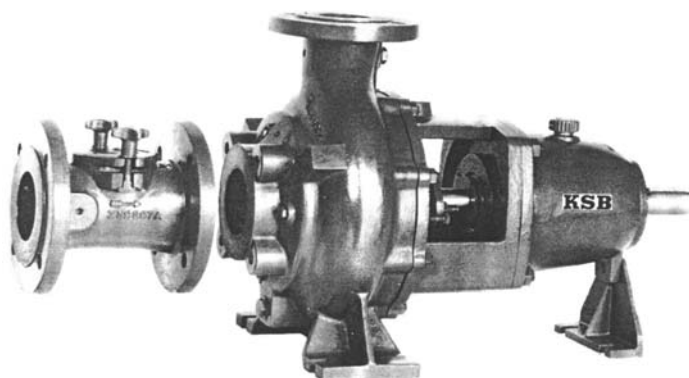


Non-Clogging Centrifugal Pumps

of process type construction
standard bearing arrangement,
casing construction 1 and 2
up to bearing bracket P65/160x



Works serial n°: _____

Product: _____

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1. General

Your centrifugal pump will only give you completely trouble free and satisfactory service on condition that it is installed with due care and properly maintained. It is absolutely essential that the instructions contained in this manual be scrupulously observed, and that the pumps are not operated under conditions which differ from those specified under our "operating conditions". These operating instructions do not take any account of any safety regulations which may apply to the installation site, and the site manager or site operator is responsible for notifying our erection staff of any such regulations such regulations and seeing that they are complied with.. The type series, pump size, main operating data and Works serial number are all stamped on the rating plate affixed to the pump; please make sure to quote this information every time you write to us in respect of queries, repeat orders, and more particularly when ordering spare parts.

1.1 Transport

The pumping set should be properly handled and slung for transport. Do not thread the ropes through the eyebolt on the motor.

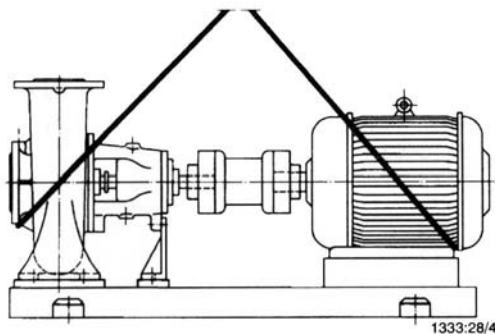
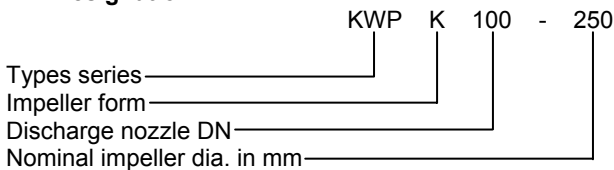


Fig.1-Pump and drive mounted on a combined baseplate

1.2 Designation



Impeller forms:

K = channel-type impeller

F = free-flow impeller (special)

O = open multi-vane impeller

1.3 Design details

Horizontal, non-self-priming, radially split volute casing pump in back pull-out design, with impeller adapted to meet application requirements, single-flow, single-stage (other impeller forms and pump sizes on request).

1.3.1 Pump casing

Radially split, consisting of pump casing with integrally cast suction and discharge cover. The discharge cover includes an integrally cast stuffing box housing; the pump casing is fitted with a wear plate.

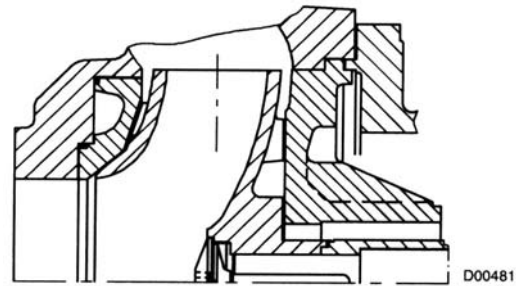
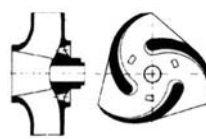


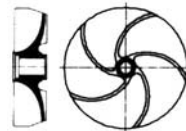
Fig.2-Discharge cover with integrally cast stuffing box housing

1.3.2 Impeller form



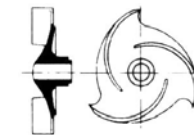
K-impeller:

closed channel-type impeller for contaminated, solids-laden, non-gaseous liquids not liable to plait. As closed multi-vane impeller for uncontaminated or slightly contaminated liquids containing no or very little gas.



F-impeller (special):

Open free-flow impeller for liquids containing large solids and matter liable to plait, as well as liquids with entrapped air and gas.



O-impeller:

open multi-vane impeller for uncontaminated or slightly contaminated liquids as well as liquids liable to form deposits and bunch, with little entrapped gas.

2. Erection

(Installation on site)

2.1 Foundation

Make sure that the concrete foundation has set firmly before placing the pumping set on it. The surface of the foundation should be truly horizontal and perfectly flat. The foundation bolts should be suspended in the baseplate.

