KSB Meganorm

Centrifugal pump for general use

Line :	**Mega**
Standard :	**ISO 2858**

1. Application

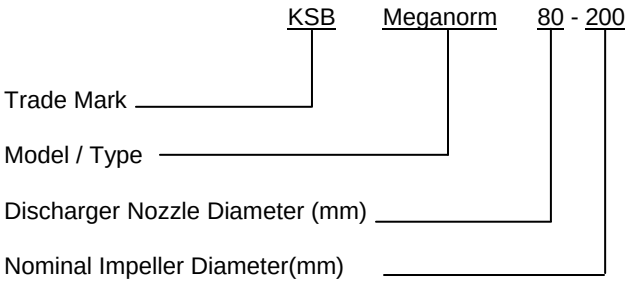
The KSB MEGANORM centrifugal pump is suitable for handling chemical products, aggressive organic and inorganic liquids, oil, water, condensate and other liquids, and it is mainly used in the following applications:

- Sugar and alcohol industry
- Water supply
- Irrigation
- Air conditioning
- Fire fighting
- Drainage

2. Design

Horizontal, single-stage, end suction with top centerline discharge. The “back-pull-out”design allows maintenance and repair services through the backside, without dismantling piping supports.
Dimensionally built to ISO 2858/DIN 24256 and mechanically to ANSI B73.1.

3. Designation



4. Operating data

Sizes	- DN 25 up to 150 (1 ¼” to 6’)
Flow	- up to 3,082 gpm (700 m3/h)
Head	- to 460 ft (140 m)
Temperature	- to 221ºF (105º C)
Max. Suction pressure	- to 145 psi (10 bar)
Speed	- to 3,500 rpm

5. Introduction

KSB has supplied you with equipment that has been designed and manufactured with the most advanced technology. Due to its simple and tough construction it will not need much maintenance. With the aim of providing our clients with a satisfactory, trouble free operation, we recommend to install and care our equipment according to the instructions contained in this service manual.

This manual has been prepared to inform the end user about the construction and operation of our pumps, describing the adequate procedures for handling and maintenance. We recommend that this manual should be handled by the maintenance supervision.
This equipment should be used in the operational conditions for which it was selected as to: flow rate, total head, speed, voltage, frequency, and temperature of pumped liquid

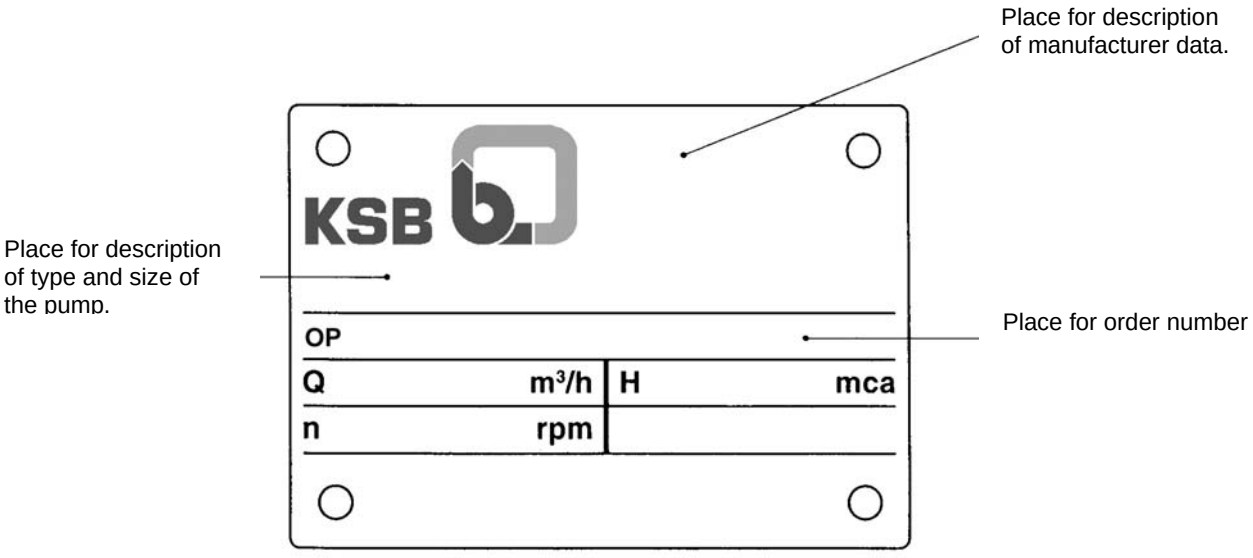


Fig. 1 –Nameplate

For requests about the product, or when ordering spare parts, please indicate the type of pump and the Production Order nº (serial nº). This information can be obtained from the nameplate on the actual pump. If the nameplate is not available, the PO nº is engraved in low relief on the suction flange, and on the discharge flange you may find the impeller diameter.

Attention: This manual contains very important instructions and recommendations. Its careful reading is an obligation before installation, electrical connections, first starting and maintenance.

