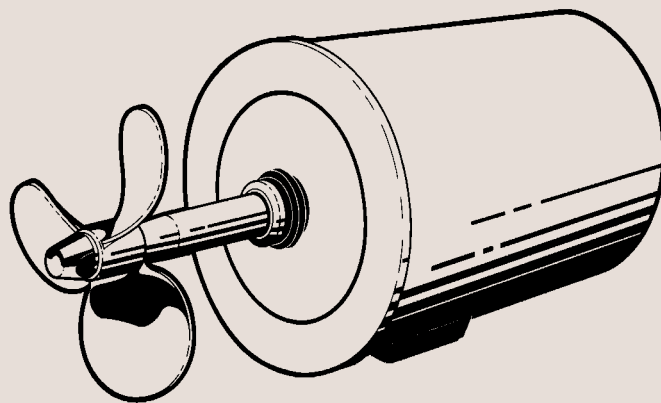




# Instruction Manual

LKR-5 Agitator



# Declaration of Conformity

## The designating company

**Alfa Laval**

Company Name

**6000 Kolding**

Address

**+45 79 32 22 00**

Phone No.

hereby declare that

**Agitator**

Denomination

**LKR-5**

Type

Year

is in conformity with the following directives with amendments:

- Low Voltage Directive 73/23/EEC
- EMC Directive 89/336/EEC
- Machinery Directive 89/392/EEC

**Bjarne Søndergaard**

Name

**Vice President, R & D**

Title

**Alfa Laval**

Company

*B. Søndergaard*

Signature

**Designation**



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# Safety

Unsafe practices and other important information are emphasized in this manual.

Warnings are emphasized by means of special signs.

## 1. Important information

**Always read the manual before using the agitator!**

2

- WARNING!** : Indicates that special procedures **must** be followed to avoid severe personal injury.
- CAUTION!** : Indicates that special procedures **must** be followed to avoid damage to the agitator.
- NOTE!** : Indicates important information to simplify practices or to make them clearer.

---

## 2. Warning signs



: General warning.



: Dangerous electrical voltage.



: Caustic agents.

All warnings in the manual are summarized on this page.

Pay special attention to the instructions below so that severe personal injury or damage to the agitator are avoided.

## 3. Safety precautions

### Installation:



- : **Always** observe the technical data (see page 14).



- : The agitator **must** be electrically connected by authorized personnel (see the motor instructions).



- : - **Always** keep a safe distance from the propeller when the agitator is running.
- **Never** stick your fingers or any tool through the motor bracket when the agitator is running.

### Operation:



- : **Always** observe the technical data (see page 14).



- : **Never** touch the agitator or the tank during operation or sterilization.



- : - **Always** keep a safe distance from the propeller when the agitator is running.
- **Never** stick your fingers or any tool through the motor bracket when the agitator is running.



- : **Always** handle lye and acid with great care.

### Maintenance:



- : **Always** observe the technical data (see page 14).



- : **Always** disconnect the power supply when the agitator is serviced.



- : - The agitator must **never** be hot when serviced.
- The tank must **never** be pressurised when the agitator is serviced.

# Installation

4

*The instruction manual is part of the delivery.  
Study the instructions carefully.*

*The agitator is supplied as separate parts.  
The items refer to the drawings and the parts list on  
pages 16-19.*

## 1. Unpacking/Delivery

---

1

### **NOTE!**

We cannot be held responsible for incorrect unpacking.

### **Check the delivery:**

1. Complete agitator (see 2).
2. Delivery note.
3. Motor instructions.

2

### **Delivery:**

1. Shroud (24), if supplied.
2. Welding flange (7), if supplied (\*).
3. The rest of the agitator.

### **(\*)NOTE!**

The welding flange is normally supplied separately (see page 5).

---

3

4

Inspect the agitator for visible transport damage.

---

Weld welding flange (7) onto the tank before assembling and installing the agitator (see page 5).

---

5

6

Do not remove the carton protection of shaft seal (4) before assembling and installing the agitator (see page 5).

---

Always remove the shroud, if fitted, before lifting the agitator.


---


Study the instructions carefully and pay special attention to the warnings!


The welding flange is normally supplied separately to facilitate the welding onto the tank.  
Always check the agitator before operation.

## 2. Installation / Welding

1

 Always observe the technical data (see page 14).

