2 45 44 51
Fax +66/2/2 48 30 06
kaniteng@bkk.a-net.net.th

Vietnam
LEWA ASIA
HERBERT OTT PTE LTD, Singapore

Representatives Abroad
Australia/New Zealand

Australia
Petrenee Pty. Ltd.
Level 1, 50 Memorial Avenue
Liverpool
New South Wales 2170
Phone +61/2/96 01 82 88
Fax +61/2/96 01 82 77
mppetrenee@ozemail.com.au

New Zealand
Pump & Machinery Company Ltd.
7 Beasley Ave, P. O. Box 12549
Penrose, Auckland
Phone +64/9/5 79 27 14
Fax +64/9/5 79 11 96
keith.h@pmcl.co.nz

Representatives Abroad
Africa

Algeria
Neujahr
Chemin Sfindja, 92 (Ex Laperlier)
16000 Alger
Phone +213/21/74 19 36
Fax +213/21/74 19 36
Mobile+49/173/9 84 55 18

Egypt/A. R. E.
AL-FARID CO.
1349 Cornish El Nil Street
Cairo - El Sahel
Phone +20/2/2 05 62 67 - 70
Fax +20/2/2 05 62 71

Morocco
Neujahr, Algeria

Nigeria
Mannchyke Electro-Tech Co. Ltd.
74, Refinery Road, Box 855
Effurun
Phone +234/53/25 46 95
Fax +234/53/25 61 96
mannchyke@hyperia.com

Republik of South Africa
Rhine Ruhr Pumps
and Valves (Pty.) Ltd.
P. O. Box 76167
Wendywood 2144
Phone +27/11/4 44 13 21
Fax +27/11/4 44 37 33
info@rrpumps.co.za

Tunisia
Neujahr, Algeria

LEWA Resident-Engineer for Middle East
Mr. Sriram Iyer
P.O.Box 35409
Dubai - UAE
Phone +971/4/3 39 19 26
Fax +971/4/3 39 19 27
lewadxb@emirates.net.ae

Representatives Abroad
Middle East

Abu Dhabi
A. D. M. M. I.
Corniche Office, P. O. Box 247
Abu Dhabi - UAE
Phone +971/2/6 27 31 31
Fax +971/2/6 27 35 87
admmieng@emirates.net.ae

Dubai
SULAIMAN PETROTECH Est.
P.O.Box 35409
Dubai - UAE
Phone +971/4/3 39 55 79
Fax +971/4/3 39 55 68
soeqtrad@emirates.net.ae

Iran
Sulzer Iran Ltd.
69, A. Ghassir (Bokharest) St. Argentine Sq.
P. O. Box 15875-4851
Teheran 15148
Phone +98/21/8 73 77 25
Fax +98/21/8 73 80 01
Tx. 2 15 556
sir@sulzer.ch

Israel
MBL, Solids Liquids Separation Equipment
P. O. Box 3 36 47
Tel Aviv 61336
Phone +972/3/5 46 45 78
Fax +972/3/5 46 45 69
mblsalt@ibm.net

Kuwait
CANAR
Trading & Contracting Company
P.O.Box 1322
Safat 13014
Phone +965/3 98 76 67
Fax +965/3 98 72 27
canar@ncc.moc.kw

Northern Emirates of U.A.E.
SULAIMAN PETROTECH Est., Dubai

Oman (Sultanate of)
United Engineering Services L. L. C.
P. O. Box 2729
Seeb Airport, Postal Code 111
Phone +968/56 18 50
Fax +968/56 20 83
sales@uesoman.com

Qatar
PETROTEC Petroleum
Technology Co. W.L.L.
AAB (Toyota) Tower, 8th. Floor,
West Wing
Airport Road, P.O.Box 16069
Doha
Phone +974/4 41 96 03
Fax +974/4 41 96 04
petrotec@qatar.net.qa

Saudi Arabia (Kingdom of)
Abdullatif & Mohammed
Al-Fozan Co.
P. O. Box 38
Al-Khobar 31952
Phone +966/3/8 30 41 55
Fax +966/3/8 30 41 66

Yemen
SULAIMAN PETROTECH Est., Dubai

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