

Wilo Mather and Platt – Vertical Ring Section pumps

en Installation and operating instructions

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 Ring Section pumps. Instructions are compiled for the person having a working knowledge of Ring section 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.

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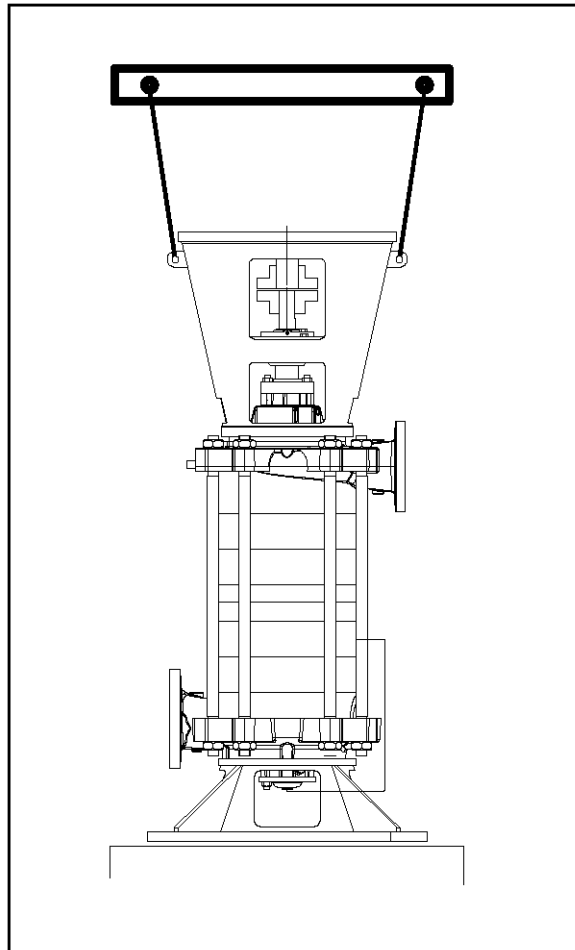
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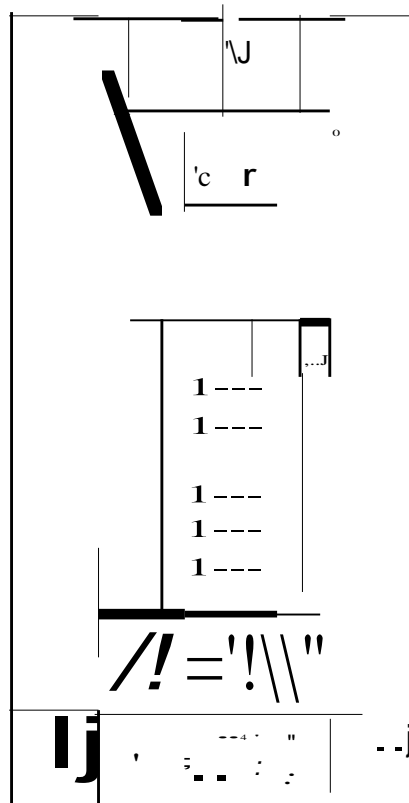
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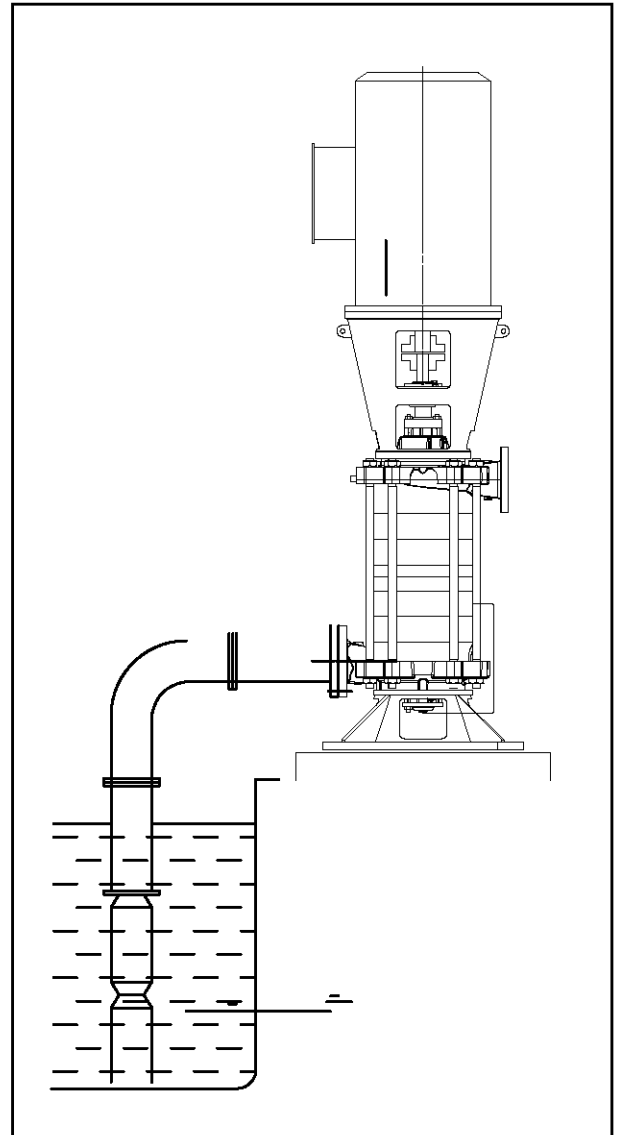
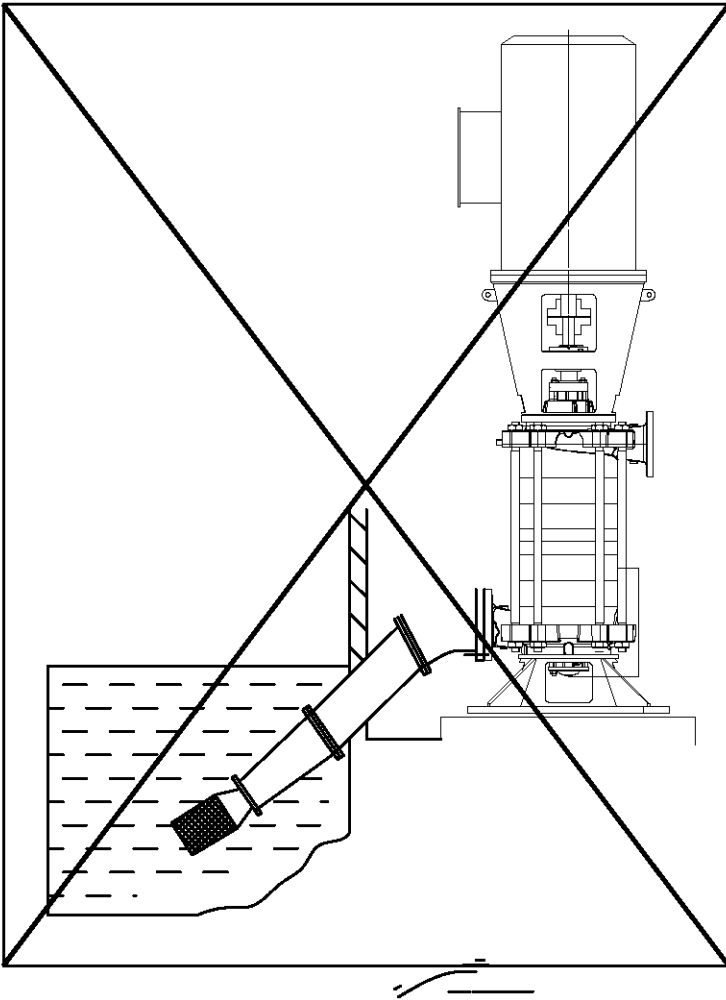
(Fig. 1) PUMP HANDLING



