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# 1 General information / safety

## 1.1 Important preliminary information

Refer to operating instruction B 0.100.1.

## 1.2 Application

This operating instruction applies to the **drive element LEWA - ecosmart® type LCA with manual stroke adjustment, motor mounted vertically.**

The LEWA works number can be found in the technical data sheet and on the nameplate fixed to the drive element casing.

## 1.3 Performance and applicabilities

See technical data sheet.

Plunger rod thrust:	1330 N
Stroke length:	0 - 15 mm
Scale division longitudinal scale:	1,00 mm
Ring scale:	0.05 mm
Attachable pump heads:	diaphragm pump heads

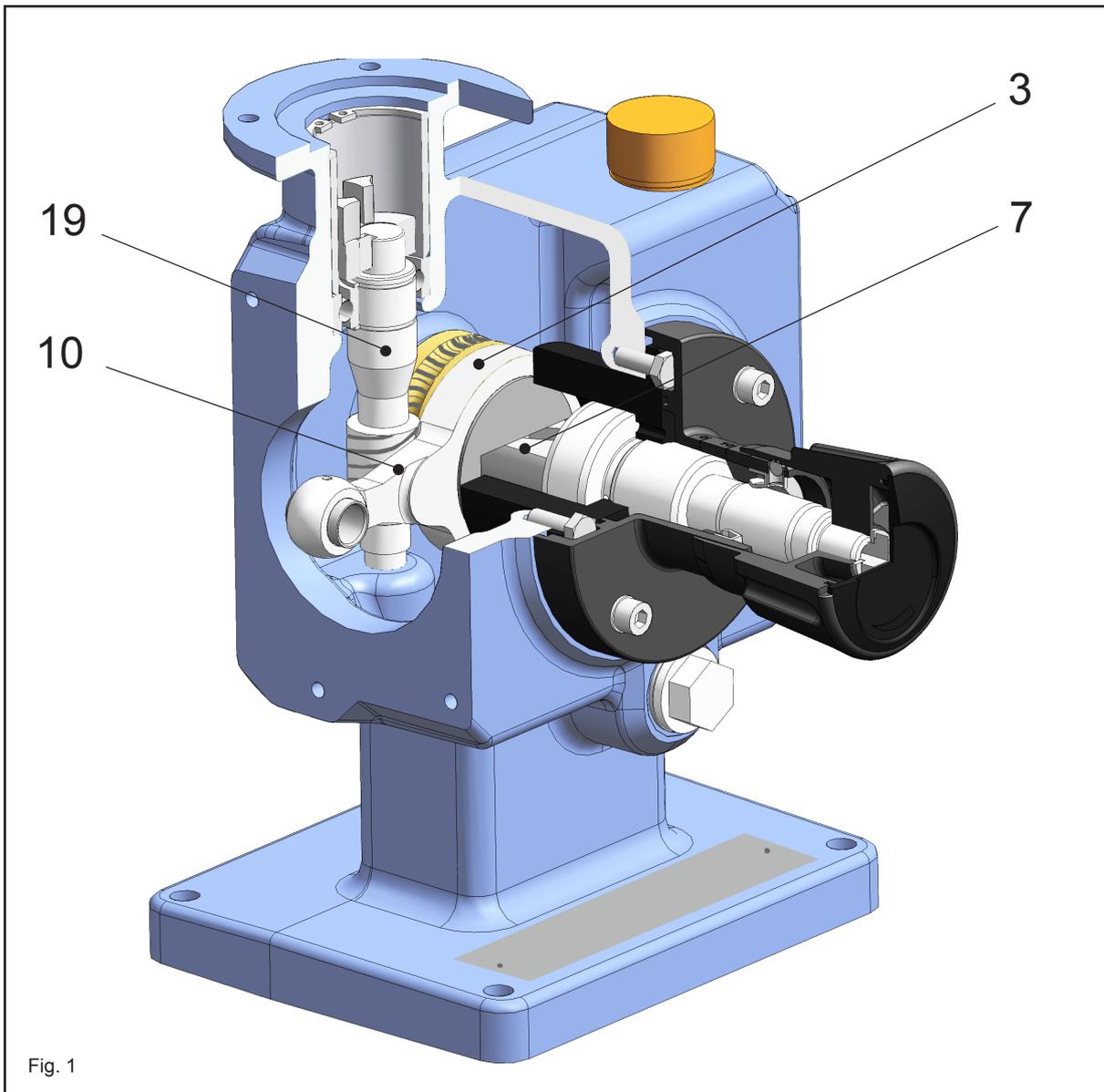


Fig. 1



This drive element was designed for the conditions stated in the technical data sheet. LEWA does not accept any responsibility when these conditions are changed. This could lead to conditions resulting in major problems up to the destruction of the metering pump. Danger to persons, animals and the environment cannot be excluded in this case!

LEWA also does not accept any responsibility if the fluid conveyed or other important operating conditions have been given partially only or not at all.

#### **1.4 Safety**

Refer to operating instruction B 0.100.1.

#### **1.5 Supply connections**

Refer to operating instruction B 0.100.1.

#### **1.6 Emissions**

Refer to operating instruction B 0.100.1.

### **2 Transportation and intermediate storage**

Refer to operating instruction B 0.100.1.

### **3 Product information**

See fig. 1.

#### **3.1 General description**

The drive element changes the rotary motion, induced by the drive motor, into an oscillating (reciprocating) movement. The stroke length can be set from 0 to 15 mm in steps of 0.05 mm. The stroke frequency results from the motor speed and the reduction ratio of the integrated worm gear.

#### **3.2 Construction and method of operation**

The drive element mainly consists of the worm shaft (19), the worm wheel (3), adjusting unit (7), connecting rod (10) and the manual stroke adjustment.

