



# Instruction Manual

LKRE 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

**LKRE**

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**

**CE**

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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.

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## 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. Instruction manual.
4. Motor instructions.

2

### **Delivery:**

1. Shroud (20), if supplied.
2. Welding flange (12), if supplied (\*).
3. The rest of the agitator.

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

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

---

3

Inspect the agitator for visible transport damage.

---

4

Weld welding flange (12) onto the tank before assembling and installing the agitator (see page 5).

---

5

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


---


Study the instructions carefully and pay special attention to the warnings!  
CIP = Cleaning In Place (See page 8).


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. Weld carefully to avoid stress and tension.
2. If necessary, strengthen the tank to ensure a firm and stable installation.
3. Do not fit the agitator onto the welding flange until the flange is cold, otherwise O-ring (11) may become damaged.

4

### CIP connection:

R3/8" (BSP), external thread.

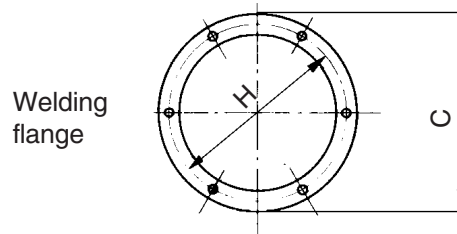
1. See the description of cleaning on page 8.
2. Connect CIP correctly.

2

### NOTE!

Weld welding flange (12) onto the top of the tank.

Propeller size (mm)	90	110
C (mm)	240	240
H (mm)	200	200



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!**

# Installation

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.

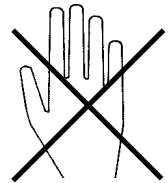
5

### 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!

Always run the agitator shortly (max. 10 min./operation) as it is not suitable for long operation periods due to the bearing design.

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!

Problem	Cause/result	Repair
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>- Smaller propeller</li> <li>- Reduce the speed</li> </ul>
Vibrations	<ul style="list-style-type: none"> <li>- Too high agitating capacity</li> <li>- Worn support bearing (24)</li> </ul>	<ul style="list-style-type: none"> <li>- Smaller propeller</li> <li>- Reduce the speed</li> <li>- Replace the bearing</li> </ul>
Air bobbles in the product	Worn shaft seal	Replace the shaft seal
Broken propeller shaft	To long operation periods (not suitable for long operation periods due to the bearing design)	Shorter operation periods (see page 6)

# Operation

8

The agitator is designed for cleaning in place (CIP).  
CIP = Cleaning In Place.  
The items refer to the drawings and the parts list on page 16-19.

## 3. Recommended cleaning

1

Caustic danger!



Always use rubber gloves!



Always use protective goggles!



Always handle lye and acid with great care.

3

### CIP:

CIP connection: R1/8" (BSP), external thread.

1. If supplied, remove shroud (20) or guard (35) from motor bracket (14).
  2. Connect CIP tube to CIP connection (29).
  3. Clean by CIP (see 4 to 6).
- Pay special attention to the warnings!**
4. Remove the CIP connection after the cleaning.
  5. If supplied, fit the shroud or the guard.

5

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.

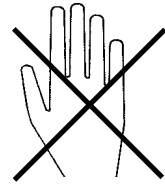
Study the instructions carefully and pay special attention to the warnings!

NaOH = Caustic Soda.

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

2

Burning danger!



Never touch the agitator or the tank when sterilizing.

4

### 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.
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2.2 l 33%NaOH	+	100 l water	= Cleaning agent.
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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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6

### NOTE!


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


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 O-rings 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

\* o

10

If fitted, remove cap nut (34), washer (33) and shroud (20) from the motor.

3

\* o

1. Remove screws (13).
2. Remove the agitator from the tank and welding flange (12).

4

\* o

If fitted, remove screw (36) and guard (35) from motor bracket (14), (only fitted, if the agitator is not supplied with shroud (20)).

5

\* o

Turn propeller (1) anticlockwise and remove it from propeller shaft (3).

6

1. Remove front plate (10) from motor bracket (14).
2. Remove O-ring (11) from the front plate.

### Only agitator with 110 mm propeller:

1. Remove lock wire (23) from support bearing (25).
2. Remove bush (24) from the bearing.

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**

\*

**8**

\*

Remove stationary seal ring (6) and O-ring (7) from front plate (10).

**9**

o

**10**

o

1. Remove rotating seal ring (8) from proller shaft (3).
2. Remove sprig (9) and O-ring (5) from the rotating seal ring.

1. Remove screws (16) from motor bracket (14).
2. Remove the motor bracket and intermediate ring (17) from the motor.

**11**

1. Loosen nut (18) by turning it anticlockwise.
2. Remove propeller shaft (3) together with the nut and wedge ring (15) from the motor shaft.
3. Remove distance ring (19) from the motor shaft.

