Wilo-SCPt

en Installation and operating instructions

WMPPPL_OIM_SCPt_RV-01_20230101

Disclaimer

WILO Mather and Platt is very grateful for your interest in its products. The basic objective of this document is to provide instructions for maintaining and operating WILO Mather and Platt Horizontal Split Case pumps. Instructions are compiled for the person having a working knowledge of Horizontal Split case pumps and the pumps shall be installed under expert supervision and guidance.

WMPPPL shall not be liable for inaccurate installation, operation or maintenance of the product at site. The authorities/persons installing and maintaining the pump/s shall be responsible for hassle free installation operation or maintenance of the product. The performance of pump at site is dependent on-site conditions and is not in the control of WMPPPL.

This document is prepared with at most care to ensure correct and accurate information, enabling the user to have trouble free installation and operational support. We welcome your valuable suggestions.

WMPPPL, its employees or agents are not liable for any direct, indirect, personal, punitive or consequential damages that may result in any way from use, misuse of the product, and for the mistakes, errors, omissions occurred while installing and using any product and any failure of performance that may result on account of any differentiated and improper use of the product and site conditions.

Any dispute arising under these terms and conditions shall be subject to the jurisdiction of the courts of India at Pune, Maharashtra only

Plant Location –
Pump Type –
So. No. –
Q (m^3/hr.) –
H (m) –
N (rpm) –
P kW –
Imp. Dia. –
Note: To be filled by the Customer

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Fig.1: Correct lifting method for pumpset