(Fig. 2) PUMP HANDLING



(Fig. 3) SUCTION PIPING



(Fig. 4) SUCTION PIPING

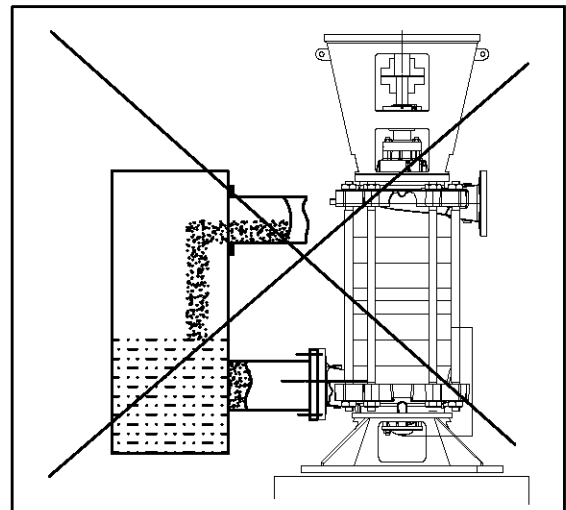
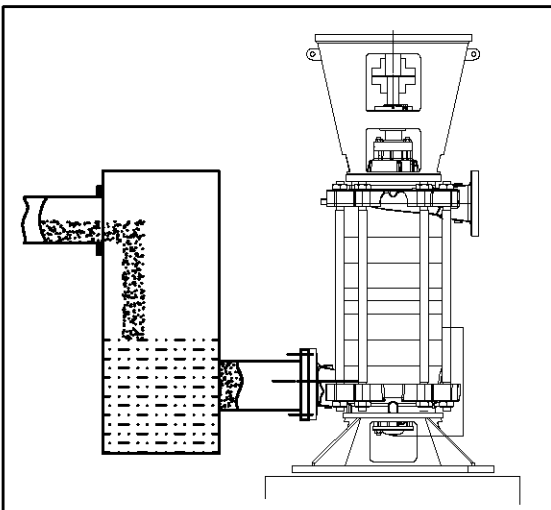