Remove nut (18) and wedge ring (15) from propeller shaft (3).

# 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** ○

**2** ○

### NOTE!

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

1. Fit wedge ring (15) in propeller shaft (3).
2. Fit nut (18) on the propeller shaft (do not tighten).

### Replacement of motor:

1. Fit indication label (28) 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.

**3** ○

**4** ○

1. Fit distance ring (19) on the motor shaft.
2. Fit propeller shaft (3) together with wedge ring (15) and nut (18) on the motor shaft (press the propeller shaft against the distance ring).
3. Tighten the nut firmly by turning it clockwise.

1. Fit intermediate ring (17) and motor bracket (14) on the motor.
2. Fit and tighten screws (16).

**5** ★

**6** ★

1. Fit O-ring (5) in rotating seal ring (8).
2. Fit spring (9) on the rotating seal ring.
3. Fit the rotating seal ring on propeller shaft (3).

Fit O-ring (7) and stationary seal ring (6) in front plate (10).

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**

\* o

#### Only agitator with 110 mm propeller:

1. Fit bush (24) in support bearing (25).
2. Fit lock wire (23) in the support bearing.

1. Fit O-ring (11) in front plate (10).
2. Fit the front plate on motor bracket (14).

**9**

\* o

**10**

\* o

Fit propeller (1) on propeller shaft (3), turn it clockwise and tighten firmly.

If supplied, fit guard (35) and screw (36) on motor bracket (14), (only fitted, if the agitator is not supplied with shroud (20)).

**11**

\* o

**12**

\* o

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

If fitted, fit shroud (20), washer (33) and cap nut (34) 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.

14

## Technical data

### Data

Propeller size (mm)	Max. current at 380 V/ 2800 rpm. (A)	Measured current at 380 V (A)	Max. tank pressure (kp/cm <sup>2</sup> )	Max. temp. (°C)	Q (m <sup>3</sup> /min.)	Cm (m/sec.)
90	6	2,7	3	110	3,9	13
110	6	4,7	3	110	6,5	16

The data are valid for 2800 rpm, and agitation in water (20°C).

Q = Theoretical mixing capacity by specific density  $\rho = 1 \text{ g/cm}^3$ .

Cm = Theoretical axial speed directly above the propeller.

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

### Materials

Product wetted steel parts ..... AISI 304  
Other steel parts ..... AISI 304  
Product wetted seals ..... Nitrile (NBR)  
Other O-rings ..... Nitrile (NBR)  
Alternative seals ..... Viton (FPM)  
Finish ..... Semi bright  
Motor and motor bracket ..... Painted

### Shaft seal

Seal type ..... Single mechanical seal  
Material, stationary seal ring ..... AISI 316  
Material, rotating seal ring ..... Carbon  
Material, O-rings ..... Nitrile (NBR)  
Alternative material, O-rings ..... Viton (FPM)

### Motor

Standard flanged motor acc. to IEC metric standard, 2 speed (Dahlander-coupled)  
IP55 (with drain holes with labyrinth plug), insulation class F