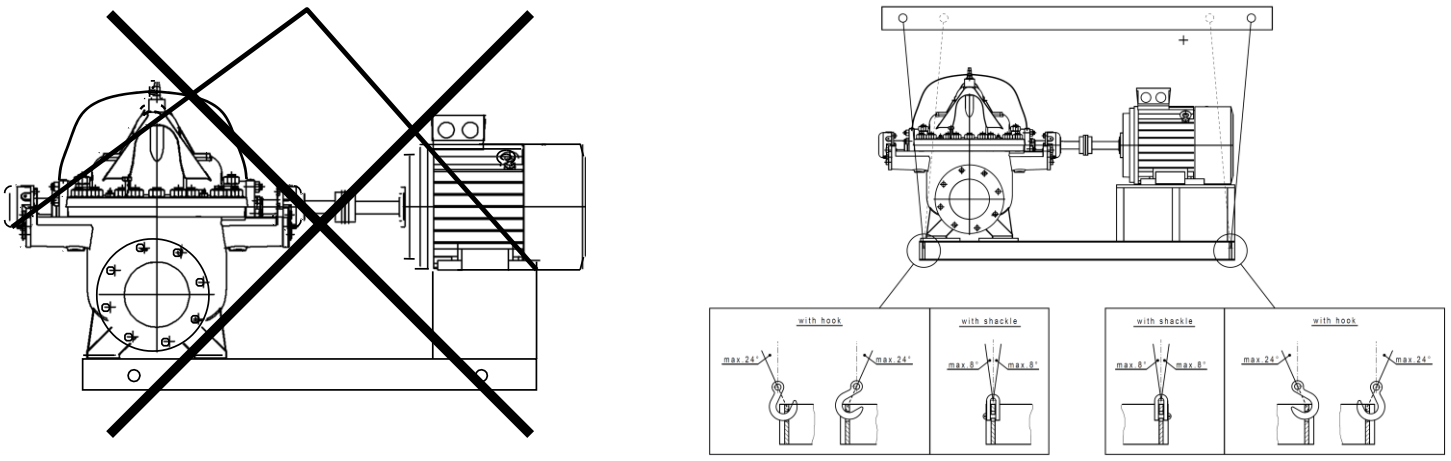


Fig.2: Correct lifting method for pump

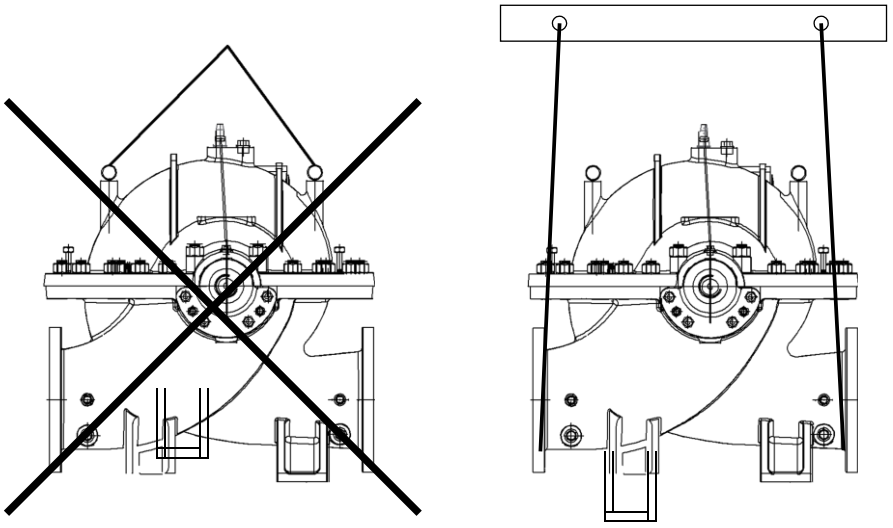


Fig.3: Correct lifting method for pumpset

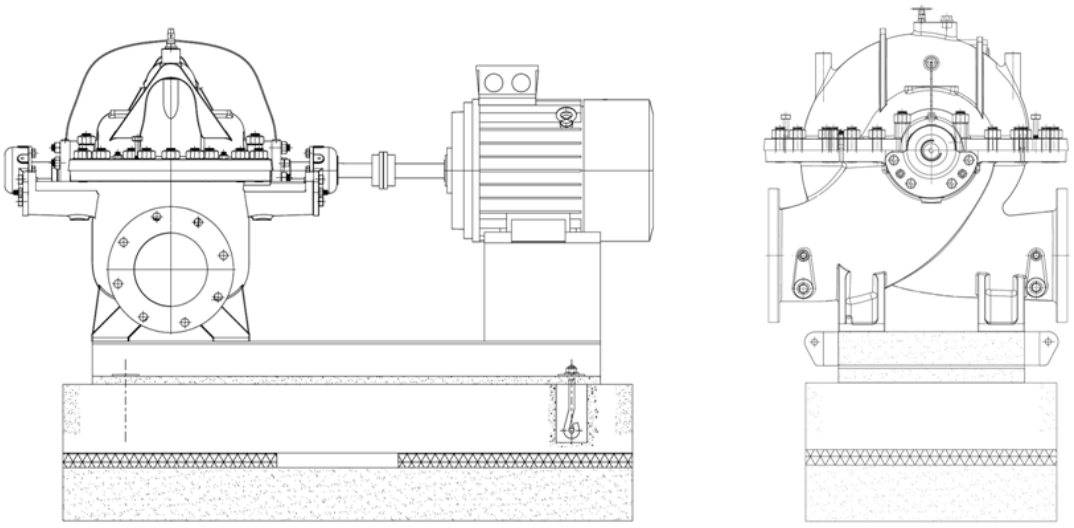


Fig.4: Baseplate mounting

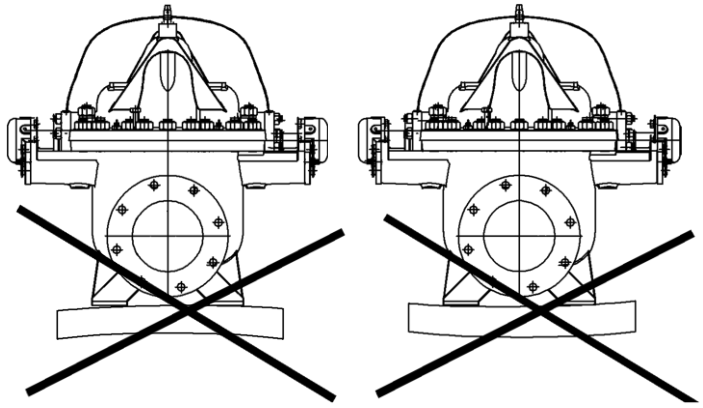


Fig.5: Checking alignment

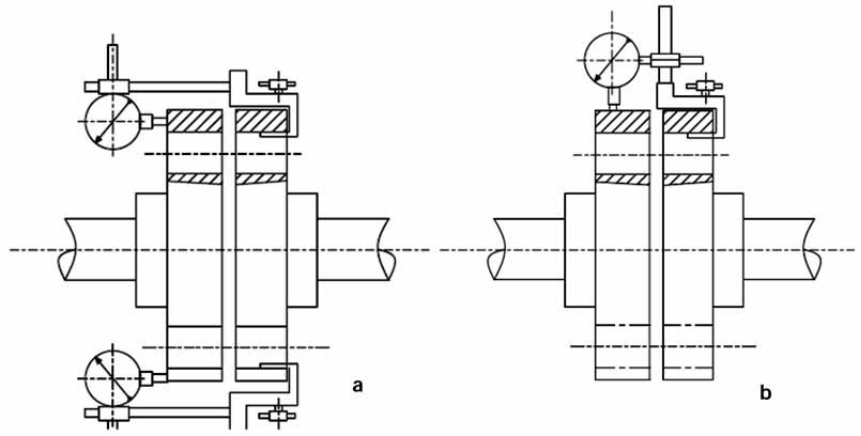


Fig.6: Forces and Moments

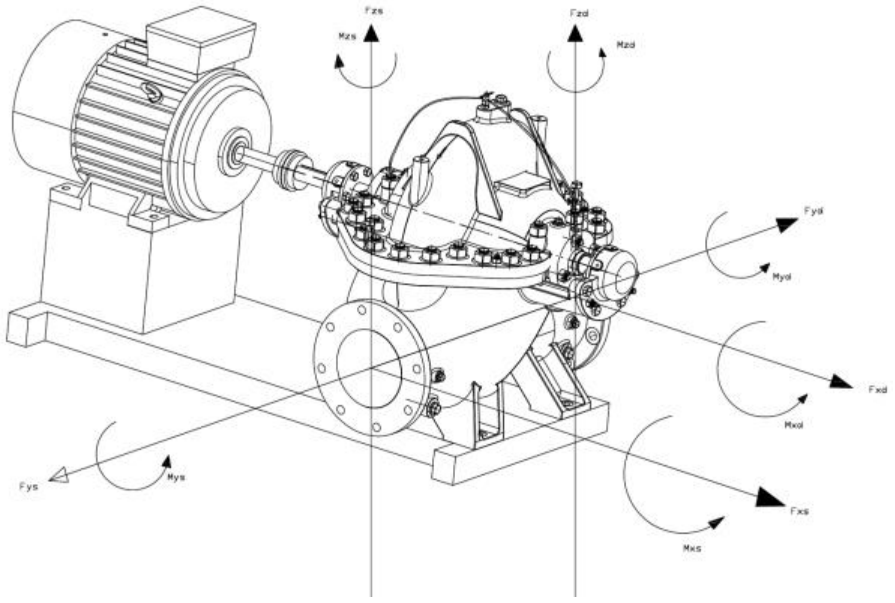


Fig.7: Lifting

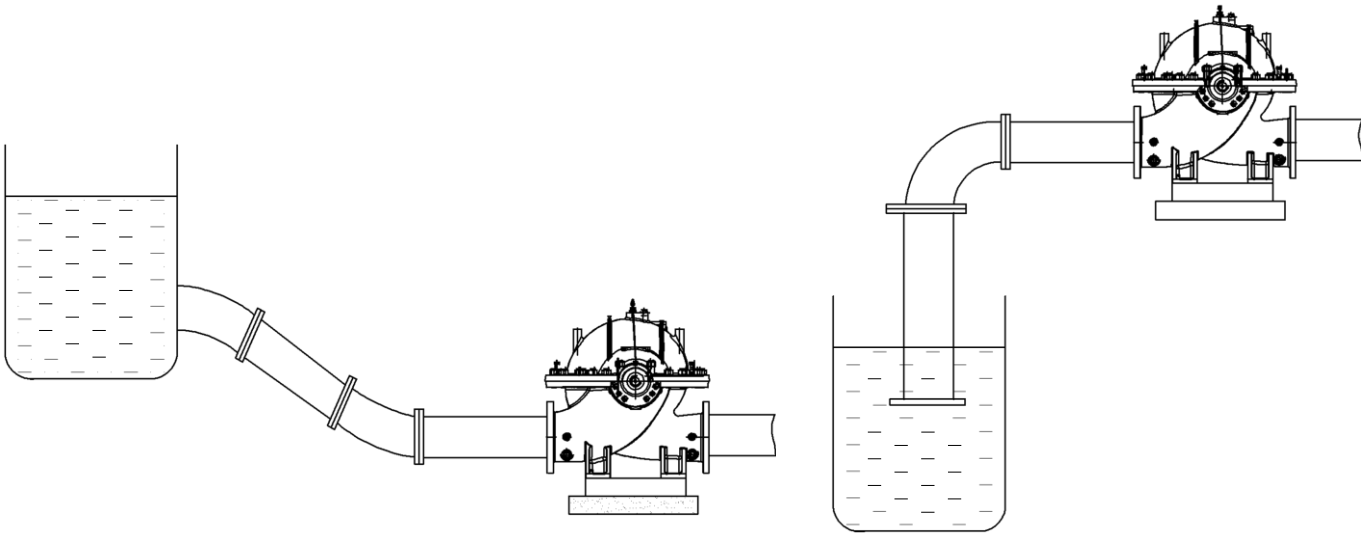


Fig.8.1: Installation

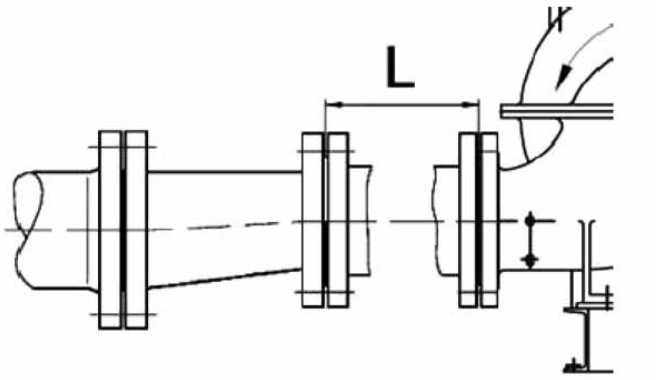


Fig.8.2: Installation

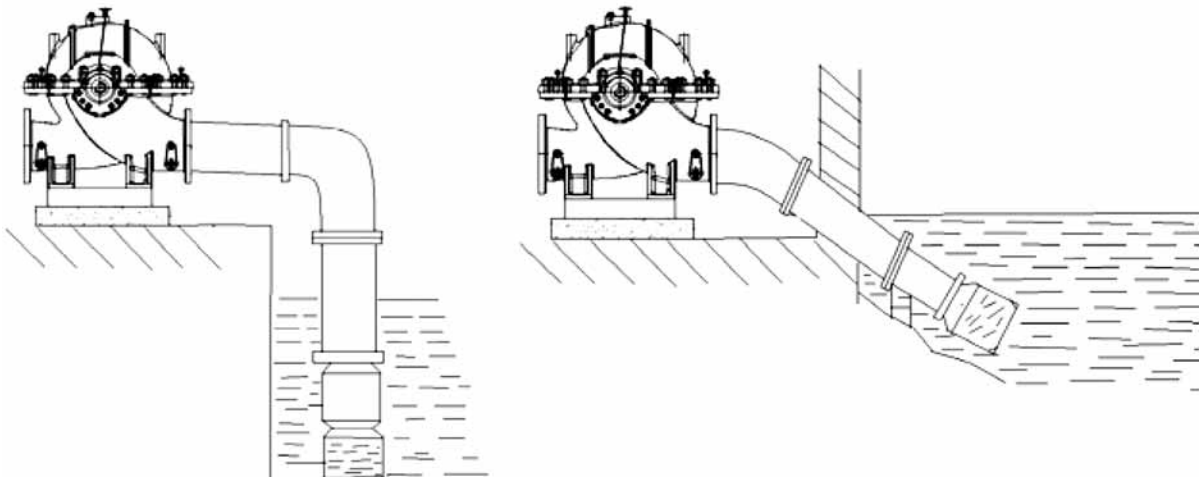


Fig.8.3: Installation

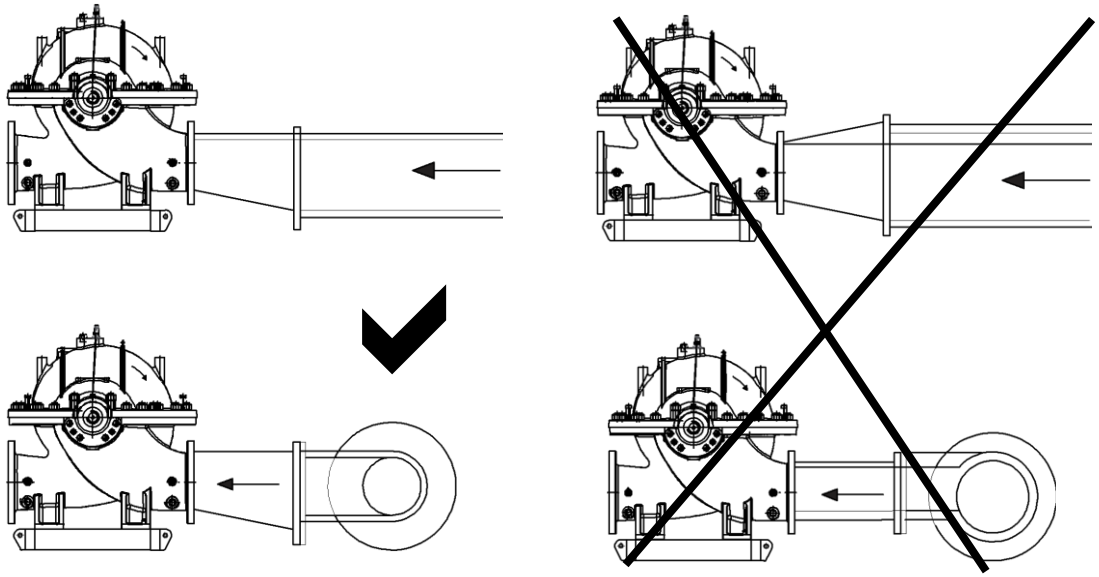


Fig.8.4: Installation

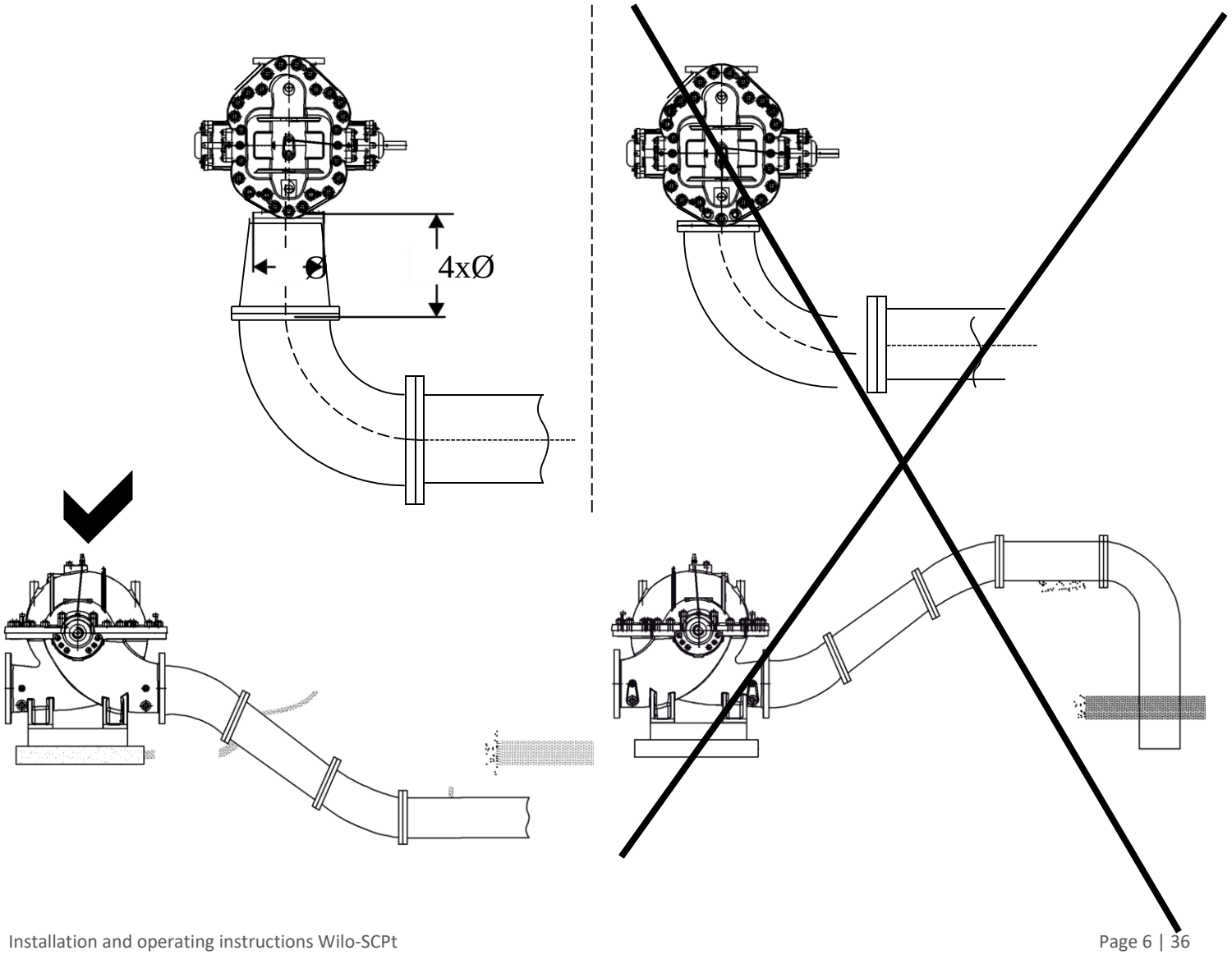


Fig.8.5: Installation

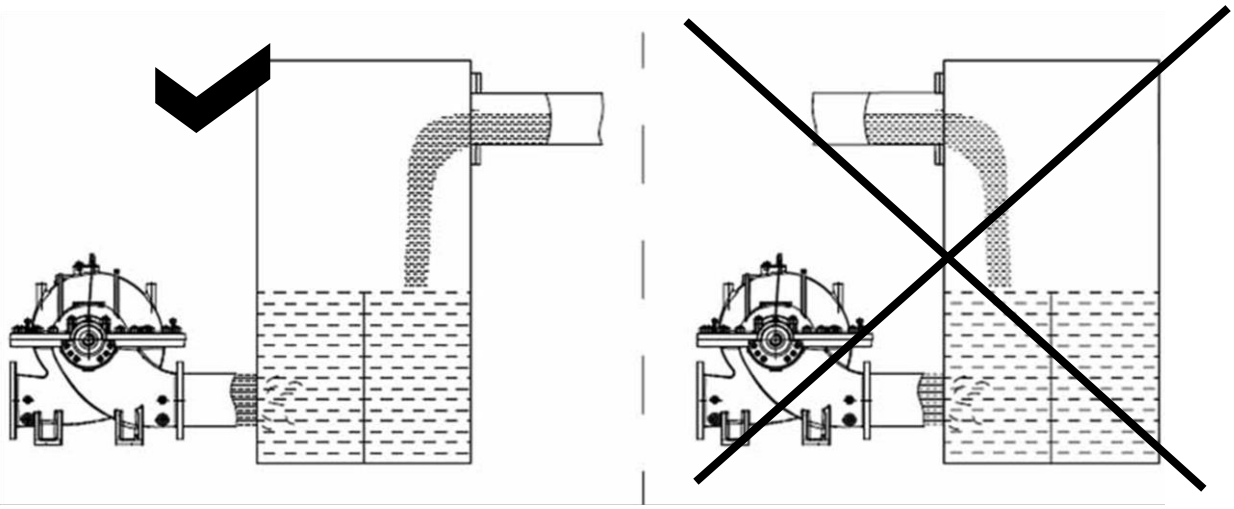
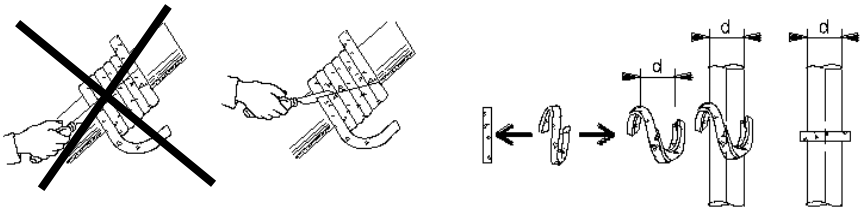


Fig.9: Gland Packing



9a **9b** **9c**

9a : DO not cut like this

9b : Wind the given packing on shaft as shown and cut at 45 deg.