Fig. 5) SUCTION PIPING

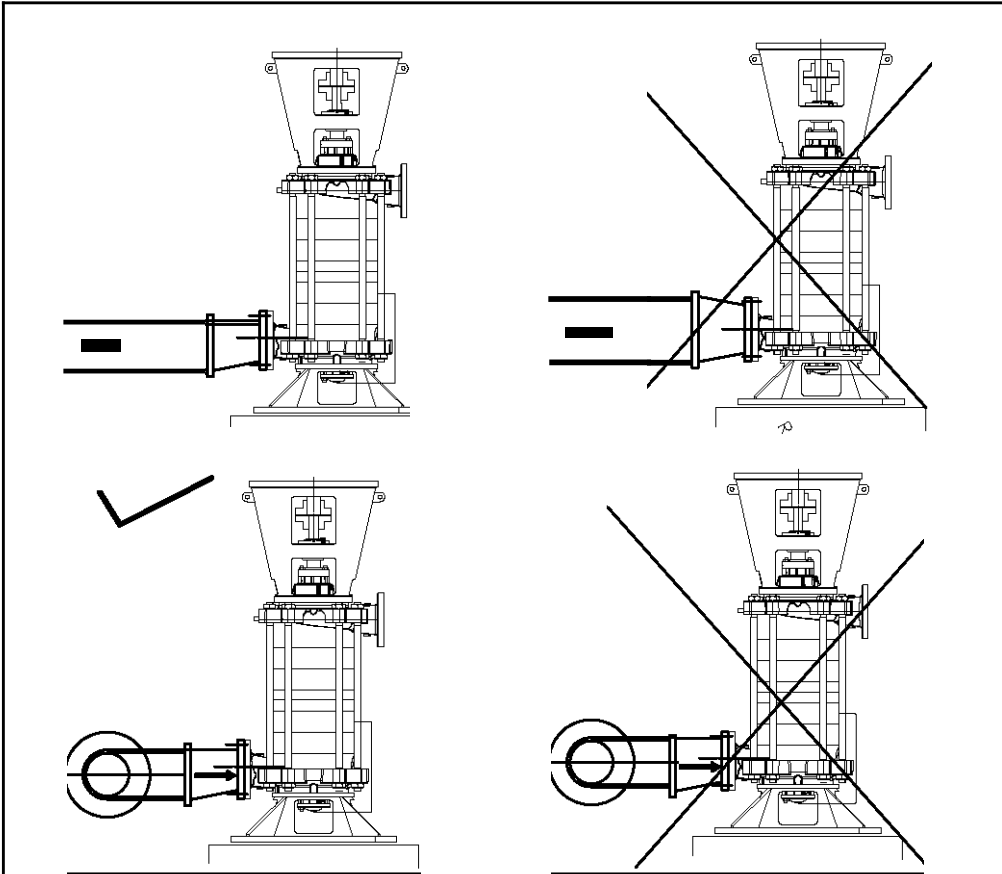


Fig. 6) SUCTION PIPING

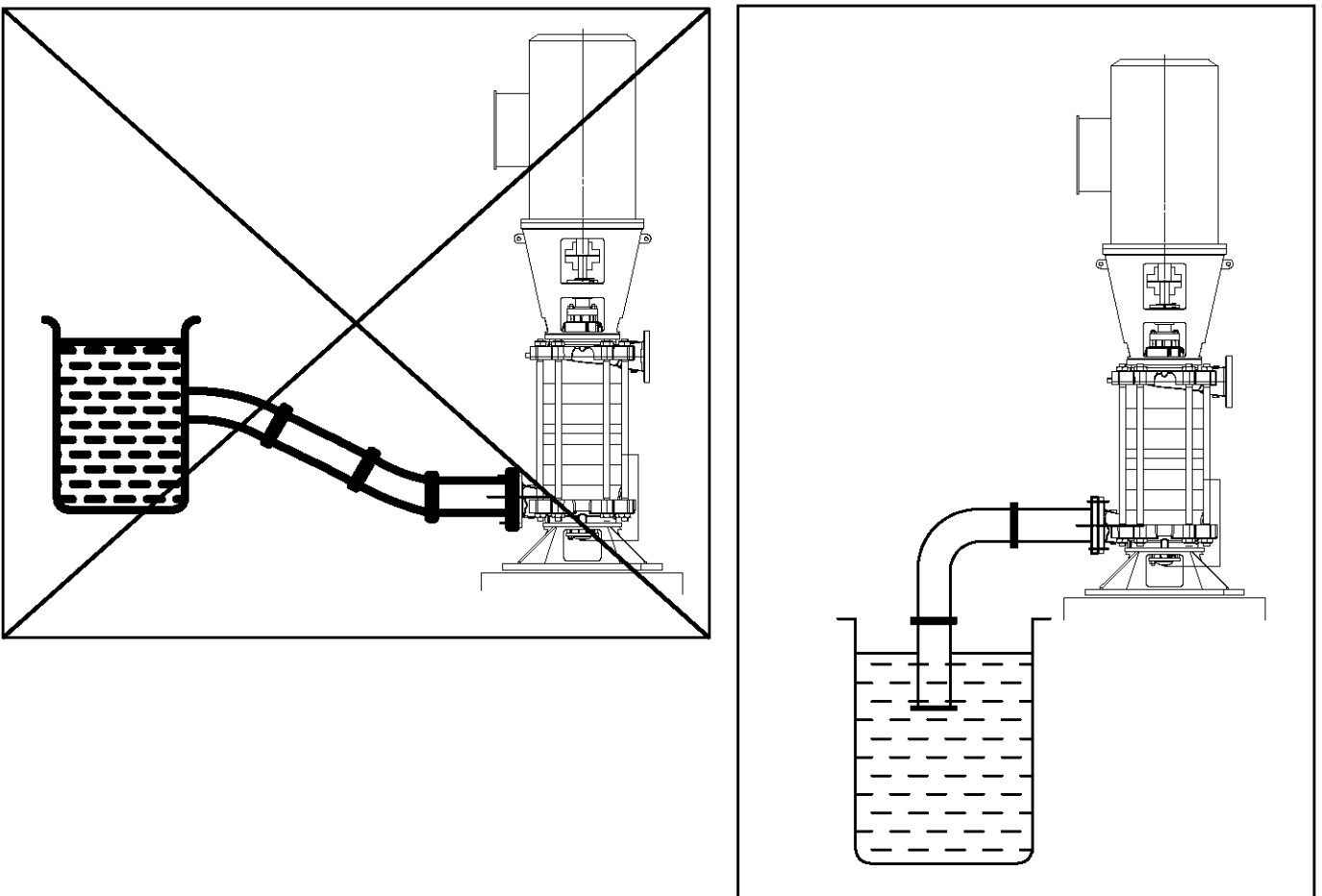


Fig.7: Coupling assembly

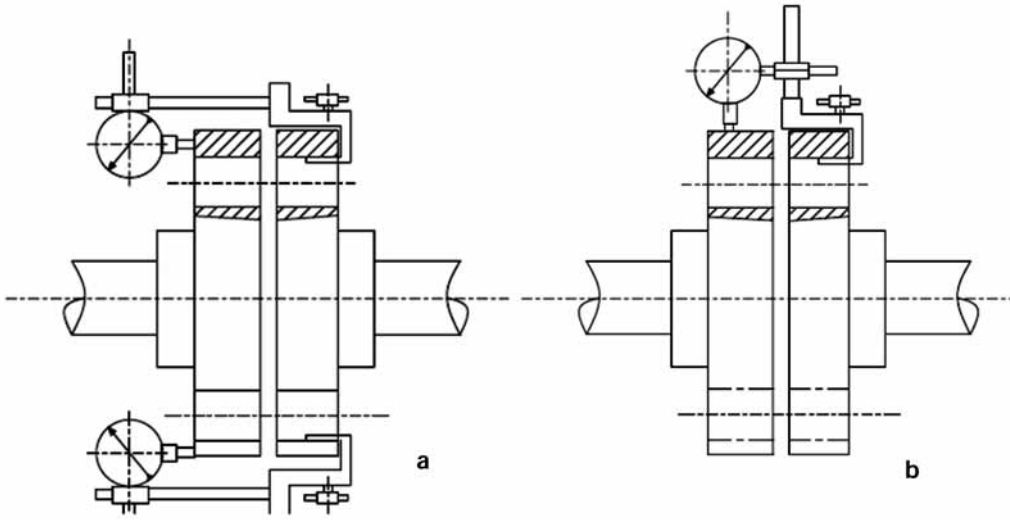
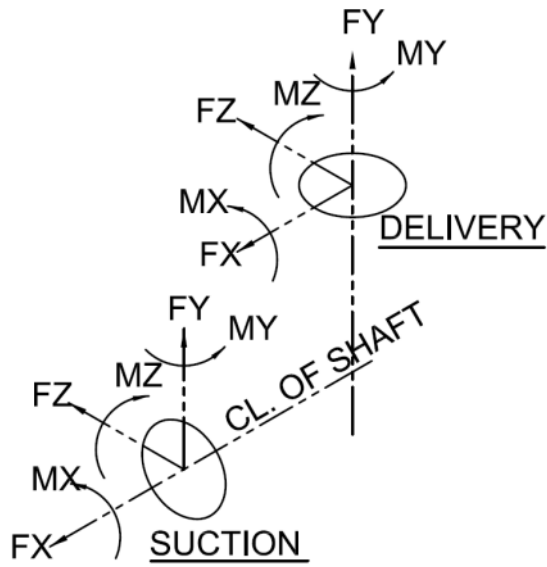


Fig 8 :Forces and Moments



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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."

2 Safety

These operating instructions contain basic information which must be adhered to during installation and operation. For this reason, these operating instructions must, without fail, be read by the service technician and the responsible operator before installation and commissioning. The machine operator list must be filled out completely. By signing this list, all persons working on or with the product confirms that they have received, read and understood this operating & maintenance manual.

It is not only the general safety instructions listed under the main point "safety" that must be adhered to but also the special safety instructions with danger symbols included under the following main points.

2.1 Designation of information in the operating instructions

Symbols:



General danger symbol



Danger due to electrical voltage



NOTE: ...

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. NOTE:

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

2.2 Personnel qualifications

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

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

Non-observance of the safety instructions can result in risk of injury to persons and damage to product/installation. Non-observance of the safety instructions can result in the loss of any claims to damages.

In detail, non-observance can, for example, result in the following risks:

- Failure of important product/installation functions
- Failure of required maintenance and repair procedures
- Danger to persons from electrical, mechanical and bacteriological influences
- Property damage

2.4 Safety consciousness on the job

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

2.5 Safety instructions for the operator

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