The drive element works on the linear thrust crank principle. The worm shaft (19), which is coupled to the drive motor, transmits the rotary motion via worm wheel (3) to the adjusting unit (7).

The latter actuates the plunger (502, refer to assembly "Diaphragm pump head") via the connecting rod (10).

The plunger stroke length is adjusted by turning the hand wheel (21). The adjusting unit changes the eccentricity of the connecting rod (10) and so the plunger stroke length.

The stroke length can be altered both with the metering pump stopped or running.

The relationship between the adjustment path and change of plunger stroke length is linear.

#### **3.3 Dimensions / weights / centres of gravity**

Refer to operating instruction B 0.100.1.

### **4 Erection and assembly**

Refer to operating instruction B 0.100.1.

## 5 Commissioning / operation / shut down

### 5.1 Operation

Drive elements with manual stroke adjustment: the stroke length can be adjusted with the metering pump running or stopped, via the hand wheel (21) and read off on the scale housing (24).

Clockwise rotation reduces the stroke length.

The metered flow at 15 mm stroke is shown in the technical data sheet. If you want to know the metered flow at any other stroke length, please refer to section 5.4 in operating instruction B 0.100.1.

### 5.2 Operating and ancillary means

Start-up temperature of drive element: > 0 °C

Maximum drive element temperature: +80 °C

Ambient temperature: - 15 °C to +50 °C

For deviating conditions please consult LEWA.

Classification:

Ambient temperature range	Designation to DIN 51502	ISO viscosity class to DIN ISO 3448	Symbol to DIN 51502	
> +5 °C bis +50 °C	CLP 100 ISO-L-CKC 100	ISO VG 100	<table border="1"><tr><td>CLP 100</td></tr></table> (1)	CLP 100
CLP 100				
>= -15 °C bis +20 °C	CLP 32 ISO-L-CKC 32	ISO VG 32	<table border="1"><tr><td>CLP 32</td></tr></table> (1)	CLP 32
CLP 32				

(1) Lubricating oils CLP: Specifications according to DIN 51517-3.