9c : Will result into no. of rings of appropriate length wind. Place them as shown

INDEX

1 General information

About this document
The language of the original operating instructions is English. All other languages of these instructions are translations of the original operating instructions.
These installation and operating instruction manual is an integral part of the product. It must be kept readily available at the place where the product is installed. Strict adherence to these instructions is a precondition for the proper use and correct operation of the product.
These installation and operating instructions correspond to the relevant version of the product and the underlying safety standards valid at the time of going to print. Supplied pump will operate trouble free and satisfactorily on the condition that, it is installed with due care and maintained properly.
If operating parameters deviate from the specified parameters as on the "Nameplate", please contact manufacturer."

2 Safety

These operating instructions contain basic information which must be adhered to during installation and operation. For this reason, these operating instructions must, without fail, be read by the service technician and the responsible operator before installation and commissioning. The machine operator list must be filled out completely. By signing this list, all persons working on or with the product confirms that they have received, read and understood this operating & maintenance manual.
It is not only the general safety instructions listed under the main point "safety" that must be adhered to but also the special safety instructions with danger symbols included under the following main points.

2.1 Designation of information in the operating instructions

Symbols:


General danger symbol


Danger due to electrical voltage

Non-observance results in death or the most serious of injuries.

WARNING!
The user can suffer (serious) injuries. "Warning" implies that (serious) injury to persons is probable if this information is disregarded.

CAUTION!
There is a risk of damaging the pump/installation. "Caution" implies that damage to the product is likely if the information is disregarded.

NOTE:
Useful information on using the product. It also draws attention to possible problems.

2.2 Personnel qualifications
The installation personnel must have the appropriate qualification for this work.

2.3 Danger in event of non-observance of the safety instructions
Non-observance of the safety instructions can result in risk of injury to persons and damage to product/installation. Non-observance of the safety instructions can result in the loss of any claims to damages.
In detail, non-observance can, for example, result in the following risks:
- Failure of important product/installation functions
- Failure of required maintenance and repair procedures
- Danger to persons from electrical, mechanical and bacteriological influences
- Property damage

2.4 Safety consciousness on the job
The safety instructions included in these installation and operating instructions, the existing national regulations for accident prevention together with any internal working, operating and safety regulations of the operator are to be complied with.

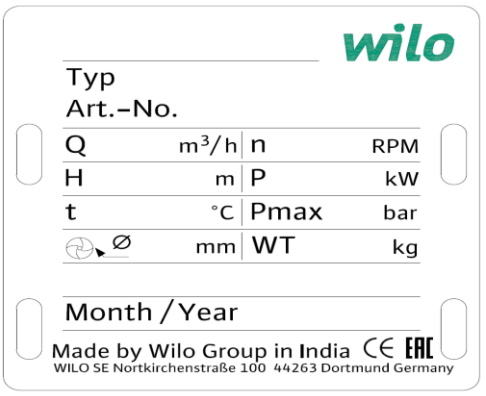
2.5 Safety instructions for the operator
This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety. Children should be supervised to ensure that they do not play with the appliance.

2 Product Information

2.1 Data plate

Date of manufacturing is marked on the name plate.
Explanation is as follows:

MM/YY = 02/2019
MM = Month of manufacturing
YY = Year of manufacturing



2.2 Type key

SCPt 100/280HA-110/4/T4-R1/E0	
SCPt	Name of the range
100	Discharge flange nominal diameter in mm
280	Nominal diameter of the impeller in
HA	Type of Hydraulic : – HA = Standard type version A – HB = Standard type version B – HS = Single suction impeller – DV = Double volute – DS = Double stage

2.3 General description

Limits of usage of the standard range

The technical features of the product have been described in the offer made for this product, especially the fluid compatibility. Please refer to this:

Property Value	Remarks	
Speed	2900, 1450, 1/min	Model dependent
Discharge nominal diameters DN	50 to 125	
Flange standard	PN 10/16	ISO 7005-2, as needed
Limit of fluid temperature (min/max) Mechanical seal version [°C] Gland packing version [°C]	 -8 up to +120 -8 up to +105	
Limits of ambient temperature (min/max) [°C]	-16 up to +40	other on request
Ambient humidity	< 90 %	other on request
Max. operating pressure	Model dependent	Model dependent
Motor insulation class	F	other on request
Motor protection level	IP 55	other on request
Electrical protection for motor	–	required in place (in accordance with local regulation)
Acoustic pressure level, (In accordance with motor performances)		Refer to the data plate on the motor on in technical leaflets
Standard fluid allowed	Cooling water. Cold water Mixture water/glycol up to 40 % of volume. Temp ≤ 40 °C for concentrations between 20% and 40% vol. Contact WILO for all other fluids	Standard version Standard version Only for special version
Electrical connections	3~400V, 50Hz	Other frequency, voltages, please contact WILO

2.4 Scope of delivery

Pump can be delivered

- As a complete pump set including electrical motor, base plate, coupling and coupling guard;
- Either without motor or
- As bare shaft pump without base plate.

2.5 Accessories

- Companion Flange
- Foundation bolts
- Shims

3. Description and Function

3.1 Description of the product

Split casing pumps are either single or two stages. They are of relatively simple construction, the casing being split along the pump axis so that normal maintenance work can be carried out without disturbing the position of either the pumping set or pipe work.

3.1.1 Casing

The pump casing is of volute form, cast in halves, which are bolted together along the pump axis. Gasket paper is provided between the split flanges of top and bottom casing. For accurate location casing halves, bearing housings / brackets etc. are located with dowel pins. The suction and delivery branches of the pump are cast integral with bottom half casing, which also incorporate the mounting feet. Holes are tapped on suction and delivery branches for connecting the pressure gauges and providing casing drain. Bores of bottom half casing are grooved to provide location for stuffing box bushes. The top half casing carries connections for liquid seal for both sides. Air vent cock is fitted on the top and also priming hole is also provided on the top of casing

No.	Pump	CG Qty.1	PG Qty.1	PM Qty.1	AC Qty.1	CDS Qty.1	CDD Qty.1	CD Qty.1	GD Qty.2	VG Qty.2	TG Qty.2
1	SCPt 50-180 HA	1/4	1/4	3/8	3/8	1/4	1/4	–	3/8	M8	M8
2	SCPt 50-340 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
3	SCPt 50-340 DS	3/8	3/8	1/2	3/8	3/8	3/8	3/8	3/8	M8	M8
4	SCPt 80-200 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
5	SCPt 80-380 DS	3/8	3/8	1/2	3/8	3/8	3/8	1/2	3/8	M8	M8
6	SCPt 80-340 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
7	SCPt 80-360 DS	3/8	3/8	3/4	3/8	1/2	1/2	1/2	3/8	M8	M8
8	SCPt 100-270 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
9	SCPt 100-280 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
10	SCPt 100-360 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
11	SCPt 100-410 DS	3/8	3/8	3/4	3/8	1/2	1/2	1/2	3/8	M8	M8
12	SCPt 125-290 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/4	M8	M8
13	SCPt 125-330 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/4	M8	M8
14	SCPt 80-420 HA	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
15	SCPt 100-270 HB	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
16	SCPt 100-270 HB H	3/8	3/8	1/2	3/8	1/2	1/2	–	3/8	M8	M8
17	SCPt 80-330 DS	3/8	3/8	3/4	3/8	1/2	1/2	1/2	3/8	M8	M8
18	SCPt 100-420 DS	3/8	3/8	3/4	3/8	1/2	1/2	1/2	3/8	M8	M8

CG: Compound Ground; PG: Pressure Gauge; PM: Priming; AC: Air Cock; CDS: Casing Drain (Suction); CDD: Casing Drain (Delivery);CD: Casing Drain; GD: Gland Drain, VG: Vibration Gauge; TG: Temperature Gauge

NOTE : All connections are BSP

3.1.2 Neck ring

To prevent the entry of pump liquid from delivery side of impeller to suction side, neck ring is provided. Fine running clearance is provided between neck ring and impeller neck. Periodic restoration of this clearance is necessary for satisfactory performance of the pump. For two stage pumps these neck rings are located in the bottom half of the casing by half-spigot (Tung and groove) and its rotation is restricted by flat face of the top casing. For rest of the single stage pumps plain neck rings with neck ring pins in bottom casing for locking are used. The neck ring pin is press fitted in the neck ring.

3.1.3 Sealing system

To prevent leakage along the shaft at the point of emergence from the pump casing, gland packing or mechanical seals may be fitted in the stuffing box situated at each end of the casing.

Gland Pack

For SCPt pumps plaited cotton impregnated with oil and colloidal graphite is used.

Mechanical Seal

For SCPt pumps generally Eagle Burgmann make mechanical seals are used

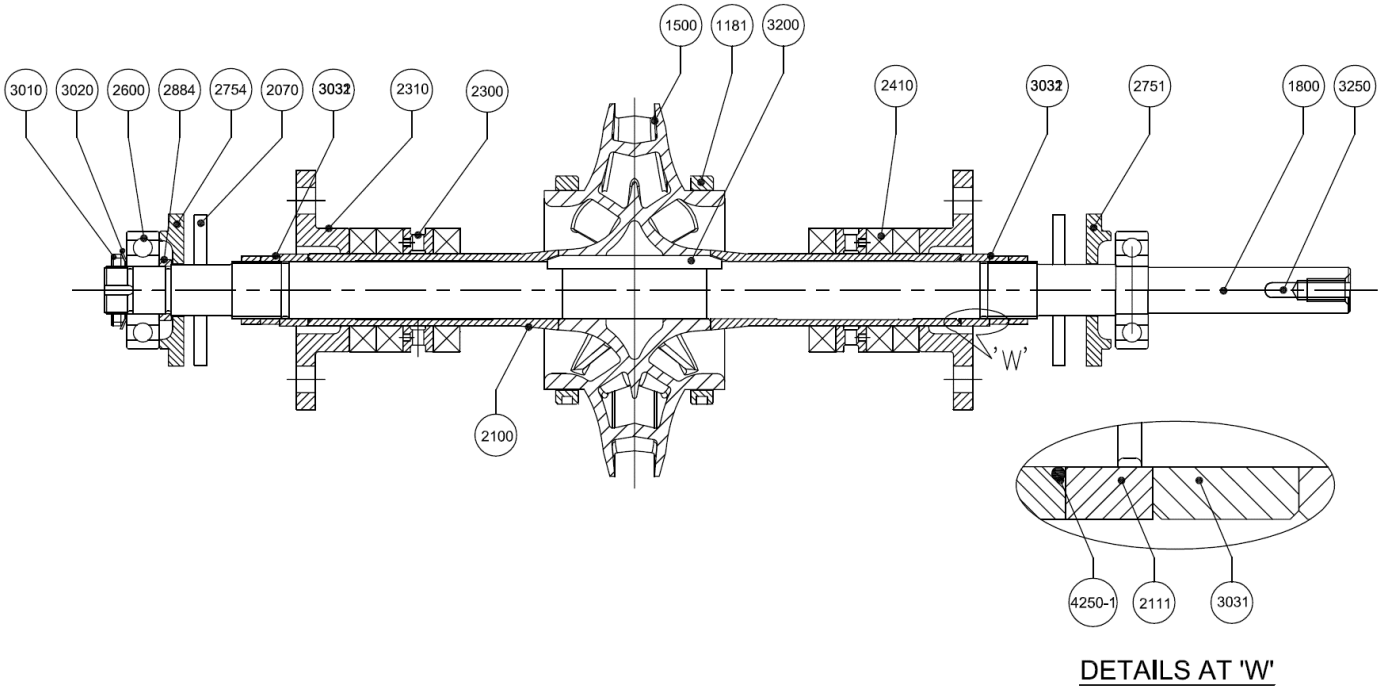
3.1.4 Rotating element

The rotating element consist of a shaft on to which an impeller is placed and arrested at its position with a key to avoid free rotation with respective of rotation of the shaft. Renewable shaft sleeves are provided on both side to protect the shaft from corrosion and erosion. The impeller is locked at its position by sleeve and sleeve nuts, which have threads left/right handed as per the direction of rotation of shaft.