2.2 Installation

After placing the pump on the foundation, level it up with the aid of a spirit level placed on the shaft/discharge nozzle. The correct gap between the two coupling halves specified on the installation drawing must be observed. Shims should always be inserted to the left and right of the foundation bolts in close proximity to the bolts themselves, between the baseplate or foundation frame and the foundation itself. If the spacing between adjoining anchor bolt holes exceeds 800 mm, additional shims should be inserted half way between the adjoining holes. All shims must lie perfectly flush.

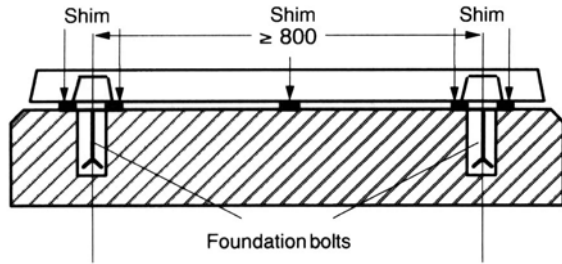


Fig.3-Provision of necessary shims

To ensure silent running, the pumping set can be mounted on vibration dampers (please consult us first). Compensators can be arranged between the pump nozzles and the suction and discharge lines.

After insertion of the foundation bolts, the latter should be grouted in the foundation with mortar. When the mortar has set firm, the baseplate should be leveled up in accordance with section 2.3 and the foundation bolts be tightened uniformly and firmly. There after the baseplate should be grouted in with mortar (non-shrinking mortar if possible), making sure that no cavities remain unfilled.

2.3 Alignment of pump and driver

The pumping set can be considered to be correctly aligned if a straight edge placed axially on both coupling halves exhibits the same distance (a or b respectively) from each shaft at all points around the circumference. In addition, the gap between the two coupling halves must remain the same at all points around the circumference. The gap can be measured with the aid of a feeler gauge, a wedge gauge or a dial micrometer (see figs.4 and 5).

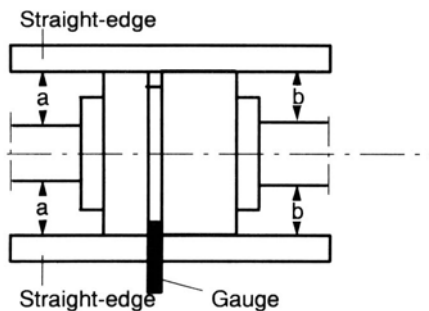


Fig.4-Coupling alignment with the aid of a gauge and a straight edge

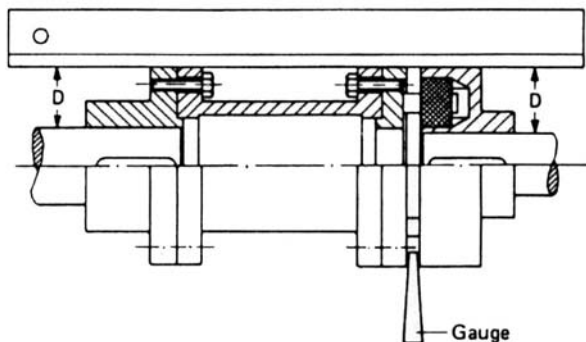


Fig.5-Alignment of a spacer-type coupling

The deviation (tolerance) between the two coupling halves must not exceed 0.1 mm both radially and axially.

2.4 Connecting the piping

Never use the pump itself as an anchorage point for the piping. Suction lift lines should be laid with a rising slope towards the pump, and suction head lines with a downward slope towards the pump. The pipelines should be anchored in close proximity to the pump and should be connected to the latter without transmitting any stresses or strains, nor should the weight of the piping be loaded onto the pump.

The nominal sizes of the pipelines should be at least equal to the nominal sizes of the pump nozzle. We recommend the incorporation of check valves or non-return valves and of isolating valves in the system, depending on the type of installation and pump.

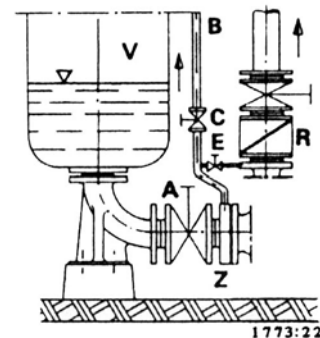
Any thermal expansion of the piping (due to high temperatures) must be compensated by suitable means, so as not to impose any additional load on the pump.

2.4.1 Auxiliary connections

The auxiliary connections required for your pump (cooling, heating, sealing liquid, flushing liquid, etc., as the case may be) are indicated on the installation drawing and on the piping diagram in respect of size and location.

2.4.2 Vacuum balance line

If the pump has to pump a liquid out of a vessel under vacuum, it is advisable to install a vacuum balance line. This line should have a nominal size of 25mm at least. It should be arranged to lead back into the vacuum vessel at a point above the highest permissible liquid level. An additional line starting at the pump discharge nozzle facilitates venting of the pump before start-up. The vacuum-tight isolating valve in this connecting line should be closed after the venting procedure and should remain closed while the pump is running. The main isolating valve C in the vacuum balance line must remain open at all times when the pump is running, and should only be closed when the pump is shut down (fig.6).