Contents

6. Technical data

Technical data \ Pump sizes	Units.	25-150	25-200 ②	32-125.1	32-125	32-160.1	32-160	32-200.1 ②	32-200 ②	40-125	40-160	40-200 ②	50-125	50-160	50-200 ②	65-125	32-250.1 ②	32-250 ②	40-250 ②	50-250 ②	65-160	65-200 ②	80-160	40-315	50-315	65-250 ②	80-200 ②	80-250 ②	100-160	100-200 ②	65-315	80-315	80-400 ③	100-250 *	100-315	100-400 ③	125-200 *	125-250	125-315	125-400 ③	150-200	150-250	150-315	150-400 ③
Bearing bracket		A 30															A 40													A 50													A60
Width of impeller passage	mm	5,5	6	7	9	5	5	6	6	14	12	9	20	16	11	25	8	8	8	12	21	17	31	9	9	13	23	19	36	32	13	18	13	27	23	17	40	37	30	25	59	48	39	33
	inch	3/16	4/16	4/16	6/16	3/16	3/16	4/16	4/16	9/16	8/16	6/16	13/16	10/16	7/16	1	5/16	5/16	5/16	8/16	13/16	11/16	1 4/16	6/16	6/16	8/16	14/16	12/16	1 7/16	1 4/16	8/16	10/16	8/16	1 1/16	14/16	11/16	1 9/16	1 7/16	1 3/16	1	2 5/16	1 14/16	1 9/16	1 5/16
WR^2 with water	kg m²	0.0214	0.0591	0.0140	0.0142	0.0224	0.0238	0.0760	0.0786	0.0144	0.0336	0.0640	0.0189	0.0394	0.0750	0.0263	0.1800	0.1820	0.1880	0.1920	0.0521	0.0985	0.0641	0.4396	0.4800	0.2232	0.1568	0.2904	0.1040	0.1800	0.5120	0.5696	1.2788	0.3172	0.6100	1.3832	0.2230	0.4100	0.7740	1.6912	0.2918	0.4656	0.8680	1.8600
	lb.ft²	0.127	0.350	0.083	0.084	0.132	0.141	0.451	0.466	0.085	0.199	0.379	0.112	0.233	0.445	0.156	1.068	1.079	1.115	1.139	0.309	0.584	0.380	2.608	2.847	1.324	0.930	1.722	0.617	1.067	3.037	3.379	7.587	1.881	3.619	8.206	1.323	2.432	4.592	10.033	1.731	2.762	5.149	11.035
Max. rot. speed	rpm	3500																						1750		3500					1750														
Max. suction pressure	bar/(psi)	10 / (145) ② ③																																											
Max. discharge pressure x Temp.	bar/(psi)	See table 7																																										
Shaft Seal – Packing	mm	10																													12,5													
	inch	3/8																													1/2													
Shaft Seal – Mech. seal ④	inch	1 3/8															1 3/4														2 3/8													2 3/4
Axial thrust balance	-	①	By bored hole on impeller																																										
Min./max. flow	-	0.1 Qopt / 1.1 Qopt																													0.15 Qopt / 1.1 Qopt													
Flanges	-	ANSI B 16.1 125 Lb FF															250 Lb FF			125LbFF	• •		•	••	ANSI B 16.1 125 Lb FF																		
Rotation direction	-	Clockwise, seen from driver end																																										
Bearings – Ball bearings 2x		6306 C 3															6308 C 3														6310 C 3													6312 C 3
Bearings – Lubrication		Oil																																										
Drive (P/n value) Shaft SAE 1045	HP/rpm	0.0176															0.0458														0.100													0.158
Weight – Cast iron	kg	32	40	34	35	34	34	42	44	38	38	49	40	42	47	49	68	68	73	72	70	61	89	104	108	89	92	106	105	108	126	132	162	132	142	178	136	157	156	193	183	192	246	280
	lb	70	88	75	77	75	75	92	97	84	84	108	88	92	104	108	150	150	161	159	154	134	196	229	238	196	202	233	231	238	278	291	357	291	313	392	300	346	344	425	403	423	542	617

Table 1

•125Lb FF ••250 Lb FF

*For sizes 100-250 and 125-200 max. speed = 2.900 rpm.
①For size 25-200 by bored holes on impeller, for sizes 25-150; 32-125.1 and 32-125 without axial thrust balance.
②③The maximum suction pressure for pumps with mechanical seal is 5 bar (73 psi), except for sizes ② in 3500 rpm and ③ in 1750 rpm which are limited by sum of inlet pressure and work pressure not exceeding 10 bar (145 psi).
④Materials: stationary face in ceramic, rotating face in carbon, seals in Buna-N.
Not recommended for liquids containing solids.
Other materials upon request.

7. Transportation

Skilled, trained personnel should perform the transportation of the pump-motor assembly or bare shaft pump. Even so, safety regulations should be observed. On lifting, the motor lug should be used to carry the motor only and never the pump-motor assembly.

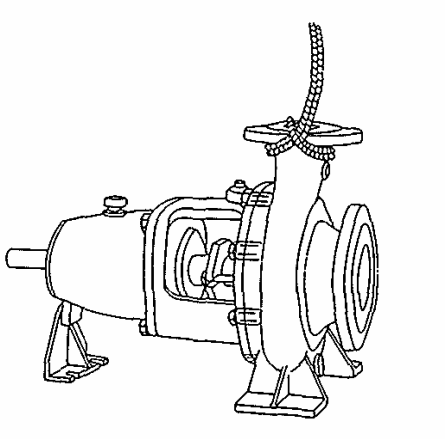


Fig. 2 – Transportation of the pump through the discharge flange.

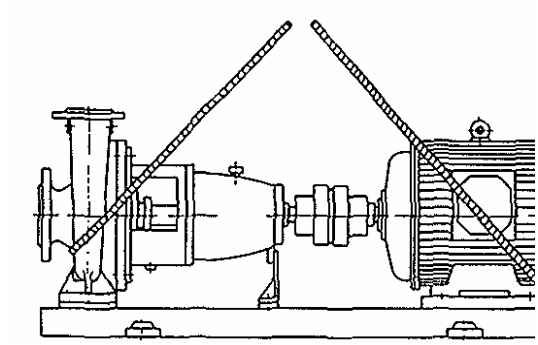


Fig. 3 – Transportation of the pump-motor assembly

NOTE: Be sure that the coupling guard and foundation bolts are not lost or damaged during transportation.

8. Preservation and storage of idle pumps

Following procedures of preservation and storage are made by KSB and its Dealer Network and protect the equipment up to 6 months in an indoor environment. It is client responsibility to keep these procedures after receiving the pump.
When the pump is not subjected to a performance test after its sale, the areas in contact with the pumped liquid which are not painted (i.e. stuffing box housing, wear rings, flange sealing areas, etc), receive an application of RUSTILO DW-301 by brush.
When the pump is equipped with packing and is subjected to a performance test, it is drained after the test without disassembling it, and then filled up with RUSTILO DW-301 rotating its rotor assembly in order to improve RUSTILO application. After this operation, the pump should be drained again.
Exposed shaft areas (i.e. shaft end, area between the gland cover and the bearing bracket) receive a brush application of TECTYL 506.
On oil lubricated bearing brackets, the bearings receive a layer of MOBILARMA 524 by spray.
The pump must be protected against material damage, humidity, dust and aggressive environment in an indoor place.

8.1 Additional procedures of preservation and storage of idle pumps

- Pumps stored for periods exceeding one year should be serviced every 12 months. They should be disassembled, cleaned and the whole preservation process described below should be repeated.