The pump rotor is supported on deep groove ball bearings on either side of the shaft. Bearings are located in the bearing housing, which are attached to the end of the pump casing.

The rotating element of SCPt pump consist of following parts

No.	Part description	No.	Part description
1800	Shaft	4250-1	O-ring
1500	lmpeller	2600	Bearing (D.E.)
3200	lmpeller key	2600	Bearing (N.D.E.)
2100	Sleeve	3020	Lock washer
1181	Neck ring	3010	Lock nut
3031	Sleeve nut	3250	Coupling key
2111	Spacer Sleeve	2070	Water thrower
2300	Logging ring*	2884	Thrust collar
2310	Gland*	2751/54	Bearing end cover
2410	Gland packing*		
	*Applicable for gland packed version		



4 Installation and electrical connection
(Motor / pump coupling system)

The installation or removal of the product must not be performed by one person alone. Measures should be taken to bar persons from standing beneath a suspended load. Furthermore, it is also prohibited to move suspended loads over exposed workplaces where people are present. The fastening devices should be adapted to the conditions at hand (weather, hooking system, load, etc.) Use suitable fastening devices to handle the weight of the product.

WARNING! Danger of personal injury!

The installation and electrical connection should be performed only by qualified personnel in compliance with local regulations. This section provides instructions on the recommended methods of installing pumping sets on to concrete foundations. Careful attention must be paid to the customer and contractor's installation drawings during the installation procedures to ensure that the pumping set is accurately positioned on the correct datum levels.
The existing accident prevention regulations must be observed.

WARNING! Danger of electric shock!

Any hazards from electrical current should be ruled out.
Any instructions from local or general directives [e.g. IEC, VDE etc.] or directives of the local electricity supply companies must be observed.

4.1 Installation of bare shaft pump

It is strongly recommended to use component such as coupling, guards, motors, base plates supplied by Wilo to install a bare shaft pump on a base plate.

4.1.1 Electrical motor selection

Select an electrical motor with sufficient power margin regarding the motor rating. The table below will guide you in this selection.

Shaft power	$P_2 \leq 4$ KW	4 kW < $P_2 \leq 10$ kW	10 kW < $P_2 \leq 40$ kW	$P_2 > 40$ kW
Recommended power margin	25 %	20 %	15 %	12 %

Example:
Duty point: 100 m3/h @ 35 m with pump efficiency 78 %
Pump shaft power: 12.5 kW
Electrical motor rating (including margin): 12.5 * 1.15 = 14.3 kW
IEC motor power rating available: 15 kW
Use a foot mounted motor B3 (IM 1001) which comply with the IEC34-1 standard.

4.1.2 Coupling selection

Use a semi-flexible coupling to link the pump to the driver.
Select the size of the coupling in accordance with the recommendation of the coupling manufacturer. Strictly follow the coupling manufacturer's instructions for the fitting of the coupling between the pump and the motor. (The coupling must comply with the local safety standard). The alignment of the pumps and the motor must be checked after the installation of the pump set on its foundation and when the piping is connected. In addition an alignment control must take place when the system works at its nominal temperature. The coupling guard must comply with the local standard in order to avoid any contact with rotating parts during operations.

4.1.3 Selection of a base plate

Select a base plate in accordance with the local regulations, sufficiently large and strong to support the pump and motor.

4.1.4 Pump set assembling

Fix the pump and motor equipped with their half coupling on the base plate and make the alignment of those elements. It is recommended to fit the coupling guard supplied as accessories by Wilo.

NOTE:

If pump is supplied with coupling and motor mounted on the base-plate, please ensure proper alignment of pump motor and coupling.

4.2 Installation of the complete pump set

• Before any installation work is carried out, inspect for damage that may have occurred during handling, transport & storage.
• Installation within a building: install the pump in a dry, well ventilated and frost-resistant room.
• Pumping machinery should have adequate access and working room for maintenance operations. Adequate overhead space for lifting devices and working clearance must be provided.
• In case of outdoor Installation, provide a suitable protection to avoid rainfalls strong wind and particles which can damage the pump set.
• Avoid exposure of the pump to direct sunlight. Also, an appropriate solution to avoid frost must be implemented.

CAUTION! Risk of material damage!

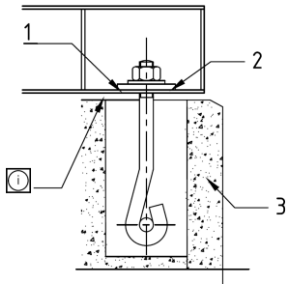
Ensure sufficient ventilation/heating if the ambient temperature exceeds/falls below the permitted limit values.
• Carry out all welding and soldering work prior to the installation of the pump.

CAUTION! Risk of material damage!

Dirt from the pipe system can destroy the pump during operation. Flush the pipe system prior to the installation of the pump.
• Provide shut-off valves in front of and behind the pump.

4.2.1 Foundations (figures 2, 3)

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent, rigid support for the base plate. The foundation must get large dimensions. Generally, the weight of the foundation is around 2 to 3 time the pump set weight. This is important in maintaining the alignment of a direct connected unit. In building the foundation, the top of the foundation should be left approximately one inch low to allow for grouting. Foundation bolts of the proper size should be embedded in the concrete, located by template (refer figure 3).



Foundation bolt

1 Erection packers
2 Finish grout
3 Concrete

NOTE: Leave top of foundation rough! Do not finish with trowel.

• A pipe sleeve about 2 ½ diameters large than the bolt should be used to allow movement for the final positioning of the bolts. For installations where a low level of noise is expected, built the foundation in a pit lined with appropriate insulation material in order to avoid vibration transmission to the ground.

CAUTION! Risk of material damage!

Do not hold the pump by the motor/module when tightening the screwed connections. Apply the wrench surfaces to the suction/pressure port inserted.
• It is insufficient to check level on the machined pads of base plate with a spirit level because it is possible that some types of errors will not be revealed or will be accepted as being within acceptable limits. These distortions as showed in figure 4. Therefore it is necessary to use I-beam straight edge along with engineer's master level.

4.2.2 Levelling and installing the base plate

CAUTION! Risk of material damage!

Pumps and drivers that are received with both machines mounted on a common base plate are checked for alignment before shipment. However during shipment, storage it may get disturbed.
• Use I-beam straight edge and an engineer's master level (with accuracy of 0.02 mm / meter) for levelling the base plate. I-beam should rest on the machined surfaces of the base plate, or on the levelling pads if provided. These machined surfaces where level is being checked must be clean and free from paint, burrs etc.
• Check datum position of base frame as given in G.A. Adjust the level of the base plate by inserting shims between the bed plate and the packer plate until the bed plate is levelled and supported on all the packing plates at the height required for the connection of suction and discharge branches. For checking the levels across two pads, I–beam type straight edge should be used extensively in conjunctions with engineer's master level. Level should be achieved within 0.05 mm per 250 mm.
• When the base plate is levelled, grout the foundation bolts only. Care should be taken so as not to disturb the verticality of foundation bolts. For grouting use rich mix of 1: 1:2 of cement, sand and gravel below 12 mm. Alternatively quick setting grout mix can be used.
• When the grout has set, gently but firmly tighten the foundation bolts. Care must be taken not to distort the base plate or loosen the

foundation bolts in the grout by excessive tightening.
• When the grout has set, gently but firmly tighten the foundation bolts. Care must be taken not to distort the base plate or loosen the foundation bolts in the grout by excessive tightening.

4.2.3 Alignment of the pumps and its driving units

• When the base plate is levelled and the satisfactory-alignment is completed, proceed with connection of suction & delivery piping. Recheck the alignment after piping and run the final grout beneath the base plate. Allow minimum seven days' time for curing. Grout mix in the proportion specified earlier for foundation bolt grouting should be used. It is further recommend that all hollow pockets in the base plate shall be filled after curing of earlier grout.

• The following procedures outline recommended practice given in BS-3170 in 1972 (Appendix A) for checking shaft alignment. This method is independent of the trueness of the coupling or shaft and is, therefore, not affected by canted coupling faces or eccentricity of the outside diameter of the coupling. Before commencing the alignment, rotate each shaft independently to check that the bearings run freely and that the shaft is true to 0.1mm or better. Check that no damage can be caused when the shaft of the driven unit is turned. Coupling should be loosely coupled and the halves must be free to move relative to each other, otherwise gauge Indicators can be incorrect. Where, tightly fitting pins or spring prevent loose coupling, the springs or pins should be removed and a line scribed across both half couplings and readings taken only when the two marks are aligned.

CAUTION! Risk of material damage!

All the alignments (angular as well as radial) have to be carried out by using 3 dial indicators, simultaneously

Angular alignment

• After isolating the driven unit from its power supply, clamp two dial indicators at diametrically opposite points on one half coupling or to the Shaft behind it with the plunger resting on the back of the other half coupling (See figure 5). Rotate the coupling unit. The gauges are to be in Line vertically and set the dial to read zero. Rotate the coupling by 180 and record the readings on each gauge. The readings should be identical, Though not necessarily zero. Either positive or negative readings are acceptable provided they are equally positive or negative. Adjust the position of one of the units if necessary. Rotate the coupling unit. The gauges are to be in the line horizontally and adjust the dial to zero. Repeat the operation outlined above by rotating the coupling by 180°.

Radial alignment

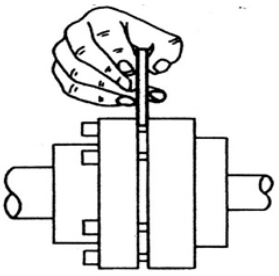
• Clamp a dial gauge on one of the couplings or to the shaft as shown in figure 5 with the plunger resting on the rim of the other half coupling. Set the dial zero. Rotate the coupling and note the reading at each quarter revolution. Any variation in the readings indicates the deviation from alignment and the position of one of the units must be adjusted until the readings at each quarter revolution are identical or within the tolerances given below. Refer figure 5b

Alignment Tolerances

	Pump speed	Angular alignment	Radial alignment
A	< 1000 rpm	0.15 mm TIR	0.15 mm TIR
B	> 1000 rpm to 1800 rpm	0.1 mm TIR	0.15 mm TIR
C	1800 rpm to 3000 rpm	0.05 mm TIR	0.1 mm TIR

TIR= Total Indicated Reading

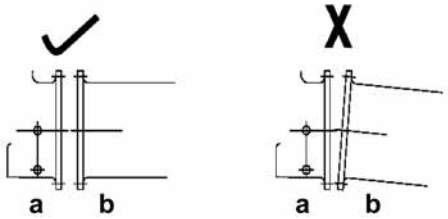
Distance between coupling halves for SCP pumps



Rotational speed			Gap [mm]
990 rpm	1450 rpm	2900 rpm	
–	3-55 kW	3-55 kW	2-4
90-120 kW	75-250 kW	75-560 kW	2-6
> 120 kW	> 250 kW	> 560 kW	3-8

4.2.4 Pipe work

No stress must be imposed on the pump casing by the pipe work; neither by the weight of the pipes nor by the tightening of badly fitting pipes
(Figure 6). All pipe worked attached to the pump must be fully supported and the mating faces of the pipe flanges must be parallel and all bolt holes coinciding with each other. (See table of maximum forces on flanges) It is important, therefore, that alignment of the pump and motor should be rechecked after the pipes are finally fitted. Resetting or supporting the pipes must correct any deviation in the alignment.