- A Main isolating valve
- B Vacuum balance line
- C Isolating valve
- E Vacuum-tight isolating valve
- R Check valve
- V Vessel under vacuum
- Z Intermediate flange

Fig.6-Suction line and vacuum balance line

2.5 Coupling guard

In compliance with the accident prevention regulations, the pump may only be operated if it is fitted with a coupling guard. If the customer states specifically that this coupling guard is not to be supplied by us, it must be provided by the pump operator.

2.6 Final check

Check the alignment once more, as described in section 2.3. It must be possible to rotate the pump rotor without effort by hand at the coupling.

3. Commissioning, start-up and shut-down

3.1 Preparations prior to commissioning

3.1.1 Lubricants

Grease-lubricated bearings:

Grease lubricated bearings are pre-packed with grease at our works before dispatch of the pump.

Oil-lubricated bearings:

The bearing bracket should be filled with oil of **HD 20** quality.

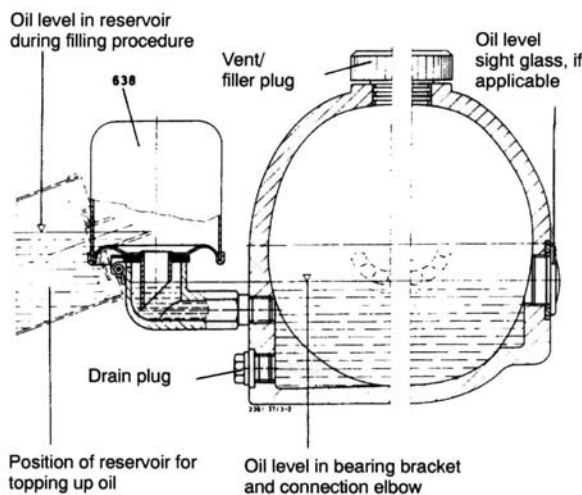


Fig.7-Oil fill

Procedure:

Unscrew vent plug. Pour in oil through the vent plug aperture after having hinged down the reservoir of the constant level oiler until oil appears in the vertical portion of the connection elbow of the constant level oiler (see fig.7). Then fill the reservoir of the constant level oiler with oil and snap it back smartly into operating position. Screw vent plug in again. After a short time has elapsed, check whether the oil level in the reservoir has sunk. The reservoir should always remain filled.

If the vent plug is inaccessible or difficult to reach, e.g. in cases where the motor is arranged above the pump (piggy-back arrangement), the oil can be filled into the bearing bracket through the connection elbow of the constant level oiler.

Caution:

The oil level should always be situated below the level of the vent slot arranged at the top edge of the connection elbow, and this slot should always be perfectly dry.

If no constant level oiler is provided on the bearing bracket, make sure that the oil level reaches the centerline of the oil level indicator arranged at the side of the bearing bracket.

3.1.2 Shaft seal

Check the shaft seal, see section 4.

3.1.3 Priming the pump and checks to be carried out

The pump and suction lift line must be vented and primed with the fluid pumped before start-up. The isolating valve in the suction lift line must be fully open. All auxiliary connections provided on your pump (e.g. flushing liquid, sealing liquid, cooling liquid, etc.) must be opened fully and the unimpeded flow of the fluid through these lines must line (if applicable to your installation) and close the vacuum-tight isolating valve E (fig.6).

3.1.4 Checking the direction of rotation

The direction of rotation must correspond to the arrow on the pump. This can be checked by switching on the pump for a short instant and switching it off again immediately.

Mount the coupling guard.

3.2 Switching on

Always make sure that the isolating valve in the discharge line is closed when the pump is switched on. Only after the pump has attained full operating speed should the discharge valve be opened gradually and the operating point conditions adjusted by means of this valve.

Caution:

After the operating temperature has been attained, and/or in the event of leakage, tighten the lantern/casing connecting bolts after switching off the pumping set.

3.3 Switching off

Close isolating valve in discharge line.

If a non-return valve or check valve has been incorporated in the discharge line, the isolating valve can remain open in so far as there is a back pressure present in the line.

Switch off driver. Observe the pumping set running down smoothly and quietly to a standstill.

In the event of a prolonged shut-down, the isolating valve in the suction lift line should be closed.

Close the auxiliary connections, and turn off the cooling liquid supply (if applicable to your installation) after the pump has cooled down. The shaft seal of pumps which are connected to a supply vessel under vacuum must be fed with sealing liquid even when the pump is switched off. In the event of frost and/or of prolonged shut-downs, the pump and the cooling compartments (if applicable) must be drained or otherwise protected against freezing.

4. Maintenance and lubrication

4.1 Supervision of operation

The pump should run quietly and free from vibration at all times. The pump must never be allowed to run dry. Avoid any prolonged running against a closed discharge valve. The bearing temperature may be allowed to attain up to 50°C above room temperature, but should not exceed + 90°C.

