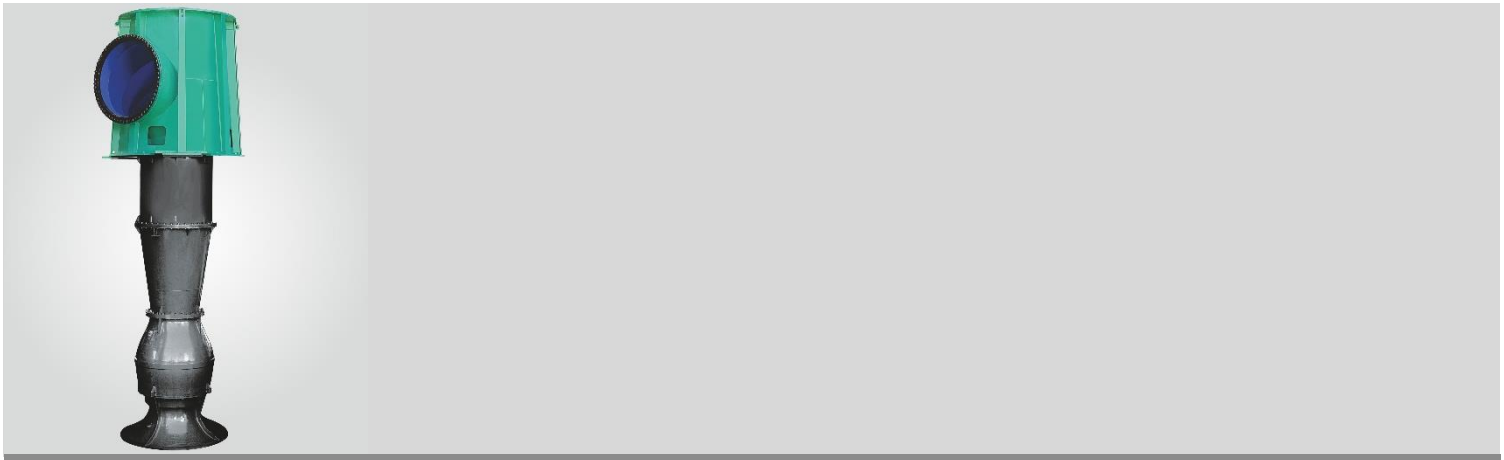


WILO Mather and Platt – Vertical Turbine Pumps

en Installation and Operating Instructions

WMPPPL_IOM_VT_RV-002_20211502

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 Vertical Turbine Pumps. Instructions are compiled for the person having a working knowledge of Vertical Turbine Pumps and the pumps shall be installed under expert supervision and guidance.

With this document WILO Mather and Platt does not accept any liability for inaccurate installation, operation or maintenance of the product at site. The authorities that install and maintain the pump shall be responsible for hassle free installation operation or maintenance of the product.

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. However, there can be few areas for improvement to make this document error free.

We welcome your valuable suggestions to make this document complete in all respects.

Pump Type –
So. No. –
Q (m3/hr.) –
H (m) –
N (rpm) –
P kW –
Imp. Dia. –
Note: To be filled by the Customer

WILO Mather and Platt Pumps Pvt. Ltd.
Mumbai–Pune Road, Chinchwad,
Pune– 411 019, Maharashtra (India)
Tel: +91 20 27442100/1/2/3/4,
Toll Fee Service: 1–800–266–8866
Fax: +91 2027442111
service.in@wilo.com
www.wilo.in

Fig. 1: Lifting of Pump Sub-assemblies (Page No. 18, Point No. 3, 3.1)

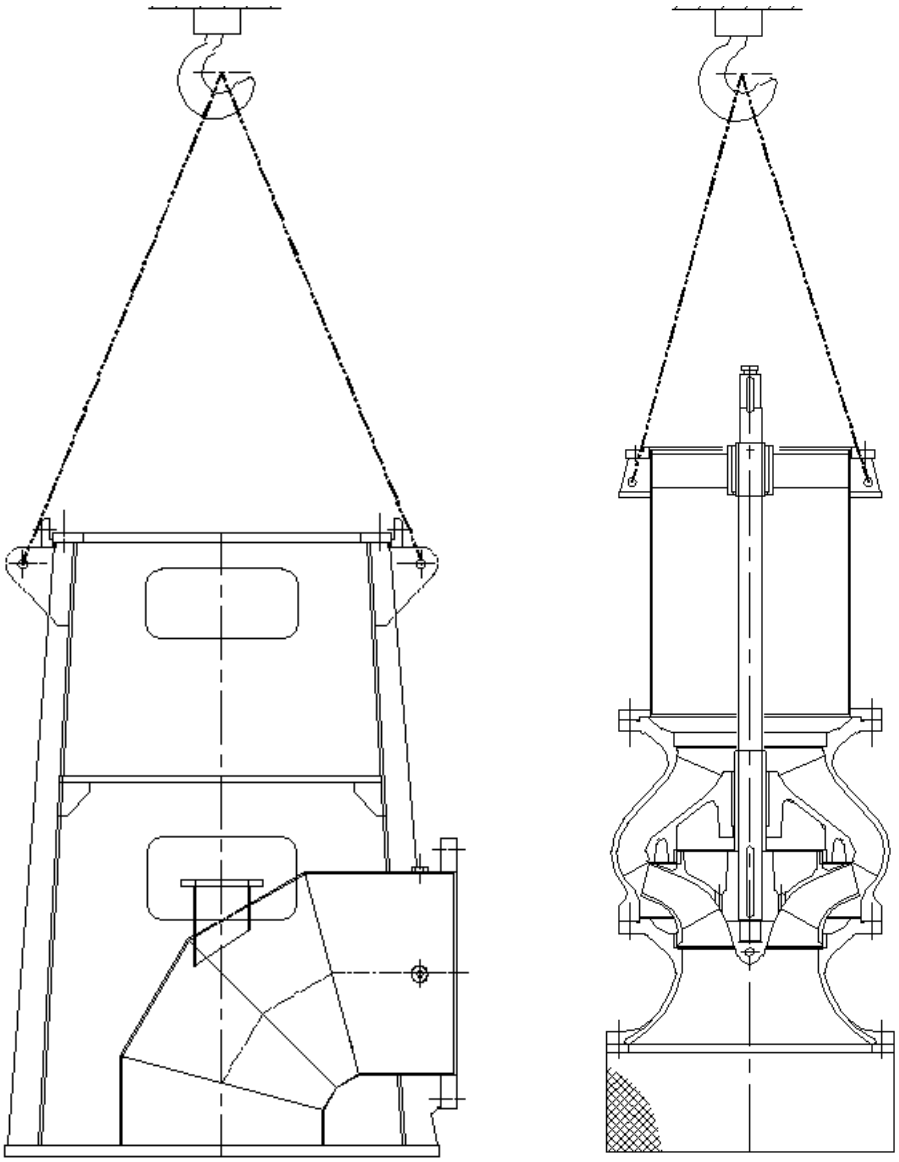
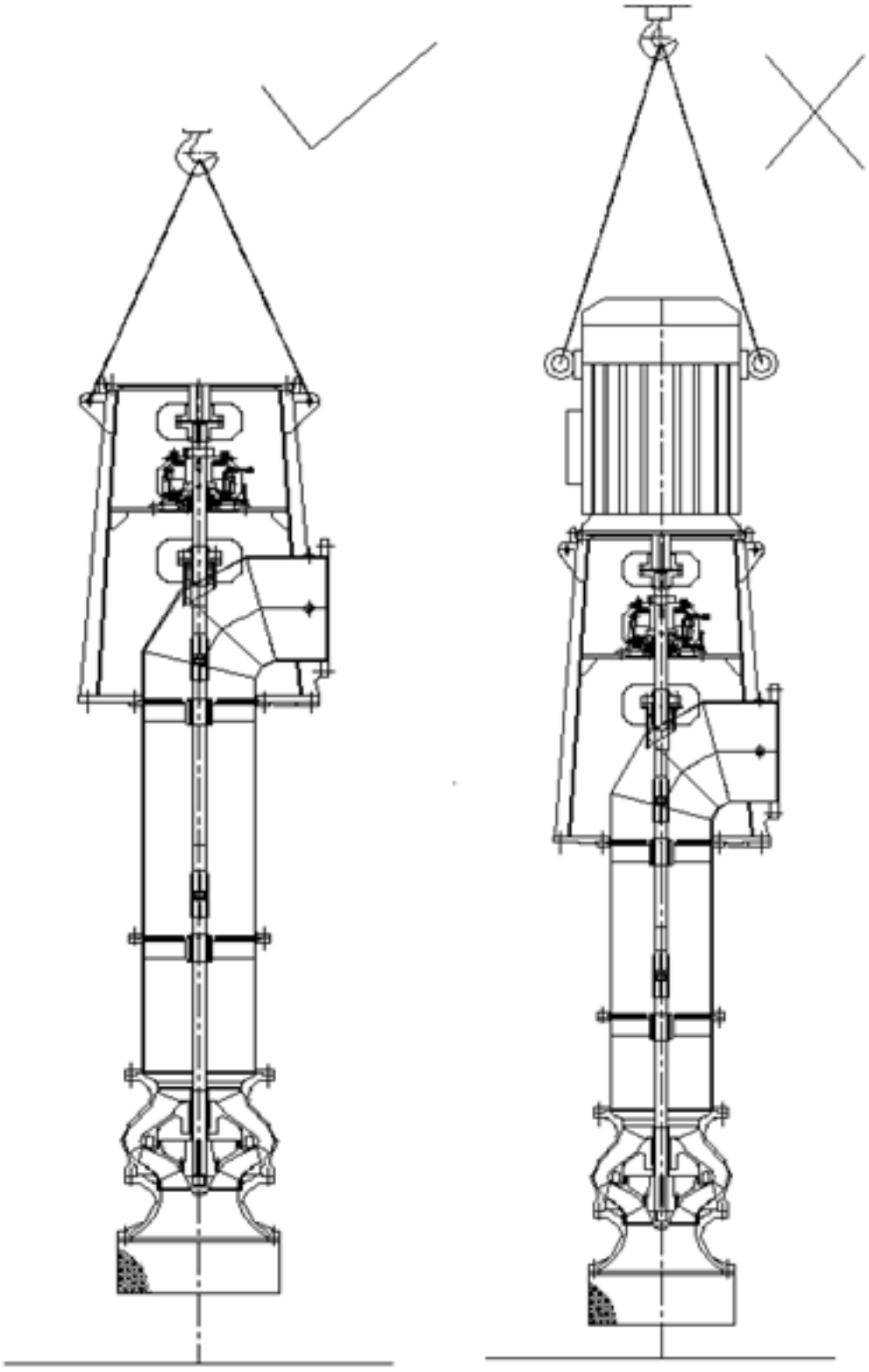


Fig. 2: Lifting of complete pump (Page No. 18, Point No. 3, 3.1)



⚠ **CAUTION : Do not lift the Pump with motor Always dismantle the motor before lifting the pump unit.**

Fig. 3: Installation of pump (Page No. 26, Point No.8)

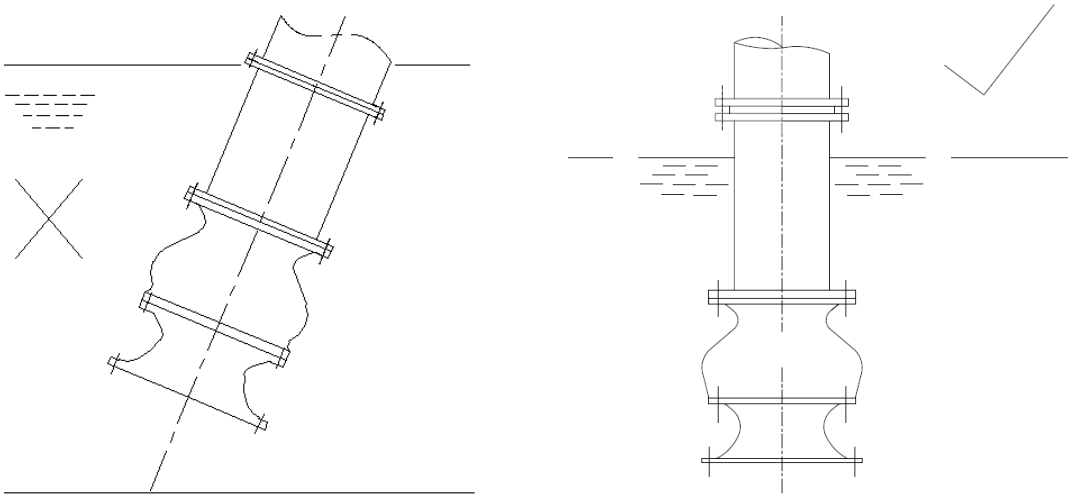


Fig. 4: Intake bay layout (Page No. 26, Point No. 8.1)

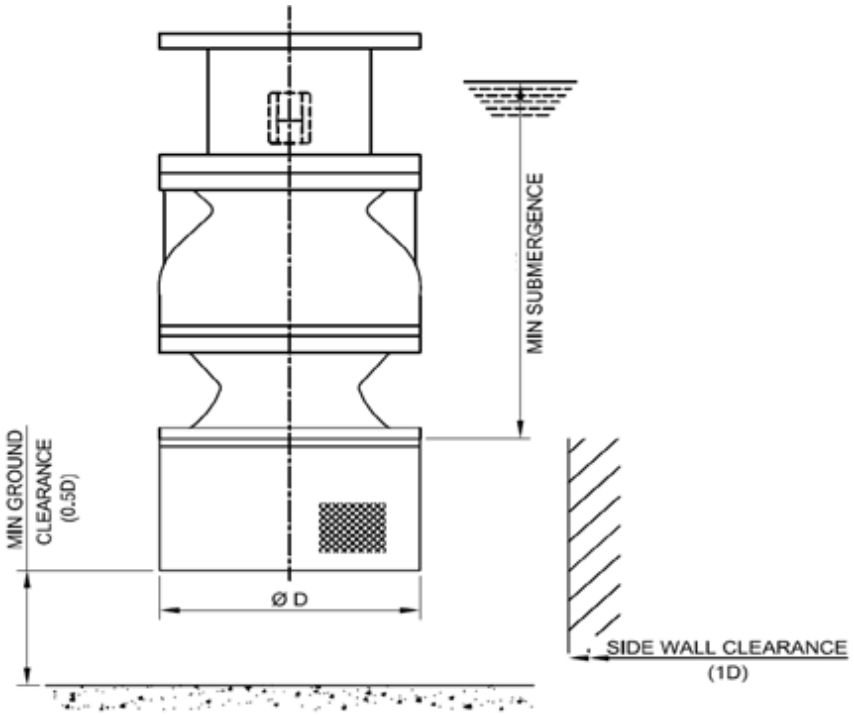


Fig. 5: Piping at the discharge flange (Page No. 31, Point No. 8.10)

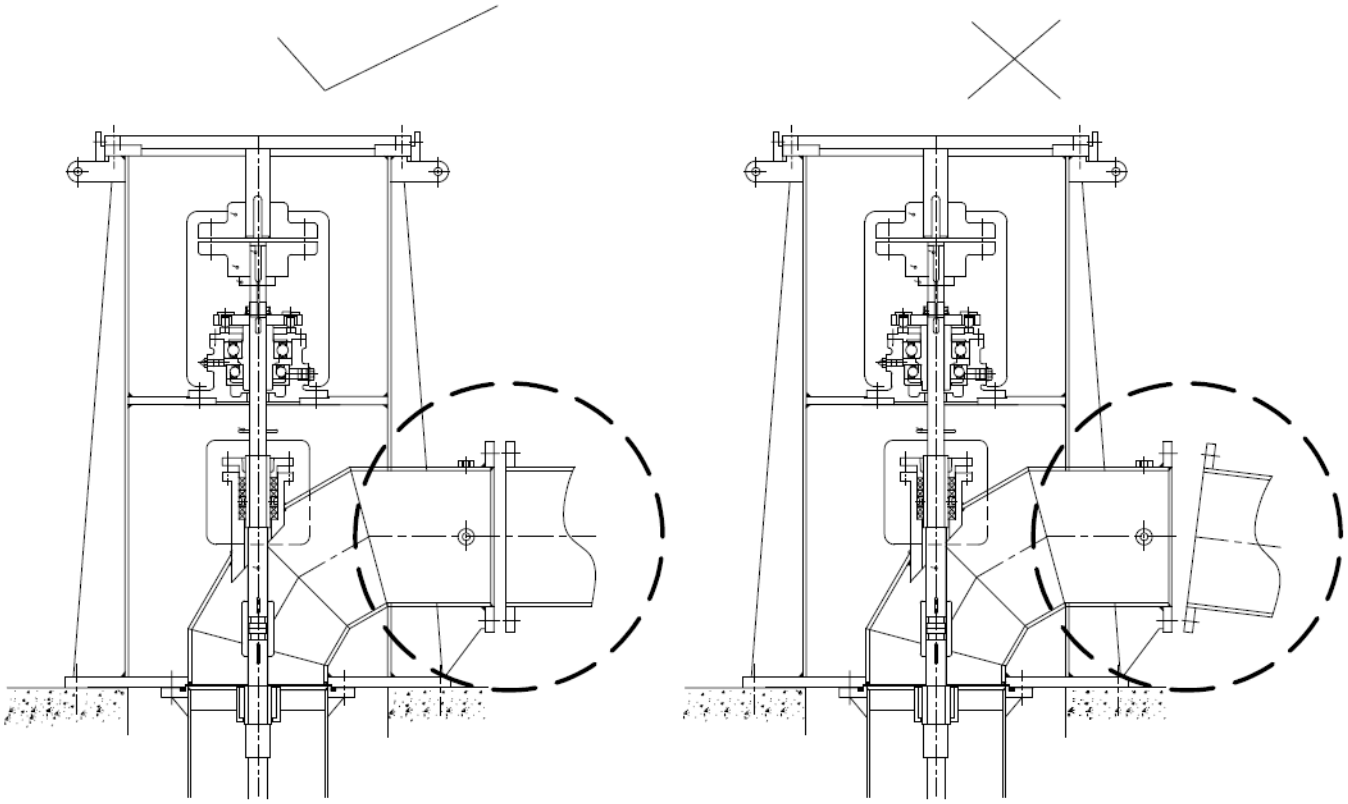


Fig. 6: Minimum level of fluid in the sump (Page No. 26, Point No. 8.1)