- 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.



CAUTION!

In accordance with the laws in effect, guidelines, standards and regulations, ear protection must be worn if the sound pressure is greater than 110dB (A). The operator is responsible for ensuring that this is observed!

2.6 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.

2.7 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.

2.8 Improper use

The operating safety of the supplied product only guaranteed for conventional use in accordance with Section 4 of the operating instructions. The limits values must on no account fall under or exceed those specified in the catalogue/data sheet.

2.9 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 and Platt Ring section 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

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put back, in its existing state, a part or component that has previously been removed. Renew - To substitute a new part or component for a worn or damaged one.

3 Transport and interim storage

Immediately check the pump and transport packaging for damage in transit upon receipt. Take the necessary steps within the period's 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



CAUTION! Risk of damage to the pump! Risk of falling!

Pumps should never be lifted with slings engaged below the bearing housing. Eyebolts on pump top casing are only for lifting top casing during maintenance. Do not lift complete pump with the eyebolts. 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 the pump in combination with the bedplate, the lifting tackle should be attached to the lifting lugs provided on the base plate side member. To lift the pump the lifting slings should pass beneath the pump body at suction and delivery flanges (see lifting diagrams - see also general safety information, chapter 2). These must have sufficient load bearing capacity to ensure that the product can be transported safely. Refer figure 1

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

3.3.1 Short-term storage (less than 3 month)

The equipments as shipped 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.