Avoid stress on the pump casing a: pump flange; b: pipe work

For difficult pumping on the suction side, to stabilize the flow, a pipe length 15 times the diameter of the suction branch should be installed before the suction branch.
• The flow rate in the suction line or inflow line must not exceed 2 3 m/s.
• Pipe velocity may need to be reduced further to satisfy pump NPSH requirements and to control suction pipe losses (refer figure 6).

MAXIMUM ALLOWABLE FORCES & MOMENTS ON SCPt PUMPS, FLANGES IN CAST IRON Forces [N] and Moments [Nm]

		Nominal Sizes of Flanges				
Flange Size (mm)		**50**	**65**	**80**	**100**	**125**
Forces (N)	Fx	710	890	1070	1420	1962
	Fy	890	1130	1330	1780	1609
	Fz	580	710	890	1160	2501
	Fr	1280	1640	1920	2560	3562
Moments (Nm)	Mx	460	690	950	1330	1765
	My	230	435	470	680	1363
	Mz	350	530	720	1000	1020
	Mr	620	970	1280	1800	2450

4.2.5 Suction line

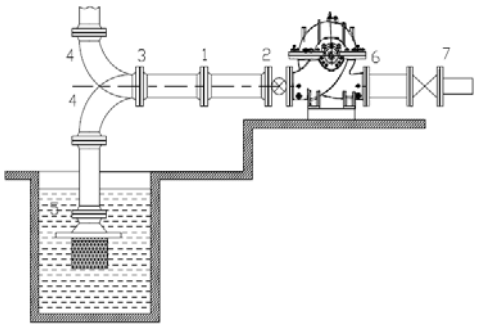
See the sketches figure 7 for the optimum layout of pump installation for flow and suction lift operation. Ensure that air pockets cannot be created. Unequal nominal widths of the suction branch and suction line must be compensated by eccentric transition pieces (refer figure 8).

• It is recommended that a strainer is installed in front of the suction pipe with a filter surface of at least 3 times the pipe cross section (approx.100 meshes/cm²).

• The suction opening of the suction line should be well below the liquid level, and a strainer should be used.

• The strainer must be far enough from the bottom to avoid excessive inlet losses, which could impair pumping performance. It is advisable to check that there is no leakage.

• A shut-off valve should be installed in the feed line. It must be closed for maintenance work. It should be installed in order to avoid air pockets forming in the spindle cap, i.e. with the spindle in a horizontal position or pointing vertically down ward.



Layout of pump installation

1) Eccentric reducer (suction) or concentric reducer (discharge)
2) Isolating valve
3) Suction line
4) Bend
5) Foot valve with strainer
6) Isolating valve
7) Regulating valve

4.2.6 Discharge line

CAUTION! Damage to the pump

Pump casings have sometimes been cracked by pressure surges imposed on them through the absence of a non-return valve. A back flow can seriously damage the bearings and the mechanical seal.

For flow regulation, a valve must be installed behind the pump. If non-return valves are used, they should close smoothly. Pressure shocks must be avoided.

4.2.7 S t u f f i n g box packing (fig. 9)

CAUTION! Risk of quick wear or leakages packing should be handled with care and it should not be allowed to pick up the dust or abrasive matter by coming into contact with floors or dirty benches. It is bad practice to hammer packing to facilitate the insertion.

Pumps are dispatched from our works with the

Stuffing boxes unpacked; otherwise packing will be aged. The packing is packed with greaseproof paper and dispatched with the pump. The softest possible packing i.e. plaited cotton impregnated with oil and colloidal graphite is recommended for most duties. Required number of and lengths of packing should be cut off so that each length will pass once round the shaft sleeve line and meet to end. The ends of packing must be cut at 45 °. After cleaning the stuffing box and shaft sleeves the packing should be inserted into the stuffing box. Each ring should be pushed into position individually using the glands joint of each ring must be positioned 180° from joints of its neighbor. A logging ring included in the arrangement; should be inserted into the stuffing box at the appropriate time during the packing sequence so that it is aligned with the cooling water connection. The gland should now be fitted square with the pump casing and the nut should be screwed up to little more than finger tightness.

4.2.8 Mechanical seal

CAUTION! Damage to the pump

Never start the pump without liquid inside otherwise the mechanical seal will be damaged instantaneously.

No real operation is required during the setup of the pump. Only filling and venting the pump are mandatory before switching on the main.

4.2.9 Pressure gauge connections

CAUTION! Risk of leakage of the fluid!

Never connect a pressure gauge onto the pump when the system is under pressure.

Pressure gauge connections are available on the pump casing close to the flanges. Then pressure gauge can be connected on suction and discharge side

4.2.10 Electrical connection

WARNING! Danger of electric shock

The electrical connection should be established by an electrician approved by the local electricity supply company in compliance with the applicable local regulations [e.g. VDE regulations].

• The current type and voltage of the mains connection must correspond to the specifications on the name plate.
• Refer to the motor and panels instruction manual at the time of installation and connection. Motors or electrical control panels are operated with alternating or industrial high-voltage current.
• The electrical connection is established via a fixed mains connection line.
• The local regulations must be adhered to.
• Ensure that there is a provision for isolation of all energy sources and locking. If the machine has been switched off by, a protective device, it must not be switched on again until the error has been corrected.
• The electrical system (machine including protective devices and operating position) must always be grounded. Refer pump GA drawing & respective manuals of motor/electrical control panel for connecting earthing suitable as per motor rating and relevant regulations and standards including proper earthing lug size and fasteners.
• Under no circumstances may any connecting cables touch the pipeline or the pump or motor housing.
• If there is a possibility that people can come into contact with the machine and the pumped liquid (e.g. at construction sites), the grounded connection must be additionally equipped with a fault current protection device.
• To ensure drip water protection and strain relief of the cable connections, use cables with an appropriate outer diameter and screw the cable glands tight. Furthermore any cables nearby screwed connections for outlet loops should be bent in order to divert any accumulating drip water. Close any unassigned cable glands with the existing sealing discs and screw them tight.

4.2.11 Operation with frequency converter

The rotation speed can be adjusted in the operating limits of the pump given in the technical data. The electrical motors can be driven by a frequency converter in order to adapt the pump performances the duty point required. Please contact Wilo before connecting the frequency converter to the motor to make sure that the electrical motor is compatible with this driver. In any case, please inform Wilo at the quotation stage if the pump set will by driven by a frequency converter this might influence the motor selection.
• The converter should never generate voltages peaks to the motor connection higher than 850V and deliver voltages variations $\Delta U/\Delta t$ greater than 2500 V/µs.
• If the above conditions cannot be fulfilled, an appropriate filter should be place between the frequency converter and the motor. Please contact the frequency converter manufacturer for guidance in the selection of this filter.
• Strictly follow the Frequency converter manufacturer instructions.
• The minimum rotation speed of the pump should never go below 40% of the nominal speed.

5 Commissioning

WARNING! Danger of injury

The devices whether on pump/motor/electrical panels must never be dismantled or disabled. They must be checked by an authorized technician for proper functioning before, start-up. Refer to motor & electrical panel instruction manuals for electrical safety & control devices information.

WARNING! Danger of pump damage!

Do not operate the pump away from specified operating range. Operating beyond duty point may not pose a risk to the operator but will reduce the efficiency of the pump or damage the pump itself. Operation more than 5 minutes, at close valve condition is not recommended. For hot liquids this is not recommended at all. Ensure that always site NPSH-A is more than NPSH-R.

5.1 Cleaning prior to start

5.1.1 Pipe work flushing

Before the pumps are brought into service, either on initial commissioning or on re-commissioning after overhaul, the pipe work associated with the pumps must be flushed through. This will clear deposits or scales which may have accumulated in the pipes, and which could damage the internal components of the pumps.

5.1.2 Cleaning of bearings

SCPt pumps are fitted with pre-lubricated, sealed bearings which do not require external lubrication for life. For Ball bearings which require external greasing and if the unit has been in store for a long period before commissioning, the bearings should be cleaned and flushed out with clean white spirit or good quality paraffin. Waste oil/paraffin & used cotton cloth should not be used for this purpose, as particles of foreign matter may be left behind which would cause damage when the bearing is in service. Bearings should be then filled with recommended grade and quality of fresh lubricant to the level. Refer list of lubricants at the end of this manual.

5.2 Filling and venting

Fill and vent the system correctly, through air cock. Brief dry running will damage the pump. Please also note that these pumps are not self-priming, which means that the impeller & casing must always be fully filled with fluid to be handled before putting in operation

WARNING! Danger of injury!

There is a risk of burns if the pump is touched! The entire pump may become very hot, depending on the operating state of the pump or system (fluid temperature).

CAUTION! Danger sealing system damage!

Any attempt to run the pump dry or partially full may result in seizure of the rotating internal components.

5.2.1 Pumps operating on flooded suction head

When these pumps operate on a flooded open the air release valve situated on top of the pump casing, open the pump inlet isolating valve and vent the air out of the casing. When the liquid issues from the air vent, free of air, the pump is properly primed. The air vent must be closed after priming and before the pumping set is started.

5.2.2 Pumps operating on negative suction head

There are two methods of priming pumps that draw their liquid from an elevation lower than the pump inlet branch:

• If the inlet pipe work is fitted with a non-return foot valve, the pump casing and inlet pipe work can be filled with liquid from an external source under pressure. The pressure imposed on the pump by this method must not exceed that for which the pump is designed. In certain cases priming can be achieved by flooding back from the delivery side of the pump.

• By extracting air or gas from the pump casing. To enable this method to be used, the gland arrangement must be sufficiently air-tight or it should be liquid sealed from an external supply. For operation details of gas exhausts reference should be made to the manufacturer's instructions. Some form of priming indicator is usually fitted to indicate when the priming operation is complete.

5.2.3 Pumps operating on hot liquids

Pumps operating on hot liquids are usually so arranged that the liquid flow into the pump is under pressure. If the saturation pressure of such liquids is above atmospheric pressure, any attempt to prime the pump will result in the liquid "flashing" from the air cocks. For these reasons, the air cocks at the top of the pump casing should be left slightly open when priming boiler circulating pumps until air has been driven out of the casing completely.

The cooling water services of a pump handling hot liquids should be turned on before the pump is primed. These services may supply cooling water to the bearings and / or stuffing boxes. Where the services are functioning, open the inlet valves and start warming the pump throughout. Never cut off the water services while the pump is "on temperature". Where bearings are water-cooled, adjust the cooling water supply until the bearings have a running heat. Over-cooling may lead to condensation of moisture from the atmosphere inside the bearing with consequent contamination of the oil. The suction valve, if provided, must be fully open and the delivery valve must be closed.

5.3 Starting the pump

5.3.1 Direction of rotation

Disconnect the drive coupling and run the motor to check its direction of rotation. A directional arrow is provided on the pump unit.

5.3.2 Pre-starting checks

• Check that the inlet isolating valve is open and that the delivery valve is closed.
• Check that there is no blockage in the strainer at the end of the suction line.
• Check for free rotation of the unit when coupled.
• Check that suction and delivery pressure gauges are connected. Test and make available any alarm, signals, interlock systems and any of the protective devices incorporated in the auxiliary and main pumping control system.
• Ensure that all electrical checks on motor, relay setting in panel etc. have been carried out in accordance with the instructions of motor manufacturer.
• Ensure that stuffing box sealing water seal connection is provided as shown in GA Drawing.

Pre-start Check up

	Activities	Checked on	Remark
1	Alignment with and without piping		
2	Flushing of pipe lines and ensure no leakages		
3	Availability of sufficient liquid in sump/suction as per specifications		
4	Installation of all instruments • Suction and delivery pressure gauges • Pressure switches • Temperature gauges • Any other as supplied/specified		
5	Operation of suction, delivery and inline valves		
6	Proper supports for piping and other allied equipment		
7	Availability of flushing/sealing liquid for stuffing box		
8	Availability of sufficient cooling liquid for bearings as specified		
9	Free rotation of pump and drive shafts		
10	Lubrication of bearings		
11	Checking of insulation resistance of motor		
12	Proper cable termination		
13	Motor protection relay settings		
14	Check all interlocks as specified/provided		
15	No load trial operation of drive • Direction of rotation is ok • Noise and vibration within limits • Bearing temperatures and winding temperatures are within limits • Overall operation is satisfactory		
16	Coupling of pump and drive and free rotation of shafts in coupled condition		
17	Suction valve is fully opened		
18	Pump is fully primed and all air is vented		
19	Delivery valve is closed (if required)		
20	Emergency shutdown is possible		

5.3.3 N o r m a l starting and running checks

• When all the foregoing pre-start checks are satisfactory, start the pump and check the direction of rotation (indicated by a direction arrow on the pump casing) otherwise stop the pump immediately for correction of direction of rotation. Then run the pump at its rated speed.