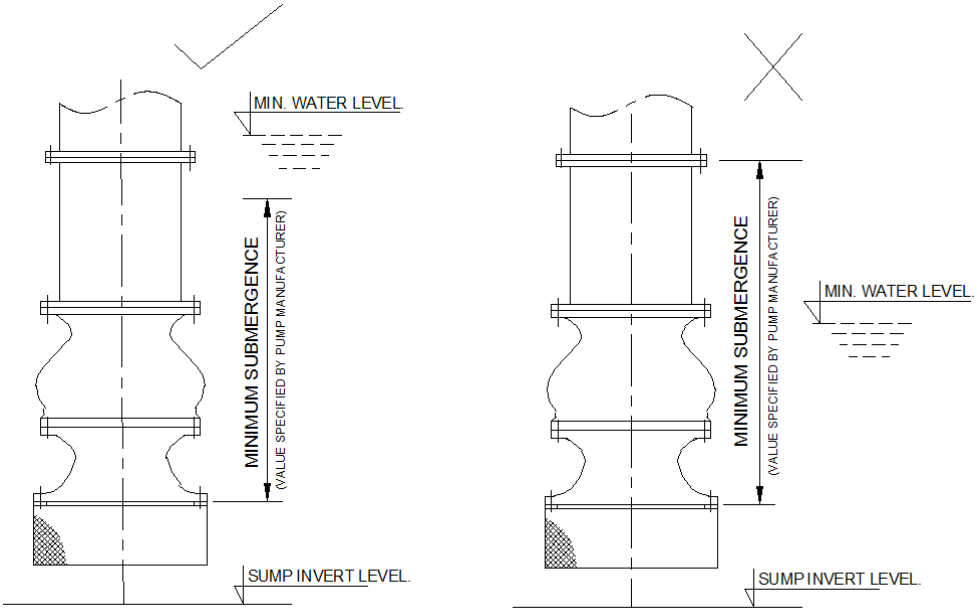


Fig. 7: Leveling of sole plate (Page No. 25, Point No. 7.2)

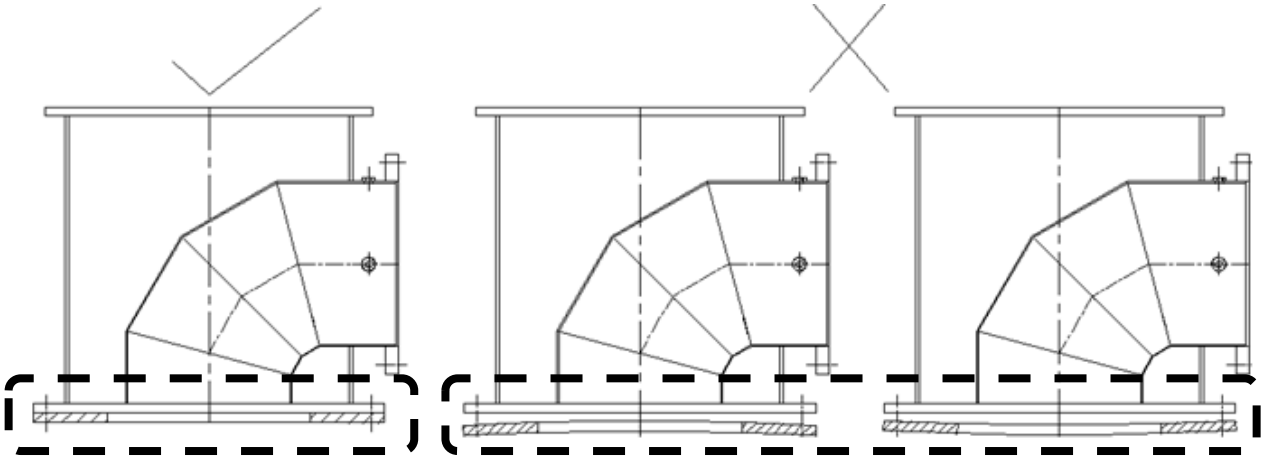


Fig. 8: Support to the discharge piping (Page No. 31, Point No. 8.10)

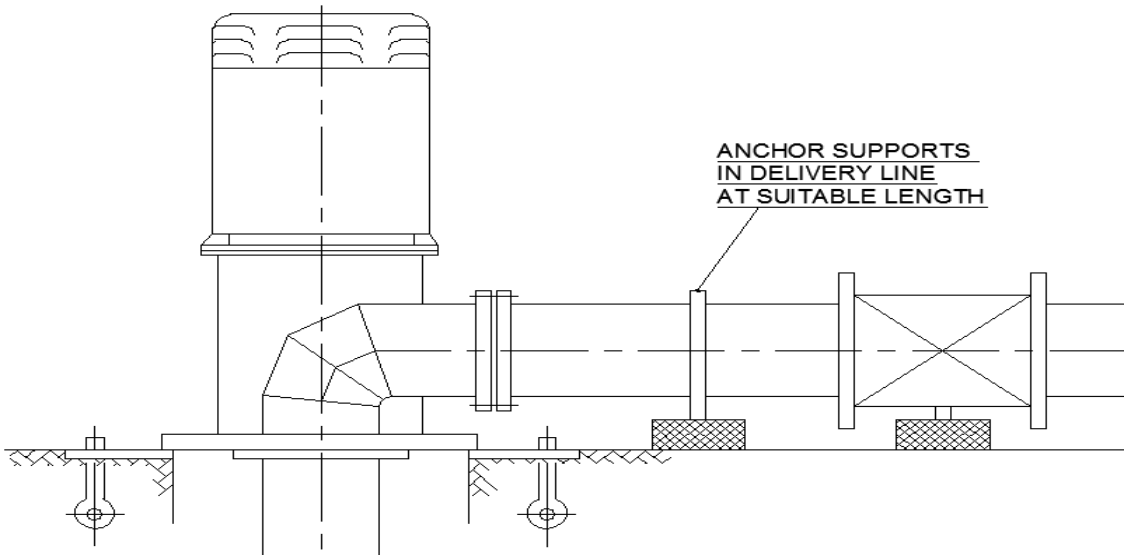


Fig. 9: Alignment of pump-motor coupling (Page No. 29, Point No. 8.7)

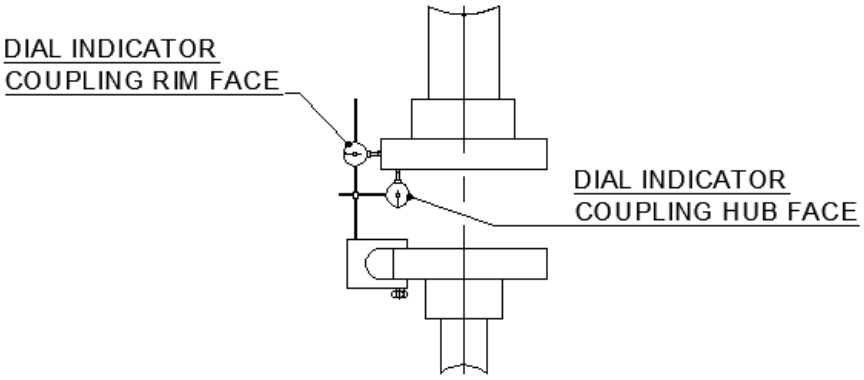


Fig. 10: Above Floor Discharge Arrangement (Page No. 21, Point No. 5)

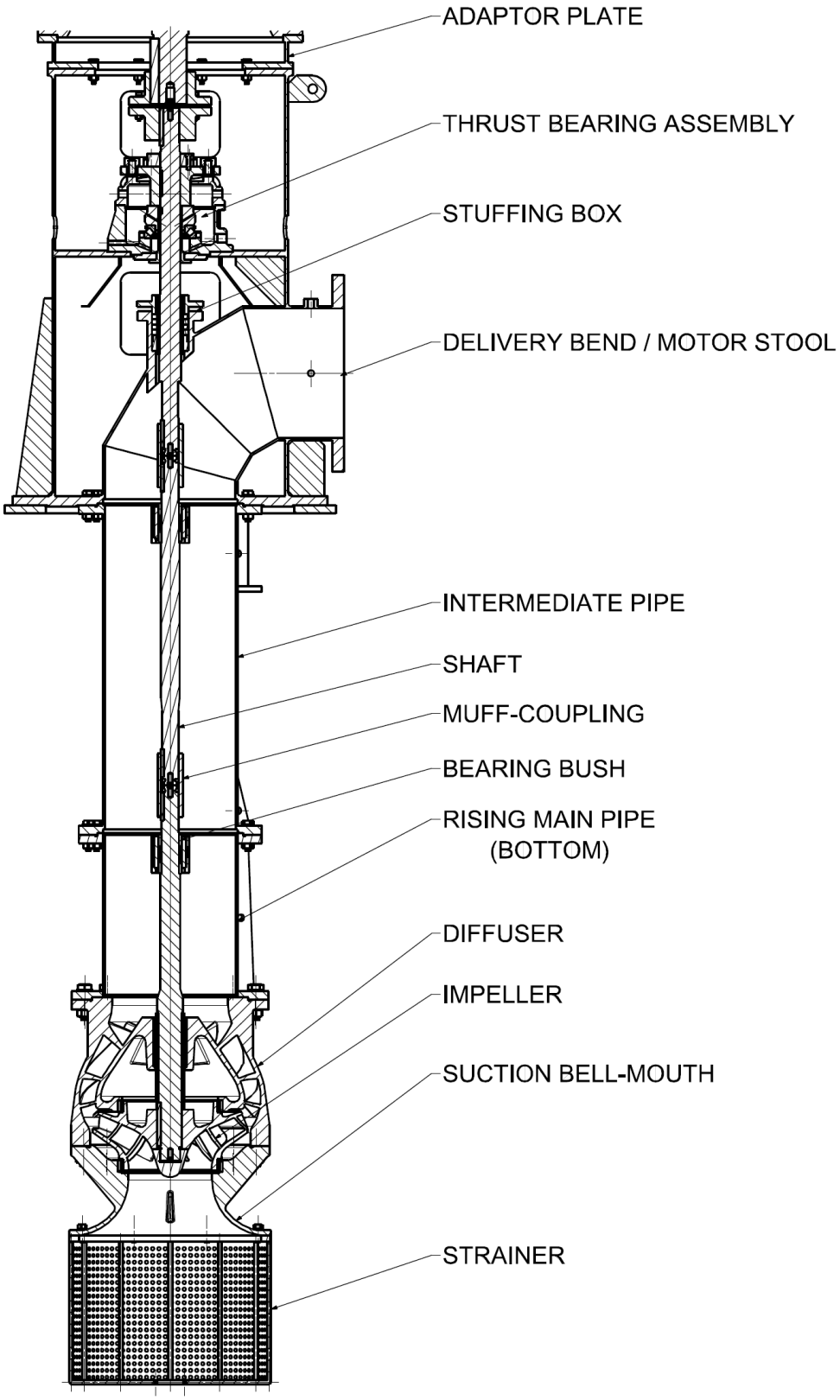


Fig. 11: Below Floor Discharge Arrangement

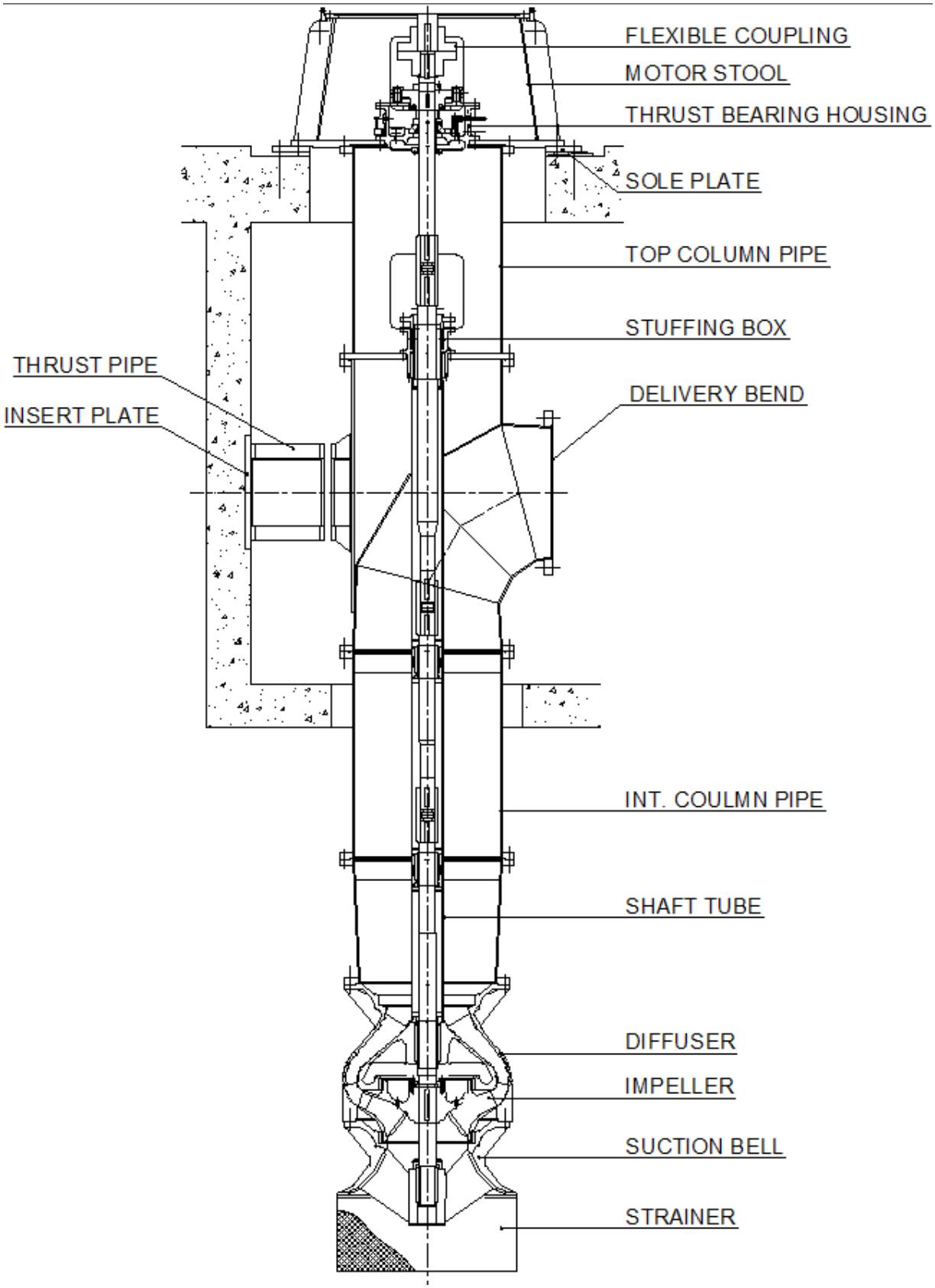


Fig. 12: Cutting of gland packing (Page No. 31, Point No. 8.11)

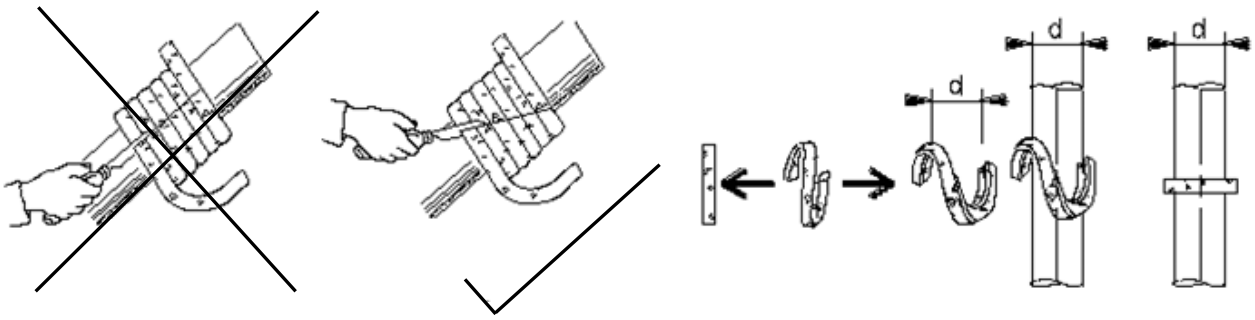


Fig. 13 : Thrust Pipe Arrangement in Below Floor (Page No. 22 & 28, Point No. 5.8 & 8.5)

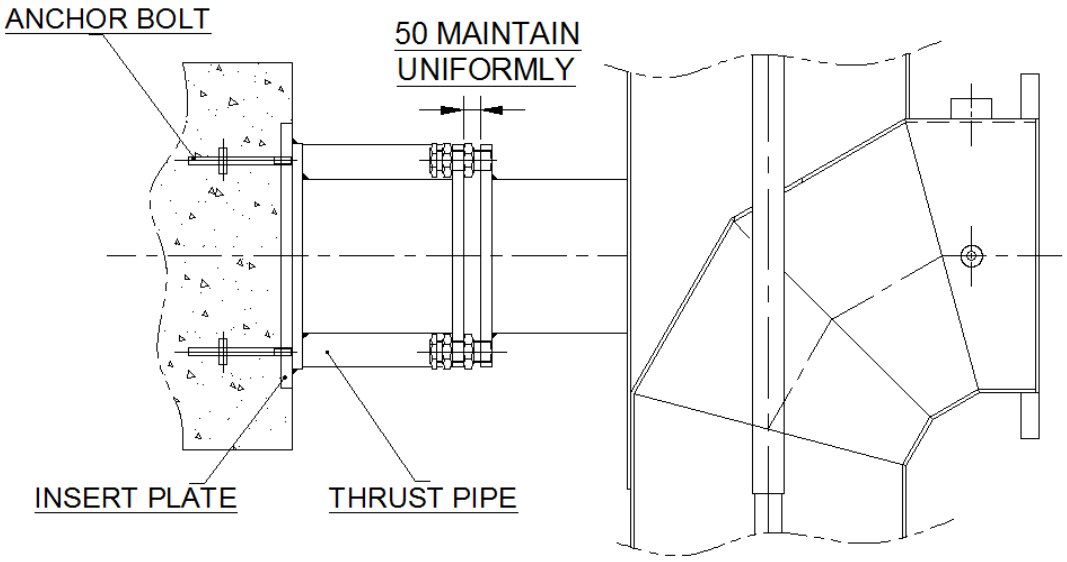


Fig. 14 : Non-reversible ratchet arrangement (Page No. 22, Point No. 5.9)