Make sure the oil level is adequate (see section 3.1.1). The isolating valves in the auxiliary feed lines must always remain open while the pump is running.

The soft-packed stuffing box (if your pump is fitted with one) should drip slightly during operation. The stuffing box gland should only be tightened lightly.

Any standby pumps in the pumping installation should be operated once a week for a short instant., by switching on and switching off again so as to maintain them in good condition for instant start-up in an emergency. The correct functioning of the auxiliary connections should be kept under observation. When signs of wear become apparent on the flexible coupling elements in the course of time, these elements should be replaced by new ones in good time.

4.2 Lubrication and lubricant changes

4.2.1 Lubrication

The antifriction bearings are grease or oil-lubricated; see section 5, for required lubricant fills.

4.2.2 Grease changes

The initial fill (grease packing) of grease-lubricated antifriction bearings should last for 3000 operating hours approx., but should be renewed at least once every 2 years or after every 3000 hours of operation (see section 5).

Grease quality:

Use a good quality ball and roller bearing grease with a lithium soap base, free of resin and acid, not liable to crumble, and possessing good rust-preventive characteristics. The grease should have a penetration number situated between 2 and 3, corresponding to a worked penetration situated between 220 and 295mm/10. Its drop point should not be less than 175°C.

4.2.3 Oil changes

The first oil change should be carried out after 300 hours of operation approx., and subsequent oil changes once every 3000 hours of operation approx.

Procedure:

Unscrew oil drain plug beneath the constant level oiler (or beneath the oil level indicator) and drain the old oil. When the bearing bracket is empty, replace the oil drain plug and fill in fresh oil in accordance with section 3.1.1.

5. Special instructions and recommendations

N.B.:

The stuffing box packing is dispatched loose together with the pump. It is therefore necessary to pack the stuffing box before commissioning the pump.

If a constant level oiler is provided, it must be screwed into the upper tapped hole on the bearing bracket before filling in any oil (see fig.7).

5.1 Basic instructions and recommendations

N.B.:

Before commencing dismantling, make sure that the pump cannot be accidentally switched on.

The isolating valves in the suction and discharge lines must be closed.

The volute casing must have cooled down to ambient temperature. The volute casing must be drained and pressure less.

Always refer to the relevant section drawing when dismantling and reassembling the pump.

5.2 Dismantling

1. Drain off the oil as described in section 4.2.3.
2. Remove coupling guard.
3. Disconnect coupling spacer sleeve, or if none is fitted, remove the drive.
4. Disconnect and remove any existing auxiliary connections.
5. Loop a rope tightly around the top web of the bearing bracket lantern 344.
6. Unscrew hex. head bolt 901.04 (resp. socket head cap screw 914.04 on bearing bracket P 02 a) and the base-plate fixing bolts on support foot 183, and remove the support foot.
7. Unscrew and remove hex. nuts 920.01 and pull the complete bearing bracket out of the pump casing 101 together with shaft 210, impeller 230 and bearing bracket lantern 344. Use the forcing screws 901.31 for this purpose, having previously cleaned the screw threads. Take care not to damage gasket 411.10.
8. Unscrew impeller screw 906 (right-handed screw thread) and remove O-ring 412.03. Pull off impeller 230 with the aid of a puller device, lift out key 940.01.
9. Dismantling of shaft seal:
If your pump is fitted with a mechanical seal, see the supplement sheet at the end of this operating instructions. If your pump is fitted with a gland packing, remove gland cover 452.01 after having unscrewed hex. nuts 920.02, not forgetting the discs 550.01. Remove discharge cover 163 together with gland packing and drip plate 463.01, and remove the gland packing from the packing compartment. Force gland bush 456.01 out of the casing cover.
10. Unscrew hex. nut 920.04 and remove bearing bracket lantern 344. Pull shaft protecting sleeve 524.01 together with gasket 400.04 off the shaft. Open out thrower 507.01 and pull it off.
11. Pull the half coupling off the pump shaft with the aid of an extractor, after unscrewing the socket head cap screw in the coupling hub, and remove key 940.02.
12. Remove bearing covers 360.01/02 at pump and drive ends after unscrewing socket head cap screw 914.01/02.
13. Carefully drive shaft 210 together with deep groove ball bearing 321.02 and inner race of cylindrical roller bearing 322.01 out of the bearing bracket towards the drive end.
14. Remove supporting disc 550.23. Inspect condition of circlips 932.01/02. Remove cylindrical roller bearing 322.01 (roller cage) from the bearing bracket.
15. Bend back lock washer 931.01, unscrew keywayed nut 920.21 (right-handed screw thread), remove lock washer.
16. Heat up deep groove ball bearing 321.02 and the inner race of the cylindrical roller bearing 322.01 and pull them off the shaft.