The drive element temperature is influenced by several factors (e.g. stroke frequency, load, ambient temperature). The value given is a typical value at full load and ambient temperatures up to + 30 °C. For ambient temperatures over + 30 °C the max. temperature can be exceeded by 10 °C. During the start-up period the max. temperature can be exceeded by another 5 - 10 °C. Please observe start-up temperature and max. drive element temperature.

Lubricant volume per drive element:



Drive element and diaphragm pump head have a common oil bath. The filling volume therefore also depends on the size of the diaphragm pump head and varies between 0.95 l and 1.1 l. For detailed information please refer to the technical data sheet (line 51/52), for volume see “parts list metering pump” (item 110).

### 5.3 Commissioning, start-up, venting

Refer to operating instruction B 0.100.1.

### 5.4 Adjustment and control

Refer to opShut-down

Refer to operating instruction B 0.100.1.

### 5.5 Shut-down

Refer to operating instruction B 0.100.1.

### 5.6 Dismantling and return transportation

Refer to operating instruction B 0.100.1.

## 6 Maintenance and repairs

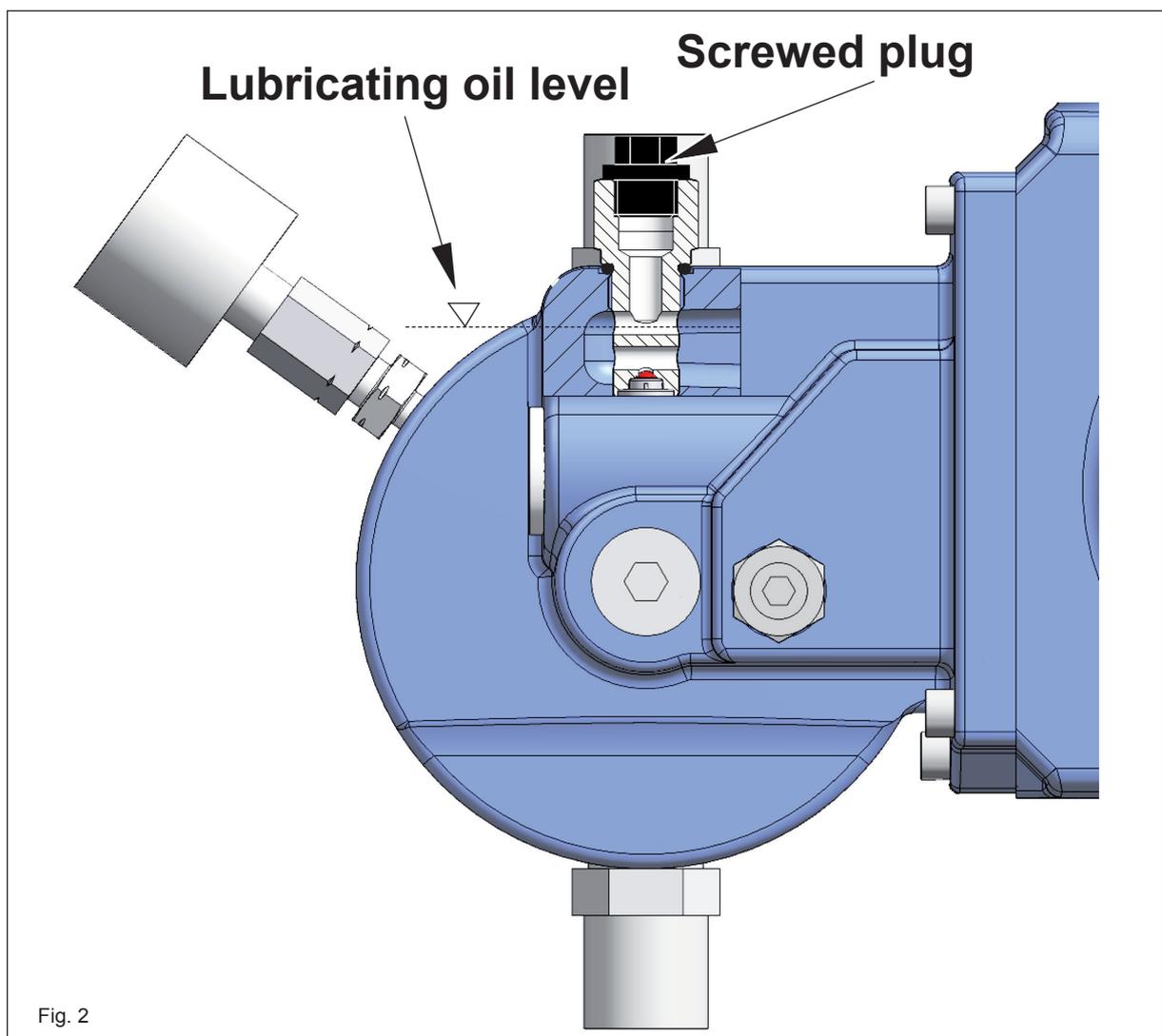
Refer to operating instruction B 0.100.1.