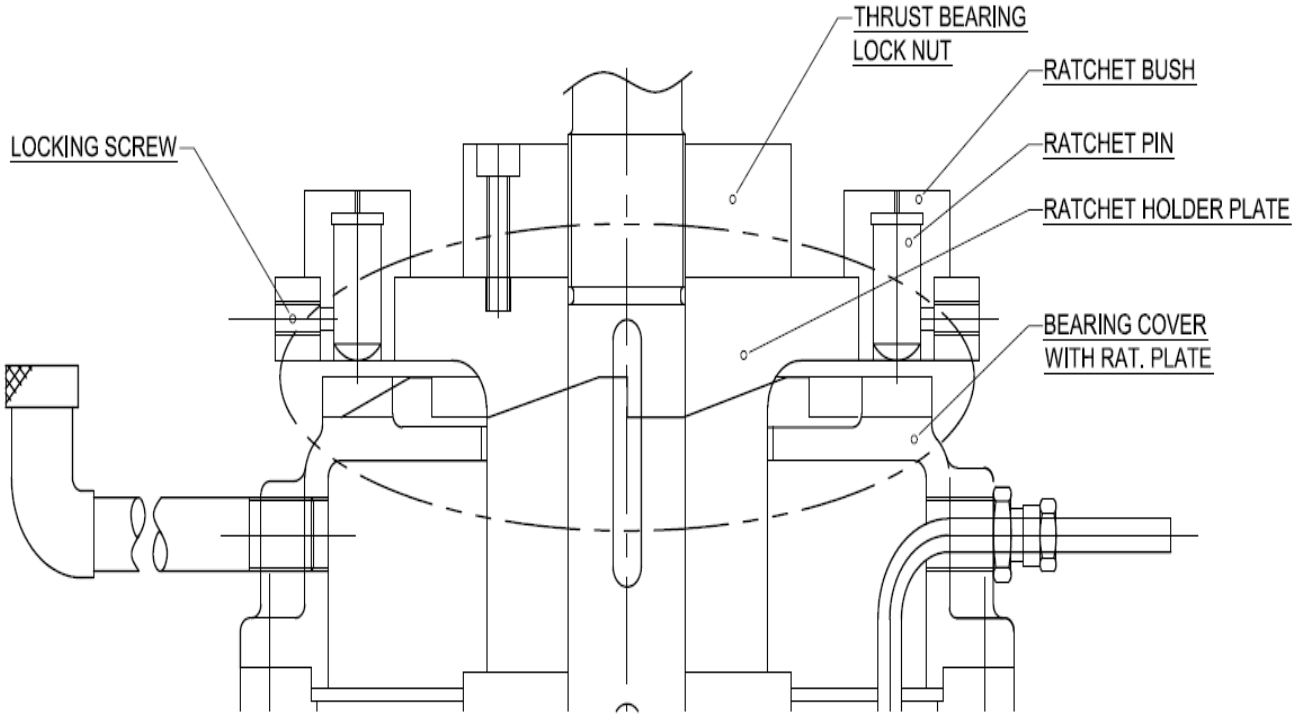


Fig. 15 : Details of Stuffing Box (Page No. 22 & 27, Point No. 5.14 & 8.4)

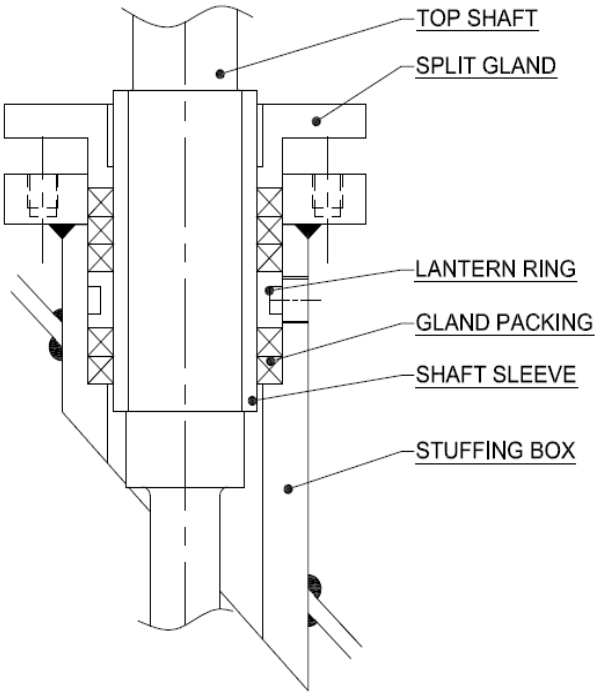


Fig. 16: Details of Flexible coupling (Page No. 23 & 28, Point No. 6.2 & 8.6)

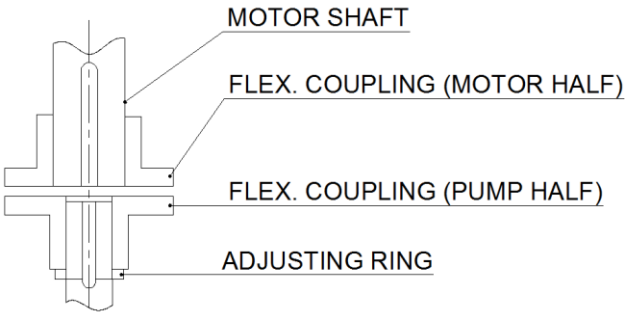


Fig. 17: Details of Bowl assembly (Page No. 21, Point No. 5)

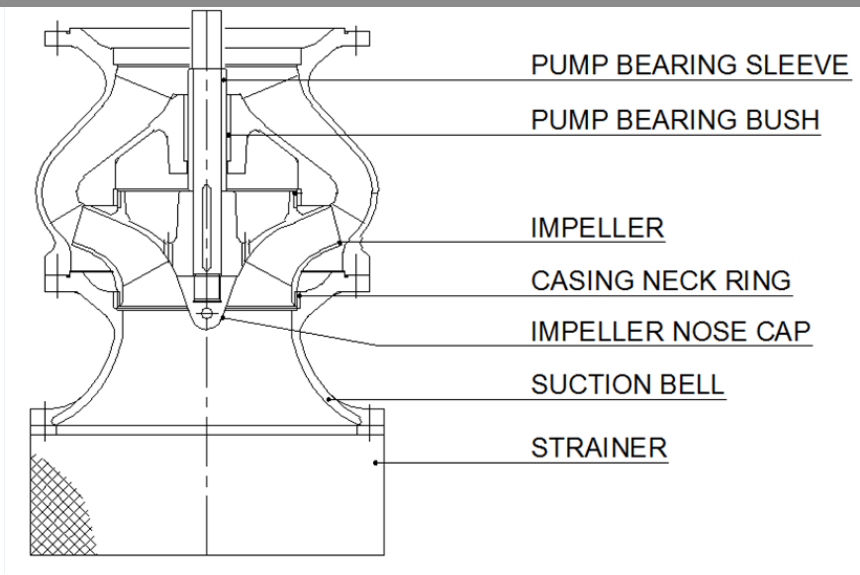


Fig. 18: Details of Muff coupling assembly (Page No. 23 & 27, Point No. 6.4 & 8.3)

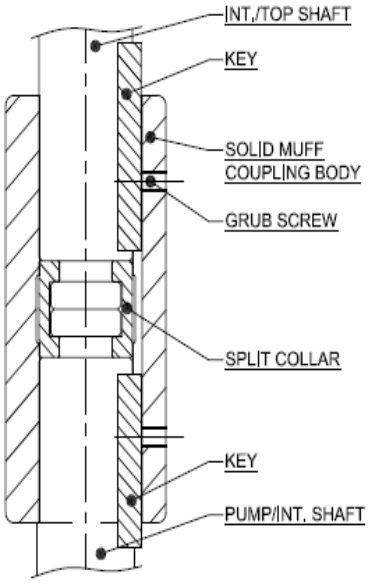


Fig. 19 : Details of grease lubrication (Page No. 22, Point No. 5.8)

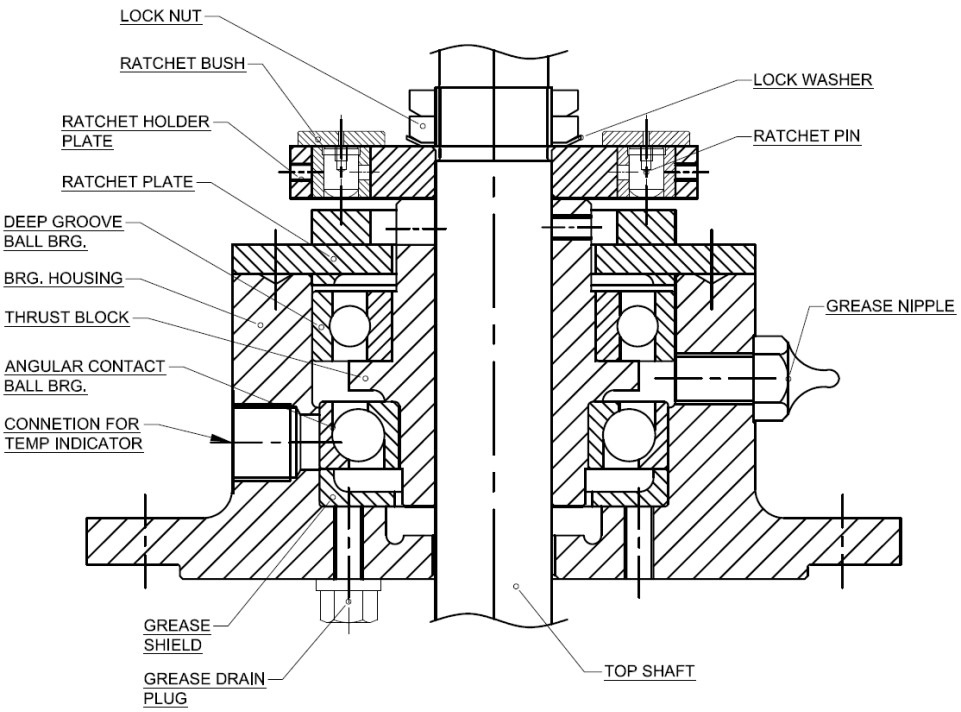


Fig. 20 : Details of oil lubrication (Page No. 22, Point No. 5.8)

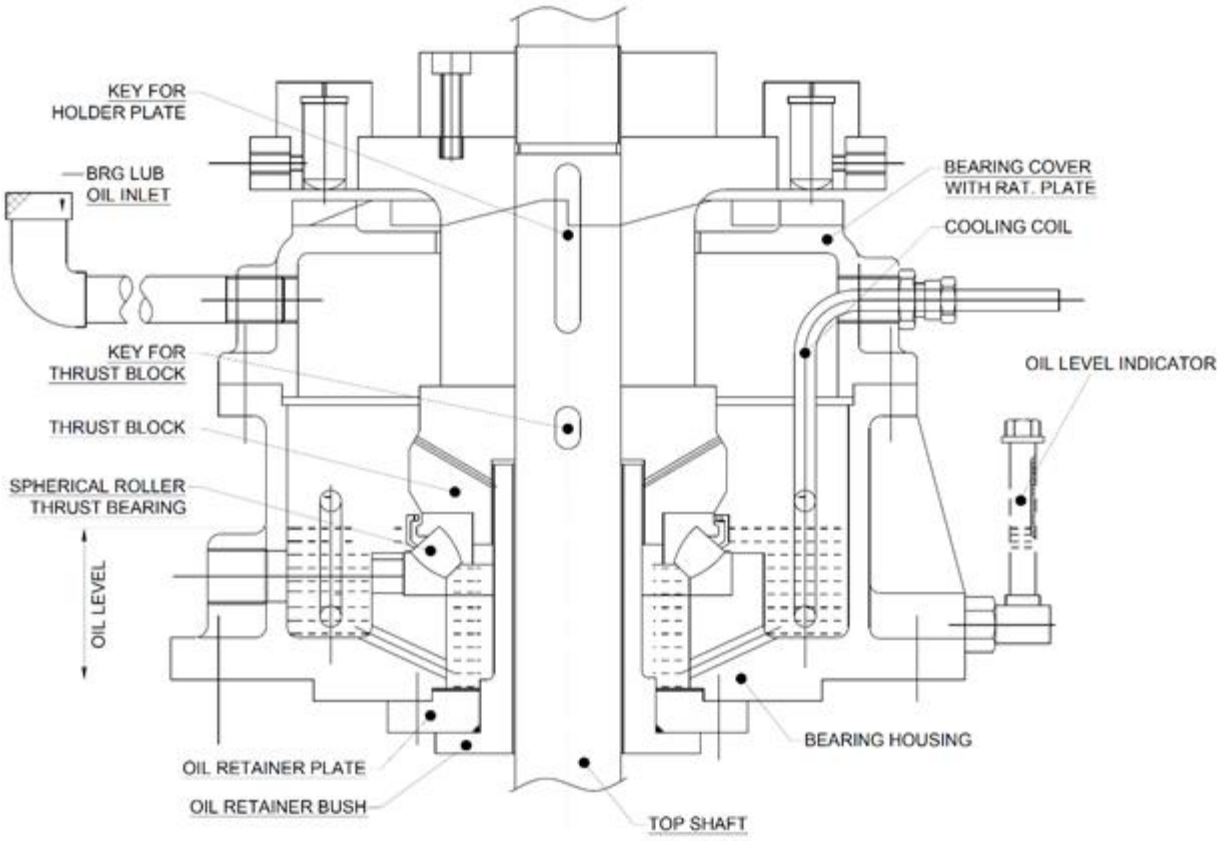


Fig 21: Arrangement for Oil lubricated pumps (Page No. 29, Point No. 8.8)

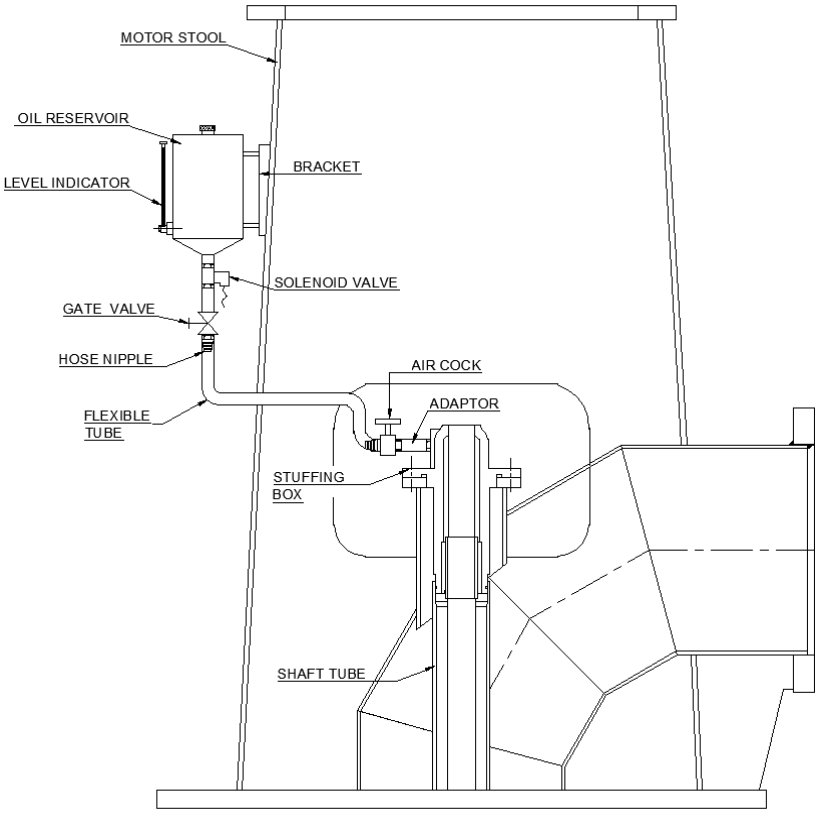


Fig 22: Schematic for forced water lubrication system (Page No. 29, Point No. 8.8)

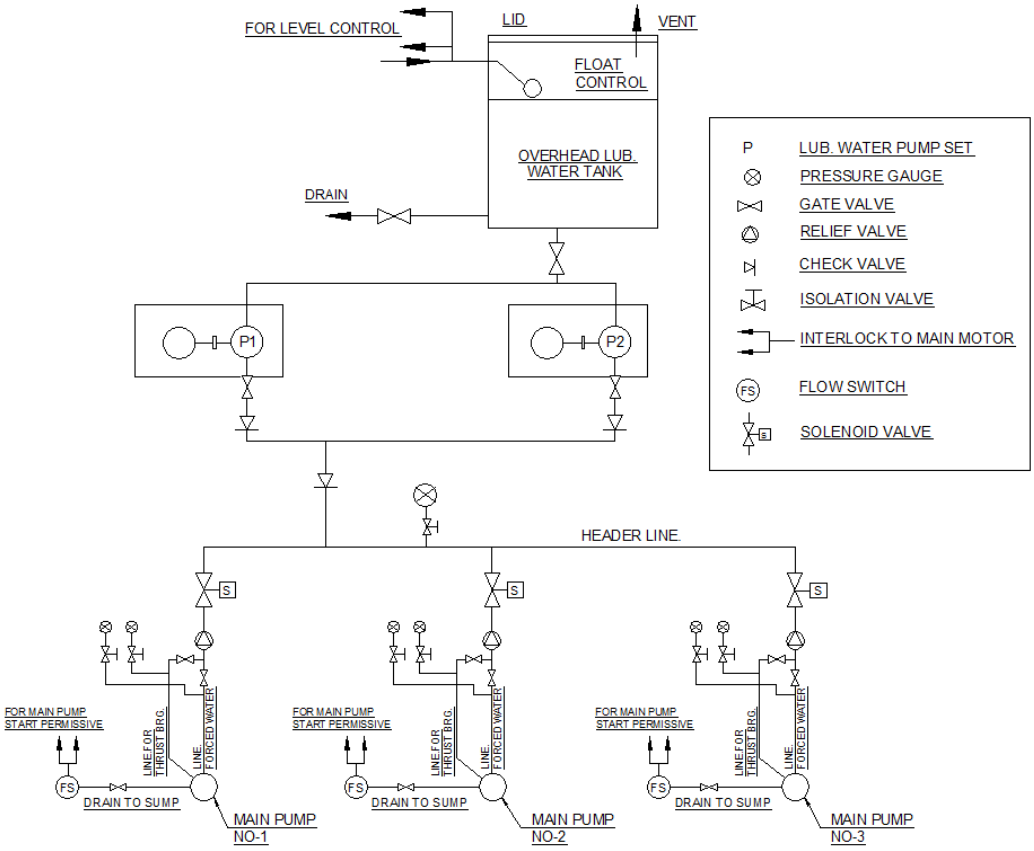


Fig 23 : Delivery Bend Connection Details (Page No. 43, Point No. 11.7 Pump Technical Data)