17. Examine wear plate 135.01 for signs of wear and if necessary remove it from the pump casing.
For dismantling the wear plate it is necessary to remove the hex. head bolts 901.03 (or if applicable the socket head cap screw 914.05) together with the joint rings 411.13. Take care not to damage the joint rings 411.12 and the O-rings 412.05.
18. Clean all components and inspect them for signs of wear. Touch up any damage parts or replace them by new ones.

5.3 Reassembly

Reassembly of the pump should be carried out in accordance with the accepted rules of engineering practice. Individual fits of components should be coated with graphite or a similar lubricant before assembly, and screw threads should also be coated with a lubricant. Gaskets and radial shaft seal rings should be examined for signs of damage and should if necessary be replaced by new ones, and the thickness of the new gasket should be exactly the same as that of the old one. Reassembly proceeds in reverse sequence to dismantling.

The following points should be carefully observed:

1. Only use the bearing type and sizes specified in section 5.3.2. Heat deep groove ball bearings 321.02 and inner race of cylindrical roller bearing 322.01 up to 80°C approx. in an oil bath before slipping them onto the shaft until they abut against the shaft shoulder.

N.B.:

After having mounted deep groove ball bearing 321.02, screw on and tighten the keywayed nut 920.21 with the aid of a hook wrench, and without fitting the lock washer 931.01. let the deep groove ball bearing cool down to approx. 5°C above ambient temperature.

Tighten the keywayed nut further, then unscrew it again. Put a few spots of Molykote on the contact faces of the lock washer and of the keywayed nut, slip on the lock washer, firmly tighten the keywayed nut and bend over the lock washer.

2. When mounting the bearing covers 360.01/.02, take care not to damage the radial shaft seal rings 421.01/.02.
3. Follow the instructions of section 5.3.1 when packing the stuffing box.
If your pump is fitted with a mechanical seal, see the supplement sheet at the end of this operating instructions.
Check the sliding fit of the shaft protecting sleeve on the shaft.
4. Carefully insert the impeller gasket, take care that the seals and sealing faces are clean.
5. After assembly into the volute casing which has remained in situ in the pipeline, the coupling alignment should be checked (see section 2.3).
6. Fill in oil as described in section 3.1.

5.3.1 Gland packing

In principle, die-pressed packing rings only should be used. Recommendations for assembly (when the pump is dismantled):

Press gland bush 456.01 into the discharge cover 163. In the case of the packing arrangement illustrated in fig.11, do not forget to insert distance ring and lantern ring 458.01.

Insert the first packing ring so that its butt joint lies in the horizontal plane. Hold onto the packing ring and push the shaft protecting sleeve, chamfered end forward, into the packing compartment from the front end of the pump. Open out the inner diameter of the packing ring slightly by pushing the shaft protecting sleeve to and fro against the ring. Then pull out the shaft protecting sleeve, and insert the second packing ring with its butt joint offset 90° in relation to the first ring. Open out the inner diameter of the second ring as described above. On the packing construction illustrated in fig.9, insert lantern ring 458.01. Then insert the remaining packing rings.

After the last packing ring has been inserted, the shaft protecting sleeve should remain in situ in the packing compartment. Insert the stuffing box ring 454.01 in such a way that its joint face is at right angles to the stuffing box gland.

Push on gland cover 452.01 and only tighten it lightly by hand with the aid of the two hex. nuts 920.02.

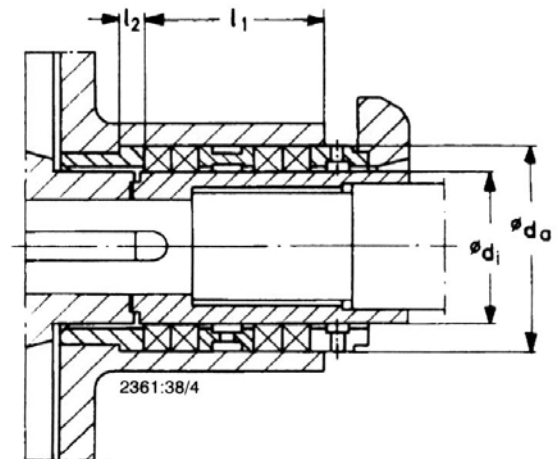
Remember the discs 550.01.

Fit the completely packed assembly of discharge cover into the pump, together with the shaft protecting sleeve.

N.B.:

The stuffing box should drip slightly when the pump is running. Any sealing and flushing liquid systems fitted to your pump should be checked at regular intervals for unimpeded flow. After the gland cover has been repeatedly tightened until it abuts, it is time to renew the pump packing completely.