- PACKING equipped pumps should have their packing removed before storage.

- MECHANICAL SEALS should be cleaned by compressed air. **No other liquid or material** should be applied to them in order to prevent damage to the secondary sealings as to o-ring gaskets.

- All connections as inlets for liquids from external sources, priming, draining, flushing and cooling should be closed. SUCTION AND DISCHARGE FLANGES SHOULD BE COVERED to prevent the entry of strange bodies.

- Assembled pumps waiting to be installed or to start operation should be turned manually every 15 days. If it is difficult to move them by hand, use a box spanner, protecting the shaft surface at the point of application.

- Before conservation liquids application, areas should be washed with gasoline or kerosene until they are completely cleaned.

Characteristics of the protecting liquids used for pump preservation purposes:

Protecting liquid	Thickness of the applied layer (μm)	Drying time	Removal	Manufacturer
TECTIL 506	from 80 to 100	½ up to 1 hour	Gasoline, benzene diesel Oil	Brascola
RUSTILO DW 301	from 6 to 10	1 up to 2 hours	Gasoline, benzene	Castrol
MOBILARMA 524	≤ 6	does not dry	Not necessary	Mobil Oil

Table 2 – Protecting liquids

9. Installation

Our pumps should be installed, leveled and aligned by skilled and trained personnel. When this service is done incorrectly, it will originate operational troubles, premature wear and damage beyond repair.

9.1 Base grouting

Place the foundation bolts in the holes or slots of the foundation block according to boring design as shown on the foundation drawing.
Between the base and the foundation block and beside the foundation bolts, metallic chocks of the same height should be fixed with grout together with the foundation bolts, to serve as support for the base.
In order to achieve a perfect adherence to the grout, the chock blocks and foundation bolts should be free of any grease or oil residues. After the grout set is completed, place the base on the foundation block (non-shrinking mortar is highly recommended). Please see Fig. 4.

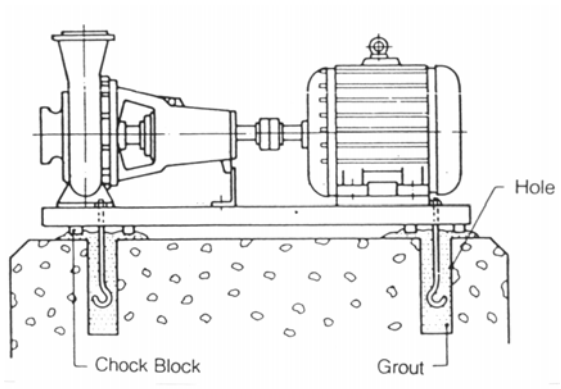


Fig. 4 – Base grouting

9.2 Base leveling

Check if the base plate is equally resting on its chock blocks, if it is correctly set, place and tighten uniformly the nuts on the foundation bolts. With the help of a precision level, check the leveling of the base longitudinally and transversally.
If the base plate is out of level, loosen the foundation bolt nuts and insert shims, as necessary, between the metallic chock block and the base, in order to correct the leveling.
Please see fig.5.

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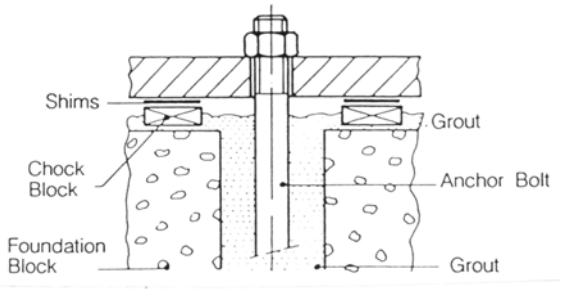


Fig. 5 – Base leveling

Note: After leveling the base and before concrete fulfill, the motor-pump set must be pre-aligned according to the instructions of item 9.4.

9.3 Grouting

In order to get a good, vibration-free operation, the pump base plate must be filled with grout.
Grout should be made of specific compounds available in the civil construction market, which prevent shrinkage through grout setting process as well as full base filling and does not allow blanks or gaps. Please see Fig. 6a

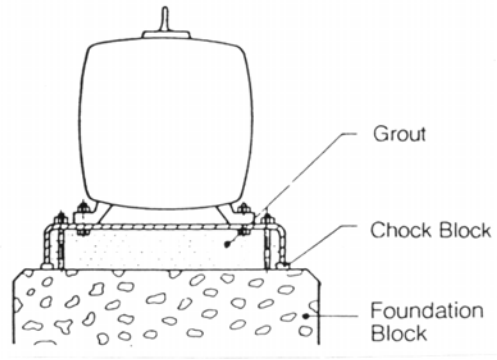


Fig. 6a-Base fulfill with grout

9.3.1 Execution with adjustment screws

When adjustment screws are used under motor side surrounding areas should be free of concrete. Protecting tubes should be used, in order permit future adjustments to align the equipments. See fig.6b.

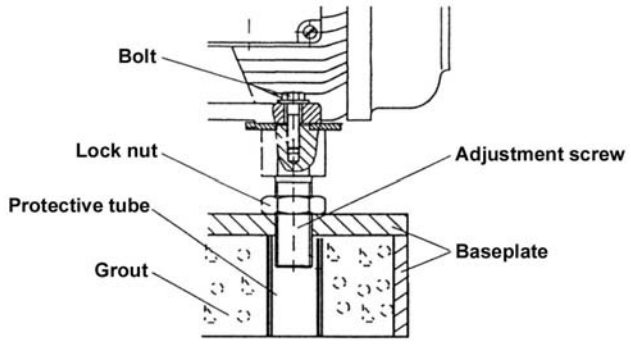


Fig. 6b – Grouting inside the baseplates of adjusting screw type

9.4 Coupling alignment

The useful life of the rotating assembly and its operation free of irregular vibrations will rely on the perfect alignment between the pump and the driver.
The alignment performed at the factory must be rechecked due to the fact that during transportation and handling, the motor-pump assembly is subjected to deformations, which may affect the initial alignment.
After the complete set of the grout, perform the alignment, if possible, with the suction and discharge pipe lines already connected.
This alignment should be performed with the help of a dial indicator for the control of the radial and axial displacements.
Fix the button of the instrument to the periphery of one the coupling halves, adjust the position of the feeler perpendicular to the periphery of the other half of the coupling. Move the dial to zero and move manually the coupling half in which the instrument button is fixed, making the dial complete a 360 degrees turn. Please see Fig.7.
The same procedure should be performed to control the axial displacement. Please see Fig.8.