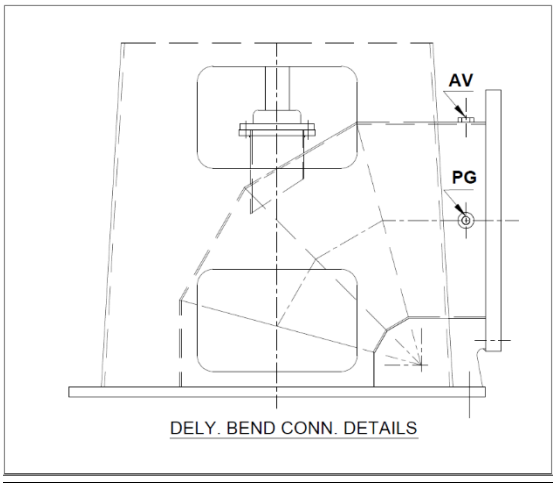
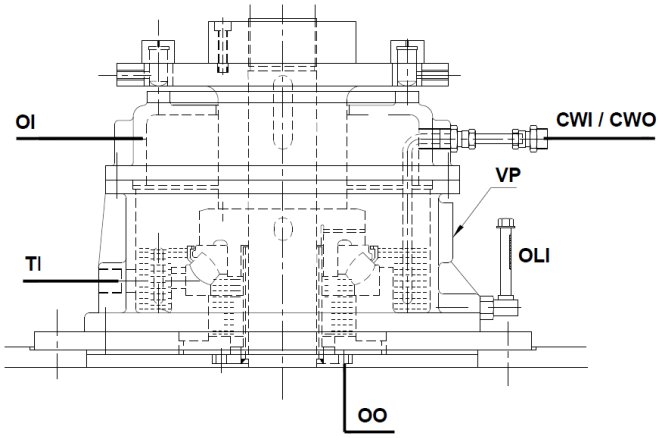
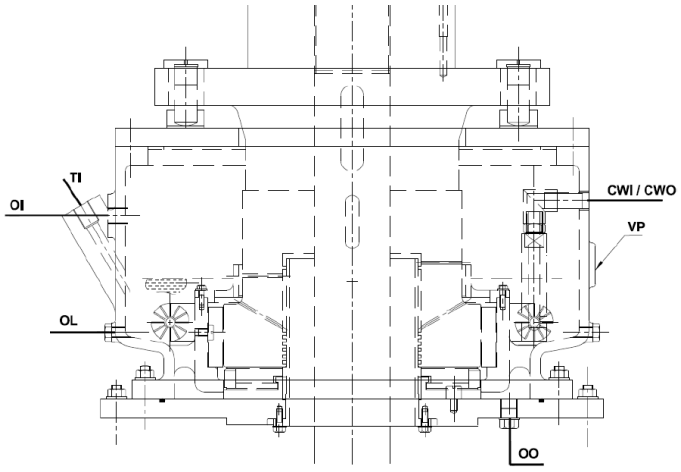


Fig 24 : Oil Lubrication Bearing Connection Details (Page No. 44, Point No. 12)

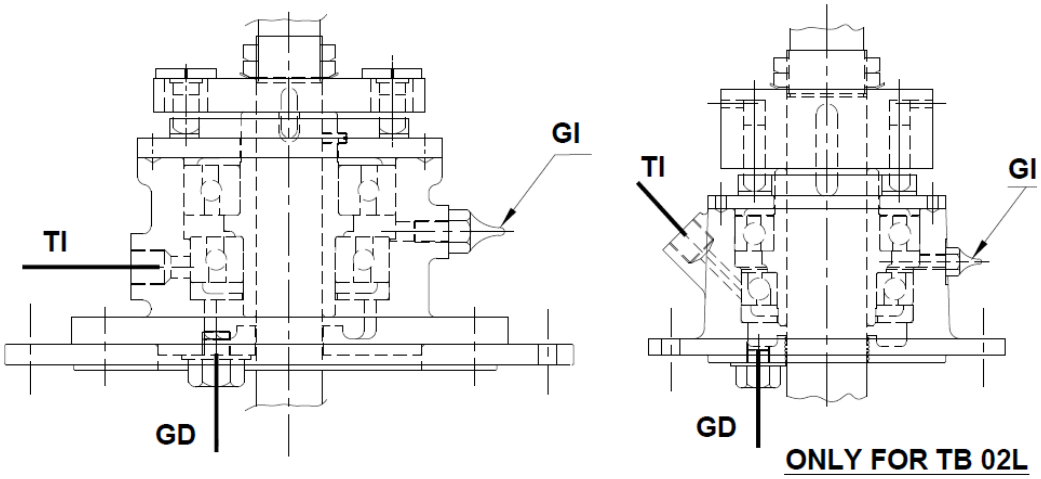


OIL LUB. BRG. CONN. DETAILS



OIL LUB.TILTING PAD BRG.CONN. DETAILS

Fig 25: Grease Lubrication Bearing Connection Details (Page No. 44, Point No. 12)



GREASE LUB. BRG.CONN. DETAILS

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 instructions are an integral part of the product. They 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.

For hassle free operating life, it is recommended that the pump should operate under specified "Operating conditions". Pump operating conditions are mentioned on the "Nameplate" affixed to the pump.

If operating parameters deviate from the specified parameters as on the "Nameplate", please contact manufacturer."

CE Marking Certification is available on request.

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 Safety Symbols:

General danger symbol:
This symbol indicates safety instructions where non-compliance would affect personal safety and could result in loss of life.

Danger due to electrical voltage
This symbol indicates electrical safety instructions where non-compliance will involve a high risk to personal safety or the loss of life.

NOTE: ...
This is not a safety symbol but indicates useful information on using the product. It also draws attention to the possible problems.

Signal words:

DANGER!
Acutely dangerous situation.
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.

2.2 Personnel qualifications

All personnel involved in the operation, installation, inspection and maintenance of the unit must be qualified to carry out the work involve.

If the personnel in question do not possess the necessary knowledge and skill, appropriate knowledge and training must be provided.

2.3 Danger in event of non-observance of the safety instructions

Non-observance of safety instructions provided in these operating instructions can 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
- Loss of any claims to damages
- WILO Mather and Platt does not accept any liability for damage, failures or losses arising due to improper installations, maintenance, repair works, modifications without our consultation and non-observance of safety instructions mentioned in this IOM.

2.4 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.

- If hot or cold components on the product/the unit lead to hazards, local measures must be taken to guard them against touching.
- Guards protecting against touching moving components (such as the coupling) must not be removed whilst the product is in operation.
- Leakages (e.g. from the shaft seals) of hazardous fluids (which are explosive, toxic or hot) must be led away so that no danger to persons or to the environment arises.

National statutory provisions are to be complied with.

- Highly flammable materials are always to be kept at a safe distance from the product.
- Danger from electrical current must be eliminated. Local directives or general directives [e.g. IEC, VDE etc.] and local power supply companies must be adhered to.
- Depending on the type, size and capacity (kW), the products produce a sound pressure up to 75 dB (A) to 110 dB (A).
- The actual sound pressure, however, depends on several factors. These include, for example, type of prime mover, installation type, fastening of accessories and pipeline, operating site condition, background noise, etc.
- Once the product has been installed, we recommend that the operator makes additional measurements under all operating conditions.

2.5 Safety instructions for installation and maintenance work

The operator must ensure that all installation and maintenance work is carried out by authorized and qualified personnel, who are sufficiently informed from their own detailed study of the operating instructions.
Work on the product/unit must only be carried out when at a standstill. It is mandatory that the procedure described in the installation and operating instructions for shutting down the product/unit be complied with.
Immediately on conclusion of the work, all safety and protective devices must be put back in position and/or re-commissioned.

2.6 Unauthorized modification and manufacture of spare parts

Unauthorized modification and manufacture of spare parts will impair the safety of the product/ personnel and will make void the manufacturer's declarations regarding safety.
Modifications to the product are only permissible after consultation with the manufacturer. Original spare parts and accessories authorized by the manufacturer ensure safety. The use of other parts will absolve us of liability for consequential events.

2.7 Improper use

The operating safety of the supplied product only guaranteed for conventional use in accordance with Section 4 of the operating instructions. The limit values on any account must not fall under or exceed those specified in the catalogue/data sheet.

2.8 Safety & control devices

Direct controls are applicable when the pump is supplied along with motor/panels. When motor/ panel is in end user's scope of supply, it is advised to go for CE approved motors /panels.
Environmental safety
Disposal of any unwanted/scrap material should be disposed in appropriate way so as not to cause any harm to the environment. No hazardous material is used in WILO Mather & Platt pumps.

NOTE
To avoid ambiguity in the use of the word „replace" the words „replace" and „renew" are used in this manual in the following context: Replace – To put back, in its existing state, a part or component that has previously been removed. Renew – To substitute a new part of component for a worn or damaged one.

3. Transport & Interim storage

Immediately check the pump and transport packaging for damage in transit upon receipt. Take the necessary steps within the period defined by the transport company in the event of damage in transit.

DANGER! Risk of getting crushed!
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.

CAUTION! Risk of damage to the pump!
Risk of damage due to improper handling during transport and storage.
The pump should be protected against humidity, frost and mechanical damage during transport and interim storage.

3.1 Handling (Fig: 1& 2 Pg. No. 3&4)

CAUTION! Risk of damage to the pump! Risk of falling!
Pumps should never be lifted with motor mounted on motor stool. Lifting lugs provided on motor stool are to be used only for lifting the pump during maintenance. Pump to be lifted /inserted in part by part. Safe working load of wire ropes reduces with increase in included angle. Never put down or pick up the product when it is not secured. Tilting of the product should be avoided at all costs.

Only suitable lifting gear and load carrying equipment with valid test certificates and adequate lifting capacity for the loads involved (such as belts/ wire ropes/slings) should be used for lifting & transporting the product.
If chains are used, they should be secured against slipping along with protective cover to prevent damage to the product, paint and/or injury to personnel. When lifting, care to be taken so that pump flanges, shaft extensions, suction, bellmouth, etc. are not damaged.

To lift the pump see lifting diagrams – see also general safety Information, Point 2). These must have sufficient load bearing capacity to ensure that the product can be transported safely.

3.2 Delivery

On arrival, the delivered items must be inspected for Damage and a check made that all parts are present.

If any parts are damaged or missing, the transport company or the manufacturer must be informed on the day of delivery. Any claim made at a later date will be deemed invalid. Damage to parts must be noted on the delivery or freight documentation.

3.3 Storage

Our vertical pumps require preparation for storage & regular maintenance during storage. The pump should be considered in storage when it has been delivered to the job site & waiting for installation.

It is suggested that the check of parts & material against the bill of materials be made jointly with the WILO Mather and Platt's representative & customer representative.

NO CLAIMS FOR SHORTAGES WILL BE HONORED BY WILO MATHER AND PLATT, AFTER THE MATERIAL HAS BEEN PLACED IN STORAGE.

3.3.1 Short-term storage (less than 3 month)

The equipments as shipped should have adequate protection for short-term storage in a covered, dry and ventilated location at the job site prior to installation.

If the pump is not installed immediately after delivery, it must be stored in a dry and clean place with sufficient ventilation, no vibration, no freezing and the temperature variations must be smooth. Bearings and couplings must be protected against sand, dust and foreign bodies.

To avoid corrosion and jamming, please lubricate the pump and make turn the rotating elements for several turns at least once a week. Pre-packed desiccants may be used to absorb moisture & keep the pump dry. It must be removed before putting the pump on operation.

3.3.2 Long-term storage (more than 3 month)

If the equipment will be subject to extended storage condition prior to installation, then the manufacturer must be informed about storage duration, so that special protection can be recommended.

- The machine must be protected from direct sunlight, heat, dust, and frost.
- The rotors or propellers must be turned at regular intervals. This prevents the bearing from locking.
- Heavy components must be placed on supports to kept them off the ground
- Shafting must be removed from the boxes & coated with preservative, then re-boxed with preservative paper.

3.4 Pump returning back to the supplier

Products, which are delivered back to the plant, must be clean and correctly packaged. In this context, clean means that impurities have been removed and decontaminated if it has been used with materials, which are hazardous to health.

The packaging must protect the product against damage.

⚠ CAUTION! Guarantee not applicable!

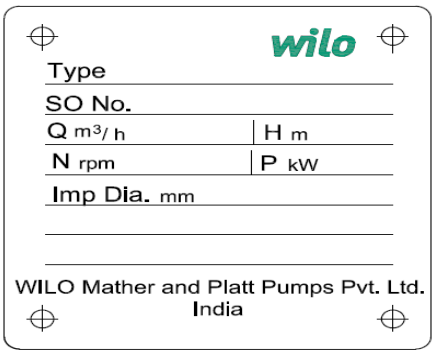
Products, which are not suitably packaged for delivery back, are no longer covered by guarantee!

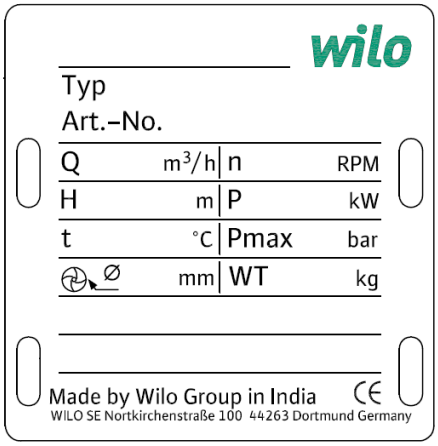
3.5 Intended use

The pump supplied is intended for specific fluid. Refer pump data sheet and order confirmation. For any change in pumped fluid refer WILO Mather and Platt beforehand. Vertical turbine pumps are used in water supply, water circulating systems, injection water, spray pond, condensate extraction, water treatment, firefighting, booster systems etc. If the operating conditions are different of the specifications given in the order, (i.e. type of liquid, temperature or duty point), the end user must ask a written agreement to WILO Mather and Platt on the new operating conditions before starting the pump.

4. Product information

4.1 Data plate





4.1.1 Key Type:

CNE 18 x 2 / 1480 / C.W 30 VMF x 3 / 740 / A.C.W	
CNE	Name of the range
VMF	Name of the range
2/3	No of stages
1480/ 740	Speed in RPM
CW/ ACW	Direction of Rotation when viewed from top

4.2 Standard product 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, 1800, 1480, 980, 740, 590, 490, 420, 390, 330 Rev/min	Model dependent
Discharge nominal diameters DN	100 mm to 2000 mm	Model dependent
Flange standard	ANSI	Others on request
Limits of ambient temperature (min/max) [°C]	up to +40	Others on request
Ambient humidity	< 90 %	Others on request
Max. operating pressure	on request	Model dependent
Motor insulation class	F	Other on request
Motor protection level	IP 55	
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 or in technical leaflets
Standard fluid allowed	Condensate, Cooling water, Clear Water, Raw Water. Contact WILO Mather Platt for all other fluids	Standard version
Electrical connections	3~230V, 50Hz 3~415V, 50Hz	Other frequency, voltages, Please contact M+P

4.3 Scope of delivery

Pump can be delivered,

- As a complete pump set including electrical motor, Sole plate, coupling
- Either without motor or as bare shaft pump without sole plate in case of existing sole plate and foundation

4.4 Accessories

- Companion Flange
- Foundation bolts
- Shims

5. Product Description

Vertical turbine pump can be single stage or multistage in construction. The pump is a vertical suction pump.
The unit is divided into three basic elements:

a. The pumping stages including bowl assembly.
b. Intermediate piping works and extension shafting.
c. Delivery bend & motor stool assembly.

The pumping stages are freely suspended from the delivery bend by intermediate pipework, depending upon the site conditions. In surface discharge installation, the delivery bend & motor stool are placed above floor level. The thrust bearing situated in the motor stool assembly supports the static weight of the rotating assembly and also absorbs any axial thrust that is developed within the unit during operation. (Refer Fig. 10 & 17, Pg. No. 8 & 12) When the pump is in operation, fluid is guided by a suction cover into the impeller eye (inlet). Rotation of the impeller vanes imparts energy to the fluid. This kinetic energy is converted into pressure energy as the liquid flows through diffuser vanes.

5.1 Casing

Casing consists of suction bellmouth and diffuser attached together with impeller and replenishable rings. Casing carries bush bearings to support shaft at regular intervals. Depending on need bush bearings can be provided in suction bellmouth. The top flange surface of casing carries groove for O-ring for liquid sealing. Also, spigot is provided on top flange for locating the components accurately.

5.2 Impeller

Impellers may be of mixed flow, Radial flow (open or close). Refer specifications/datasheet/General arrangement drawing/cross sectional drawing for details. The impeller varies in size according to capacity of the individual pump. Close type impellers are hydraulically balanced to reduce axial thrust. Impeller carries balance holes and back vane for thrust balancing. Balance holes can be plugged depending upon the need. In case of open type of impeller, throat line is provided below impeller. The gap between the same is maintained as per pump manufacturer's recommendations.