- Place the Ring section pumps on firm foundation and secure it against falling.
- 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 and the film of lubricant on the mechanical shaft seal is renewed.
- For mechanical seal, we recommend: relative air humidity below 65%, temperature between 15°C and 25°C. Direct exposure of the mechanical seal to heat (sun, heating) as well as to ozone, present or produced by ultraviolet

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light (halogen or fluorescent lamps), must be avoided because of the risk of embrittlement of elastomeric materials.

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!

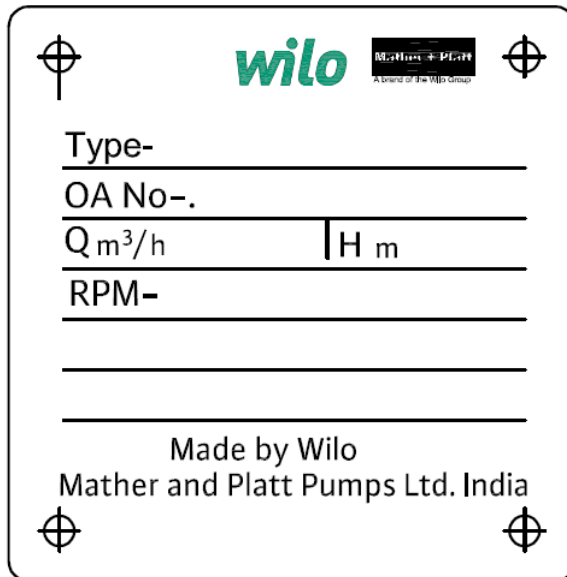
Products, which are not suitably packaged for delivery back, are no longer covered by guarantee!

4 Intended uses

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. Ring section pumps are used in water supply, water-circulating systems and process, injection water, mine dewatering, water treatment, fire fighting, 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.

5 Product information

5.1 Data plate



5.2 Type key

Pump	Description
RN-50A	50- Discharge Nominal Dia. A- Type A Hydraulic

5.3 Scope of delivery

Pump can be delivered

- As a complete pump set pump stool, motor stool, coupling and coupling guard;

5.4 Accessories

- Foundation bolts

6 Description and function

6.1 Description of the product

Ring Section Pumps are vertically split Multi-stage Centrifugal Pumps. The Delivery Pressure is governed by the number of stages, each stage consists of a cylindrical body section.

6.1.1 Casing

Casing consists of suction and delivery end covers and middle bodies. The inlet & outlet branches are cast integral with suction & delivery cover. Tapping's are provided in the middle bodies for removing airlocks and to receive water seal pipeline and in the end covers for instrumentation. Holes are provided in end covers for bolting them, with the middle bodies in between when the pump is assembled.

6.1.2 Diffuser and Passage guide

The Guide passage or Diffusers having vanes are sets of component which abuts the casings of the preceding stage with the stage impeller being centrally disposed and is prevented from rotating by anti-rotation pegs secured in the casings.

6.1.3 Neckring and Neck bushes

To minimize the amount of leakage between high and low-pressure areas of the pump, neck rings are fitted into the casing/middle bodies & neck bushes are fitted into the diffusers or guide passage. Running clearance is provided between neck rings and impeller upper hub & neck bush and impeller lower hub respectively. Neck rings & Neck bushes are renewable to allow this fine clearance to be restored periodically as wear takes place. For smaller pumps,

RN 32 & RN 40, Neck rings & Neck bush design are not provided. Running clearance is maintained between impeller neck and casing/middle body.

6.1.4 Rotating Element

The rotating element consists of a shaft on to which is keyed the impeller or impellers. Renewable shaft sleeves protect the shaft from corrosion and erosion. Sleeves are positioned by sleeve nuts, which have their threads left/right handed as per direction of rotation to prevent them from unscrewing by the rotation of the shaft. Threaded sleeves are provided in RN pumps.

To minimize the leakage between high and low-pressure areas, impeller neck diameter and hub diameter / distance sleeves are machined to close tolerances to provide fine running clearance. The shafts are carried in antifriction bearings.



DANGER! Danger of material damage!

It is of the greatest importance that the free flow of the balance water should not be restricted in any way, as any restriction will lead to the collapse of the valve. For this reason regulating valves should never be fitted into the balance water pipe.

6.1.5 Sealing system

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

Mechanical Seal

For Ring section pumps mechanical seals are used of different type & different make as per application and liquid details. In standard condition i.e. ambient temp 45 deg

6.1.6 Wear on Balance valve and Seating

As wear occurs on the balance valve and seating, the rotating element will move towards the suction end of pump. To keep the amount of wear under observation, in the case of pump with balance valve a 'T' mark is made on the shaft when the valve and seating are new. See Annexure. The head of the 'T' mark is flush with the outer cover of the driving end bearings. When checking for balance valve wear the rotating element should be pulled to its' limiting position in the direction of the suction end of the pump before observation is made.