Voltage and frequency ..... 3~, 50 Hz, 220-240V $\Delta$  /380-420VY

Motor sizes, 50 Hz ..... 2.2 kW ~ 1410 rpm  
2.7 kW ~ 2800 rpm



# 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 LKRE

16

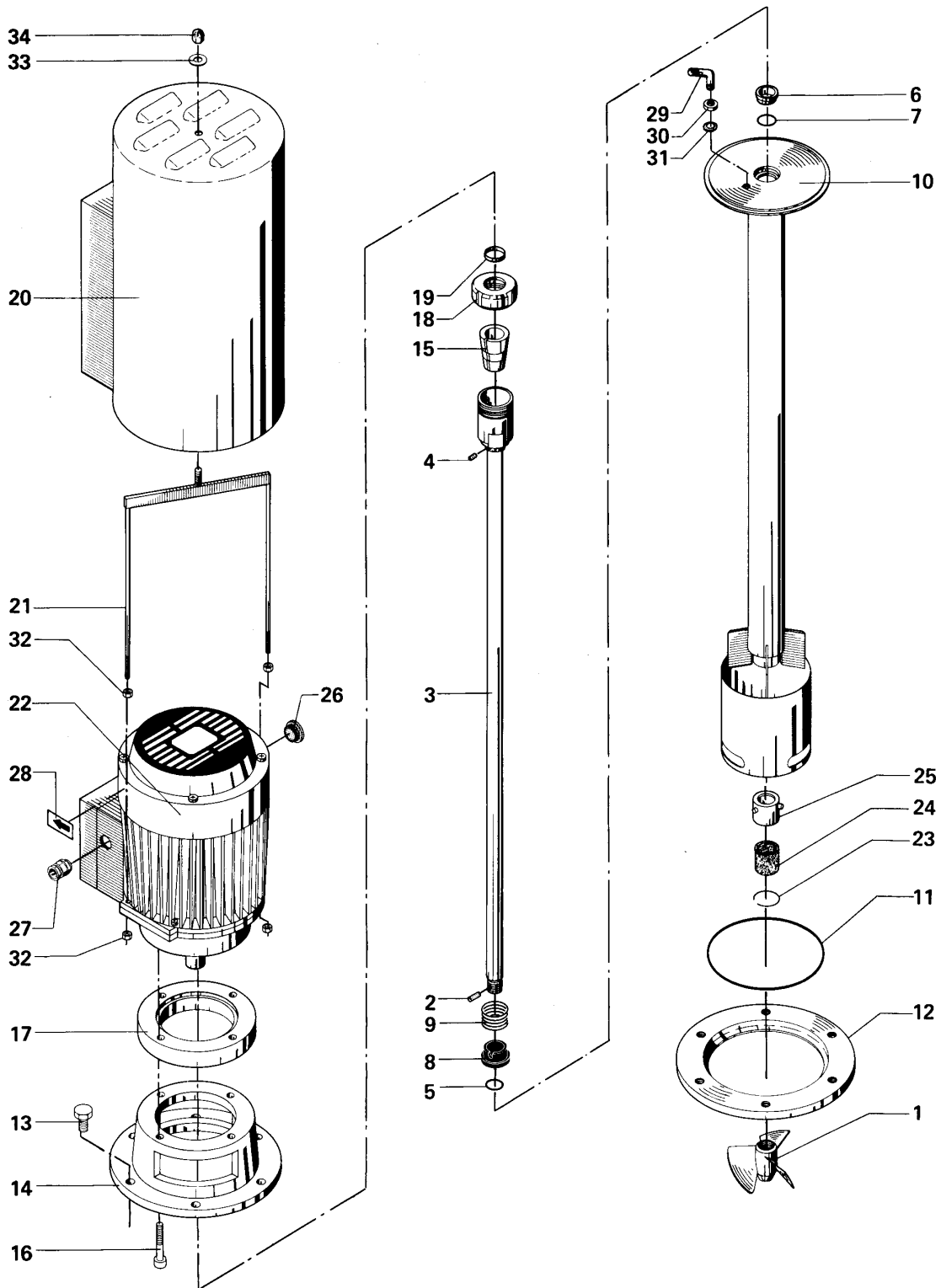
Pos.	Qty.	Denomination
1	1	Propeller
2	1	Connex pin (Nylon 4 x 20)
3	1	Shaft
4	1	Screw
5Δ	1	O-ring
6	1	Stationary seal ring
7Δ	1	O-ring (NBR)
8Δ	1	Rotating seal ring
9Δ	1	Spring
10	1	Front plate
11Δ	1	O-ring (NBR)
12	1	Welding flange
13	6	Screw
14	1	Motor bracket
15	1	Wedge ring
16	4	Allen screw
17	1	Intermediate ring
18	1	Nut
19	1	Distance ring
20	1	Shroud
21	1	Shroud fixing ring
22	1	Motor
23Δ	1	Lock wire (only agitator with 110 mm propeller)
24Δ	1	Bush (only agitator with 110 mm propeller)
25	1	Support bearing (only agitator with 110 mm propeller)
27	1	Cable gland
28	1	Direction arrow
29	1	CIP connection
30	1	Nut
31	1	Seal
32	4	Nut
33	1	Washer
34	1	Nut
35	1	Guard for motor bracket
36	1	Screw for guard

Δ: Service kit - NBR, FPM  
(See Spare Parts list)

This page shows an exploded drawing of LKRE.