Dimensions of packing compartment / number of packing rings

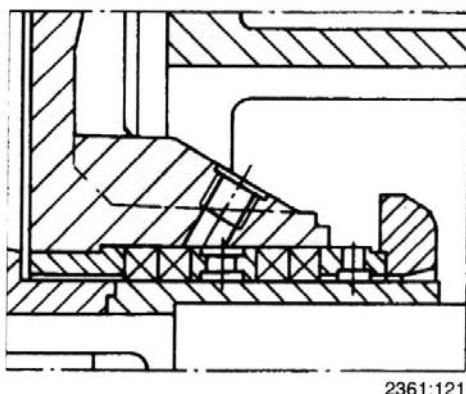


Bearing bracket	Number of packing rings					Dimensions of packing compartment	
	With lantern ring	Without lantern ring	$\varnothing d_1$	$\varnothing d_a$	\square	l_1	l_2
P25/62S	4 ①	6	35	51	8	53	8
P35/80S	4 ①	6	45	65	10	64	8
P45/120ax	4 ①	6	55	75	10	64	8
P45/120S	4 ①	6	70	95	12,5	79	8
P55/140ax	4 ①	6	80	105	12,5	79	8
P65/160ax	4 ①	6					

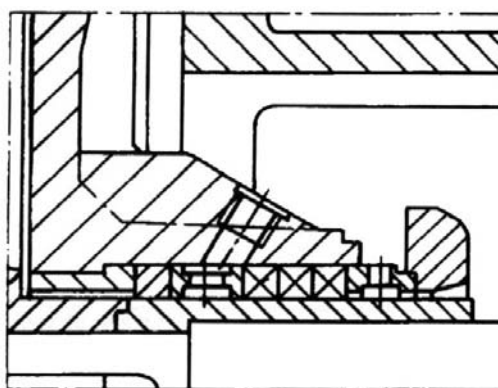
① on construction in accordance with fig.11

See section 5.4.2 for allocation of bearing bracket sizes to pump sizes.

Fig.8

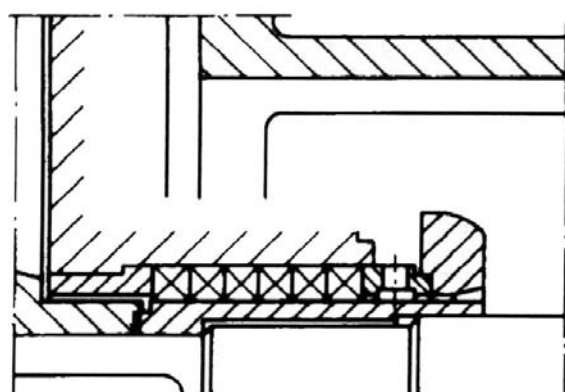


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Fig.9-Packing with sealing liquid connection
(standardized construction)


2361:123

Fig.11-Packing with flushing liquid connection



2542:22

Fig.10-Packing without lantern ring

5.3.2 Bearing arrangement

Bearing bracket	Cylindrical roller bearings 322.01 (DIN5412)	Deep groove ball bearings 321.02 (DIN625)	Oil fill in litres
P25/62S	NU 305	7206 BUA	0,3
P35/80S	NU 307	6307 BUA	0,5
P45/120ax	NU 311	7311 BUA	0,5
P45/120S	NU 311	7311 BUA	0,5
P55/140ax	NU 313	7313 BUA	1,5
P55/140S	NU 313	7313 BUA	1,5
P65/160ax	NU 413	7313 BUA	-
P65/160x	NU 413	7313 BUA	-

See section 5.4.2 for allocation of bearing bracket sizes to pump sizes.

Bearing types to be used and required oil fills

5.4 Stock of spare parts / Interchangeability

Always please quote the following data when placing orders for spare parts:

Type series: KWP in this case

E-n°:

Works serial n°:

The above data stamped on the rating plate.

5.4.1 Recommended stock of spare parts for 2 years of operation, in accordance with DIN 24 296

Part n°	Part designation	Number of pumps (including standby pumps)						Number of spare parts
		2	3	4	5	6	8	
135.01	Wear plate, suction end ①	2	2	2	3	3	4	50%
210	Shaft	1	1	2	2	2	3	30%
230	Impeller	1	1	2	2	2	3	30%
321.02	Radial ball bearing	1	1	2	2	3	4	50%
322.01	Cylindrical roller bearing	1	1	2	2	3	4	50%
330	Bearing bracket, complete	-	-	-	-	-	1	2 off
433.01 ①	Mechanical seal	2	3	4	4	4	6	90%
	Rotary seal ring	2	3	4	4	4	6	90%
	Stationary seal ring	2	3	4	4	4	6	90%
	O-rings	2	3	6	8	8	10	150%
	Gasket on stat, seal ring	2	3	6	8	8	10	150%
	Spring	1	1	1	1	2	2	20%
456.01	Gland bush	1	1	2	2	2	3	30%
461.01	Gland packing (set)	2	2	3	3	3	4	40%
524.01	Shaft protecting sleeve	2	2	2	3	3	4	50%
	Gasket for pump casing (set)	4	6	8	8	9	12	150%