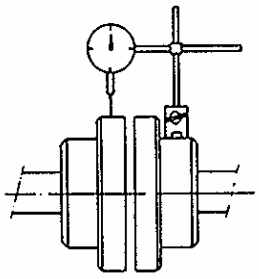


Fig. 7
Radial control

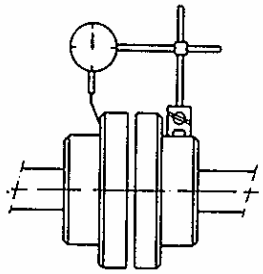


Fig.8
Axial control

To correct the alignment, loosen the driver bolts and move driver laterally or insert shims to adjust height as required.
Axial and radial alignments should remain within a tolerance of 0.1 mm with the pump and driver set screws tighten securely.
If there is no dial indicator available, use a straight edge placed across the two rims of the sleeve coupling. To control axially use a feeler gauge. Please see Fig. 9. Observe the sleeve coupling hub clearance specified by manufacturer.

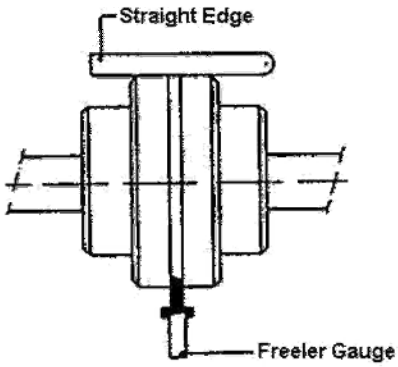


Fig. 9 – Alignment with straight edge and feeler gauge

9.4.1 Motors without adjustment bolts

For the alignment correction, loosen the bolts from the drive replacing them laterally, or insert shims to correct the height as required.

9.4.2 Motors with adjustment bolts

To realign the coupling, first loose the four drive bolts, as well as the lock nuts. Turn the adjustment bolt by hand or with a tool until the coupling alignment is correct. Retighten the bolts and respective nuts.

9.5 Suction pipeline – Recommendations

To install the suction piping follow these instructions:

a) Connect the suction piping to the pump only after the complete hardening of the grout in the base plate.

b) The suction piping should be as straight and short as possible – reducing pressure losses - and totally air tight, preventing any air leaks.

c) In order to be free of air pockets, the horizontal section of the suction piping, when negative, should be installed with gradual rise slope. When positive, the horizontal section of the pipeline should be installed with a gradual rise slope to the suction tank.

d) The nominal diameter of the pump suction flange does not determine the suction pipe nominal diameter. To calculate the ideal diameter as a reference, the liquid velocity can be defined between 3.2 ft/s and 6.5 ft/s (1 and 2 m/s).

e) If it were necessary to use a reduction, it should be eccentric, mounted with its taper facing downwards, so that the reduction upper generatrix stays in a horizontal position coincident with the pump generatrix, so as to prevent air pockets.

f) Curves and accessories, when needed should be designed and installed reducing pressure losses to a minimum, i.e. always prefer long or medium radius curves.

g) The suction line flange should fit to the pump suction flange without any stress or tension and without applying any kind of force to the casing. **The pump should never be an anchor point for the suction pipeline.** If this condition is not observed a misalignment may happen, originating cracks on pump parts and/or other severe damages.

h) On installations equipped with foot valve, observe that the free passage area should be 1.5 times the cross sectional area of the suction pipeline. Normally coupled to the foot valve there should be a suction strainer with a free passage area 3 to 4 times larger than the cross sectional area of the suction pipeline.

i) When the liquid being pumped has large temperature variations, expansion joints should be installed preventing the effects of contractions and expansions of the suction pipeline on the pump.

j) With positive suction, it is advisable to install an inlet valve to close the flow to the pump when necessary. During the pump operation it should stay totally open. A suction with a common header for several pumps should have an inlet valve for each pump and the connection between the header and each suction line should be made with line angle changes less than 45 degrees. In all these applications of gate valves, the valve stems should be directed either horizontally or vertically downwards.

k) To prevent turbulence, leakage of air, sand or mud at the pump suction, all recommendations of the HYDRAULIC INSTITUTE referred to the these types of installation should be strictly observed.

l) Even if the coupling alignment has been checked before tightening, it has to be repeated after the final tightening of the suction pipeline.

m) To facilitate the mounting of the suction pipeline and the fitting of the parts, install as necessary, flexible joints of the following types: Dresser, common or special with tie bolts.

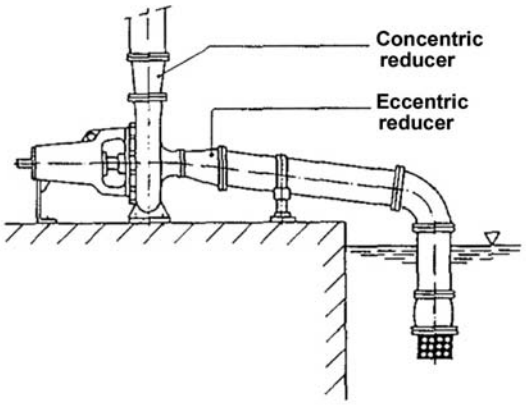


Fig.10 – Negative suction

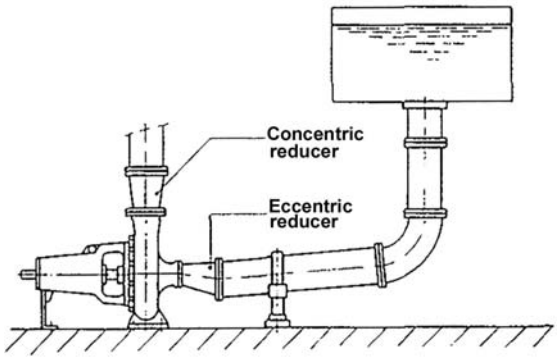


Fig.11 Positive suction

9.6 Discharge pipeline – Recommendations

To install the discharge pipeline, please follow the instructions below:

a) If the overpressures caused by the returning of the liquid in long pipe lines, exceed the limits specified for the line and the pump, water hammer control devices should be installed on the discharge pipe line.

b) When the diameters of the pump and pipeline flanges are different, the connections should be done through a concentric reduction.

c) On the points where it is necessary to bleed the air in the pipeline, vent valves should be installed.

d) Install a discharge valve, if possible immediately after the discharge nozzle of the pump in order to properly control the flow rate and pressure or to prevent driver overloads.

e) When a non-return valve is installed, it should be mounted between the pump and the discharge valve, prevailing this condition over item D.

f) Tie mounting joints should be installed to absorb the system reaction forces, originated on the applied loads.

g) Safety valves, pressure relief devices and other operational valves not included up to now, should be installed as necessary for adequate operation of the pipeline.

h) The recommendations for the suction pipeline described on items A, B, F, G are also valid for the discharge pipeline.