5.3 Impeller wear rings / neck rings

The impellers necks and casing are accurately machined to provide a close running fit in the neck rings and wear rings that surround them. The close clearance between the neck ring and impeller neck as well as wear ring and casing minimizes the leakage of fluid from the high-pressure areas to the low-pressure areas of the pump.
Neck rings and Wear rings are renewable to allow this fine clearance to be restored periodically as wear takes place. Ref. Table 6 below,

Table 6 – Minimum Running Clearances.

Diameter of Rotating Member at Clearance (mm)	Minimum diametral clearance (mm)
< 50	0.25
50 to 64.99	0.28
65 to 79.99	0.30
80 to 89.99	0.33
90 to 99.99	0.35
100 to 114.99	0.38
115 to 124.99	0.40
125 to 149.99	0.43
150 to 174.99	0.45
175 to 199.99	0.48
200 to 224.99	0.50
225 to 249.99	0.53
250 to 274.99	0.55
275 to 299.99	0.58
300 to 324.99	0.60
325 to 349.99	0.63
350 to 374.99	0.65
375 to399.99	0.68
400 to 424.99	0.70
425 to 449.99	0.73
450 to 474.99	0.75
475 to 499.99	0.78
500 to 524.99	0.80
525 to 549.99	0.83
550 to 574.99	0.85
575 to 599.99	0.88
600 to 624.99	0.90
625 to 649.99	0.95
Note: For diameters greater than 649.99 mm, the minimum diametral clearances shall be 0.95 mm plus 1 μmfor each aadditional 1 mm of diameter or fraction thereof.	

5.4 Rotating Elements

The rotating element consists of the pump shaft, impellers, intermediate extension shafting and solid muff couplings, bearing and thrust block.
Impellers are keyed to the pump shaft and located axially. The complete impeller and pump bearing sleeve assembly is end tightened against step on the shaft by an impeller lock nut at suction end. This lock nut is locked in position by locking screw. Intermediate shafts are coupled together by solid muff coupling. The weight of the whole rotor assembly is transferred to bearing via thrust block. Float / lift of the pump can be adjusted by adjusting thrust block lock nut.

5.5 Rising Main Pipe

Rising main pipes have flanged connections. Spigot joints are provided in flanges to ensure concentricity. The top rising column is connected to delivery bend. Grooves for O-rings are provided for liquid sealing.

5.6 Delivery Bend

Delivery Bend/ Delivery tee which forms discharge branch of the pump unit is a fabricated component and situated above operating floor level. The bottom flange of the delivery bends supports rising main pipe and pump bowl assembly. It accommodates the stuffing box and split gland assembly/ mechanical seal arrangement for sealing the top shaft.

In sub-surface discharge configuration, delivery tee is located below operating floor. If space permits, delivery tee accommodates the stuffing box and split gland assembly/Mechanical seal arrangement for sealing the top shaft. Alternatively, stuffing box can be provided in bottom flange of motor stool. Thrust Pipe, if provided, is located opposite to delivery branch in below floor arrangement. Tapping is provided near discharge flange of delivery bend to accommodate pressure gauge. Delivery bend is fitted onto a soleplate or top flange of canister when provided.

5.7 Motor Stool

It is a fabricated structure. In surface discharge installation, motor stool rests on the top of delivery bend. The top flange of motor stool supports the drive motor. Also thrust bearing assembly, non-reverse ratchet assembly (when provided) and coupling between pump and motor are mounted in the motor stool. Openings are provided to access the parts housed in motor stool.

When hollow shaft motor is provided with combined thrust bearing for pump and motor, motor stool and coupling to connect pump - motor shafts are not provided.

5.8 Thrust bearing Assembly

It consists of thrust bearing to take up axial and radial thrust. Small vertical pumps have grease lubricated bearings while medium to large vertical pumps have oil lubricated bearings. Oil level should be checked prior to starting of pump. (Fig: 13, Pg. No. 10)

5.9 Non-Reverse Ratchet Arrangement

Non-Reverse Ratchet is mechanical device to prevent the reverse rotation of pump, motor during flow reversal condition. It consists of a fixed ratchet and rotating pins as shown in enlarged details.

The ratchet plate teeth allow pins to slide up during normal direction of rotation. However, during reversal, the pins engage with the teeth and prevent reverse rotation. A pump could be offered optionally without Non reverse arrangement if reverse rotation detection system and non-return valve is provided. (Fig: 14 Pg. No. 11)

5.10 Thrust Pipe Arrangement

Thrust pipe arrangement is provided to absorb back thrust generated in below floor discharge arrangements. Thrust pipe is bolted to delivery bend on one side and welded to insert plate fixed in column on other side. An adaptor pipe may be provided in between to adjust the lengths. Insert plate is to be fixed with anchor bolts to column. Refer Fig 13 Pg. No. 10 above.

5.11 Line Shafts

Line shaft shall be of suitable diameter and length as per pump manufacturer's recommendation with 30% margin on both sides for critical speed with interchangeable sections of standard lengths of 1, 1.5, 2, 2.5, 3m. To ensure correct alignment shafts should be straight within 0.125mm for 3 m length total dial indicator reading. Line shafts are coupled together with the help of rigid coupling. Maximum permissible error in the axial alignment of the axis with the axis of shaft shall be 0.05 mm in 150 mm. Line shaft are provided with sleeves to be supported in line shaft bearing at suitable intervals.

5.12 Line Shaft bearing

Line shaft bearing could be of Thordon, Cutless rubber, Feroform, Finocot, Bronze or any other special material depending upon application and shall be spaced at suitable interval securely in bearing spider located between column pipes. The bearings shall consist of grooves to allow water and oil flow to the bearing below. In case of oil lubricated pump with shaft enclosing tubes, bearing bronze material is to be used.

5.13 Shaft enclosing tubes

Shaft enclosing tubes are used in forced water and oil lubricated pumps. Shaft tube is generally supported on bearing carriers between bearing spiders with a sealing ring provided at both ends to prevent leakage. Shaft tube should be selected such that sufficient clearance is maintained between shaft tube internal diameter and shaft rigid coupling outer diameter allowing required quantity of water / oil to pass to bearing below. Bottom most shaft tube should be located in diffuser/ casing with an adaptor.

5.14 Stuffing Box

Stuffing box may be provided either with gland packing or mechanical seal as per client's requirements. Gland packing of plaited cotton and colloidal graphite is provided as standard material, others may be provided on request. Stuffing box also acts as a bearing support for head shaft; hence a sleeve is provided to accommodate the rubbing. Logging ring / lantern ring is provided in stuffing box is provided for lubrication and bypassing additional fluid via leak off connection. Throttle bush may be provided in stuffing box in case if high pressure pumps to prevent mechanical seal faces from being damaged. (Refer Fig. 15 Pg. No. 11)

6. Selection of Motor and Pump Components

6.1 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	P2 ≤ 22 KW	22 kW < P2≤ 55 kW	55 kW < P2
Recommended Power Margin	25%	15%	10%

Example:

- Duty point: 100 m3/h – 30 m – pump efficiency 78 %
- Pump shaft power: 10.5 kW
- Electrical motor rating (including margin):
  10.5 * 1.25 = 13 kW
- IEC motor power rating available: 15 kW

6.2 Coupling selection

Standard Pin-bush type flexible coupling is used to connect top / head shaft to motor shaft. (Fig 16, Pg. No. 12)

Couplings can be selected with Cast Iron or Forged steel as standard material. 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. Use torque or power/100 rpm rating to select suitable coupling in suitable MOC.

Check if the rated coupling speed is more than pump speed.

Also check the motor shaft dia. for selected motor is less than or equal to the max. Shaft dia. mentioned in the coupling catalogue.

Additional service factor must be considered in coupling selection for special applications. (Refer table on next page for coupling details in CI MOC)

Example:

- Power: 1000 hp, Pump speed: 980 rpm,
  Service Factor: 1

(Power/100 rpm) Rating = hp * 100 * SF / rpm
= 1000*100*1 / 100
= 102

Select coupling with hp /100 rpm rating more than 102

- For other types of couplings such Metaflex / Spacer-Membrane type / Rigid threaded type kindly consult WILO Mather and Platt.

- Care should be taken to consider and maintain gap between motor and pump half side of the coupling.

6.3 Selection of Mechanical seal (If applicable)

Mechanical seal should be selected in accordance to type of fluid, contents handled, and temperature and pump head. Suitable seal plan should be selected as per pump manufacturer's recommendations. Care should be taken to check availability of potable water on site if external flushing is required.

6.4 Selection of forced water lubrication system

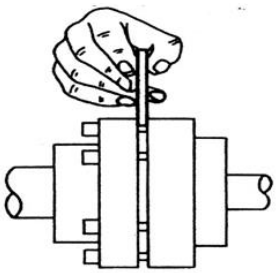
Forced water lubrication system should be employed when the pumping media is hazardous, dirty and contains solid as well as abrasive contents. Pump manufacturer should be consulted priorly with detailed water chemical analysis report to decide on with the feasibility of system. Pump manufacturer will provide a schematic for forced water system along with quantity of water required for shaft tube and thrust bearing cooling per pump. Time required for starting booster pump prior to main pumps will also be provided by pump manufacturer. (Refer Fig. 18 Pg. No. 12)

COUPLING SELECTION CHART FOR STD PIN-BUSH COUPLING

Material of Construction	Coupling Size	Max. Shaft Diam. (Ø mm)	Rating		Max. Speed rpm	Gap mm
			Torque (Nm)	hp/100 rpm		
C.I.	96	30	125	1.75	7200	4
	112	42	250	3.5	6100	4
	125	48	400	5.6	5500	4
	140	55	520	7.3	4900	4
	160	60	750	10.5	4500	4
	180	70	1050	14.7	3800	4
	200	80	1450	20.3	3400	4
	225	90	2400	33.7	3000	7
	250	105	3000	42.1	2700	7
	285	110	4900	68.8	2400	7
	320	125	6000	84	2100	7
	360	135	10000	140	1900	10
	400	145	14000	196	1700	10
	450	160	21000	295	1500	6
Steel	500	210	27500	385	2200	6
	560	230	39000	547	2200	6
	630A	200	52000	730	1800	6
	630B	250	52000	730	1800	6
	710A	240	84500	1186	1600	7
	710B	280	84500	1186	1600	7
	800A	280	110000	1543	1400	7
	800B	320	110000	1543	1400	7
	800C	340	110000	1543	1400	7
	900A	315	190000	2666	1240	7
	900B	360	190000	2666	1240	7
	900C	390	190000	2666	1240	7
	1000A	310	260000	3650	1110	10
	1000B	360	260000	3650	1110	10
	1000C	410	260000	3650	1110	10

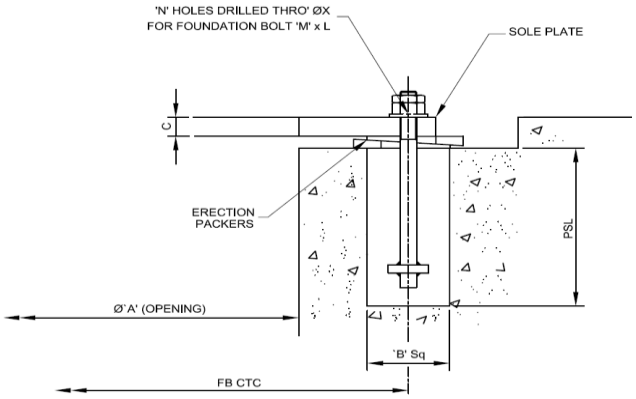
Notes:

- For Forged Steel / Cast Steel MOC kindly contact WILO Mather and Platt.
- Specified gap to be maintained between pump and motor half coupling.



7. Preparing Foundation

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent, rigid support for the sole plate. The strength of foundation must be adequate for the static and dynamic loads imposed and depend upon local soil conditions. The foundation must get large dimensions. Generally, the weight of the foundation is around 2 to 3 time the pump set weight. In building the foundation, the top of the foundation should be left approximately equal to sole plate thickness plus 25 mm for packers/shims below, to allow for grouting. Foundation bolts of the proper size should be embedded in the concrete, located by template.



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!

While tightening pump screws/bolts, pump as well motor should be free and should not be in coupled condition. Pump or motor should not be used as supports while tightening.

- Ensure that both Sole plate faces are parallel within allowable value, free from any distortion as shown in fig. Spirit level, straight edge along with engineer's mater level can be used to check flatness.

7.1 Sole Plate Installation

Sole plate has machined surfaces on both top and bottom sides. The top surface of foundation over which the sole plate rests must be left rough to assist in keying the final grout. After the sole has been leveled by positioning steel packer plates at suitable intervals on the foundation surface, ensure that the surface beneath each packing plate is solid by crushing any protrusion or alternatively each packer plate may be placed on a thin screen of cement.

7.2 Levelling of Sole Plate (Fig: 7, Pg. No. 7)

CAUTION!

The machined surfaces where level is being checked must be clean and free from paint, burrs etc.

Provide suitable packer plate (25 mm to 30 mm thick) or taper wedges on the foundation one each of either side of foundation bolt and in-between around 250 mm center to center. It is advisable to provide thin layer of cement below the packer plate.

- Lift the soleplate and lower it on the foundation. Insert the foundation bolts through the holes in the soleplate and screw a nut on to each bolt until the bolt protrudes through the nut by a length, which is sufficient to accommodate a lock nut.
- Adjust the level of the soleplate by inserting shims between the soleplate and the packer plate until the soleplate is leveled. And support on all the packing wedges at suitable height. For checking the levels & straightness, I-beam type straight edge should be used extensively in conjunctions with engineer's master level. Level should be achieved within 0.02 mm per meter. Also ensure that elevation of bedplate is adjusted suitably.
- 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. Do not to distort the soleplate or loosen the foundation bolts in the grout by excessive tightening. Carefully re-check the level of the soleplate and make adjustments that are necessary by fine shimming. Ensure that the sole plate is leveled, as per the site datum level, various centerlines etc. (Refer Fig: 7 Pg. No. 7)

8. Installation (Fig: 3, Pg. No. 5)

(Motor / Pump coupling system)

⚠ DANGER! Risk of getting crushed!

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

8.1 Sump Verification (Fig: 4&6 Pg. No. 5&6)

- Pump sump intake bay should be designed in such a way that flow evenly distributed and vortex free. Enough back wall and side wall clearances should be left for the pump to perform satisfactorily. Baffles formed inlet and other flow improving arrangements should be employed in case of restricted or constrained sump conditions.
- The special attention must be paid to sump design. When two or more nos. of pumps are operated in combinations of working & standby conditions. It is recommended that when space & site constraints do not allow the suction sump design as per recommendation of HIS, the suction sump design should be verified by a model study.
- Whenever model study has been carried out previously for optimizing sump design, its recommendation regarding corrective structures should be fully implemented.
- Care should be always taken to maintain minimum submergence condition for satisfactory performance of pump. Cavitations, vibrations etc. can occur in absence of the same.
- Sufficient bottom clearance should be maintained below suction bell as per HIS.
- It is recommended to install a strainer to keep unwanted solids out of the pump. Strainer may be installed at the suction bell end. These strainers usually introduce a moderate drop in pressure when choked up. Suction bell strainers typically clear themselves by back flow in the pump column when the unit is stopped. For large pumps, trash racks and screens are typically provided in intake structure.
- It is recommended that a strainer is with a filter surface of at least 2.5 times the suction bell dia. and more in case of firefighting applications.

8.2 Necessary steps before pump installation

- Before any installation work is carried out, the machine should be inspected 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.
- Installation outside a building (outdoor installation):
- Install the pump with a suitable protection to avoid rainfalls strong wind and particles which can damage the pump or motor.
- Avoid exposure of the pump to direct sunlight.
- An appropriate solution to avoid frost must be implemented.

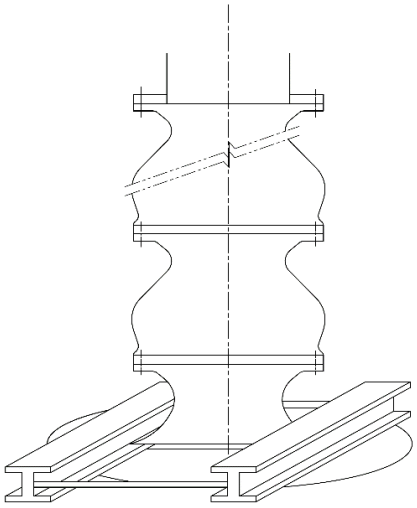
⚠ CAUTION! Risk of material damage!

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.
- Provide shut off valve and non-return valve in pump delivery line.

8.3 Installing a partially assembled pump

Depending upon column length of the pump it may not be possible to dispatch the pump in fully assembled condition and pump needs to be assembled at site in sequential manner. For installation and assembly purpose suitable beams are required to be placed across the opening over the sole plate



- Lower the pump assembly, comprising of suction bell mouth with suction strainer, casing & diffuser and rising main pipe (bottom) in the sump with the help of sling and EOT crane. Support the assembly on Beams placed across the opening over the soleplate, (If necessary supporting channels must be held together with help of tie rods).
- Couple first intermediate shafts with pump shaft by solid muff coupling and split collar arrangement. (Refer Fig: 18 Pg. No. 12)
- Lift first intermediate rising main pipe and lower on to the top flange of bottom rising main pipe. Ensure that the 'O' rings have been placed between the flanges. Insert screws & nuts to tighten them.
- Take first intermediate bearing bracket and lower it on to first intermediate shaft till it is located in groove of top flange of bottom rising main pipe. Ensure that 'O' rings are fitted on both sides of bearing bracket.

Note:

For column size more than 250 NB, fabricated intermediate bearing spider integrated with column pipe is provided instead of casted one.

CAUTION:

When strainer is attached to suction side of the pump, care should be taken so that it should not damage while raising the assembly in vertical position. Do not allow the suction end to drag or support the total weight of assembled pump.