### 6.1 Maintenance

#### 6.1.1 Inspection intervals: lubricant

  In order to prevent problems check lubricant level weekly.

1. Stop metering pump and wait for approximately 5 minutes.
2. Remove screwed plug of the hydraulic snifting valve (529) (see fig. 2).
3. The lubricant level indicated must be within the range of the cross bore visible from above (see figure 2).
4. If required top up lubricant. For this remove air filter (39).  
For grade of lubricant refer to section 5.2.
5. Reinstall air filter (39).



### 6.1.2 Inspection of coupling clearance



Read and observe enclosed separate operating instruction "Torsionally flexible jaw coupling in the drive flange" B 1.950.

### 6.1.3 Grooved ball bearing (16) and grooved ball bearing from adjusting unit (7)



All roller bearings are theoretically designed for a service life of at least 30 000 h. The effective service life strongly depends on the operating conditions (e.g. load, quality of lubricant, temperature) and can be considerably longer or also shorter depending on the individual case.



Break-down of a bearing can lead to unscheduled interruptions and very high heat build-up locally.

Therefore it is recommended to check drive elements regularly with regard to the roller bearings. One indication for damaged roller bearings is the development of noise.

Damage at the bearings can be detected at an early stage with suitable diagnosis systems.

- Switch off metering pump.



**Safeguard drive element against unintentional start-up (disconnect electric power supply, for this also refer to section "1.4 safety" in operating instruction B 0.100.1).**

#### Grooved ball bearing (16):

- Unscrew 4 hexagon screws at motor flange and remove motor.
- Dismantling of the grooved ball bearing (16) must be carried out as per section 6.3.1.
- Assembly of grooved ball bearing (16) is carried out as per section 6.3.2.

#### Grooved ball bearing (part of adjusting unit (7)):

The grooved ball bearing is available and can be installed as complete spare part (adjusting unit) only.

### 6.1.4 Change of lubricant



**Change lubricating oil after 8800 hours of continuous operation or after two years at the latest.**

Changing the lubricant:



**Danger of burns when draining hot lubricant!  
Assure environmentally safe draining and disposal of spent lubricant.**

1. Switch off metering pump.
2. Open screwed plug (40) and drain lubricant (at operating temperature).
3. Open screwed plug (560) and drain residual lubricant from diaphragm pump head with the hydraulic snifting valve (529) removed.
4. Screw-in screwed plug (40 and 560) observing the torque given in the parts list.
5. Unscrew air filter (39).
6. Fill correct volume of lubricant into drive element. The lubricant volume depends on the diaphragm pump head size. For detailed information refer to the operating instruction for the diaphragm pump head. Refer to section 5.2 for oil grade, and to section 6.1.1 for lubricant level.
7. Reinstall air filter (39) again.

### 6.1.5 Change of Coupling - toothed rim

Also refer to the attached, separate operating instruction B 1.950).