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 LKRE

18

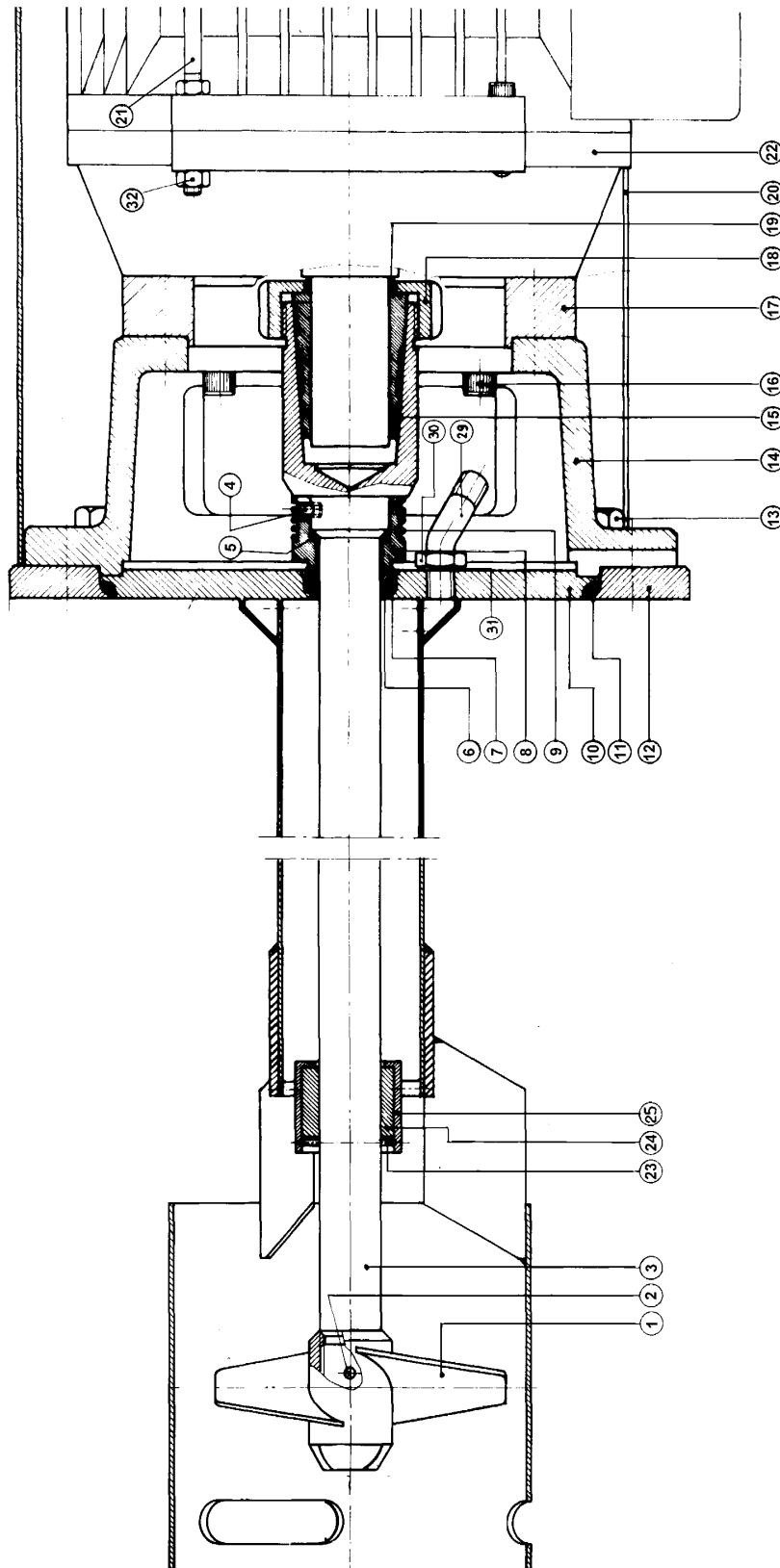
Pos.	Qty.	Denomination
1	1	Propeller
2	1	Connex pin (Nylon 4 x 20)
3	1	Shaft
4	1	Screw
5Δ	1	O-ring
6	1	Stationary seal ring
7Δ	1	O-ring (NBR)
8Δ	1	Rotating seal ring
9Δ	1	Spring
10	1	Front plate
11Δ	1	O-ring (NBR)
12	1	Welding flange
13	6	Screw
14	1	Motor bracket
15	1	Wedge ring
16	4	Allen screw
17	1	Intermediate ring
18	1	Nut
19	1	Distance ring
20	1	Shroud
21	1	Shroud fixing ring
22	1	Motor
23Δ	1	Lock wire (only agitator with 110 mm propeller)
24Δ	1	Bush (only agitator with 110 mm propeller)
25	1	Support bearing (only agitator with 110 mm propeller)
27	1	Cable gland
28	1	Direction arrow
29	1	CIP connection
30	1	Nut
31	1	Seal
32	4	Nut
33	1	Washer
34	1	Nut
35	1	Guard for motor bracket
36	1	Screw for guard

Δ : Service kit - NBR, FPM  
(See Spare Parts list)

The drawing shows LKRE.

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

## Exploded 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.