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7 Installation and electrical connection (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.

7.1 Installation of the complete pump set

- 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.



CAUTION! Risk of material damage!

Dirt from the pipe system can destroy the pump during operation. Flush the pipe system prior to the installation of the pump.

- Provide shut-off valves in front of and behind the pump.

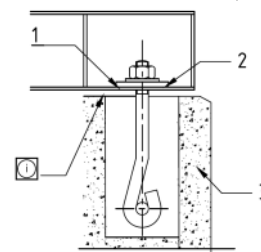
7.2.1 Foundations

The foundation should be sufficiently substantial to absorb any vibration and to form a permanent, rigid support for the base plate. The foundation must get large dimensions.

Generally, the weight of the foundation is around 2 to 3 times the pump set weight. This is important in maintaining the alignment of a direct connected unit. In building the foundation, the top of the foundation should be left approximately one inch low to allow for grouting. Foundation bolts of the proper size should be embedded in the concrete, located by template

Foundation bolt

- 1 Erection packers
- 2 Finish grout
- 3 Concrete



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NOTE:

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

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

CAUTION! Risk of material damage!

Do not hold the pump by the motor/module when tightening the screwed connections. Apply the wrench surfaces to the suction/pressure port inserted.

7.2.2 Leveling and installing the Pump stool

- Initially the foundation surface will be rough to key the final grout and the motor stool could distort if mounted directly on this uneven surface. To avoid this distortion and to provide a suitable base for leveling, steel packing blocks must be positioned at suitable spacing on the foundation surface, a minimum requirement being one on each side of every foundation bolt. Ensure the surface beneath each packing block is solid by crushing any protrusion or alternatively each block may be placed on a thin screed of cement.

Lift the whole assembly (pump stool + pump + motor stool) and lower it on the foundation. Insert the foundation bolts through the holes in the pump stool plate and screw a nut on to each bolt until the bolt protrudes through the nut by a length, which is sufficient to accommodate a locknut.

Level the pump stool plate as follows:

- Place an engineer's level (sensitive to an error of 0.05 mm per 250 mm) on the machined top surfaces of the motor stool plate. The leveling pads if provided.

NOTE:

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

- Adjust the level of the pump stool plate by inserting shims between the pump stool plate and the packer plate until the motor stool top plate is leveled and supported on all the packing blocks at the height required for the connection of suction and discharge branches. For checking the levels across two pads, I-beam type straight edge should be used extensively in conjunction with engineer's level. Level should be achieved within 0.05 mm per 250 mm.
- When the motor stool top plate is leveled, grout in the foundation bolts. Care should be taken so as not to disturb the verticality of foundation bolts. For grouting use rich mix of 1:1:2 of cement, sand and gravel.
- When the grout has set, gently but firmly tighten the foundation bolts; then screw on and tighten the lock nuts. Care must be taken not to distort the motor stool top plate or loosen the foundation bolts in the grout by excessive tightening.
- Carefully re-check the level of the top surface of motor stool plate and make adjustments that are necessary by fine shimming.
- Place the motor on motor stool, which is fixed to pump casing previously.
- When the motor stool top plate is leveled and the pump and motor are in proper position, run the final grout beneath the pump stool. Allow minimum seven days' time for curing before commencing the pipe work. Grout mix in the proportion specified earlier for foundation bolt grouting should be used.

7.2.3 Alignment of the pumps and its driving units

- When the pump stool 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 pump stool. Allow minimum seven days' time for curing. Grout mix in the proportion specified earlier for foundation bolt grouting should be used.

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

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CAUTION! Risk of material damage!

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

Angular alignment

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

Radial alignment

Clamp a dial gauge on one of the couplings or to the shaft as shown in figure 3 with the plunger resting on the rim of the other half coupling. Set the dial zero. Rotate the coupling and note the reading at each quarter revolution. Any variation in the readings indicates the deviation from alignment and the position of one of the units must be adjusted until the readings at each quarter revolution are identical or within the tolerances given below.