1. Switch off metering pump.



**Safeguard drive element against unintentional operation (disconnect power supply, also refer to section 1.4 “Safety” in operating instruction B 0.100.1 for this).**

2. Remove 4 hexagon head screws at the motor flange and lift-off motor.
3. Remove toothed rim and replace by a new toothed rim.
4. Mount motor again and tighten using the 4 hexagon head screws.

## 6.2 Repairs

### 6.2.1 Standard tools:

allen keys: size 4/5 mm,  
open ended spanner: size 10/ 13/ 19 mm,  
plastic hammer, screw drivers (different sizes), circlip pliers (inside and outside), soft metal drifts,  
claw pulling device, pulling device with sliding hammer (insert for M8).

### 6.2.2 Required documents

Additional documents required: sectional drawing “Metering pump type LCA” and relevant parts list.

### 6.2.3 Wear parts

Please check whether the parts marked "V" in parts list are available.

For machines having an operating time of > 5 years we recommend to have the parts designated "E" available also.

For safety reasons, parts designated "E" or "V" in the parts list should be re-used as an exception and after thorough inspection only.

## 6.3 Dismantling / Assembly

Refer to sectional drawing / parts list of drive element.

### 6.3.1 Preparation Dismantling/ Assembly

Reserve suitable clean area for depositing the individual parts.



**Safeguard drive element against unintentional operation (disconnect power supply, also refer to section “1.4 Safety” in operating instruction B 0 100.1 for this).**

Take drive element to a dry, enclosed, but well ventilated and essentially dust-free room for dismantling / assembly if possible.

- Clean all parts to be used again thoroughly, however, if possible, do so only just before re-assembly.  
Use a cold cleaner to remove lubricant residues.



**Observe any safety and disposal instructions!**

- **Check** all parts for perfect condition before installation.
- **Slip agents, lubricants**
  - a) Radial seal rings and O-rings must be thinly coated with the lubricating agent specified for operation before assembly.
  - b) Screws and threaded shafts must be coated with the lubricating agent specified for operation before assembly.

### 6.3.2 Total dismantling

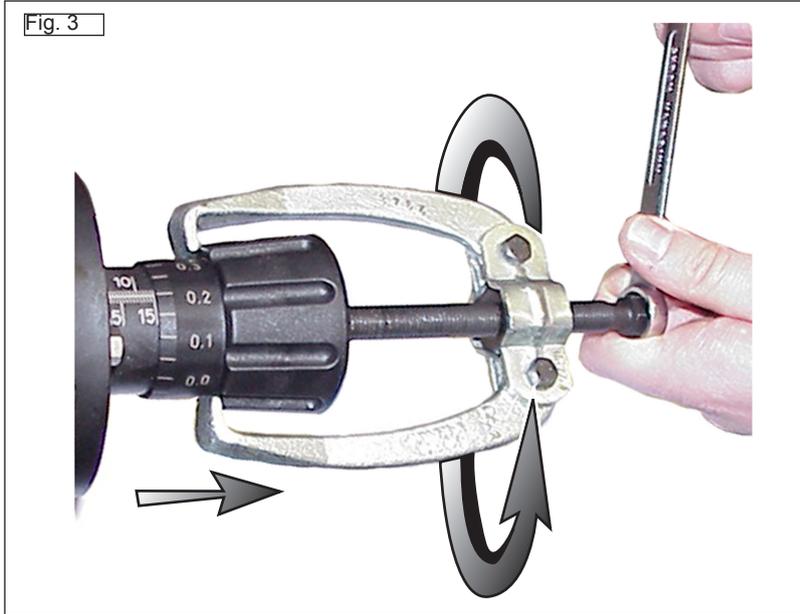


**Safeguard drive element against unintentional operation (disconnect power supply, also refer to section "1.4 Safety" in operating instruction B 0.100.1 for this).**