 The agitator **must** be electrically connected by authorized personnel (see the motor instructions).

 - **Always** keep a safe distance from the propeller when the agitator is running.  
- **Never** stick your fingers or any tool through the motor bracket when the agitator is running.

### NOTE!

We cannot be held responsible for incorrect installation.

3

1. Position and weld welding flange (7) so that the terminal box on the motor is turned downwards when the agitator is installed.
2. Weld carefully to avoid stress and tension.
3. If necessary, strengthen the wall of the tank to ensure a firm and stable installation.
4. Do not fit the agitator onto the welding flange until the flange is cold, otherwise O-ring (6) may become damaged.

4

### CAUTION!

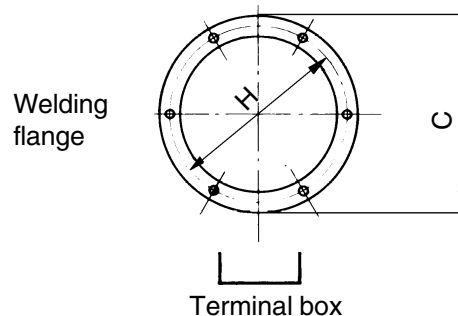
The carton protection of shaft seal (4) protects against sunlight.  
Do not remove this until the agitator is assembled.

2

### NOTE!

Weld welding flange (7) onto the lower part of the wall of the tank.

Propeller size (mm)	200	250/300
C (mm)	240	310
H (mm)	200	270



5

### Pre-use check:

1. Start and stop the motor momentarily.
2. Ensure that the direction of rotation of the propeller shaft is **clockwise** as viewed from the back end of the motor (see the indication label on the agitator).
3. Examine the working condition very closely to avoid overloading and stressing of the mechanical construction of the agitator.

**Pay special attention to the warnings!**

# Operation

Study the instructions carefully and pay special attention to the warnings!

## 1. Operation / Control

1



**Always** observe the technical data. (See page 14).

### NOTE!

We cannot be held responsible for incorrect operation/control.

3



- **Always** keep a safe distance from the propeller when the agitator is running.
- **Never** stick your fingers or any tool through the motor bracket when the agitator is running.

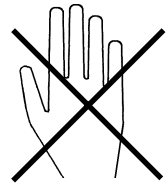
5

### Control:

Reduce the capacity and the power consumption by means of:

- Reducing the propeller diameter.
- Speed control of the motor.

2



**Never** touch the agitator or the tank during operation or sterilization.

4

### CAUTION!

The shaft seal must not run dry.

*Pay attention to possible faults.*

*Study the instructions carefully.*

## 2. Fault finding

**NOTE!**

Study the maintenance instructions carefully before replacing worn parts. - See page 9!

<b>Problem</b>	<b>Cause/result</b>	<b>Repair</b>
Overloaded motor	<ul style="list-style-type: none"> <li>- Viscous liquids</li> <li>- Liquids with high density</li> </ul>	<ul style="list-style-type: none"> <li>- Larger motor or smaller propeller</li> <li>- Reduce the speed</li> </ul>
Leakage at the drain hole	<ul style="list-style-type: none"> <li>- Leaking shaft seal</li> <li>- Leaking O-ring (6) (examine closely)</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the shaft seal</li> <li>- Replace the O-ring</li> <li>- Select a different rubber grade</li> </ul>
Vibrations	Too high agitating capacity	<ul style="list-style-type: none"> <li>- Smaller agitator and/or smaller propeller</li> <li>- Reduce the speed</li> </ul>

# Operation

8

The agitator is designed for cleaning in place (CIP).  
CIP = Cleaning In Place.

Study the instructions carefully and pay special attention to the warnings!

NaOH = Caustic Soda.

HNO<sub>3</sub> = Nitric acid.

## 3. Recommended cleaning

1

Caustic danger!



Always use rubber gloves!



Always use protective goggles!



Always handle lye and acid with great care.

3

### Examples of cleaning agents:

Use clean water, free from chlorides.

1. 1% by weight NaOH at 70°C.

1 kg NaOH	+	100 l water	= Cleaning agent.
--------------	---	----------------	-------------------

2.2 l 33%NaOH	+	100 l water	= Cleaning agent.
------------------	---	----------------	-------------------

2. 0.5% by weight HNO<sub>3</sub> at 70°C.