① If fitted

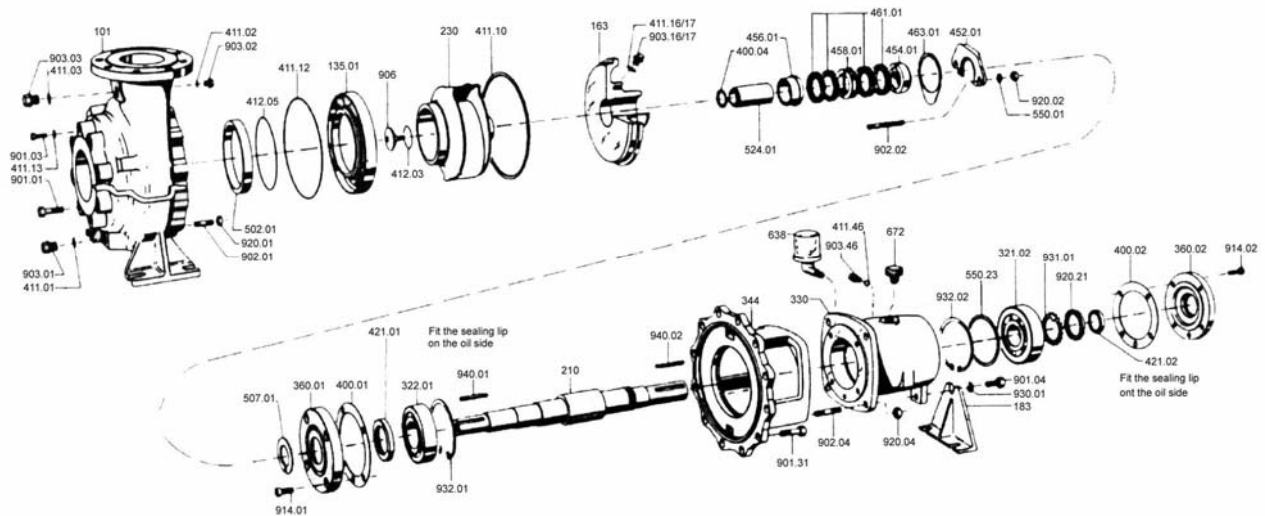
5.4.2 Interchangeability of pump parts

Part n°	Part designation	Bearing bracket	P25/62S	P35/80S-HYDR.K P45/120ax-HYDR.O			P45/120S-HYDR.K P55/140ax-HYDR.O			P55/140S-HYDR.K P65/160ax-HYDR.O			
		Pump sizes	50-160 ①	50-200	65-200 ①	80-250	65-315	100-250	100-315	80-400	100-400	150-315	200-315 ①
101	Pump casing		1	3	4	5	6	9	10	11	12	15	17
135.01	Wear plate, suction end		1	3	4	5	6	9	10	11	12	15	17
163	Discharge cover		1	3	3	2	4	6	4	7	7	8	8
183	Support foot		1	3	2	4	5	5	7	8	8	9	10
210	Shaft		1	2	2	2	3	3	3	4	4	4	4
230	Impeller		1	3	4	5	6	9	10	11	12	15	17
321.02	Deep groove ball bearing		1	2	2	2	3	3	3	4	4	4	4
322.01	Cylindrical roller bearing		1	2	2	2	3	3	3	4	4	4	4
330	Bearing bracket		1	2	2	2	3	3	3	4	4	4	4
344	Bearing bracket lantern		1	3	3	2	4	2	4	6	6	7	7
433.01	Mechanical seal		1	2	2	2	3	3	3	4	4	4	4
452.01	Gland cover		1	2	2	2	3	3	3	4	4	4	4
454.01	Stuffing box ring		1	2	2	2	3	3	3	4	4	4	4
458.01	Lantern ring		1	2	2	2	3	3	3	4	4	4	4
461.01	Gland packing		1	2	2	2	3	3	3	4	4	4	4
507.01	Thrower		1	2	2	2	3	3	3	4	4	4	4
524.01	Shaft protecting sleeve		1	2	2	2	3	3	3	4	4	4	4
906	Impeller screw		1	2	2	2	3	3	3	4	4	4	4

The parts within each horizontal column which bear the same number are interchangeable

① Only impeller form K

5.5 Exploded view and list of components



Please quote the following data when ordering spare parts:

Type series, pump size, works serial n° (stamped on the rating plate and on the discharge nozzle), year built, quantity, part n°, part designation, material, product pumped, sectional drawing n° and means of transport.