• Check the ammeter reading to ensure that the motor is not being overloaded.

• If applicable, ensure that the stuffing box is not overheating and that there is slight leakage from the gland (about 1 drop per second). There may be at first a tendency for the stuffing boxes to run warm because of the high viscosity lubricant in the packing. During the first few minutes of running with new packing, a small quantity of very viscous fluid will be extruded, but the flow should reduce when the packing has settled down.

• Check the mechanical seal for leak. In the start phase (and also after downtimes) slight leakage can be expected. Visual leakage checks are however required from time to time. Distinctly visible leakage will require an exchange of the seal. Wilo offers a repair set containing all parts required for an exchange.

• Check that the bearing is not overheating. Bearings will normally run at a temperature of 30 ˚C-35 ˚C above ambient temperature. The ideal running temperature of bearings is 40 ˚C to 60 ˚C for ball bearings and 40 ˚C to 55 ˚C for bush bearings. The temperature should never exceed 82 ˚C for ball bearings and 75 ˚C for bush bearings. If the bearings are overheating its cause should be investigated immediately.

• If the foregoing checks are satisfactory, open the delivery valve slowly and bring the pump gradually up-to its rated parameters indicated in the data sheet/name plate and based on pressure gauge and ammeter readings. Unless the pump is fitted with a special leak-off device, it should not be run for a long period against a closed delivery valve.

• Check that the driving unit is not being overloaded during valve opening. Overloading may occur if the pump is discharging into an empty system. If the pumping unit fails to generate at least its rated delivery pressure it must be stopped immediately, the cause ascertained,

• Check vibration of pump set and ensure that vibration level is within limits specified. Check that noise level is within stipulated limits.

• The pumps may be run for 8 hours trial operation and all the parameters like delivery pressure, current, bearing temperature, etc. Be recorded periodically.

• Make the following checks at regular intervals. It is recommended that they be made at every change of shift.

• Check the suction and discharge pressure gauge for normal operating pressure, if there is significant drop in the suction or discharge pressure the pump may have lost its supply. In the event of this fault occurring, the pump must be stopped immediately and the cause of

liquid loss eliminated.
• Check the mechanical seal or stuffing box assembly for overheating.

5.3.4 Sealing system

Gland packing
CAUTION! Risk of damaging the pump!

If the gland plate is too tight, the packing stuff will be immediately damage.
At the beginning of the operation, the leak at the gland packing should be important. It should reduce progressively after several hours by a balanced and reasonable tightening the gland plate. The gland packing must operate without excessive temperature. The correct setting of the gland packing let a permanent leak around 1 or 2 drops per seconds.
If this leak is too much and cannot be adjusted with the gland plate, the packing stuff are worn and must be replaced.

Mechanical seal
CAUTION! Risk of damaging the pump!

A mechanical seal must never operate without fluid and lubrication even for a short period of time.
Insure that the pump is completely full of water and vented before starting the pump. Small leakages can occur during the period of running-in, they should disappear after several hours of operation. If the leakages don't stop, shut down the pump disassemble the mechanical seal and control their condition.

5.3.5 Normal shutdown

WARNING! Risk of Burns!

If the fluid temperature and system pressure is high, close the isolation valves upstream and downstream of the pump. Initially let the pump cool.
• Close the delivery valve to reduce the load on the driving unit.
• Stop the driver of the pump.
• When the pump has come to rest, close the suction-isolating valve.
• Isolate any ancillary supplies.

5.3.6 Emergency Shutdown

In the event of any malfunction of the equipment, switch off the pump set. When the pump has come to rest, close the suction & discharge valves, isolate the driving unit power supply & rectify the fault.

6 Maintenance

Maintenance and repair work should be carried out by qualified personnel only.
WARNING! Danger of electric shock!

Any danger from electrical current should be ruled out.
• The pump should be electrically isolated and secured against unauthorized switch-on prior to any maintenance or repair work.
• Any damage to the connection cable should always be rectified by a qualified electrician only.

WARNING! Risk of scalding!

At high fluid temperatures and system pressures, allow the pump to cool down first and then depressurize the system

6.1 Routine maintenance and frequency of inspection

Centrifugal pump requires very little routine maintenance, however, serious troubles can be often avoided by regular observation and analysis of various working parameters. Some of the routine maintenance checks for this purpose are as under:
• To keep daily logbook records of working parameters like suction and discharge pressure, flow rate, current drawn, bearing temperature, etc. These parameters should be recorded twice a shift. Any sudden change should be a signal for investigation. Refer Section Maintenance & Inspection log.
• Check bearings for normal temperature. See 8.3.3
• Vibration & sound level readings should be taken once in a fortnight and values compared with that of previous records.
• Check that there is sufficient leakage from the gland packing to ensure proper cooling and lubrication. (If applicable) For mechanical seal, check that there is no visible leakage.
• For any abnormality observed from the visual/ manual inspection and through maintenance & inspection logs, stop the pump and investigate.
• Fault finding – Many of the common faults which occur on centrifugal pumps and which can be diagnosed by observations are given in the chart under section 10 Faults, causes and remedies.

Routine maintenance			
Parts	**Action**	**Period**	**Remarks**
Gland Packing	Check for Leakage	Daily	10 to 120 drops/min
	Check for Leakage	Half yearly	If required replace with new pickings
Bearings	Check temperature	Weekly	Bearings are greased for life and are maintenance free
Suction Pressure	Check Pressure	Daily	
Discharge Pressure	Check Pressure	Daily	
Flushing	Check Flow	Weekly	Flow through the Flushing pipes must be clear and continuous
Vibration	Vibration	Weekly	
Voltage and Current	Check for the rated values	Weekly	
Rotating element	Check the rotating for wear	Yearly	
Clearances	Check the clearances between neck ring and impeller	Yearly	If value of clearance is more, neck ring should be replaced
Total Dynamic Head	Check Suction and Discharge TDH	Yearly	
Alignment	Check the alignment of pump with motor	Half yearly	For reference use pump motor GA Drawing

NOTE:

In case fault cannot be diagnosed, please fill up the form in section the Issue/Feedback and send it to service department at Wilo.

6.2 Overhaul maintenance

6.2.1 General information

After a long period of service, wear will occur in parts of the pump, necessitating the renewal of a few components. Logbook records will indicate wear as gradual deterioration of performance is noticed. Once this is known, pumps should be taken for overhaul. It is recommended that yearly stripping & checking of wear & tear and clearances should be done and overhauling where required.

If related pair of components show a marked degree of wear in relation to the rest of the unit, then it may be sufficient to renew only the heavily worn components. If the wear is uniform throughout the pump, then all wearable components may require renewal.

Measurements should be taken and recorded of all wearable components at the first, and every sub sequent overhaul period. Reference to these records will enable an accurate assessment of the rate of wear to be made, and a reasonably accurate forecast regarding when a particular component may require renewal can be made.

Internal nominal diameter in (mm)	65	100	150	200	250	300	350
Nominal gap at the diameter of the wear ring in (mm)	0.38	0.46	0.58 - 0.55	0.62	0.68	0.74	0.84 - 0.80

NOTE:

The figures given in the table above are only valid if the wear rings and the impeller are made with in the same materials of low galling tendencies. For materials with higher galling tendencies (AISI 304/316 etc...), higher clearance is provided (0.125 mm to be added to given values).

Information regarding original design dimensions and clearances is furnished in data sheet. Any other information, if needed, can be requested from Service Department, WILO. Such request must quote name plate number and type of the pump in question.

The parts most likely to be affected are:

- Impeller
- Mechanical seal
- Neck Rings
- Sleeves
- Stuffing Box Bush
- Bearings
- Coupling Bushes

Before commencing dismantling operations, ensure that the following tools and tackles are available:

- A crane / chain pulley block suitable for handling the weight of pumping unit.
- A selection of ring and open-ended spanners, eye bolts in British and Metric sizes.
- Cotton rope, wire rope and slings.
- Hardwood and metal packing blocks.

- Miscellaneous tools including a set of Allen keys, drills, pin drivers, files etc.
- Extractor / puller for bearing and coupling.

The torque value to be set for a particular size of screw is dependent upon:

- Material of screw
- Parent metal
- Whether the screw is untreated or plated
- Whether the screw is dry or lubricated
- The depth of the thread

Tightening torques – Untreated Screw (black finish); Coefficient of Friction 0.14													
Property class	**Torque**	**Nominal diameter – Coarse thread**											
		M6	**M8**	**M10**	**M12**	**M14**	**M16**	**M20**	**M22**	**M24**	**M27**	**M30**	**M33**	**M36**
8.8	**Nm**	9.2	22	44	76	122	190	300	350	500	600	1450	1970	2530
	Ft. lb	6.8	16.2	32.5	56	90	140	221	258	369	443	1069	1452	1865

6.3 Disassembling the pump

6.3.1 Disassembling the top casing

- Isolate the pump system by closing suction and delivery valve.
- Drain the pump and open the upper air vent
- Remove piping from casing from both side
- Remove two steady pins and split flange nuts of the split flange.
- Remove both side head screw of stuffing box cover
- Remove all studs joining top & bottom casing Connect suitable lifting tackles to the eye bolts provided on top half casing (1001).
- Remove the paper gasket placed in between the two casing halves
- Remove the bearing housing from DE & NDE side.

6.3.2 Dismantling the rotating element (Gland pack version pump)

- Remove coupling side key
- Remove coupling guard plate
- Remove the screw of the bearing end cover
- Lift the rotor element
- Now remove the bearing lock nut and lock washer From the shaft free end
- Remove the both driving and non-driving bearings using puller (Never try to extract the bearing by applying force to the outer race)
- Now remove the thrust collar from the non-driving end of the shaft
- Remove the Brg. end cover & water thrower
- Remove gland solid, log ring from both side
- Remove gasket from both side
- Remove the stuffing box housing from both side
- Remove the o ring from st box housing from both both side
- Remove sleeve nut, spacer sleeve & O-ring from both side
- Remove sleeve from both side.
- Now remove the impeller carefully avoiding damage to the impeller key.
- If difficulty is observed in removal of the impeller, apply heat uniformly over the impeller shrouds inwards towards the hub.

6.3.3 Dismantling the rotating element (Mechanical seal version pump)

The only difference between disassembly of gland pack and mechanical seat version pump is the disassembly of the mechanical seal The procedure up to water thrower removal is same as per gland pack version.

Disassembly of mechanical seal is as follows:

- Difference is only Remove both side nut of gland plate before loosening the St. Box housing
- Slide out the gland plate carefully over the shaft.
- Now mark the position of mechanical seal on the shaft to ease the position while reassembling
- Unscrew the grub screw of the seal adjusting ring
- Pull the mechanical seal carefully over the shaft followed by removal of adjusting ring
- Rest procedure is same as explained for gland pack version pump

6.4 Examination of Internal Components

With the disassembled rotating element, the internal components and clearances can be checked

6.4.1 Casing neck ring

Use an internal micrometer to measure the bore of casing ring, taking measurements at intervals around the circumference to check for uneven wear. A comparison between this dimension and that of the impeller neck will indicate the amount of diametrical clearance between the casing neck ring and the impeller neck. If this clearance is
150% or more than the original design clearance, or if the deterioration in hydraulic performances has been such that no further deterioration can be tolerated during the next operation period, the neck ring should be replaced.
The impeller-wearing ring to casing neck ring clearance must be restored to the original design value by fitting small in-bore neck rings, bored out to suit the diameter of the impeller.

6.4.2 Shaft Sleeves

The shaft sleeve should be examined to see if it is grooved or generally worn. The outside diameter of the sleeve should be measured and a comparison made with the bore of the stuffing box bush through which the sleeve passes. The amount of clearance between the two can thus be checked to determine whether or not it is within acceptable limits.