0.7 l 53% HNO <sub>3</sub>	+	100 l water	= Cleaning agent.
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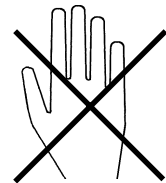
5

### NOTE!

The cleaning agents must be stored/discharged in accordance with current rules/directives.

2

Burning danger!



Never touch the agitator or the tank when sterilizing.

4

1. Avoid excessive concentration of the cleaning agent

⇒ Dose gradually!

2. Adjust the cleaning flow to the process

**Viscous liquids**

⇒ Increase the cleaning flow!

3. Always rinse well with clean water after the cleaning.

Maintain the agitator carefully.  
Study the instructions carefully and pay special attention to the warnings!  
See separate motor instructions.

Always keep spare shaft seals and rubber seals in stock.  
Check the agitator for smooth operation after service.

## 1. General maintenance

1



**Always** observe the technical data (See page 14).



**Always** disconnect the power supply when the agitator is serviced.



- The agitator must **never** be hot when serviced.
- The tank must **never** be pressurised when the agitator is serviced.

2

### CAUTION!

Fit the electrical connections correctly if they have been removed from the motor during service (see pre-use check on page 5).

**Pay special attention to the warnings!**

### NOTE!

All scrap must be stored/discharged in accordance with current rules/directives.

## Ordering spare parts

- Contact the Sales Department.
- Order from the Spare Parts List.

**Recommended spare parts: Service kits (see Spare Parts List).**

	Shaft seal	Rubber seals	Motor bearings
Preventive maintenance	<b>Replace after 12 months:</b> (one-shift) The complete shaft seal	Replace when replacing the shaft seal	
Maintenance after leakage (leakage normally starts slowly)	<b>Replace at the end of the day:</b> The complete shaft seal	Replace when replacing the shaft seal	
Planned maintenance	<ul style="list-style-type: none"> <li>- Regular inspection for leakage and smooth operation</li> <li>- Keep a record of the agitator</li> <li>- Use the statistics for planning of inspections</li> </ul> <b>Replace after leakage:</b> The complete shaft seal	Replace when replacing the shaft seal	Yearly inspection is recommended <ul style="list-style-type: none"> <li>- Replace complete bearing if worn</li> <li>- Ensure that the bearing is axially locked (see motor instructions)</li> </ul>
Lubrication	<b>Before fitting</b> Lubricate the bellows with silicone grease or silicone oil	<b>Before fitting</b> Silicone grease or silicone oil	<b>None</b> The bearings are permanently lubricated

# Maintenance

Study the instructions carefully.  
The items refer to the drawings and the parts list on pages 16-19.

Handle scrap correctly.

## 2. Dismantling of agitator / Removing the shaft seal (\*) / motor (o)

1

o

2

\*

If fitted, remove cap nut (28), washer (27) and shroud (24) from the motor.

3

\*

4

\*

Remove nut (17), washer (16) and propeller (15) from propeller shaft (1).

Remove O-ring (19) from propeller (15).

5

\*

6

o

1. Push fixing ring (3) towards the motor.
2. Remove O-ring (2) and the fixing ring.

Remove shaft seal (4) from propeller shaft (1) and front plate (5).

1. Remove lock nuts (13) or screws (12).
2. Remove the rest of the agitator from the tank and welding flange (7).

Study the instructions carefully.  
The items refer to the drawings and the parts list on pages 16-19.

Handle scrap correctly.

## 2. Dismantling of agitator / Removing the shaft seal (\*) / motor (o)

**7**

o

**8**

1. If fitted, remove screw (30) and guard (29) from motor bracket (8), (only fitted, if the agitator is not supplied with shroud (24)).
2. Loosen the screws in compression coupling (11).
3. Pump grease through grease nipple (9) with a grease gun and remove propeller shaft (1) together with front plate (5).

**9**

o

**10**

o

1. Remove front plate (5) from propeller shaft (1).
2. Remove O-ring (6) from the front plate.

Remove washer (10) and O-ring (20) from propeller shaft (1).

**11**

o

Remove compression coupling (11) from the motor shaft.

1. Remove lock nuts (13) and screws (14).
2. Remove motor bracket (8) from the motor.

# Maintenance

12

Study the instructions carefully.  
The items refer to the drawings and the parts list on pages 16-19.

