For Rapid and Vigorous Mixing

LKRE-H Agitator

Application
Agitator LKRE-H is used in tanks or vessels where the product requires mixing or stirring.

LKRE-H is intended for horizontal installation perpendicular to tanks or vessels. LKRE-H is used in process and storage tanks in the food processing industry, dairies, breweries and in the chemical industry.

Standard design
Agitator LKRE-H is based upon the agitator LKR-5 and has - like this one - a standard motor and an agitator shaft directly coupled to the motor shaft. The agitator is fitted with a jet head around the propeller - meaning that the jet head of the agitator acts like a nozzle or a jet during operation thus mixing the product effectively (see section "Operation").

The joint between the front plate and mating flange is fitted with an O-ring which acts as a hygienic seal. The shaft seal is fitted on the product side and is replaceable as a complete unit.

The propeller shaft is in solid steel and is fitted onto the motor shaft by means of a compression ring which is adjusted to the correct tension during assembly before delivery. The special propeller consists of 3 blades welded in an angle of 45 degrees to give a high velocity on the delivery side together with a large shearing effect. Furthermore the LKRE-H has a separat CIP fitting.

The standard motor is suitable for operating in humid conditions. The motor is protected by a stainless steel shroud as standard.

Note! The agitator has to be installed horizontally and perpendicular to the tank and parallel with the tank bottom. For further details, please see IM70790.

Materials
Product wetted steel parts: Stainless steel 1.4301 (304).
Other steel parts: Stainless steel 1.4301 (304).
Product wetted seals: EPDM rubber.

Shaft seal (spring loaded)
Bellows: EPDM rubber.
Rotating seal ring: Carbon.
Stationary seal ring: Silicon Carbide.

Finish, steel parts: Semi-bright.
Motor and bracket: Painted.

Fig. 1. Agitator LKRE-H.

Operation
The agitator causes the product to move, resulting in the following two types of flow or current: Firstly a main flow which moves the liquid over a large distance, secondly a whirlpool effect (turbulence) which overrides the main flow and moves the liquid over smaller distances (fig. 2). The specially designed nozzle jet head around the propeller (fig. 1) produces concen-trated sucking and squirting actions which lead to an effective mixing.
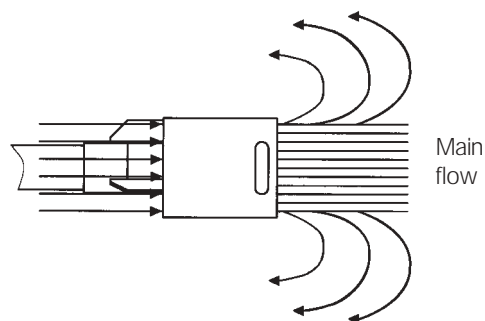

Main flow

Fig. 2. Operation.

Selection of LKRE-H

Calculation for low viscous products (max. 100 cP - e.g. milk, juice, wine etc.):

Agitating time [min.] = V/Q

V = Liquid volume of tank (m^3)
Q = Flow of LKRE-H (m^3/min)

Normal agitating time
Agitating: 5-10 min.
Mixing: 1-2 min.

Installation advice
- Min. distance between agitator and tank bottom:
  1 x propeller diameter.

- Max. height of silo tanks:
  H < 3 x tank diameter.
  If H > 3 x tank diameter, use 2 agitators, one of which is to
  be placed half way up the tank - note that the agitators
  are to be placed on the same side.

- Protect the agitator against dry run.

- Select rubber and shaft seal, depending on product/CIP.

Basic agitator calculations

Flow capacity:

$Q = C_1 \times n \times D^2 \times S$

Power required:

$P = C_2 \times r \times n^3 \times D^5$

Q	=	Agitator flow	(m^3/min)
P	=	Power	(kW)
n	=	Revolution speed	(rps)
D	=	Propeller diameter	(0.19 m)
S	=	Propeller pitch	(0.6 m)
r	=	Density	(Kg/m^3)
C_1	=	Factor specific for the propeller	0.5
C_2	=	Factor depending on turbulance	0.6 app.