- Slowly raise the whole assembly slightly, comprising of the bottom rising main pipe and pump assembly, remove channels and lower the assembly further into the sump till supporting flanges or lugs of bottom pipe are rested on channels across the sole plate opening
- Assemble 2nd intermediate shaft to 1st intermediate shaft through muff coupling
- Take 2nd rising main pipe & lower it slowly with the help of slings and crane on the bottom rising main pipe. Ensure that intermediate bearing bracket is located correctly
- Insert bolts and nuts and tighten them properly and evenly
- Assemble remaining shaft tubes (if provided), rising main pipes and intermediate shaft is done in same way as explained in seq. earlier.
- Lift delivery bend and lower on to the top flange of rising main pipe. Tighten the fasteners. Care must be taken to have a 'O' ring between two flanges
- Raise entire assembly, remove temporary support beams and lower down till bottom flange of delivery bend rests on sole plate & fix it with soleplate. Lift delivery bend and lower on to the top flange of rising main pipe. Tighten the fasteners. Care must be taken to have a 'O' ring between two flanges
- Raise entire assembly, remove temporary support beams and lower down till bottom flange of delivery bend rests on sole plate & fix it with soleplate

8.4 Stuffing Box Installation (Refer Fig. No.15 Pg. No. 11)

- The stuffing box and gland sleeve should be thoroughly cleaned and full entry of gland/mechanical seal into stuffing box must be checked
- Gland packing arrangement – Insert three rings of gland packing into stuffing box. Check if each ring of packing length passes round the shaft and meets end to end, the ends being cut square
- Insert logging ring in the stuffing box. Insert remaining three rings of gland packing into stuffing box. Each ring should be pushed into position individually using the gland. The joint of each ring must be positioned at 180° from adjacent ring
- Fit gland square with stuffing box and gland nuts should be screwed up to little more than finger tightness. While re-packing, if packing is available in complete coil form or rope form, then the quantity required for immediate use only should be taken. Each ring of requisite length should be cut so that it passes once round the shaft and meets end to end, the ends being cut square.

CAUTION! Risk of material damage!

Packing should be handled with care and it should not be allowed to pick-up dust or abrasive foreign matter by coming into contact with floors or dirty benches. It is bad practice to hammer packing to facilitate the insertion.

Note:

For Mechanical Seal installation, refer seal manufacturer's instruction manual.

8.5 Thrust pipe arrangement installation

- In case of below floor delivery arrangement, an arrangement is provided to absorb back thrust. Initially fix the insert plate in column wall as per dimensions shown on GA drawing with the help of provided anchor bolts. Match the pump delivery center line with insert plate and thrust pipe center line. Once the centers of all three have been matched, weld the thrust pipe onto insert plate; ensure that thrust pipe flange face is perpendicular to delivery center line. First ensure complete delivery line is connected to discharge tee without any piping / pulling stress.

- Fasten the thrust pipe against the delivery bend as shown in figure. Adjust and lock the delivery bend in place by adjusting the locknut provided between the both. 50 mm or less difference can be maintained between the both depending upon site conditions. (Refer Fig. 13 Pg. No. 10)

8.6 Thrust Bearing and Coupling Installation (Refer Fig No. 16 Pg. No. 12)

⚠ CAUTION! Risk of material damage!

Pump oil level to be checked and maintained at as per pump manufacturer's recommendation. Low oil level can result in bearing damage and high oil level will cause excessive oil leakage.

- Thrust bearing assembly provided on this pump comprises of bearing housing, cover, thrust block, locknut, Oil lubricated spherical roller thrust bearing or Grease lubricated deep groove ball bearing as Guide bearing, angular contact ball bearing as Thrust bearing. The outer race of bearing is fitted in the housing whereas the inner race is fitted on the thrust block.
- For grease lubricated bearing the top surface of thrust block is provided with 6 or 8 equispaced holes into which the locking screw can be engaged. The rotating element is set at desired position by engaging the locking screw in the nearest hole, after rotating the lock nut through requisite number of turns.
- This thrust bearing assembly requires very little maintenance other than occasional feeding up of lubricating Oil/Grease. The thrust bearing assembly should be completely dismantled, cleaned and reassembled after 8000 hours approximately (Grease lubricated bearings) and 2000 hrs. approximately or as required by site conditions (Oil lubricated bearings).
- For oil-lubricated bearings when level of oil goes down below required level, the fresh lubricating oil should be filled up to the required quantity. For Grease lubricated bearings the fresh lubricating grease should be filled up to the required quantity with help of grease gun after every 1000 hrs. running of pump. Before greasing, the grease drain plug should be opened so that while filling the fresh grease, the deteriorated grease drains out.
- During assembly of thrust bearing (oil lubricated) follow the following procedure:
- Fit oil retaining bush to bearing housing. Then fit inner race of thrust bearing on thrust block & outer race in bearing housing. Mount the bearing housing to motor stool. Fit thrust block on top shaft so that inside diameter of thrust bearing fits on thrust block and attach the cooling coil. Tighten the thrust bearing lock nut. Finally fit the bearing cover cum ratchet plate to bearing housing.
- Once the ratchet plate has been fixed in place mount the ratchet holder plate with pin and bushes on top / head shaft
- Fit pump half coupling on top shaft. An adjusting ring is provided below pump half coupling. This ring can be machined to maintain the recommended gap between pump half and motor half coupling. Place the motor on top flange of motor stool and complete the alignment.

Note:

During tightening of thrust bearing locknut, maintain the total float of pump as per pump manufacturer's recommendation. Refer table for details. Finally lock the lock nut to thrust block via lock screw.

For 2000 VMF Pump refer the following:

- Check motor stool face distance from top shaft face
- Fit pump coupling to the top shaft
- Fit spacer lock nut on top shaft
- Lift top shaft with hook /crane as of required height
- Tight spacer lock nut with matching Pump Side (PH) coupling and coupling holes
- Give support to pump side coupling from bottom side through stuffing box by jacking screws.
- Release hook from top shaft
- Check distance between pump shaft face to motor stool face and reset if required.
- Lift motor with Motor half coupling fitted on it by using crane
- Keep it on motor stool
- Touch the motor half coupling face to pump half coupling face
- Rotate motor body to match the holes with motor stool holes
- Fit the fasteners with motor & motor stool
- Fit the coupling fasteners with pump half & motor half
- Release the jacking screws from stuffing box
- Check the freeness of rotor
- Release the motor from hook/crane
- Do the electric work as per wiring diagram

8.7 Alignment of the pumps and its driving units

- When the sole plate is leveled 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 recommended 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 truth 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 Indicators can be incorrect. Where, tightly fitting pins gauge or spring prevent loose coupling, the springs or pins should be removed, a line scribed across both half couplings and readings taken only when the two marks are aligned.

Angular alignment

- After isolating the driven unit from its power supply, clamp two dial indicators are dramatically opposite points on one half coupling or to the shaft behind it with the plunger resting on the back of the other half coupling as shown in (Fig. 9 Pg. No. 7) Rotate the coupling unit the gauges are 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 couplings unit the gauges are in the line horizontally and adjust the dial to zero. Repeat the operation outlined above by rotating the coupling by 180°. In case where fitment of dial gauge is not feasible check gap between two coupling halves with the help of filler gauge.

Radial alignment

- Clamp a dial gauge on one of the couplings or to the shaft as shown in (figure 9 Pg. No. 7), 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.

⚠ CAUTION! Risk of material damage!

Oil level in reservoir to be checked and maintained regularly to prevent damage to line shaft and bowl bush bearing.

Alignment Tolerances:

Pump Speed	Angular Alignment	Radial alignment
A<1000 rpm to 1800 rpm	0.15 mm TIR	0.15 mm TIR
B 1000 rpm	0.1 mm TIR	0.15 mm TIR
C 1800 rpm to 3000 rpm	0.1 mm TIR	0.1 mm TIR

TIR– Total Indicated Reading

ⓘ NOTE:
All the alignments (angular as well as radial) have to be carried out by using 3 dial indicators simultaneous

8.8 Forced water and oil lubricated pump pre checks

- In case of forced water lubricated pump start the booster pumps initially to fill in the shaft tubes prior of starting the main pumps. Check the regulated pressure at both shaft tube and thrust bearing cooling inlet end. Suitable throttling should be carried out before providing the supply for bearing cooling.
- Potable or fresh water should be used. If dirty water or raw water from pump delivery is to be used special self–cleaning strainers and pressure filters should be employed. A sufficient size overhead tank should be selected for supplying of potable water. Level switches should be employed to prevent water in tank from falling below low level, thus preventing the system from breakdown.
- In case of oil lubricated pumps, oil should be filled till top of the shaft tube priorly before starting of main water pumps. A reservoir of suitable size is provided which should be mounted firmly to motor stool with the help of bracket. Oil flow to shaft tube and level in reservoir is regulated with the help of an automatic solenoid valve. Care to taken to only use bronze bearing bushes in oil lubricated pumps. (Refer Fig. 21, Pg. No. 14)

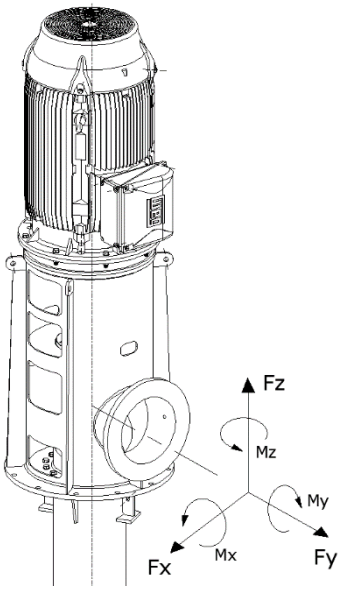
ⓘ NOTE:
Always refer forced water schematic provided by pump manufacturer. (Fig 22 Pg. No. 14)

⚠ CAUTION! Risk of material damage!

Oil level in reservoir to be checked and maintained regularly to prevent damage to line shaft and bowl bush bearing.

8.9 Pipe work

No stress must be imposed on the pump on delivery side by the pipe work; neither by the weight of the pipes nor by the tightening of badly fitting pipes (Refer Fig: 5). 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.



MAXIMUM ALLOWABLE FORCES AND MOMENTS ON VT PUMPS
Forces (N) and Moments (N-m)

Flange Nozzle size [mm]		100	150	200	250	300	350	400	450	500	600	700
Forces [N]	Fx	1427	2497	3790	5350	6688	7134	8472	9364	10032	11370	12374
	Fy	1784	3121	4905	6688	8026	8918	10255	11147	12262	13823	15160
	Fz	1248	2051	3121	4459	5350	5796	6688	7358	7914	9029	9810
Moments [Nm]	Mx	1331	2309	3532	5027	6114	6386	5338	7744	8016	8424	8968
	My	679	1182	1766	2445	2990	3125	3668	3940	4212	4415	4823
	Mz	1005	1766	2581	3804	4620	4755	5434	5774	6114	6453	6793

Flange Nozzle size [mm]		800	900	1000	1100	1200	1400	1500	1600	1800	2000
Forces [N]	Fx	12819	13154	13622	14135	14648	15529	15716	15892	16285	147058
	Fy	16052	16388	16989	17591	18237	19365	19600	15127	15784	20797
	Fz	10255	10701	11415	12195	12998	14489	14803	19836	20307	16500
Moments [Nm]	Mx	9511	10054	10659	11297	11970	13194	13450	13587	14254	14823
	My	4959	5163	5523	5903	3611	7053	7210	7377	7711	8064
	Mz	6997	7337	7805	8308	8838	9800	10006	10222	10644	11095

8.10 Discharge line (Fig: 5&8, Pg. No. 6&7)

⚠ CAUTION! Damage to the pump

Pump can rotate in reverse direction in the absence of a non-return valve. A back flow can seriously damage the bearings, mechanical seal and other pump internals.

Discharge piping should be anchored, supported and restrained near the pump to avoid application of forces and moments in excess of those permitted by the pump manufacturer.

If it is necessary to use an expansion joint, it is recommended that a pipe anchor to be located between it and pump. Note that an anchor provides axial restraint, whereas a pipe support or guide does not.

8.11 Stuffing box packing (Fig. 12 Pg. No. 10)

⚠ 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 motor stool and the nut should be screwed up to little more than finger tightness.

8.12 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

8.13 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 motor stool close to the delivery flange. Then pressure gauge can be connected on discharge side.

8.14 Air release valves

For vertical pumps an automatic air release and vacuum release valve is recommended. The valve should be located on pump discharge nozzle. This valve prevents a large volume of air being compressed, and then setting up a severe shock wave when suddenly released with potential for serious equipment damage. The air release valve also prevents air from entering the pressurized system.

9. Electrical connections

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].

- 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.

9.1 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 performance at the duty point required. Please contact WILO Mather and Platt 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 Mather and Platt at the quotation stage if the pump set will be driven by a frequency converter, this might influence the motor selection.

- Strictly follow the Frequency converter manufacturer instructions
- The minimum rotation speed of the pump should never go below 40% of the nominal speed.

10. 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.

10.1 List of Essentials to made available at site prior to start commissioning

- Set of I-Beams of erection.
- Set of Slings, Shackles, wire ropes, eye bolts, wrenches.
- Set of spanners, Allen keys, hammer, scrapper, screw drivers.
- Skilled manpower, ladder, sufficient lighting, Helmet, Safety jacket, Safety Shoes etc.

10.2 Cleaning prior to start

10.2.1 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.

10.2.2 Cleaning of Bearings

VT pumps can be supplied with oil or grease lubricated bearing depending upon the suitability. 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.

Ball and roller bearings are given an initial charge of grease before leaving WILO Mather & Platt works and do not require any attention beyond the normal greasing routine before the first servicing period. Only greases recommended by pump manufacturer or their equivalent should be used. Bearings should never be over grease.

10.3 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.

10.3.1 Availability of liquid

Efficient operation of the pump depends upon fine running clearance that is lubricated by the pumped fluid. Sufficient fluid must be available to ensure that the pump is flooded at all times to prevent seizure of the internal components. Wherever external flushing/lubrication is provided it should be available before starting the pump.

If on starting, a pump fails to generate at its rated delivery head, as indicated on the pump nameplate, it must be stopped immediately; the cause must be ascertained and rectified, before re-starting.

Ensure that minimum submergence is available as recommended. Open all ancillary inlet and outlet isolating valves such as, bearing cooling systems, gland sealing, or cooling systems, air vents, leak-off connections etc. The efficient operation of a centrifugal pump depends upon fine running clearances, which are lubricated by the pumped liquid. These pumps must therefore be properly primed before starting, with venting of all the air, gases, vapor etc.

10.3.2 Pumps handling hot liquids

Pumps handling 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 hot media 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 delivery valve must be in closed condition.

10.4 Starting the pump

10.4.1 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.

10.4.2 Pre-starting checks

- Check that sufficient submergence level is maintained.
- Check that there is no blockage in the strainer at the suction bell end.
- Check for free rotation of the unit when coupled.
- Check that delivery pressure gauge is connected.
- Check that discharge line is having non-return valve & get valve installed.
- Test and make available all protection devices like alarm, signals, interlock systems 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 cooling water arrangement is provided bearing cooling and stuffing box.

10.4.3 Normal starting and running checks

- When all the foregoing prestart checks are satisfactory, Start the pump and check the direction of rotation (indicated by a direction arrow on the motor stool) 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 that the bearing is not overheating. Bearings will normally run at a temperature of 30 ˚C to 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 spherical roller bearings. The temperature should never exceed 85 ˚C for 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 as per HIS standard (see page no. 38 for reference)
- 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.

10.4.4 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 40 to 60 drops per minute.

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.

Ensure 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.

10.4.5 Normal shutdown

⚠ WARNING! Risk of Burns!

If the fluid temperature and system pressure is high, close the isolation valves upstream (in case of barrel pumps) and downstream of the pump. Initially let the pump cool.

- Stop the driver of the pump.
- When the pump has come to rest, close the delivery valve.
- Isolate any ancillary supplies.

10.4.6 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 discharge valves, isolate the driving unit power supply & rectify the fault.

11. 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 de-pressurize the system.