Lubricate the rubber seals before fitting them.

## 3. Assembly of agitator / Fitting the shaft seal (★) / motor (o)

1

o

### NOTE!

It is recommended to replace the shaft seal when replacing the motor.

1. Fit motor bracket (8) on the motor.
2. Fit screws (14) and lock nuts (13).
3. Tighten the lock nuts.

3

o

Fit O-ring (20) and washer (10) into propeller shaft (1).

### Replacement of motor:

1. Fit indication label (23) on the new motor.
2. Ensure that the label indicates that the direction of rotation is **clockwise** as viewed from the back end of the motor.

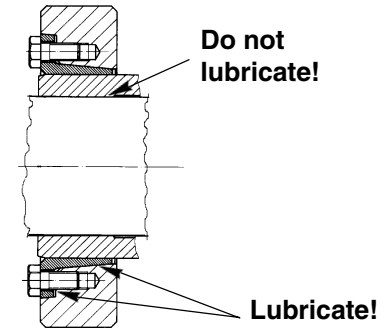
5

o

1. If supplied, fit guard (29) and screw (30) on motor bracket (8), (only fitted, if the agitator is not supplied with shroud (24)).
1. Fit O-ring (6) on front plate (5).
2. Fit the front plate on the motor bracket.

2

o



Fit compression coupling (11) on propeller shaft (1).

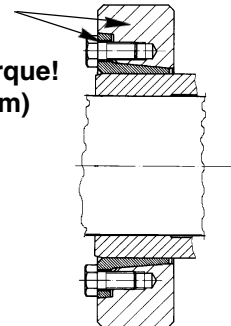
### NOTE!

Ensure that the shaft connection is completely cleaned from grease.

4

o

Plane →  
correct torque!  
(min. 29 Nm)



1. Fit propeller shaft (1) on the motor shaft.
2. Torque tighten the screws in compression coupling (11) evenly to min. 29 Nm.

### NOTE!

Ensure that the shaft connection is completely cleaned from grease.

6

o

1. Fit the agitator on the tank and welding flange (7).
2. Fit and tighten lock nuts (13) or screws (12).

Study the instructions carefully.  
The items refer to the drawings and the parts list on the pages 16-19.

Lubricate the rubber seals before fitting them.

### 3. Assembly of agitator / Fitting the shaft seal (\*) / motor (o)

**7** \*

**8** \*

Fit shaft seal (4) on propeller shaft (1) and in front plate (5).

**9** \*

1. Fit fixing ring (3) and push it towards the motor.
2. Fit O-ring (2) on propeller shaft (1).

**10** \*

Fit O-ring (19) into propeller (15).

**11** o

1. Fit propeller (15) and washer (16) on propeller shaft (1).
2. Fit and tighten nut (17).

If supplied, fit shroud (24), washer (27) and cap nut (28) on the motor.

# Technical data

It is important to observe the technical data during installation, operation and maintenance.

Inform the personnel about the technical data.

## Technical data

### Data

14

Propeller size diam. (mm)	Rev. (rpm)	Motor (kW)	Max. current at 400 V (A)	Measured current at 380 V (A)	Max. tank pressure	Max. tmp. seal: EPDM (° C)	Max. tmp. seal: Nitril (NBR) (° C)	Max. tmp. seal: Viton FPM (° C)	Q (m³/min.)	Cm (m/sec.)	Weight (kg)
200	950	1.5	4.1	2.7	1000 kPa 10 bar	120	90	135	4.5	3.1	30
200	1430	2.2	4.8	4.8					6.8	4.7	28
200	1430	3.0	6.5	5.0					6.8	4.7	31
250	940	2.2	9.4	4.7					8.5	3.8	56
250	960	3.0	6.9	6.0					8.5	3.8	69
250	960	4.0	8.7	6.0					8.5	3.8	76
250	1450	5.5	11.1	10.0					13.5	5.9	70
250	1450	7.5	14.8	10.0					13.5	5.9	78
300	720	3.0	7.8	7.0					11.5	3.5	80
300	955	5.5	11.9	11.0					15.0	4.2	80

The data are valid for agitation in water (20° C).

Q - Theoretical mixing capacity.

Cm - Theoretical jet velocity on the delivery side of the propeller.