**Danger of burns when draining hot lubricant!  
Assure environmentally safe draining and disposal of spent lubricant.**

1. Drain lubricant (refer to section 6.1.4, "Change of lubricant").
2. Remove pump head (according to operating instruction "pump head").
3. Remove motor.  
Take drive flange off.
4. Force protecting cover (72) from hand wheel (21) using a small screw driver. Remove hexagon head screw (22) and disk (75).  
Pull hand wheel (21) from adjusting unit (7) (see figure 3) using the claw pulling device.
5. Loosen the screws (33) (make sure not to lose the seal rings (34)), and pull scale housing (24) off via the adjusting unit (7).
6. Remove O-ring (48) and hexagon head screws (29). Using plunger (502) hold the connecting rod (10) tight and pull the adjusting unit (7) from the drive element housing (1).
7. For further dismantling turn the adjusting unit (7) from the threaded bushing (65) clockwise.
8. Remove connecting rod (10), plunger (502) and cylindrical pin (32) from drive element housing (1).
9. Remove the circlip (13) and take out spacer pipe (23).  
Lift worm shaft (19) by approximately 20 mm (O-ring (17) is moved upwards from its operating position ) and drop again. Remove O-ring (17). Pull out worm shaft (19) while turning it.
10. If the grooved ball bearing (16) must be replaced separate coupling hub (75) and worm shaft (19) using the claw pulling device.  
Remove key (20) and then circlip (15). Now you can pull the grooved ball bearing (16) from the worm shaft (19).
11. If the grooved ball bearing (16) does not have to be replaced do not dismantle the assembly.
12. If shims (14) were used also remove them from the drive element housing (1) and note their number for re-assembly with the same grooved ball bearing (16).



**When installing a new grooved ball bearing (16) make sure to follow the instructions in section 6.3.3.2.**

13. Take worm wheel (3) from drive element housing (1).  
Unscrew air filter (39) and screwed plug (40).

### 6.3.3 Assembly

Assembly basically takes place in reverse order to dismantling.

Observe the following points when doing so:

1. Before assembly clean the individual parts. Use a cold cleaner to remove lubricant residues.



**Follow the safety and disposal regulations!**

Check the parts for damage. Damaged or heavily worn parts must be replaced.

2. Mounting of shims (14)/ grooved ball bearing (16), item 12 of dismantling: determine the number of shims (14) required when installing a new grooved ball bearing (16) to assure that the grooved ball bearing (16) has no play. **Remove the O-ring (17) before installation (to determine the dimension)**. Mount worm shaft (19) with grooved ball bearing (16), install spacer pipe (23) and fit circlip (13). Using a feeler gauge measure the distance between circlip (13) and the upper edge of the spacer pipe (23). Select shims according to the dimension measured and install below the grooved ball bearing (16).  
Do not forget O-ring (17) when doing the final assembly!
3. Mounting of circlip (13), to item 10 of dismantling: Set-up circlip (13) and force into final location using a soft drift.



**Subsequently check if the circlip (13) is in its proper place!**

4. Observe the torque stated in the parts list when tightening screws (33)!
5. When connecting the drive motor again observe the direction of rotation of the motor shaft.  
The direction of rotation is marked by an arrow in the casting of the drive element housing(1).

## 6.4 Filling, adjustment

### 6.4.1 Filling

1. Switch off metering pump.
2. Unscrew air filter (39).
3. Fill lubrication oil into the drive element.  
For oil volume and grade refer to section 5.2.
4. Screw air filter (39) back in. Check of lubricant level as per section 6.1.1.

### 6.4.2 Setting of stroke scale

First set a stroke length of 5 mm by turning hand wheel (21) in the corresponding direction. This is checked using a dial gauge. Measure the movement of the plunger (502) with the diaphragm pump head mounted and the screwed plug (570) removed. To move it either rotate the motor shaft (remove fan cover),



**Safeguard motor against unintentional start!**

or turn the worm shaft.

Now install the hand wheel (21) so that the zero division on the hand wheel (21) covers the 5 mm reference line on the scale housing (24).

Tighten hexagon head screw (22) with disk (75) until the 5 mm division mark remains just visible. Close hand wheel (21) with protecting cover (72).

## 7 Faults: symptoms, remedial action

Refer to operating instruction B 0.100.1.