11.1 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 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.
- 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 and 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
Mechanical Seal	Check for Leakage	Daily	5.6 gm/hr. per pair of seal face
Gland Packing	Check for Leakage	Daily	40-60 drops/minute
	Check for Leakage	Half yearly	If required replace with new packings
Bearings	Check temperature	Weekly	If Bearing temperature exceeds 80^0 C, the fault needs to be rectified.
Oil / Grease @ Bearing	Replenish	1000 hours	
Discharge Pressure	Check Pressure	Daily	
Flushing	Check Flow	Weekly	Flow through the Flushing pipes must be clear and continuous
Vibration	Vibration	Weekly	Refer acceptable field vibration limit chart Pg. No. 36
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, Ref. Table on Pg. No. 21
Total Dynamic Head	Check Suction and Discharge head	Yearly	
Alignment	Check the alignment of pump with motor	Half yearly	For reference use pump motor GA Drawing

Notes:

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

11.2 Overhaul maintenance

- 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 subsequent 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.
- Information regarding original design dimensions and clearances is furnished in data sheet. Any other information, if needed, can be requested from Service Department, WILO Mather Platt. Such requests 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/ membrane set

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

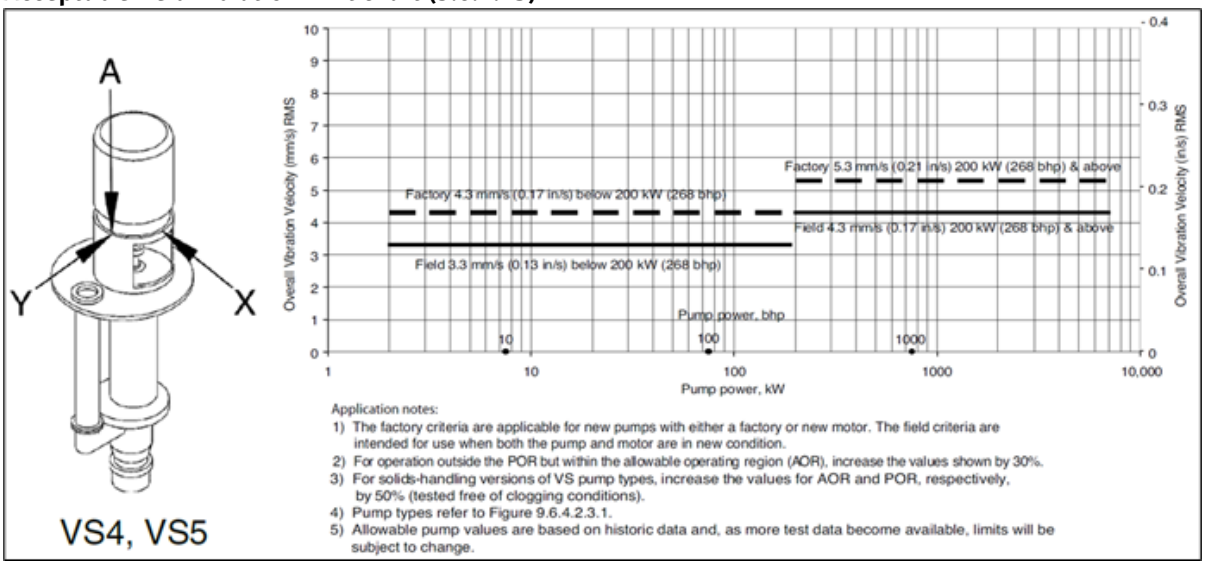
- A crane / chain pulley block suitable for handling the weight of pumping unit.
- A selection of ring and open-ended spanners in
- British and Metric sizes.
- Eyebolts in British and Metric sizes.
- Cotton rope, wire rope and slings.
- Hardwood and metal packing blocks.
- Miscellaneous tools including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

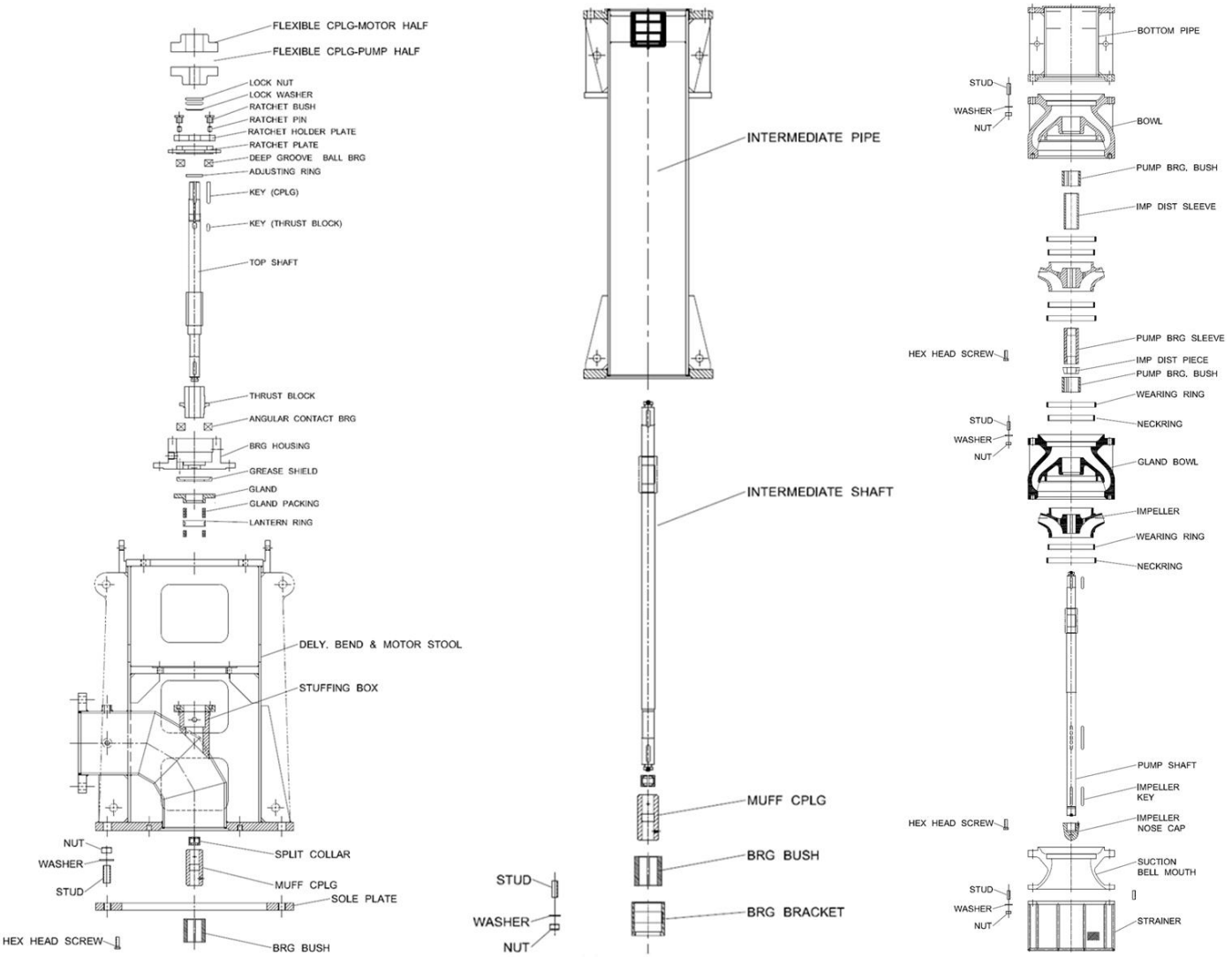
Tightening torques – Untreated Screw.
Coefficient of Friction 0.14

Property class Torque Nominal diameter-Coarse threads

		M6	M8	M10	M12	M14	M16	M20	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52
8.8	Nm	10	23	45	77	123	193	377	513	651	952	1292	1759	2259	2923	3616	4514	5431	7021
	Ft. lb.	7	17	33	57	91	142	278	378	480	702	953	1297	1666	2156	2667	3329	4005	5178

Hydraulic Institute Standard (HIS) ANSI/HI 9.6.4-2016
Acceptable field vibration limit chart (9.6.4.13)





TOP ASSEMBLY **INTERMEDIATE ASSEMBLY** **PUMPING STAGES**

11.3 Disassembling the Pump

11.3.1 Disassembling the top Motor

- Isolate the pump motor electrically
- Isolate the pump system hydraulically
- Clear the area of any equipment that might impede the free lifting of the pump
- Disconnect the electrical supply cables from the motor terminal block
- Disconnect and remove the driver couplings.
- Attach slings and lifting apparatus to the motor lifting attachments
- Remove the screws / bolts, or nuts, from the motor flange and lift the motor off the combined delivery bend & motor stool. Support the motor on timber packing blocks with the coupling hub clear off the ground

11.3.2 Disassembling of top and intermediate assembly

- Remove the pump coupling, spacer, key and dismantle the coupling assembly
- Remove lock nut lock screw to bring the rotor lift in downward position.
- Remove ratchet plate holder, rachet pin, ratchet bush and remove the ratchet plate
- Drain the oil (if applicable) from bearing housing and remove bearing housing cover and gasket
- Remove cooling coil (if applicable) and the connections
- Remove the bearings, thrust block and bearing housing and the oil retainer bush
- Remove gland, gland packings / mechanical seal, leak valve and pipeline
- Remove motor stool and top shaft along with muff coupling and split collar, shaft key and the grub screw
- Remove the rising main pipe (top) / discharge bend column pipe and rest the entire rotor assembly on C clamps.
- Remove the rising main pipe (int.) one by one along with Intermediate shaft, intermediate bearing assembly, split collar, muff coupling, grub screw until arrival of bottom rising main pipe bottom
- Again, lift the rest of pump assembly and till the next column pipe rests on beams. Follow the same steps till pump casing level is reached.

11.3.3 Disassembling of pumping stages

- Pumping stages assembly consists of strainer, suction bell mouth, diffuser casing, impeller, pump shaft, rising main pipe (bottom), etc.
- Remove the fasteners securing to diffuser casing and the rising main pipe (bottom) and lift the rising main pipe off the pump shaft.
- Remove rising main pipe (bottom)
- Lift the rotor assembly and put it horizontally on the floor
- Remove the strainer and the suction bell mouth
- Remove diffuser/bowl assembly and the impeller nose cap/ impeller lock nut.
- Remove the impellers one by one, neck ring and wear ring (if required and found damaged / not suitable for further usage) along with grub screw from diffuser casing as per the drawing. It may be necessary to apply heat to the impeller for removal. Apply heat uniformly from the shrouds inwards towards the hub. Before removing the impeller put a reference mark on the shaft for ease of re-assembly at correct center position.
- Remove the pump retainer rings, bush from the diffuser/bowl assembly if required and found damaged / not suitable for further usage).

11.4 Examination of Internal Components

- With the disassembled rotating element, the internal components, sleeves and clearances can be checked (replace if required and found damaged / not suitable for further usage)

11.4.1 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.

11.4.2 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.

11.4.3 Impeller

Inspect the impeller as follows:

- Examine the impeller for damage.
- For corrosive /erosion pitting.
- Cavitations pitting.
- Bent or cracked vanes, inlet and outlet vane end wear.

If damage is extensive, impeller may need replacement. Further information should be sought from WILO Mather and Platt 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 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.

11.4.4 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.

11.4.5 Bearings

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.
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.
For oil lubricated bearing oil should be replaced for every 2000 hours of operation.

11.4.6 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 blocks the spring action.

11.5 Re-assembly of Pump

- Prepare the foundation block as per the dimension mentioned in GA drawings of the pump.
- Install the sole plate and check the levelling of sole plate with master level. The acceptable limit for the sole plate levelling is within 0.05 mm.
- **Then install canister pipe* (*only if applicable as per the GA Drg.) and check that the sole plate levelling is not disturbed.**
- Fix strainer to suction bell mouth. Add casing neck ring to suction bell and in the diffuser/bowl. Insert the O-ring in grooves provided on both suction bell and diffuser/bowl.
- Add wearing ring on both sides of impeller and bearing bushes in diffuser/bowl.
- Add pump bearing sleeve on pump shaft and then slide in the impeller and lock it in position via a key and impeller lock nut from bottom.
- Place this assembly vertically in suction bell, suitable support should be provided to shaft to be suspended vertically.
- Slide in the diffuser/bowl from top followed by bottom column pipe. Then insert the pump bearing bracket with bush fitted in it. O-ring should be fitted on both side of bearing bracket. Then connect the taper piece to the diffuser/bowl assembly.
- Assemble the intermediate bearing bracket and bush to diffuser/bowl assembly.
- **Connect the forced lubrication pipe* (*only if applicable as per the GA Drg.) coming from discharge bend/external pump as per drawing.**
- Assemble the split collar to connect the bottom shaft to the intermediate shaft and then assemble the muff coupling along with grub screw.
- Now lower the intermediate column pipe with the help of slings on bottom pipe. Tighten all intermediate column pipe nuts and bolts. Repeat the above procedure till column length assembly is achieved as per the GA Drawing.
- Fix the top pipe to delivery bend and the first intermediate column pipe along with the bearing bush assembly from the top.
- Fix the loose stuffing box onto the motor stool with packing, logging ring.
- Fix oil retainer bush, retainer plate and lower bearing race in bearing housing and mount this housing onto the motor stool.
- Initially connect head/top shaft to intermediate shaft. Gland sleeve to be fitted in shaft. Now motor stool should be inserted slowly via slings till the bottom machined face of bottom plate of motor stool rests on top face of column pipe flange. Secure the assembly with the help of studs.
- Once this is done, lower the motor stool onto the sole plate and firmly secure it with the help of studs. Check the levelling of motor stool after fitment on the sole plate. The acceptable limit for the sole plate levelling is within 0.05 mm.
- Care to be taken to insert water thrower on the head shaft while lowering the motor stool.
- Now assemble the oil retainer bush, bearing housing and then fix the upper race of bearing followed by thrust block, ratchet plate/housing cover, ratchet bush and pins, lock nut and locking screw. Then adjust the float of the pump as per the GA drawings.
- Rest the pump half of flexible coupling on the top shaft with adjusting ring below. Thickness of the adjusting ring to be maintained based on the gap between the coupling half mentioned in GA drawings. Machine the adjusting ring if the gap is less than the required. Refer the below procedure –
- Fix the coupling halves of the pump and motor.
- Assemble the motor on the motor stool.
- Check the gap between the coupling halves with the feeler gauges.
- If the gap is less dis-assemble the motor and then machine the adjusting ring.
- Care to be taken to maintain recommended gap between both coupling faces.
- Thickness of the adjusting ring can be varied as per assembly requirement.
- Then fix the gland and other accessories such as pressure gauge, air release valve, vibration sensor etc. on the motor stool.
- Ensure the cooling pipeline is completed/connected for cooling coil.
- Ensure the stuffing box leak-off connection are done if gland leakage is heavy.

Re-assembly of a below floor installation pump

- Prepare the foundation block as per the dimension mentioned in GA drawings of the pump.
- Install thrust pipe on the column/slab/channel as shown in the GA Drawing.
- Assemble the delivery bend/tee column pipe to the intermediate column pipe along with the bearing bush assembly.
- Fix strainer to suction bell. Add casing neck ring to suction bell and in diffuser. Insert the O-ring in grooves provided on both suction bell and diffuser.
- Add wearing ring on both sides of impeller and bearing bushes in diffuser.
- Add pump bearing sleeve on pump shaft and then slide in the impeller and lock it in position via a key and impeller lock nut from bottom.
- Place this assembly vertically in suction bell, suitable support should be provided to shaft to be suspended vertically.
- Slide in the diffuser from top followed by bottom column pipe. Then insert the pump bearing bracket with bush fitted in it. O-ring should be fitted on both side of bearing bracket. Then connect the taper piece to the bowl assembly.
- Assemble the intermediate bearing bracket and bush to diffuser/bowl assembly.
- Assemble the split collar to connect the bottom shaft to the intermediate shaft and then assemble the muff coupling along with grub screw.
- Now lower the intermediate column pipe with the help of slings on bottom pipe. Tighten all intermediate column pipe nuts and bolts. Repeat the above procedure till column length assembly is achieved as per the GA Drawing.
- Assemble the delivery bend/tee column pipe to the first intermediate column pipe along with the bearing bush assembly.
- Install the sole plate and check the levelling of sole plate with master level. The acceptable limit for the sole plate levelling is within 0.05 mm.
- Assemble the motor stool and top shaft along with muff coupling and split collar, shaft key and the grub screw

- Care to be taken to insert water thrower on the head shaft while lowering the motor stool.
- Now assemble the oil retainer bush, bearing housing and then fix the upper race of bearing followed by thrust block, ratchet plate/housing cover, ratchet bush and pins, lock nut and locking screw. Then adjust the float of the pump as per the GA drawings.
- Rest the pump half of flexible coupling on the top shaft with adjusting ring below. Thickness of the adjusting ring to be maintained based on the gap between the coupling half mentioned in GA drawings. Machine the adjusting ring if the gap is less than the required. Refer the below procedure –
- Fix the coupling halves of the pump and motor.
- Assemble the motor on the motor stool.
- Check the gap between the coupling halves with the feeler gauges.
- If the gap is less dis-assemble the motor and then machine the adjusting ring.
- Care to be taken to maintain recommended gap between both coupling faces.
- Thickness of the adjusting ring can be varied as per assembly requirement.
- Then fix the gland and other accessories such as pressure gauge, air release valve, vibration sensor etc. on the motor stool.
- Ensure the cooling pipeline is completed/connected for cooling coil.
- Ensure the stuffing box leak-off connection are done if gland leakage is heavy.

11.6 Recommended spare parts

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

Recommended spare parts					
Sr. No.	Description	Quantity	Recommended Spare Parts		
			2 Yrs	3 Yrs	5 Yrs.
1	Suction Bell	1			
2	Diffuser	1			
3	Impeller	2			✔
4	Pump Shaft	1			✔
5	Neck ring &Wear ring	2	✔	✔	✔
6	Impeller key	1			
7	Shaft sleeve	2	✔	✔	✔
8	O-ring	2			
9	Impeller lock nut	1			
10	Bearing bush	2	✔	✔	✔
11	Gasket	2	✔	✔	✔
12	Gland packing	Set	✔	✔	✔
13	Logging ring	2			
14	Gland	2			
15	Stud for gland	2			
16	Bearing	1	✔	✔	✔
17	Bearing	1	✔	✔	✔
18	Bearing housing	1			
19	Thrust block	1			
20	Strainer	1			
21	Muff coupling	2	✔		✔
22	Bearing lock nut	1			
23	Lock washer	1	✔	✔	✔
24	Lock nut	1	✔	✔	✔
25	Mechanical seal	2	✔	✔	✔
26	Hex plug	–			
27	Air cock	1	✔		✔
28	Hex screw for jacking	2			
29	Studs for delivery flange	–			
30	Coupling key	1			
31	Water thrower	1			
32	Ratchet Plate	1			
33	Ratchet pin	2	✔	✔	✔
34	Ratchet Bush	2	✔	✔	✔
35	Flexible coupling	2	✔	✔	✔

- It is strongly recommended to purchase the original spares parts from WILO Mather and Platt. 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.