Noise level (at 1 m) ..... 60 dB(A)

### Materials

Product wetted steel parts ..... AISI 304 (standard) or AISI 316L  
 Other steel parts ..... AISI 304  
 Product wetted seals ..... EPDM rubber  
 Alternative seals ..... FPM rubber, Nitrile (NBR)  
 Finish ..... Semi bright  
 Motor and motor bracket ..... Painted

### Shaft seal

Seal type ..... Single mechanical seal  
 Material, stationary seal ring ..... Silicone carbide  
 Material, rotating seal ring ..... Carbon (standard) (alternative = SiC)  
 Material, Bellows ..... EPDM rubber  
 Alternative material, Bellows ..... FPM rubber, NBR rubber

### Motor

Standard flanged motor acc. to IEC metric standard,  
 IP55 (with drain holes with labyrinth plug), insulation class F

Voltage and frequency .....  $\left( \begin{array}{l} 3\sim, 50 \text{ Hz, } 220\text{-}240\text{V}\Delta / 380\text{-}420\text{VY} \leq 4 \text{ kW} \\ 3\sim, 60 \text{ Hz, } 250\text{-}280\text{V}\Delta / 440\text{-}480\text{VY} \leq 4.6 \text{ kW} \\ 3\sim, 50 \text{ Hz, } 380\text{-}420\text{V}\Delta / 660\text{-}690\text{VY} \geq 5.5 \text{ kW} \\ 3\sim, 60 \text{ Hz, } 440\text{-}480\text{V}\Delta \geq 6.3 \text{ kW} \end{array} \right)$

Motor sizes (kW), 50 Hz ..... 1.5, 2.2, 3.0, 4.0, 5.5, 7.5

Motor sizes (kW), 60 Hz ..... 1.75, 2.2, 3.5, 4.6, 6.3, 8.6



# Drawing/Parts list

The drawing and the parts list include all items of the agitator.

The items are identical with the items in the Spare Parts List.

When ordering spare parts, please use the Spare Parts List!