Part n°	Part designation	Extent of supply
101	Pump casing	threaded plug 903.01/.02 ③/.03, joint ring 411.01/.02 ③/.03/.10, hex. nut 920.01, stud 902.01, hex. head bolts 901.01
135.01	Wear plate, suction end	hex. head bolts 901.03 ④, gasket 411.12/.13, o-ring 412.05.05
163	Discharge cover	stud 902.02, hex. nut 920.02, disc 55001, threaded plug 903.16/.17, drip plate 463.01
183	Support foot	hex. head bolts 901.04, spring washer 930.01
210	Shaft	key 940.01/.02, keywayed nut 920.21, lock washer 931.01, impeller screw 906, o-ring 412.03
230	Impeller	gasket 400.04
321.02	Deep groove ball bearing	
322.01	Cylindrical roller bearing	
330	Bearing bracket	vent plug 672, oil drain plug 903.46, gasket 411.46, constant level oiler 638, gasket 400.01/.02
330	Bearing bracket complete	same as above, hex. head bolt 901.04, socket head cap screw 914.01/.02, bearing cover 360.01/.02, radial shaft seal ring 421.01/.02, support foot 183, circlip 932.01/.02, support disc 550.23
344	Bearing bracket lantern	stud 902.04, hex. nut 920.04, jacking screw 901.31
360.01	Bearing cover, pump end	gasket 400.01, socket head cap screw 914.01
360.02	Bearing cover, motor end	gasket 400.02, socket head cap screw 914.02
421.01/.02	Radial shaft seal ring	
452.01	Gland cover	
454.01	Stuffing box ring, split	
456.01	Gland bush	
458.01	Lantern ring, split	
461.01	Packing ring	
507.01	Thrower	
524.01	Shaft protecting sleeve	gasket 400.04

③ If fitted

④ Or socket head cap screw 914.05

6. Faults

Fault	Code number Cause - Remedy
Pump delivers insufficient liquid	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 28
Driver is overloaded	12, 13, 14, 15, 23, 27, 28
Excessively high pump discharge pressure	15
Excessively high bearing temperature	22, 23, 25, 26, 31
Leakage at the pump	29
Excessive leakage at shaft seal	17, 18, 20, 21, 22, 23
The pump runs rough	3, 6, 11, 12, 22, 23, 30, 31, 32
Excessive temperature rise inside the pump	3, 6, 32

Numbers which are omitted do not apply to the pump type series under consideration.

Cause – Remedy ①

- The pump delivers against an excessively high discharge pressure
 - Open discharge valve further until the duty point conditions have been attained (adjusted)
- Excessively high back pressure
 - Fit an oversize impeller ②
 - Increase rotational speed (applies to turbine or I.C. engine driven pumps)
- The pump and/or piping are incompletely vented or primed
 - Vent or prime the pump and system completely
- Suction line or impeller clogged
 - Remove deposits in the pump and/or piping
- Formation of air pockets in the piping
 - Alter piping layout
 - If necessary, fit a vent valve
- NPSH available is too low (on positive suction head installations)
 - Check liquid level in suction vessel
 - Open isolating valve in suction line fully
 - Install a different suction line if necessary, if the friction losses in the suction line are excessive
 - Check suction line strained
- Excessively high suction lift
 - Clean out suction strained basket and suction piping
 - Check liquid level in the pit
 - Alter the suction line
- Entrainment of air through the stuffing box
 - Sealing liquid passages are clogged; clean them out. If necessary, arrange a sealing liquid supply from an outside source, or increase sealing liquid pressure
 - Fit a new shaft seal
- Reverse rotation
 - Change over two of the phase leads of the power supply cable
- Rotational speed is too low ②③
 - Increase rotational speed
 - Increase voltage of power supply
- Excessive wear of the pump internals
 - Replace worn components by new ones

- Pump back pressure is lower than specified in the purchase order
 - Adjust duty point accurately by means of the isolating valve in the discharge line
 - In case of persistent overloading, trim the impeller if necessary ②
- Specific gravity or viscosity of the fluid pumped is higher than that specified in the purchase order
 - ②
- Gland cover tightened excessively or askew
 - Adjust the gland as required
- Excessive rotational speed
 - Reduce speed (applies to turbine or I. C. engine driven pump)
 - ②③
- Worn shaft seal
 - Check condition of shaft seal and renew it if necessary
 - Check flushing liquid or sealing liquid pressure
- Grooving, score marks or roughness on shaft protecting sleeve surface
 - Fit a new shaft protecting sleeve
- Gland cover or seal incorrectly tightened, wrong type of packing material used
 - Remedy the fault
- The pump runs rough
 - Correct the suction conditions
 - Check alignment of pumping set and realign if necessary
 - Re-balance the pump rotor dynamically
 - Increase the suction pressure at pump suction nozzle
- Pumping set misaligned
 - Check piping connections and pump fixing bolts
- The pump is warped
 - Check piping connections and pump fixing bolts
- Too much or too little lubricant, or unsuitable lubricant quality
 - Top up lubricant, reduce quantity of lubricant, or change lubricant quality
- The prescribed coupling gap has not been maintained
 - Restore correct coupling gap in accordance with the data on the foundation drawing
- Operating voltage is too low
- The motor is running on two phases only
 - Replace the defective fuses
 - Check the cable connections
- The connecting bolts are slack
 - Tighten the bolts
 - Fit new gaskets
- The rotor is out of balance
 - Clean the rotor
 - Re-balance the rotor dynamically
- Defective bearings
 - Fit new bearings
- Insufficient rate of flow
 - Increase the minimum rate of flow

① The pump should be made pressure less before attempting to remedy faults concerning parts exposed to pressure

② Please refer to KSB

③ This fault can also be remedied by altering the impeller diameter

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