11.7 VT Pumps Technical Data

Sr. No.	Pump Model	Type	TOTAL FLOAT (+/- 2 mm)	Rotor Lift (+/- 2 mm)	Pressure Gauge (PG) Connection	Air Vent (AV) Connection	Neck Ring	Wearing Ring	Bearing Bush in Bell Mouth / Bottom Bush
1	CNE 2A C	O/T	8	3	3/8" BSP	3/8" BSP	Yes	-	No
2	CNE 3AC	O/T	11	3	½" BSP	½" BSP	Yes	-	No
3	CNE 4A C	O/T	8	3	½" BSP	1" BSP	Yes	-	No
4	CNE 33	O/T	10	5	½" BSP	1" BSP	Yes	-	No
5	12 VMF1	C/T	10	4	½" BSP	1" BSP	Yes	Optional	No
6	12 VMF2	C/T	10	4	½" BSP	1" BSP	Yes	Optional	No
7	12 VMF3	C/T	14	5	1/2" BSP	1/2" BSP	Yes	Optional	No
8	16 VMF	C/T	10	5	½" BSP	1" BSP	Yes	Optional	No
9	16 VMF1	C/T	18	5	½" BSP	1" BSP	Yes	Optional	No
10	16 VMF2	C/T	17	3	½" BSP	1" BSP	Yes	Optional	Yes
11	16 VMF4	C/T	10	4	½" BSP	1" BSP	Yes	Optional	Yes
12	20 VMF	C/T	12	4	½" BSP	1" BSP	Yes	Optional	Yes
13	20 VMF5	C/T	12	4	½" BSP	1" BSP	Yes	Optional	No
14	24 VMF3	C/T	20	8	½" BSP	1" BSP	Yes	Optional	No
15	24 VMF5	C/T	14	7	½" BSP	1" BSP	Yes	Optional	Yes
16	30 VMF	C/T	22	6	½" BSP	1" BSP	Yes	Optional	Yes
17	30 VMF3	C/T	20	6	½" BSP	1" BSP	Yes	Optional	Yes
18	30 VMF4	C/T	20	6	½" BSP	1" BSP	Yes	Optional	Yes
19	36 VMF1	C/T	10	4	½" BSP	1" BSP	Yes	Optional	No
20	36 VMF2	C/T	10	3.5	1/2" BSP	1" BSP	Yes	Optional	Yes
21	36 VMF4	C/T	20	7	½" BSP	1" BSP	Yes	Optional	No
22	36 VMF6	C/T	17	8	½" BSP	1" BSP	Yes	Optional	No
23	36 VMF8	C/T	8	4	3/8" BSP	1" BSP	Yes	Optional	No
24	40 VMF	C/T	10	4	1/2" BSP	1" BSP	Yes	Optional	No
25	42 VMF	C/T	48	12	1/2" BSP	1" BSP	Yes	Optional	Yes
26	400 VMF	C/T	7	3	½" BSP	1" BSP	Yes	Optional	Yes
27	400 VMF4	C/T	12	5	1/2" BSP	1" BSP	Yes	Optional	Yes
28	550 VMF	C/T	14	5	1/2" BSP	1" BSP	Yes	Optional	No
29	600 VMF	C/T	10	5	½" BSP	1" BSP	Yes	Optional	Yes
30	650 VMF	C/T	14	6	1/2" BSP	1" BSP	Yes	Optional	Yes
31	700 VMF	C/T	38	6	½" BSP	1" BSP	Yes	Optional	No
32	800 VMF	C/T	18	7	½" BSP	1" BSP	Yes	Optional	No
33	1000 VMF	C/T	20	10	½" BSP	1" BSP	Yes	Optional	Yes
34	1600 VMF2	C/T	20	10	½" BSP	1" BSP	Yes	Optional	No
35	2000 VMF	C/T	30	14	½" BSP	1" BSP	Yes	Optional	Yes
36	VMF 1B	C/T	6	3	½" BSP	½" BSP	Yes	Optional	Yes
37	VMF 1C	C/T	7	3	½" BSP	½" BSP	Yes	Optional	No
38	VMF 5B	C/T	7	3	½" BSP	1" BSP	Yes	Optional	No
39	VMF 9A	C/T	8	3	½" BSP	1" BSP	Yes	Optional	Yes
40	VMF 11AC	C/T	18	8	½" BSP	1" BSP	Yes	Optional	No
41	VMF 12A	C/T	10	4	½" BSP	1" BSP	Yes	Optional	Yes
42	VMF 15A	C/T	12	6	½" BSP	1" BSP	Yes	Optional	No
43	VMF 15B	C/T	8	3	½" BSP	1" BSP	Yes	Optional	No
44	VMF 16A	C/T	17	3	½" BSP	1" BSP	Yes	Optional	No
45	VMF 17A	C/T	9	4	½" BSP	1" BSP	Yes	Optional	No
46	VMF 19C	C/T	12	6	½" BSP	1" BSP	Yes	Optional	No
47	VMF 21A	C/T	15	5	½" BSP	1" BSP	Yes	Optional	No
48	VMF 21B	C/T	11	5	½" BSP	1" BSP	Yes	Optional	No
49	VMF 27A	C/T	18	9	½" BSP	1" BSP	Yes	Optional	Yes
50	VMF 28B	C/T	14	5	½" BSP	1" BSP	Yes	Optional	No
51	VMP 30A	O/T	14	7	½" BSP	1" BSP	Yes	-	No
52	VMF 30A	C/T	14	5	½" BSP	1" BSP	Yes	Optional	No
53	VMF 38A	C/T	14	5	½" BSP	1" BSP	Yes	Optional	Yes
54	VMF 50A	C/T	16	8	½" BSP	1" BSP	Yes	Optional	-
55	VMF 52A	C/T	12	6	½" BSP	1" BSP	Yes	Optional	No
56	VMF 60A	C/T	15	5	½" BSP	1" BSP	Yes	Optional	No
57	VMF 62A	C/T	16	8	½" BSP	1" BSP	Yes	Optional	Yes
58	VMF 75A	C/T	18	9	½" BSP	1" BSP	Yes	Optional	Yes
59	VMF 80A	C/T	18	9	½" BSP	1" BSP	Yes	Optional	Yes
60	VMF 85A	C/T	16	8	½" BSP	1" BSP	Yes	Optional	Yes
61	VMF 95A	C/T	21	10	½" BSP	1" BSP	Yes	Optional	Yes
62	VMF 95B	C/T	20	10	½" BSP	1" BSP	Yes	Optional	Yes
63	VMP 105AC	O/T	5.5	3	½" BSP	1" BSP	Yes	-	Yes
64	VMP 120A	O/T	20	10	½" BSP	1" BSP	Yes	-	No
65	VMF 145A	C/T	18	8	½" BSP	1" BSP	Yes	Optional	Yes
66	VMFO 150A	C/T	-	-	½" BSP	1" BSP	Yes	Optional	-
67	VMF 160A	C/T	30	8	½" BSP	1" BSP	Yes	Optional	Yes
68	VMP 220A	O/T	9	3	½" BSP	1" BSP	Yes	-	Yes
69	VMF 240A	C/T	25	12.5	½" BSP	1" BSP	Yes	Optional	Yes
70	VMF 250A	C/T	25	12.5	½" BSP	1" BSP	Yes	Optional	Yes
71	VMF 16B	C/T	12	6	½" BSP	½" BSP	Yes	Optional	No
72	VMF 10D	C/T	10	5	3/8" BSP	1" BSP	Yes	Optional	No
73	VMF 7B	C/T	10	5	3/8" BSP	3/8" BSP	Yes	Optional	No
74	VMF 35B	C/T	15	7.5	½" BSP	1" BSP	Yes	Optional	No
75	VMF 100C	C/T	20	10	½" BSP	1" BSP	Yes	Optional	Yes
76	VMF 120A	C/T	20	10	½" BSP	1" BSP	Yes	Optional	Yes
77	VMF 125A	C/T	20	10	½" BSP	1" BSP	Yes	Optional	Yes
78	VMF 130C	C/T	21	10	½" BSP	1" BSP	Yes	Optional	Yes
79	VMF 265B	C/T	28	15	½" BSP	1" BSP	Yes	Optional	Yes
80	VMF 55A	C/T	19	10	½" BSP	1" BSP	Yes	Optional	Yes
81	VMF 1D	C/T	6	3	3/8" BSP	½" BSP	Yes	Optional	No
82	VMF 12B	C/T	9	3	½" BSP	1" BSP	Yes	Optional	No
83	VMP 180A	O/T	7	3	½" BSP	1" BSP	Yes	-	Yes
84	VMP 260A	O/T	8	3	½" BSP	1" BSP	Yes	-	Yes
85	VMF 50C	C/T	20	10	½" BSP	1" BSP	Yes	Optional	-
86	VMF 8A	C/T	10	5	½" BSP	½" BSP	Yes	Optional	No

12. Pump Lubrication and Connection Data (Refer Fig. No. 24 & 25, Pg. No. 15 for connection details)

Oil and GREASE LUBRICATED BEARING CONNECTION DATA

OIL LUBRICATED BEARING CONNECTION DATA

Sr. No.	BEARING NO.	OI	OO	TI	CWI / CWO	OLI	VP	Bearing Oil Qty. (Ltr.)	Recommended Bearing Oil Grade
1	29318 E	1/2" BSP	1/4"BSP	3/4" BSP	1/2" BSP	1/4"BSP	Yes	1.8	
2	29320 E	1/2" BSP	1/4"BSP	3/4" BSP	1/2" BSP	1/4"BSP	Yes	3.2	
3	29324 E	1/2" BSP	1/4"BSP	3/4" BSP	1/2" BSP	1/4"BSP	Yes	2.9	
4	29326 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
5	29328 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
6	29330 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
7	29332 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
8	29334 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
9	29428 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	10.3	
10	29430 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	14.6	
11	29432 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	14.6	
12	29434 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	14.6	
13	29438 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	11.9	
14	29440 E	1/2" BSP	1/2" BSP	3/4" BSP	1/2" BSP	3/8" BSP	Yes	11.9	
15	29452 E	1/2" BSP	1/2" BSP	3/4" BSP	3/4" BSP	3/8" BSP	Yes	20.0	

GREASE LUBRICATED BEARING CONNECTION DATA

Sr. No.	BEARING NO.	BEARING COMBINATION	GI	GD	TI	VP
1	TB01 L	6214/7213	3/8" BSP	1/2" BSP	3/4" BSP	NO
2	TB01 M	6315/7314	3/8" BSP	1/2" BSP	3/4" BSP	NO
3	TB02 M	6317/7316	3/8" BSP	1/2" BSP	3/4" BSP	NO
4	TB03 M	6319/7318	3/8" BSP	1/2" BSP	3/4" BSP	NO
5	TB04 M	6321/7320	3/8" BSP	1/2" BSP	3/4" BSP	NO

13. Recommended Lubricants

Manufacturer	Oil Lubricated Bearings	Grease Lubricated Bearing
Indian Oil Corporation	Servo System-46	Servogem-2/3
Hindustan Petroleum	Enclo-46	Lithon-2/3
Bharat Petroleum	Hydrol-46 / Hydrol 220	Multipurpose Grease-3

Note: For oil Lubrication:

- ISO Grade 46 oil.
- All above oils are compatible with each other when fresh.
- It is unsafe to mix oil of two or more grades for use in bearings.
- Number 46 is Viscosity at 40 degree centigrade in centistokes.

For Grease Lubrication:

- Only lithium base Grease to be used.
- Numbers mentioned stands for consistency.
- Grease of two different grades should not be used.

14. Decommissioning and recycling

The disposal of all material or debris must be done in order to protect the environment.
WILO Mather and Platt pumps do not contain any dangerous substances. The major part of the pump is recyclable. The disposal and recycling of the pump sets must be done in accordance with the local in force regulations

The dismounting must be done by qualified personal. Clean and de contamination must be achieved before any transportation or recycling.

15. Faults, Causes and Remedies

	Symptoms	Possible cause of trouble and remedies (Each number is defined in the table below)
– –	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 column pipe not completely filled with liquid	Check water level and blockages at strainer
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	Check the reasons and eliminate. Gas gets entrapped in liquid. Air may be entering through suction joints
6	Air pocket in suction line	Ensure that air release valve is open
7	Air leaks into suction line	Tighten pipe joints with solution
8	Air leaks into pump through stuffing boxes	Ensure stuffing box sealing
9	Strainer broken	Replace
10	Strainer partially clogged	Shut off the pump, strainer usually gets cleaned due reverse flow
11	Inlet of suction pipe insufficiently submerged recommendation	Ensure adequate submergence level as per pump manufacturers
12	Water seal pipe clogged	Clean or change
13	Logging ring is improperly located in stuffing box, preventing sealing fluid from entering to seal	Position logging ring centrally under sealing holes of stuffing box form
14	Speed too low	Check motor RPM, supply frequency, Motor nameplate speed should be as specified on pump nameplate
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 WILO Mather and Platt
20	Viscosity of liquid different from design	Refer to WILO Mather and Platt
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 WILO Mather and Platt 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 soleplate, 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 required
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 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

Annexure-2

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		

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 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:

Customer Representative	**WILO M&P Representative**

Pump Commissioning Report (Engine Driven Pumps)

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

Details of Pump		**Details of Engine**	
Pump Sr. No.		Engine Make	
Type of Pump		Sr. No.	
Head		Type / Model	
Capacity		BHP	
RPM		RPM	
Construction		Cooling System	

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

Pump Operating Parameters		**Engine Operating Parameters**	
Suction Pressure		RPM	
Discharge Pressure		Oil Pressure	
RPM		Water Temperature	
DE Bearing Temperature		Lubricating Oil Temperature	
NDE Bearing Temperature		Gear Box Temperature	
Duration of Trial Run			

Observations and Remarks:

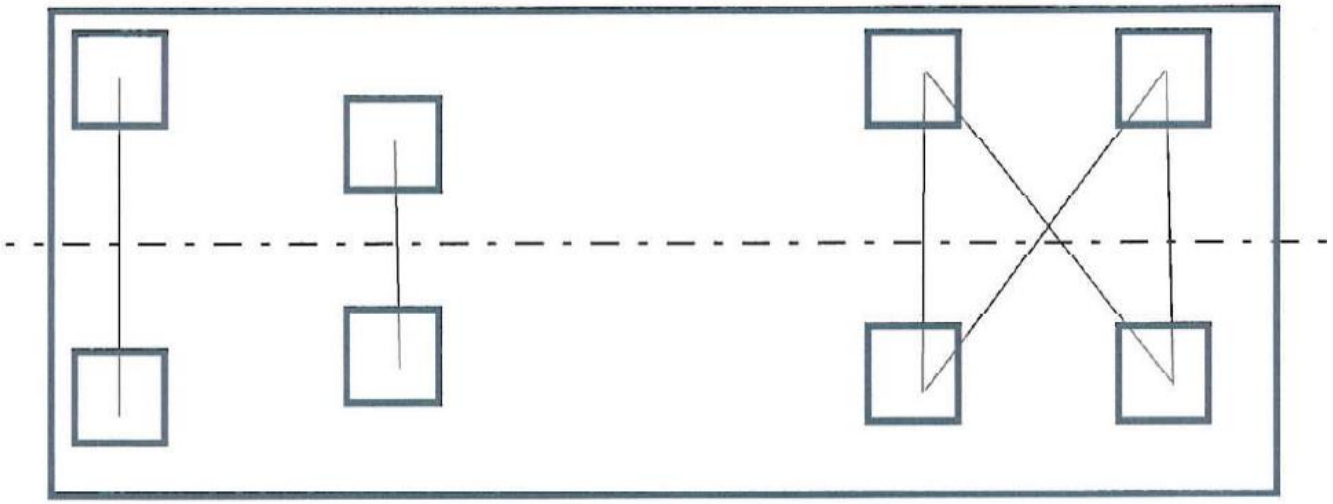
Auto Mode / Manual Mode

Customer Representative	**WILO M&P Representative**

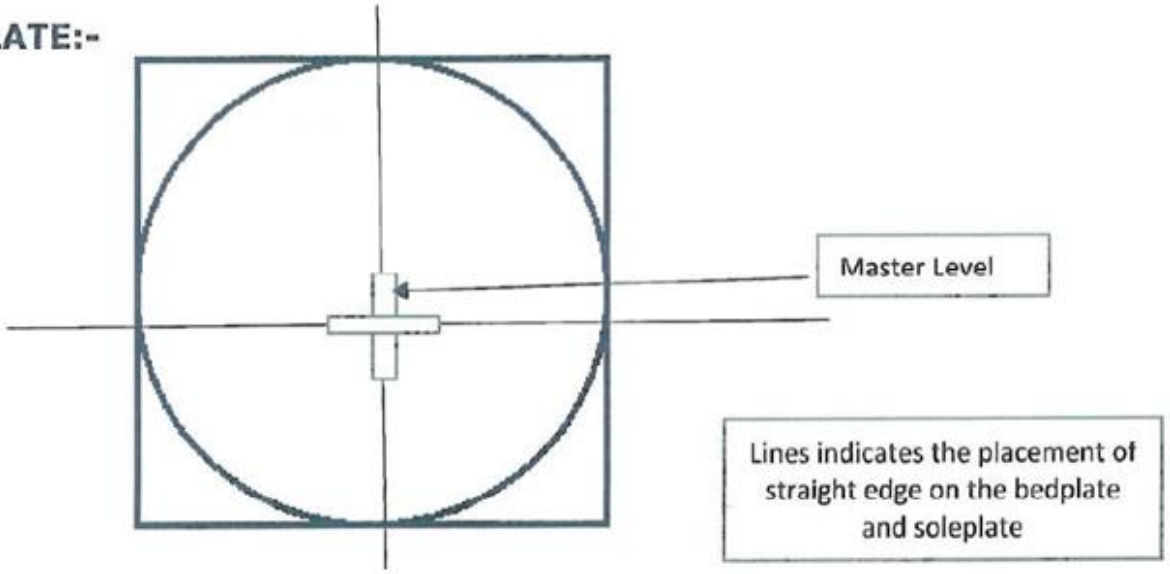
Pump set Levelling Record

Required accuracy of pump set levelling is 0.05 mm

A) BEDPLATE



SOLEPLATE:-



Result:

Customer Representative **WILO M&P Representative**

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

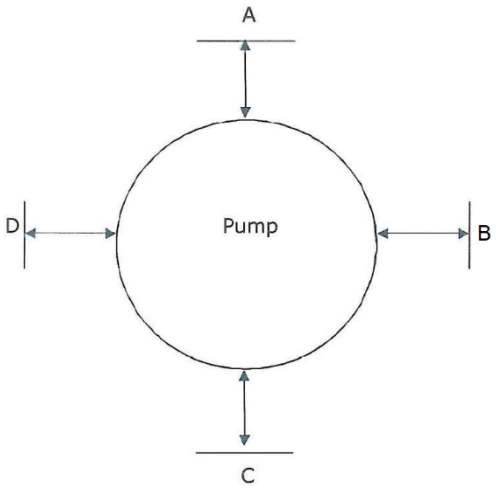
Gap Between Coupling Halves: _____ mm

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**

NOTES

NOTES

WILO Mather and Platt Pumps Private Ltd.
Mumbai–Pune Road, Chinchwad,
Pune– 411 019, Maharashtra (India)
Tel: +91 20 27442100/1/2/3/4,
Toll Fee Service: 1–800–266–8866
Fax: +91 2027442111
service.in@wilo.com
www.wilo.in