## Parts list LKR-5

16

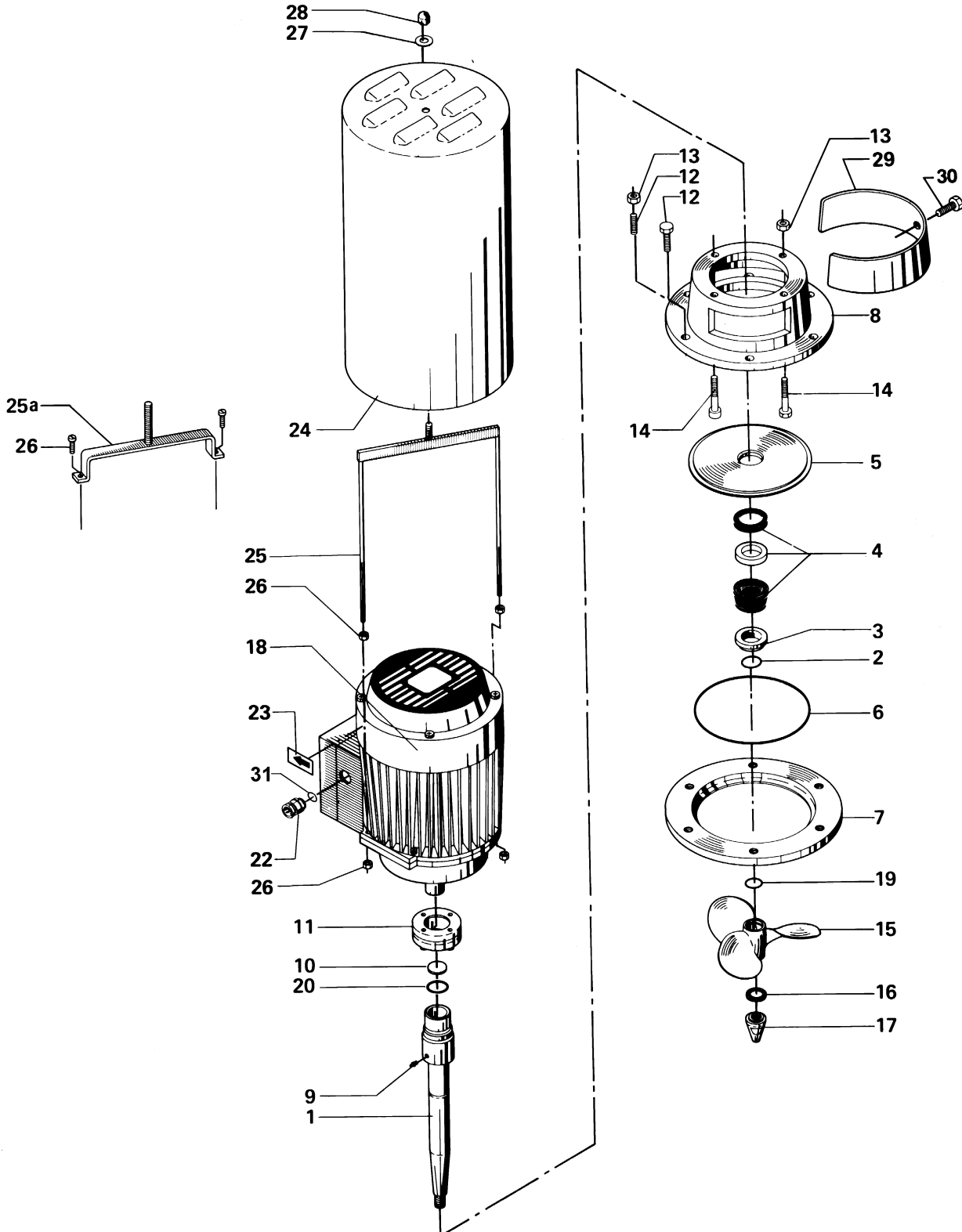
Pos.	Qty.	Denomination
1	1	Propeller shaft
2 $\Delta$	1	O-ring
3	1	Fixing-ring
4 $\Delta$	1	Shaft seal
5	1	Front plate
6 $\Delta$	1	O-ring
7	1	Welding flange
8	1	Motor bracket
9	1	Grease nipple
10	1	Washer
11	1	Compression coupling
12	6	Set screw (only propeller size 200 mm)
	6	Pointed screw (only propeller sizes 250-300 mm)
13	10	Lock nut (only propeller sizes 250-300 mm)
	6	Lock nut (only propeller sizes 250-300 mm)
14	4	Allen screw (only propeller size 200 mm)
	4	Hexagon screw (only propeller sizes 250-300 mm)
15	1	Propeller
16	1	Fibre washer
17	1	Nut
18	1	Motor
19 $\Delta$	1	O-ring
20 $\Delta$	1	O-ring
22	1	Cable gland
23	1	Direction arrow
24	1	Cover
25	1	Fixing clamp
25a	1	Fixing clamp
26	4	Nut
	2	Nut
27	1	Washer
28	1	Top nut
29	1	Guard for motor bracket
30	1	Screw for guard
31	1	O-ring

$\Delta$ : Service kit - NBR, FPM  
(See Spare Parts list)

This page shows an exploded drawing of LKR-5.

The drawing includes all items of the pump.  
They are identical with the items in the Spare Parts List.

## Exploded drawing



# Drawing/Parts list

The drawing and the parts list include all items of the agitator.

The items are identical with the items in the Spare Parts List.

When ordering spare parts, please use the Spare Parts List!