9.7 Auxiliary piping and connections

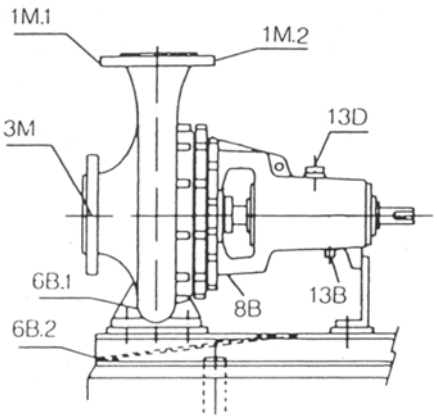


Fig. 12 – Auxiliary piping and connections

Connection	Designation	Dimension – NPT Thread			
		A30	**A40**	**A50**	**A60**
1M.1	Manometer	1/4	1/4	1/4	1/4
1M.2	Manometer	1/4	1/4	1/4	1/4
3M	Vacuum pressure gauge	1/4	1/4	1/4	1/4
6B.1	Drain	3/8	3/8	1/2	1/2
8B	Dripping	1/2	1/2	3/4	3/4
6B.2	Base drain	1	1	1	1
13D	Lubrication	Ø 20 mm			
13B	Drain	1/4	1/4	1/4	1/2

Table 3

9.8 Coupling guard

For increased safety in operation, coupling guards should be installed. They are made of steel or brass and fixed to the base.
Check that the coupling guard is not in touch with moving parts.

9.9 Instruments

It is recommended to use pressure gage and vacuum meter on discharge and suction pipes respectively for a better operation control.
Their ranges must correspond to 150% of highest pumping pressure.
Instruments must be equipped with valves.
When pumping chemicals and agressive liquids, the instruments and their valves should be made of proper materials.
In order to obtain a longer useful life the valves should be open only to read the instruments and then closed again.

10. Operation

10.1 First starting procedure

The following items must be provided for pump first startup:

a) Pump and its driver must be securely fastened to the base plate;

b) Fix firmly the suction and discharge pipelines;

c) Connect and run auxiliary pipelines and connections (if any).

d) Wiring should be done upon assuring that all motor thermal overload protections are securely and adequately connected and set.

e) Check bearings for cleanliness and dampness. Fill bearing bracket with oil in quantity and quality as specified in item 11.

f) Check the rotation direction of driver without coupling the pump to avoid dry operation.

g) Manually check for the free running of the moving parts.

h) Check that the proper coupling alignment according to item 9.4 has been performed.

i) Mount coupling guard (if any).

j) Prime pump by filling it and suction pipeline with water or with the liquid to be pumped, bleeding internal air simultaneously.

k) Check that the gland cover nuts are just fitted, without tightening them (pumps with packing).

l) Fully open suction valve (if any) and close discharge valve.

10.2 Immediate steps after first start-up

Once the pump has started and is already in normal operation, please follow the instructions below:

a) Adjust pump to its operation point (pressure and flow) by opening slowly the discharge valve shortly after pump drive has reached its nominal speed.

b) Motor current consumption (amperage) must be controlled as well as network voltage value.

c) Assure that suction pressure value corresponds to the designed one.

d) Assure that pump runs vibration-free and without unusual noises. Vibration criteria in accordance to Hydraulic Institute.

e) Check bearing temperature that may reach 122ºF (50ºC) over ambient temperature. However the sum of bearing temperature and ambient temperature should not exceed 197ºF (90ºC).

f) Adjust the packing by tightening gland cover nuts about 1/6 turn. Like any new packing, it is required a certain period to set. The new packing should be checked during the first 5 to 8 hours of operation and in the event of leakage in excess, the gland cover nuts should be tightened about 1/6 turn again. During normal operation, packing should drip. When packing reach the set stage, a weekly inspection should be enough. The procedure mentioned above should be practiced every 15 minutes over the first 2 hours of operation. If all tests pass, new checking should be carried out every hour, until the first 5 to 8 running hours (pumps with packing).

g) At the operation beginning, the pump with mechanical seal may have a little leakage through that. This leakage must stop after sealing faces accomodation.

10.3 Operation supervision

Depending on the availability of personal and on the importance of the pump, we recommend the following supervision. **In case of any irregularity, the maintenance supervisor should be called immediately**.

10.3.1 Weekly supervision

Check:

a) Operating point of the pump.

b) Electric motor consumed current and network voltage.

c) Suction pressure.

d) Vibrations and irregular noises.

e) Oil level.

f) Packing leakage.

10.3.2 Monthly supervision

Check:

a) Oil change interval. Consult chapter 11.2.

b) Bearings temperature.

10.3.3 Semestral supervision

Check:

a) Fixing bolts on pump, driver and base.

b) Alignment of the motor-pump assembly.

c) Coupling lubrication (if any).

d) Replace packing if necessary (if any).

e) Check the mechanical seal (if any), if their sealing faces are worn-out, scratched or broken. Replace it if necessary.

10.3.4 Annual supervision

a) Disassemble the pump for maintenance. After cleaning, inspect condition of ball and roller bearings (very carefully), radial seal rings, gaskets, o-rings, impellers, internal areas of the volute casing (check also thickness), wear areas and coupling.

10.4 Shutdown procedure

Follow in sequence these instructions:

a) Shut off pump discharge valve.

b) Turn off the driver and observe the gradual and smooth stop of the rotating assembly.

c) Close the suction valve (if any).

d) Close the auxiliary pipelines (if there is no restriction).