6.4.3 Impeller

Inspect the impeller as follows:
• Examine the impeller for damage.
• For corrosive /erosion pitting.
• Cavitation's pitting.
• Bend or cracked vanes, inlet and outlet vane end wear.
If damage is extensive, impeller may need replacement.
Further information should be sought from Wilo before any decision on repair work is undertaken.
• Around the eye, wearing rings protects the impeller. Examine around the eye at neck portion for grooving in alignment with spindle axis; slight grooving is acceptable but deep or profuse grooving must be remedied by machining the impeller by taking a polish cut on wearing ring. Spare wear rings are supplied with excess outside diameter to facilitate machining after fitting. The wear rings are shrink fitted on impeller neck and are screwed. NOTE:
Impeller wearing rings are an optional feature to enhance the protection for impeller eye. In standard case pump is supplied with neck ring only.
• To check wear around the impeller neck, use precision instruments such as outside micrometer to accurately measure the outside diameter. Measurements should be taken at intervals around the circumference to check the uneven wear. Differences between the neck OD and the neck ring ID measured will give us the clearance between the two. Clearance thus obtained should not be more than 150% of maximum designed clearance.

6.4.4 Shaft & keys

ⓘ Shaft should be checked for the trueness, or any other mechanical damage and corrosion. If the shaft is not true within 0.1 mm TIR (Total Indicated Reading), it should be replaced/repaired. Examine the shaft keys and keyways. Remove damaged or worn out keys.

6.4.5 Bearings

The ball bearings fitted on the SCP range are greased for life. Then no maintenance is required. Check that bearing rotates freely and smoothly, verify that the outer ring presents no abrasions or discoloration. If there is any doubt regarding the serviceability of the bearing it should be replaced. As exceptions, the (*) marked models of SCP receive bearing which need re-greasing.
The re-filling must take place each 1000 hours of operation and the grease fully replaced every
3000 hours or earlier if the local prescription requires it.

		BALL BEARINGS				BALL BEARINGS	
Sr. No	**Pump Model Designation**	**Drive End Size**	**Non Drive End Size**	**Sr. No**	**Pump Model Designation**	**Drive End**	**Non Drive End**
1	SCPt 80-330 DS	6306 2z	6306 2z	**10**	SCPt 100-270 HA	6305 2z	6305 2z
2	SCPt 50-180 HA	6304 2z	6304 2z	11	SCPt 100-270 HB	6305 2z	6305 2z
3	SCPt 50-340 HA	6304 2z	6304 2z	12	SCPt 100-270 HB H	NU-206	6305 2z
4	SCPt 50-340 DS	6305 2z	6305 2z	13	SCPt 100-280 HA	6305 2z	6305 2z
5	SCPt 80-360 DS	6306 2z	6306 2z	14	SCPt 100-360 HA	6305 2z	6305 2z
6	SCPt 80-420 HA	6305 2z	6305 2z	15	SCPt 100-410 DS	6307 2z	6307 2z
7	SCPt 80-200 HA	6305 2z	6305 2z	16	SCPt 100-420 DS	6308 2z	6308 2z
8	SCPt 80-380 DS	N206	6305 2z	17	SCPt 125-290 HA	6306 2z	6306 2z
9	SCPt 80-340 HA	6305 2z	6305 2z	18	SCPt 125-330 HA	6306 2z	6306 2z

6.4.6 Stuffing box housing

Check bore of stuffing box and compare with sleeve diameter. If "clearance is excessive, the stuffing box housing should be renewed.

6.4.7 Mechanical seal

Ensure that the sliding face do not present any scratches or abnormal wear. Verify that the driving collar is well screwed on the shaft at the right place. Check that no material block the spring action.

6.5 Reassembling the pump

6.5.1 Reassembly of rotating element (Gland pack version pump)

- Place the impeller key at its seat on the shaft
- Now slide the impeller at its position on the shaft matching the marked position done while disassembly
- Place the neck ring on the impeller eye
- Slide the sleeve on both side of the impeller over the shaft
- Insert the O-ring in between the shaft and sleeve.
- Now place the spacer sleeve ensuring proper positioning of the O-ring
- Screw the sleeve nut but don't tight it now, keep it loose CONDITION
- Now slide over the shaft stuffing box housing with O-ring, round PTFE gasket & peg pin fitted condition.
- Now log ring, gland solid, and Water thrower slide over the shaft.
- Now fit bearing end cover & bearing for both side.
- Please note-For only non-drive side thrust collar fit before bearing fitment.
- Tight the bearing lock nut completely with proper tightening tool and lock it with the lock washer.

6.5.2 Re-assembly of the pump (Gland pack version pump)

- Ensure that casing is clean, dry and free from foreign matter. Clean casing neck ring.
- Now lift the rotor assembly and place it on the bottom half casing
- Now fit bearing housing over the stuffing box housing by using mallet & tight below 2 head screw with Casing (Not tightened with required torque).
- Now both side 8 no's head screw tightened with end cover (Not applying full torque).
- Now apply grease on spit face machining area & fit press pahn paper properly.
- Now lift top by belt clean machined area & kept slowly on bottom face along guide with all stud.
- Fit both side steady pin properly & tight all hex nut properly with required torque. Refer fig for tightening sequence.
- Now ensure pump freeness & ensure once again all nut & head screw tightened properly with required torque.
- Now fit four-way connection along with air vent.
- Now fit stud coupling on St. box housing & on four way piece. Complete the piping ensuring that there will be no leakage.
- Fit drive side key & ensue pump freeness once again

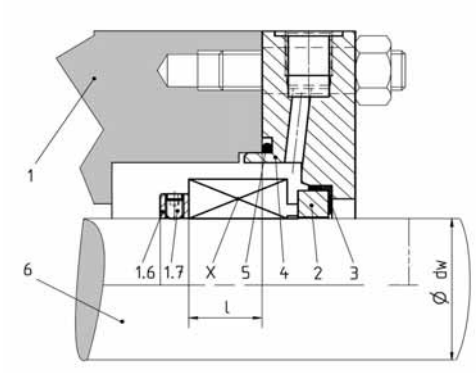
Gland Packing Details For SCPt pumps

Pump	Gland packing size mm^2	Packing ring quantity	Pump	Gland packing size mm^2	Packing ring quantity
SCPt 80-330 DS	10	3	SCPt 100-270 HA	14	3
SCP 50-180 HA	14	3	SCPt 100-270 HB	14	3
SCP 50-340 HA	10	5	SCPt 100-270 HB H	14	3
SCP 50-340 DS	9	3	SCPt 100-280 HA	14	3
SCPt 80-360 DS	14	3	SCPt 100-360 HA	14	3
SCPt 80-420 HA	14	3	SCPt 100-410 DS	10	4
SCP 80-200 HA	14	3	SCPt 100-420 DS	17.5	3
SCP 80-380 DS	10	3	SCPt 125-290 HA	16	3
SCP 80-340 HA	14	3	SCPt 125-330 HA	16	3

6.5.3 Reassembly of rotating element (Mechanical seal version pump)

Procedure for rotor assembly for mechanical seal pump is similar up to assembly of stuffing box housing.
Reassembly of mechanical seal is as follows:

- Extreme cleanliness must be observed during installation, and damage to the seal faces and mounting rings must be avoided
- Place the adjusting ring of mechanical seal at its pre marked position
- Place the grab screw at its position on the adjusting ring, but tight it yet
- The O-rings may be oiled to reduce friction, during installation of the seal. EP-rubber O-rings should not come into contact with oil or grease; In this case lubrication with glycerin or water is recommended.
- Never cover the sliding faces with a lubricant as they must be assembled completely dry, clean and dust-free.
- When pressing in stationery seals, make sure that the pressure distribution is uniform. The O–ring must be fitted using water or alcohol only.
- Crowned drive pins must be replaced whenever the seal is dismantled. During insertion of the stationary seats, especially those of special carbon, care must be taken to exert pressure evenly.
- Now check the distance of seal as shown in the figure and adjust its value as per values given table
- For rest parts follow the above explained procedure as per gland pack version pump



Location of mechanical seal of shaft

1) Pump casing
2) Stationary seat
3) Stationary seat
4) Gland plate
5) O-ring
6) Shaft
X) Mechanical seal
1.6) Abutment ring
1.7) Abutment ring fixing screw

6.5.4 R e –assembly of the pump (Mechanical seal version pump)

For assembling mechanical seal version pump follow the same procedure as done for gland pack version pump. Difference in assembly of mechanical seal pump is as follows:
Reassembly of mechanical seal is as follows:
After placing the top half casing at its position and tightening the studs
Slide in the gland plate at its position and tight its studs
Now fix the flushing tubes to the mechanical seal gland plate
Rest procedure is same as explained above for gland pack version pump

NOTE:

While assembling stainless steel component, molybdenum-disulphide paste should be applied to prevent galling / seizure and also to facilitate easy removal in future.

NOTE:

Change the gasket each time when the pump is opened.

6.6 Recommended spare parts

In case of standard operation, we recommend the following list of spare part regarding the period of functioning.

- For 2 years of normal operation:
- Mechanical seal or Packing, ball bearings and the different gasket required for the dismounting of the pump.
- For 3 years of normal operation:
- Mechanical seal or Packing, ball bearings and the different gasket required for the dismounting of the pump, wear rings and their nuts. For the pumps equipped with Gland packing, include the gland plate and lubrication spacer.
- For 5 years of normal operation:

Take the same lot of part as for 3 years and add the shaft and impeller.
The maintenance of the split case pumps is easier than other pump types. Then in order to facilitate this operation we strongly recommended purchasing a batch of part with the pump in order to reduce the shutdown timing.
It is strongly recommended to purchase the original spares parts from <WILO>. In order to avoid any mistake we invite you to supply with any spare parts demand, the information mentioned on the data plate of the pump and / or motor.

7 Faults, causes and remedies

	Symptoms (Each number is defined in the table below)	Possible cause of trouble and remedies
--	Pump does not deliver water.	1,2,3,4,6,11,14,16,17,22,23
--	Insufficient capacity delivered.	2,3,4,5,6,7,8,9,10.11.14.17,20,22,23.29,30,31
--	Insufficient pressure developed	5,14,16,17,20,22,29,30,31
--	Pump loses prime after starting.	2,3,5,6,7,8,11,12,13
--	Pump requires excessive power.	15,16,17,18,19,20,23,24.26,27,29,33,34,37
--	Stuffing box leaks excessively.	12,13,24,26,32,33,34,35,36,38.39,40
--	Pump vibrates or it is noisy.	2,3,4,9,10,11,21.23,24,25.26.27,28,30,35,41,42,43, 44, 45,46,47
--	Bearings have short life.	24,26,27,28,35,36,41,42,43,44,45,46,47
--	Pump overheats and seizes.	1,4,21,22,24.27,28,35,36,41

	Causes	Remedies
1	Pump not primed	Ensure that casing is fully filled and water comes out from air-cock.
2	Pump or suction pipe not completely filled with liquid	Check leaking foot valve in case of negative suction
3	Suction lift too high.	Reduce by lowering pump elevation or increase Water level.
4	Insufficient margin between pressure and vapor Pressure.	Check that NPSH available is at least 1 meter more 1 meter more than NPSH required.
5	Excessive amount of air in liquid. Air may be entering through suction joints.	Check the reasons and eliminate. Gas gets entrapped in liquid.
6	Air pocket in suction line.	Ensure pipe fully filled and there is no bend for negative suction.
7	Air leaks into suction line	Tighten pipe joints with solution.
8	Air leaks into pump through stuffing boxes.	Ensure stuffing box sealing.
9	Foot valve too small or leaking.	Replace *I* Attend.
10	Foot valve partially clogged.	Clean
11	Inlet of suction pipe insufficiently submerged.	Ensure adequate submergence such that foot valve is not exposed.
12	Water seal pipe clogged.	Clean or change.
13	Logging ring is improperly located in stuffing box, preventing sealing fluid from entering to	Position logging ring centrally under sealing holes of stuffing box. form seal.
14	Speed too low. should be as specified on pump nameplate.	Check motor RPM, supply frequency, Motor nameplate speed
15	Speed too high.	Check motor RPM and supply frequency.
16	Direction of rotating wrong.	Check correct direction of rotation for motor before coupling to motor.
17	Total head of system higher than design head of Pump.	Check the causes and refer to M&P. Measure with pressure gauge.
18	Total head of system lower than pump design Head.	Check the causes and refer to M&P. Measure with pressure gauge.
19	Specific gravity of liquid different from design.	Refer to M&P.
20	Viscosity of liquid different from design.	Refer to M&P
21	Operation at very low capacity.	Check the causes and refer to M&P, Operate pump at rated duty.
22	Parallel operation of pumps unsuitable for such Operation.	Refer to M&P with characteristics curves of pump.
23	Foreign matter in impeller.	Open and clean.
24	Misalignment.	Check with Dial gauge should be within limits and without undue pipe stresses.
25	Foundations not rigid.	Check, vibration on Baseplate, check hollowness.
26	Shaft bent.	Dismantle and check, Replace shaft.