Calculation of change in rpm and impeller diameter

Change in rpm (n):

$$Q_2 = Q_1 \times \frac{n_2}{n_1}$$

$$P_2 = P_1 \times \left[\frac{n_2}{n_1} \right]^3$$

Change in impeller diameter (D):

$$Q_2 = Q_1 \times \left[\frac{D_2}{D_1} \right]^2$$

$$P_2 = P_1 \times \left[\frac{D_2}{D_1} \right]^5$$

Technical data

Propeller size Diam. (mm)	Rev. (rpm)	Motor (kW)	Max. tank pressure (kPa) (bar)	Max. temp. seal: Nitrile (NBR) (°C)	Max. temp. seal: Flour. rubber (FPM) (°C)	Q (m³/min)	c_m (m/sec)
190	700	3				9.0	6.9
190	950	3				12.1	9.3
190	950	5.5	1000 kPa	90	130	12.1	9.3
190	1430	5.5	10 bar			18.5	14.2
190	1430	7.5				18.5	14.2

The data is valid for agitation in water (20° C) and for 50 Hz only.

Note! At 60 Hz the rpm will be increased with 20% and need more power (kW). Contact Alfa Laval for advice.

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

Voltage and frequency for standard motor
3~, 50 Hz, 220-240VΔ/380-420VY	≤ 2.2 kW
3~, 60 Hz, 250-280VΔ/440-480VY	≤ 2.5 kW
3~, 50 Hz, 380-420VΔ/660-690VY	≥ 3.0 kW
3~, 60 Hz, 440-480VΔ	≥ 3.5 kW

Motor size
50Hz:	1.5, 2.2, 3.0, 4.0, 5.5, 7.5 kW.
60Hz:	1.75, 2.5, 3.5, 4.6, 6.3, 8.6 kW.

Q - Theoretical mixing capacity.
c_m - Theoretical jet velocity on the delivery side of the propeller.

Dimensions (mm)

A*	350
B	140
C	320
D	ø205
E*	525
F*	304
H	270

* Agitator fitted with shroud.

Options

A) Supplied without shroud.
B) Motors for other voltage or frequency.
C) Other shaft seal combinations and other product wetted rubber types:
   - Shaft seal carbon/silicon carbide/NBR rubber.
   - Shaft seal carbon/silicon carbide/FPM rubber.
   - Shaft seal silicon carbide/silicon carbide/EPDM rubber.
   - Shaft seal silicon carbide/silicon carbide/NBR rubber.
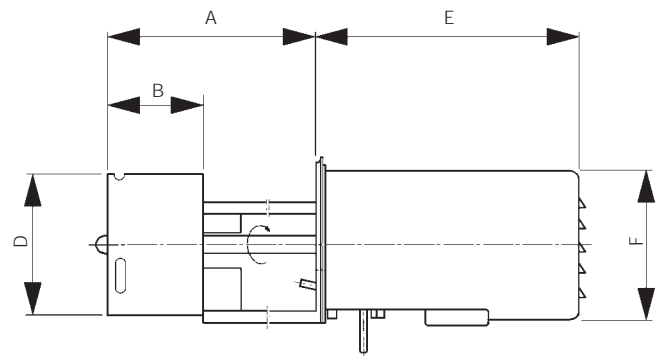   - Shaft seal silicon carbide/silicon carbide/FPM rubber.

Ordering
Please state the following when ordering:
- Agitator type LKRE-H.
- Motor power and speed.
- Options.

Note!
For further details, see also PD 65036.

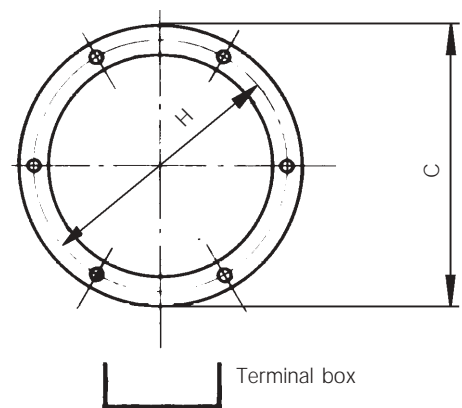**Note!** It is recommended to turn the terminal box downwards. Please weld-in the flange accordingly.

Fig. 3. Dimensions.