11. Maintenance

11.1 Bearing maintenance

Maintenance purpose here is to increase bearing system useful life as long as possible. While pump is operating, the maintenance consists in controlling the ball bearings temperature and the bearing bracket oil level.
The pumps are delivered from the factory without oil in the bearing bracket.

NOTE: Table of oil quantity to fill KSB MEGANORM pumps bearing bracket.

Bearing Bracket	Oil quantity - ml (in^3)
A 30	100 (6.10)
A 40	170 (10.37)
A 50	200 (12.2)
A 60	480 (29.30)

Table 4

11.2 Lubrication Intervals and oil specification

The first oil change should be made after the first 200 or 300 working hours. The next oil change should be made after 1500 or 2000 working hours. This will avoid dirt particles, which have not been eliminated by cleaning, to contaminate oil and damage bearings.
Then, oil change should be made every 8000 effective working hours or at least once a year (the one that becomes first). Bearings should be washed every 2 years (as a minimum).

Manufacturer	UP to 3,000 rpm	Exceeding 3,000 rpm
Atlantic	Eureka 68	Eureka 46
Castrol	HYS PIN AWS 68	HYS PIN AWS 46
Esso	Turbine Oil 68	Turbine Oil 46
Mobil Oil	DTE 26	DET 24
Ipiranga	IPITUR AW 68	IPITUR AW 46
Petrobrás	Marbrax TR 68	Marbrax TR 46
Shell	Tellus 68	Tellus 46
Texaco	Regal R&O 68	Regal R&O 46
Promax Bardhal	Maxlub MA 20	Maxlub MA 15

Table 5: Oil specifications

11.3 Packing maintenance

If the packing has already been pressed an equivalent of one packing ring thickness and even so the leaking is excessive, it will need maintenance according to the following instructions:

- Stop the pump;
- Loosen the gland cover and remove it. The removal of gland cover is easy due to its split design. To remove it, just push it in the direction of the bearing cover, and then pull half of the gland cover to the right and the other half to the left.
- Remove with the help of a flexible rod all the packing rings as well as the lantern ring.
- Clean the stuffing box chamber.
- Check the condition of the shaft protecting sleeve. If it is rough or has grooves that could damage the packing, the sleeve may be remachined on its diameter up to a maximum of 1 mm, or replaced by a new one.
- Cut new packing rings, if possible with oblique edges (see Fig. 13). To facilitate this cutting operation a very simple device may be constructed as shown in Fig. 14.

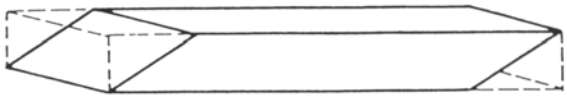


Fig. 13 – Slanted cut of the packing

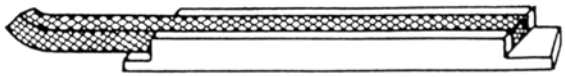


Fig. 14 – Packing rings cutting device

- Lubricate the inner diameter of each packing ring with grease. Lubricate the outer diameters of the lantern ring, of the gland bush and of the gland ring (if any) with Molykote G;
- Proceed to the assembly in the inverse sequence of the disassembly, introducing each part into the stuffing box chamber with the help of the gland cover. The packing rings should be mounted with their ends positioned 90 degrees from each other (see Fig. 15).

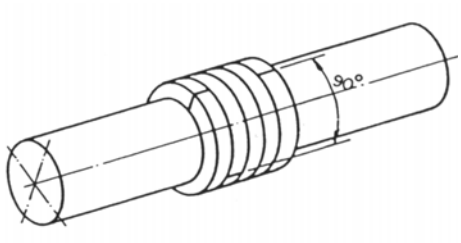


Fig. 15 – Ring position with ends positioned 90 degrees from each other

After all parts have been installed in the stuffing box chamber, a gap of 0.12" (3 mm) should remain as a guide for the gland cover.

11.4 Dismantling instructions

The numbers indicated between parenthesis just after the name of each part refers to the part list and to the exploded view drawing (Item 12).
Due to its modern project KSB Meganorm pump offers several maintenance advantages. The whole set can be dismantled to the back; bearing bracket, pressure cover and impeller. The spiral casing (102) and the suction and discharge piping remain in their place. In case of installation with spacer coupling, the driver remains also in its place, during the pump maintenance.

11.4.1 Dismantling sequence of pump

1) Close the suction and pressure valves. Drain the pump, taking the threaded plug off. (903.3).

2) Close the valve and disconnect the auxiliary piping (if any).

3) Remove the coupling cover.

4) Remove the oil level pointer (639) and the threaded plug (903.6) and drain the oil from the bearing bracket.

5) If the coupling has a spacer, remove it; if it doesn't have one, disconnect the sleeve removing the driver.

6) Remove the coupling from the pump shaft, loosening before the coupling fixing Allen bolt.

7) Loosen the bolts that fix the support foot to the base plate.

8) Loosen the bolts (901.2) or bolts (901.4) when necessary.

9) Remove all the set by fastening uniformly the extracting bolts.

10) Support the overhang side of the set with a piece of wooden. Lock the shaft using a device in the region of coupling sleeve key (940.2)

11) Loosen and extract the impeller bolt (906), the flat gasket (400.4) and the circlip (932).

12) Extract the impeller (230), the key (940.1) and the gasket (400.1).

13) Loosen the bolts (901.4). Loosen the nuts (920.2) and extract the gland cover (452) (if any). Extract the discharge cover (163) and the flat gasket (400.2). Extract the shaft protecting sleeve (524) and the seal components (433) (if any).

14) Extract the thrower (507) and the key (940.2).

15) Loosen the bolt (901.6) and release the support foot (183).

16) Loosen the bolts (901.5), extract the bearing cover (360) and the flat gasket (400.3). Take care not to damage the radial shaft seal rings (421) which come outside with the bearing cover.

17) With a piece of lead, strike against the shaft (210) suction side, in order to make the external surfaces of the radial ball bearings (321) run inside of the bearing bracket (330) until the complete extracting.

18a) Extract the parts of the sealing chamber, gland packing (461) and lantern ring (458). (Pumps with packing).

18b) Extract the stationary face of mechanical seal (433) from the pressure cover (163) (pumps with mechanical seal).