	Causes	Remedies
27	Rotating part rubbing on stationary part.	Incorrect assembly, correct the assembly.
28	Bearing worn.	Check lubrication, shaft run out, alignment, replace if
29	Wearing rings worn.	Replace.
30	Impeller damaged.	Replace.
31	Casing gasket defective, permitting internal leakage.	Replace.
32	Shaft or shaft sleeves worn or scored at packing.	Replace.
33	Packing improperly installed.	Use correct grade and size of packing
34	Type of packing incorrect for operating condition.	Use correct grade and size of packing.
35	Shaft running' out of center because of worn bearings or misalignment.	Rectify.
36	Rotor out of balance, causing vibration.	Balance the rotor.
37	Gland too tight, resulting in no flow of liquid to lubricate packing.	Adjust gland. Ensure sealing water flow
38	Cooling liquid not being provided to water cooled stuffing boxes.	Provide.
39	Excessive clearance at bottom of stuffing box between shaft and casing, causing packing to be forced into the pump.	Check pumps assembly.
40	Dirt or grit in sealing, liquid leading to scoring of shaft or shaft sleeve.	Provide clean liquid for flushing.
41	Excessive thrust caused by mechanical failure inside pump or by failure of hydraulic balancing device, if any (in case of multistage pump etc.)	Check pump operation and assembly
42	Excessive grease or oil in antifriction bearing housing or lack of cooling, causing excessive bearing temperature.	Attend.
43	Lack of lubrication.	Provide proper lubrication.
44	Improper installation of antifriction bearings (damage, incorrect assembly of stacked bearings, use of unmatched bearings as a pair l etc.)	Rectify or replace bearing.
45	Dirt in bearings	Investigate the cause and clean bearing.
46	Rusting of bearings from water in housing	Arrest water ingress.
47	Excessive cooling of water-cooled bearing, resulting in condensation of atmospheric moisture in bearing housing.	Reduce cooling water flow.

8 Decommissioning and recycling

Proper disposal and recycling of this product prevents damage to the environment and risks to personal health.

Disposal in accordance with the regulations requires the product to be drained and cleaned.

Lubricants must be collected. The pump components are to be separated according to material (metal, plastic, and electronics).

1. Use public or private disposal organizations when disposing of all or part of the product.
2. For more information on proper disposal, please contact your local council or waste disposal office or the supplier from whom you obtained the product.

NOTE:

The pump must not be disposed of along with household waste!
Further information on recycling can be found at: www.wilo-recycling.com

Annexure – Formats

Pre-commissioning checklist Pump with Motor

Sr. No.	Activities	Checked on	Remarks
1	Levelling of Pump set		
2	Alignment with and without piping		
3	Flushing of pipelines and ensures no leakages		
4	Availability of sufficient liquid in sump/suction as per specifications		
5	Installation of all instruments		
	Suction and delivery pressure gauges		
	Pressure switches		
	Temperature gauges		
	Any other as supplied/specified		
6	Operation of suction, delivery and inline valves		
7	Proper supports for piping and other allied equipment		
8	Availability of flushing/sealing liquid for stuffing box		
9	Availability of sufficient cooling liquid for bearings as specified		
10	Free rotation of pump and drive shafts		
11	Lubrication of bearings		
12	Checking of insulation resistance of motor (if supplied by WILO M&P)		
13	Proper cable termination (Clients Scope)		
14	Motor Protection Relay Setting (Check with Clients)		
15	Check all interlocks as specified/provided		
16	No load trial operation of drive		
	Direction of rotation is ok		
	Noise and vibration are within limits		
	Bearing temperatures and winding temperatures are within limits		
	Overall operation is satisfactory		
17	Coupling of pump and drive and free rotation of shafts in coupled condition		
18	Suction valve is fully opened		
19	Pump is fully primed, and all air is vented		
20	Delivery valve is closed (if required)		
21	Emergency shutdown is possible		

Pump Commissioning Report (Motor Driven Pumps)

Customer:	**Service Ref.:**
Sr. No.:	**Date:**

Details of Pump		**Details of Motor**	
Pump Sr. No.		Motor Make	
Type of Pump		Sr. No.	
Head		Frame Size	
Capacity		Kw / Hp.	
RPM		RPM	
Construction		Voltage	
		Current	

Details of System		**Piping Details**	
Application		Suction Pipe Size	
Liquid		Delivery Pipe Size	
pH Value		Valves	
Suction	Flooded / Lift	Expansion Joints	

Pump Operating Parameters		**Motor Operating Parameters**	
Suction Pressure		Current	
Discharge Pressure		Voltage	
RPM		RPM	
DE Bearing Temperature		DE Bearing Temperature	
NDE Bearing Temperature		NDE Bearing Temperature	
Duration of Trial Run		Winding Temperature (Max.)	

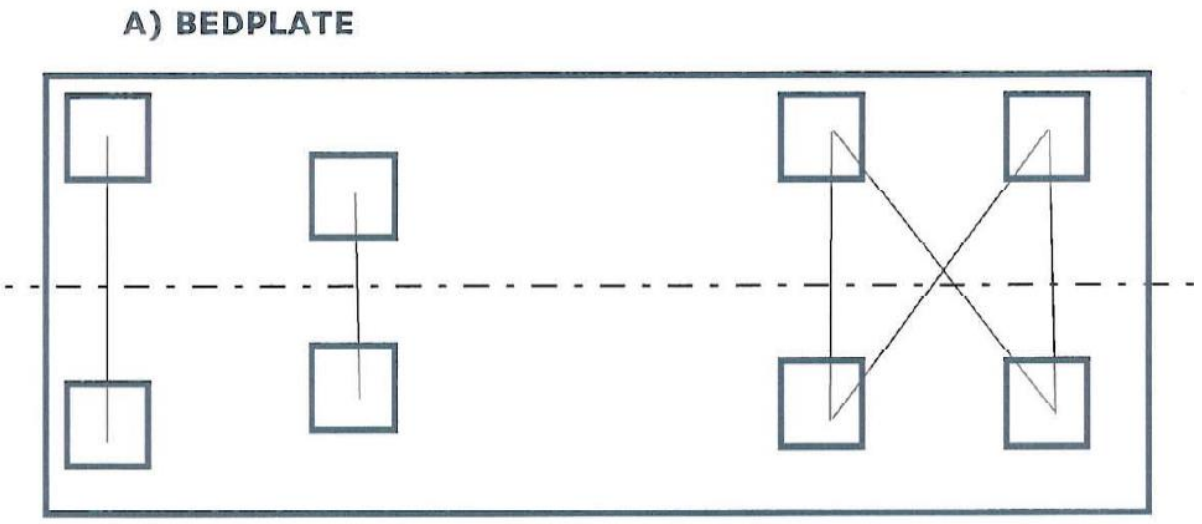
Observations and Remarks:

Pre-commissioning checklist Pump with Engine

Sr. No.	Activities	Checked on	Remarks
1	Levelling of Pump set		
2	Alignment with and without piping		
3	Flushing of pipelines and ensures no leakages		
4	Availability of sufficient liquid in sump/suction as per specifications		
5	Installation of all instruments		
	Suction and delivery pressure gauges		
	Pressure switches		
	Temperature gauges		
	Any other as supplied/specified		
6	Operation of suction, delivery and inline valves		
7	Proper supports for piping and other allied equipment		
8	Engine is installed properly on foundation with AVM pads		
9	In case of HE cooled engine, all external water connections are done		
10	Availability of flushing/sealing liquid for stuffing box		
11	Availability of sufficient cooling liquid for bearings as specified		
12	Free rotation of pump and drive shafts		
13	Batteries are fully charged		
14	Battery cables and lead are available		
15	Exhaust silencer and all required exhaust piping is completed		
16	Fuel tank is supplied. Supply & return fuel lines connected to engine		
17	Engine coupled with water pump and all discharge piping is completed		
18	Lube oil, coolant and fuel is available at site		
19	Lubrication of bearings		
20	Checking of insulation resistance of motor (if supplied by WILO M&P)		
21	Proper cable termination (Clients Scope)		
22	Motor Protection Relay Setting (Check with Clients)		
22	Check all interlocks as specified/provided		
23	No load trial operation of drive		
	Direction of rotation is ok		
	Noise and vibration are within limits		
	Bearing temperatures and winding temperatures are within limits		
	Overall operation is satisfactory		
24	Coupling of pump and drive and free rotation of shafts in coupled condition		
25	Suction valve is fully opened		
26	Pump is fully primed, and all air is vented		
27	Delivery valve is closed (if required)		
28	Emergency shutdown is possible		

Pump set Levelling Record

Required accuracy of pump set levelling is 0.05 mm



Pump and Motor / Engine / Turbine Alignment Record

A: Before Connecting Suction and Delivery Piping:

RADIAL

AXIAL

Gap Between Coupling Halves: _____ mm

Actual Gap: _____ mm

B: After Connecting Suction and Delivery Piping:

RADIAL

AXIAL

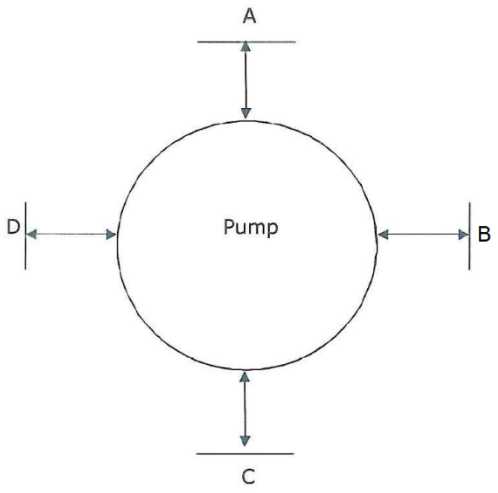
Gap Between Coupling Halves: _____ mm

Actual Gap: _____ mm

Customer Representative **WILO M&P Representative**

Pump set Noise Level Record

Noise level measurement at Pump House Floor



Noise Level in dBA:

A:	**B:**
C:	**D:**

Background Noise (dBA):
Instrument Details:
Distance –1 Mtr. from the Pump:
Make:
Model:
Sr. No.:

Customer Representative **WILO M&P Representative**

Pump set Vibration Measurement

Pump Set Details:

Date:

Pump Sr. No.	**Motor Sr. No.:**
Pump Type:	**Make:**
Project:	

Vibration Measurement: (Pk to Pk)

Sr. No.	Position	V		H		A	
		Displacement	Velocity (mm/sec.)	Displacement	Velocity (mm/sec.)	Displacement	Velocity (mm/sec.)
1	Pump DE						
2	Pump NDE						
3	Motor DE						
4	Motor NDE						

Instrument Details:

Make:
Model:
Sr. No:

Customer Representative **WILO M&P Representative**

Pump set Bearing Temperature Measurement

Pump Set Details:

Date:

Pump Sr. No.	**Motor Sr. No.:**
Pump Type:	**Make:**
Project:	

Bearing Temperature:

Sr. No.	Position	Temperature	Ambient Temperature	Remarks
1	Pump DE			
2	Pump NDE			
3	Motor DE			
4	Motor NDE			

Instrument Details:

Make:
Model:
Sr. No:

Customer Representative **WILO M&P Representative**

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