## Parts list LKR-5

18

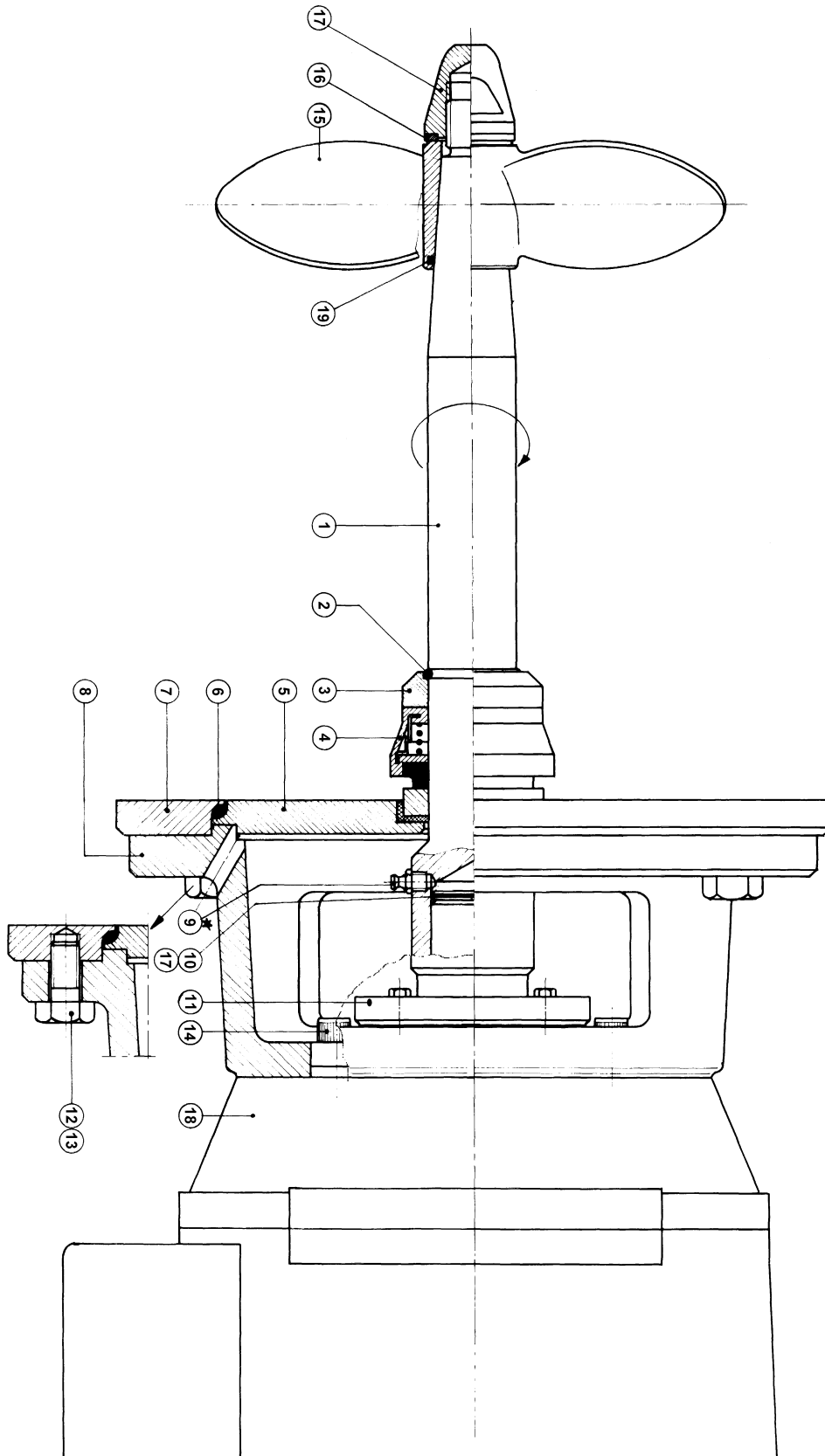
Pos.	Qty.	Denomination
1	1	Propeller shaft
2 $\Delta$	1	O-ring
3	1	Fixing-ring
4 $\Delta$	1	Shaft seal
5	1	Front plate
6 $\Delta$	1	O-ring
7	1	Welding flange
8	1	Motor bracket
9	1	Grease nipple
10	1	Washer
11	1	Compression coupling
12	6	Set screw (only propeller size 200 mm)
	6	Pointed screw (only propeller sizes 250-300 mm)
13	10	Lock nut (only propeller sizes 250-300 mm)
	6	Lock nut (only propeller sizes 250-300 mm)
14	4	Allen screw (only propeller size 200 mm)
	4	Hexagon screw (only propeller sizes 250-300 mm)
15	1	Propeller
16	1	Fibre washer
17	1	Nut
18	1	Motor
19 $\Delta$	1	O-ring
20 $\Delta$	1	O-ring
22	1	Cable gland
23	1	Direction arrow
24	1	Cover
25	1	Fixing clamp
25a	1	Fixing clamp
26	4	Nut
	2	Nut
27	1	Washer
28	1	Top nut
29	1	Guard for motor bracket
30	1	Screw for guard
31	1	O-ring

$\Delta$ : Service kit - NBR, FPM  
(See Spare Parts list)

The drawing shows LKR-5.

The items refer to the parts list on the opposite part of the page.

## Drawing



**How to contact Alfa Laval**

Contact details for all countries are continually updated on our website. Please visit [www.alfalaval.com](http://www.alfalaval.com) to access the information direct.