After these instructions are completed, the parts will be available for analysis and maintenance.

11.4.2 Dismantling sequence of the pump with mechanical seal and seal gland

Loosen the auxiliary pipings and the seal gland. Follow the instructions mentioned in the O&M booklet of the Mechanical Seal Manufacturer, which will be attached to the pump, in case of seal supply.

11.5 Assembly instructions

All the parts should be cleaned and deburred before the assembling.

11.5.1 Unauthorized modification and manufacture of spare parts

Modifications or alterations of the equipment supplied are only permitted after consultation with the manufacturer and to the extent permitted by the manufacturer. Original spare parts and accessories authorized by the manufacturer ensure safety. The use of other parts can invalidate any liability of the manufacturer for consequential damage.

11.5.2 Assembling sequence of the pump

Before the assembly at the shaft, the bearings should be heated at a furnace or with an oil bath up to a maximum temperature from 176ºF (80ºC) to 194ºF (90ºC) over the shaft temperature during 30 minutes, observing the maximum limit of 257ºF (125ºC).

1) Assemble the radial ball bearings (321) at the shaft. With a piece of lead, assemble the shaft at the bearing bracket, from the suction side, making the external track of the bearing to slide inside the bearing bracket until it reaches equal measurements at the both sides of the bearing bracket in order to allow grooving of the bearing covers.

2) Assemble the radial shaft seal ring (421) at the bearing covers (360). Assemble the covers carefully not to damage the radial shaft seal rings with the flat gaskets (400.3).

3) Fasten the bolts (901.5). Fit the support foot (183) and fasten the bolt (901.6) with its washer (554.3).

4) Support the overhang side of the bearing bracket (330) with a piece of wooden. Introduce the centrifugal ring at the shaft, without touching the bearing cover.

5a) Assemble the studs (902) at the pressure cover (163). So, assemble the packing (461) at the sealing chamber (pumps with packing).

5b) Assemble the stationary face of mechanical seal (433) in the pressure cover (163) (pumps with mechanical seal).

6a) Assemble the gland cover (452), leaning it against the nuts (920.2) (pumps with packing).

6b) Assemble the mechanical seal components (433) on the shaft protecting sleeve (524). Lubricate a little with oil (SAE 10 or SAE 20) or pure vaseline on the pieces in contact with the mechanical seal (433) (pumps with mechanical seal)

7) Assemble the shaft protecting sleeve (524) at the shaft, having first greased its internal diameter with Molykote G. Guide the flat gasket (400.2) at the pressure cover; fit the discharge cover (163) at the bearing bracket (330) and fix it with bolts (901.4) (tighten them crossly and uniformly).

8) Assemble the flat gasket (400.1), the key (940.1), the impeller (230) (grease its internal diameter with Molykote G), the circlip (932), the flat gasket (400.4), and the impeller bolt (906).

9) Assemble the key (940.2) at the shaft drive side, lock the shaft with a device and tight firmly the impeller bolt (906).

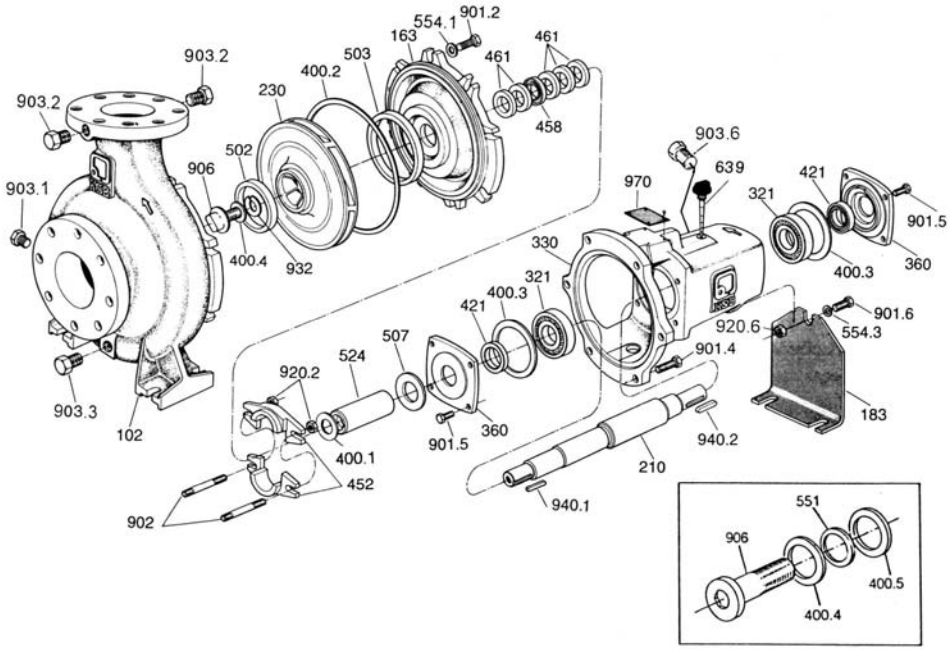
10) Introduce the whole set at the volute casing (102) guiding the set through the diameter of the pressure cover (163). Assemble the bolts (901.2) with the washers (554.1), tightening them, crossly and uniformly. Check manually if the rotor turn round free.

11.5.3 Pump assembly sequence with mechanical seal with seal gland

Please see Mechanical Seal O&M Manual, which will be attached to the pump's manual, in case of mechanical seal supply.

12. Exploded view / Part list

12.1 Pumps with packing



Impeller fixing detail for size 25-150

Fig.16

Pumps with mechanical seal

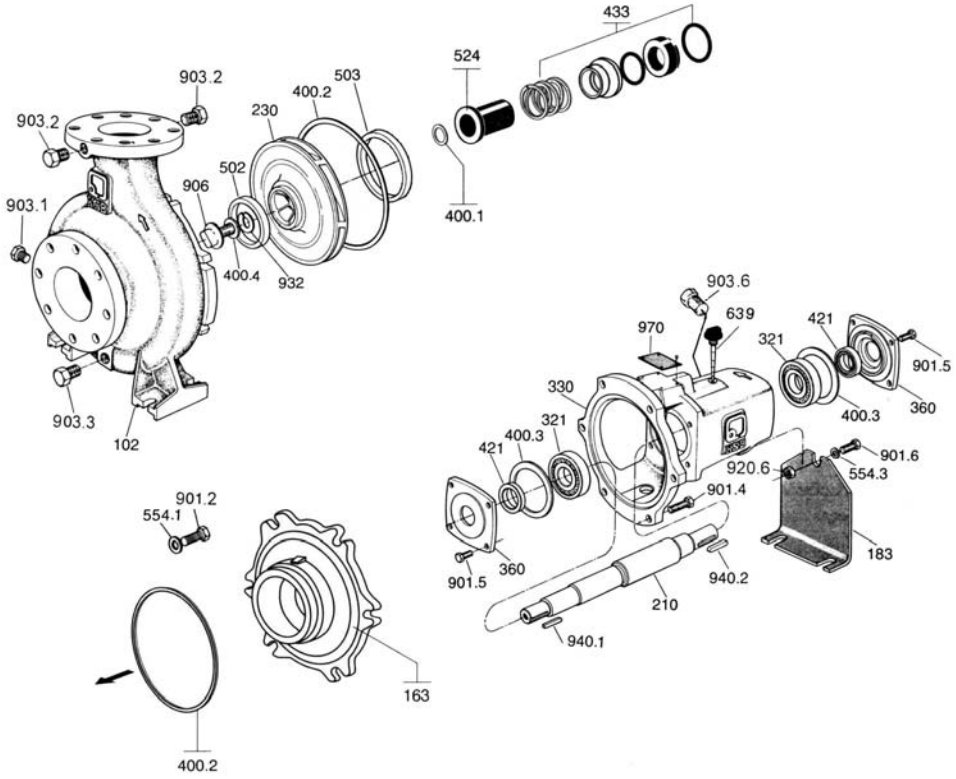


Fig.17

Part List

Designation	Part nº	Designation	Part nº
Volute casing	102	Shaft protecting sleeve	524
Discharge cover	163	Spacer disc (1)	551
Support foot	183	Washer	554.1
Shaft	210	Washer	554.3
Impeller	230	Oil level pointer	639
Radial ball bearing	321	Hexagon head bolt	901.2
Bearing bracket	330	Hexagon head bolt	901.4
Bearing cover	360	Hexagon head bolt	901.5
Flat gasket	400.1	Stud	901.6
Flat gasket	400.2	Threaded plug (3)	902
Flat gasket	400.3	Threaded plug	903.1
Flat gasket	400.4	Threaded plug	903.2
Flat gasket (1)	400.5	Threaded plug	903.3
Radial shaft seal ring	421	Threaded plug	903.6
Mechanical seal (4)	433	Impeller screw	906
Gland cover (3)	452	Nut	920.6
Lantern ring (3)	458	Nut (3)	920.2
Gland packing (3)	461	Circlip	932
Casing wear ring	502.1	Key	940.1
Impeller wear ring (2)	503	Key	940.2
Thrower (3)	507	Nameplate	970

(1) Only applicable for 25-150
(2) Not applicable for 25-150, 32-125 and 32-125.1
(3) Not applicable for pumps with mechanical seal
(4) Not applicable for pumps with packing

13. Recommended spare parts

Spare parts recommended for a continuos 2-year continuous service according to the DIN 24296 Standard.

Part nº	Designation	Number of Pumps (including stand-by ones)						
		2	3	4	5	6 and 7	8 and 9	10 or more
		Quantity of Spare Parts						
210	Shaft	1	1	1	2	2	2	20%
230	Impeller	1	1	1	2	2	2	20%
321	Bearing (pair)	1	1	2	2	2	3	25%
330	Bearing bracket	-	-	-	-	-	1	2 units
421	Rad shaft seal ring (pair)	2	3	4	4	4	5	50%
433	Mechanical seal	1	1	2	2	2	3	25%
461	Gland packing (5 rings)	4	4	6	6	6	8	100%
502	Casing wear ring	2	2	2	3	3	4	50%
503	Impeller wear ring	2	2	2	3	3	4	50%
524	Shaft protecting sleeve	2	2	2	3	3	4	50%
	Gasket repair set	4	6	8	8	9	12	150%

Table 6 – Recommended Spare Parts

14. Special recommendations

14.1 Machining of the impeller external diameter

All impellers made of stainless steel have their vanes adjusted (sharpened) at the outlet area of the liquid being pumped, according to the illustration on fig.17, when the impellers have been trimmed in their external diameter by machining.

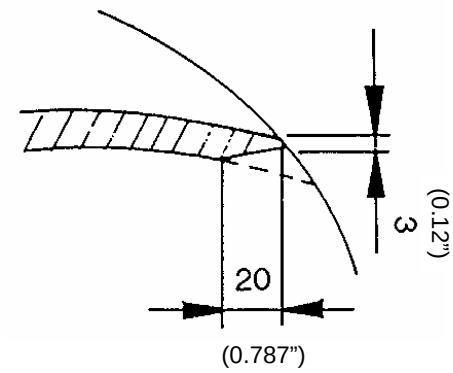


Fig. 17 - Adjusting the Impeller Vanes

14.2 Shaft run-out on the impeller region

Verify the shaft run-out. Arrange the bearing bracket mounted with the shaft on vertical position and check the run-out on the shaft end with a dial comparator within the maximum limit of 0,05 mm (0,002").

15. Pressure limit X Maximum temperature

Shaft sealing	Temperature º F	Temperature º C	ANSI B16.1 Flange 125 #	ANSI B16.1 Flange 250 #
			Pressure [bar] / [psi]	Pressure [bar] / [psi]
Gland packing	-18,4 up to 149	- 28 up to 65	12 / 174	16 / 232
	199	93	11 / 160	
	221	105	10 / 145	
Mechanical seal	194	90	10 / 145	

Table 7

16. Wearing areas maintenance

Change the wear rings of volute casing and / or casing cover (if any) when they are wornout and the impeller in good condition.
KSB and Dealer Network supply wear rings to repair or as spare parts to be applied for KSB Meganorm pumps.
These wear rings are supplied with suitable tolerance of the outside diameter and 2mm (0,05") of extra material of the inside diameter.

16.1 When the exchange mist be made

The wear ring exchange must be made when the clearance between the impeller and the wear ring is three times longer than the original clearance that is 0,3mm (0,01").

Note: KSB reserves the right to modify the information presented in this manual without prior notice.

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