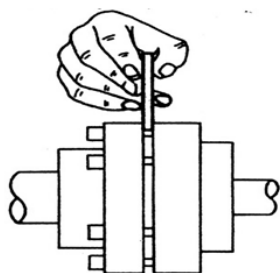
Refer figure 3

Alignment Tolerances

Speed (rpm)	Parallel tolerance	Angular tolerance
<1000	0.15 mm TIR	0.15 mm TIR
From 1000 to 1800	0.15 mm TIR	0.10 mm TIR
From 1800 to 3600	0.10 mm TIR	0.05 mm TIR

TIR: Total Indicated reading

Distance between coupling halves



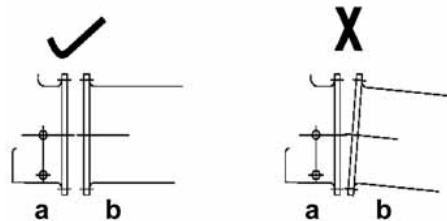
Rotational Speed			Gap
990 rpm	1450 rpm	2900 rpm	
-	3-55 kW	3-55 kW	2-4
90-120	75-250	75-560 kW	2-6
> 120 kW	> 250 kW	> 560 kW	3-8

7.2.4 Pipe work

No stress must be imposed on the pump casing by the pipe work; neither by the weight of the pipes nor by the tightening of badly fitting pipes. 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.

For difficult pumping on the suction side, to stabilize the flow, a pipe length 15 times the diameter of the suction branch should be installed before the suction branch.

- The flow rate in the suction line or inflow line must not exceed 2 - 3 m/s.
- Pipe velocity may need to be reduced further to satisfy pump NPSH requirements and to control suction pipe losses.



Avoid stress on the pump casing

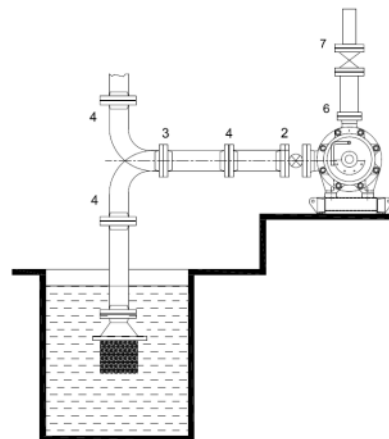
a: pump flange;

b: pipe work

7.2.5 Suction line

See the sketches for the optimum layout of pump installation for flow and suction lift operation. Ensure that air pockets cannot be created. Unequal nominal widths of the suction branch and suction line must be compensated by eccentric transition pieces (refer figure 6,7,8).

- It is recommended that a strainer is installed in front of the suction pipe with a filter surface of at least 3 times the pipe cross section (approx. 100 meshes/cm²).
- The suction opening of the suction line should be well below the liquid level, and a strainer should be used.
- The strainer must be far enough from the bottom to avoid excessive inlet losses, which could impair pumping performance. It is advisable to check that there is no leakage.
- A shut-off valve should be installed in the feed line. It must be closed for maintenance work. It should be installed in order to avoid air pockets forming in the spindle cap, i.e. with the spindle in a horizontal position or pointing vertically downward.



Layout of pump installation

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

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- 6) Isolating valve
- 7) Regulating valve

7.2.6 Discharge line

CAUTION! Damage to the pump

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

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

Pressure shocks must be avoided.



7.2.7 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.

7.2.8 Pressure gauge connections

CAUTION! Risk of leakage of the fluid!

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

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

7.2.9 Electrical connection



WARNING! Danger of electric shock

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

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

8 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.

8.1 Cleaning prior to start

8.1.1 Pipe work flushing

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

8.1.2 Cleaning of Bearings

Where possible, especially 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 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.

8.2 Filling and venting

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



WARNING! Danger of injury!

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



CAUTION! Danger sealing system damage!

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

8.2.1 Pumps operating on flooded suction head

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

8.2.2 Pumps operating on negative suction head

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

- If the inlet pipe work is fitted with a non-return foot valve, the pump casing and inlet pipe work can be filled with liquid from an external source under pressure. The pressure imposed on the pump by this method must not exceed that for which the pump is designed. In certain cases priming can be achieved by flooding back from the delivery side of the pump.
- By extracting air or gas from the pump casing. To enable this method to be used, the gland arrangement must be sufficiently air-tight or it should be liquid sealed from an external supply. For operation details of gas exhausts reference should be made to the manufacturer's instructions. Some form of priming indicator is usually fitted to indicate when the priming operation is complete.

8.3 Starting the pump

8.3.1 Direction of rotation

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

8.3.2 Pre-starting checks

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

Pre-start Check up

Activities	Checked on	Remarks
1 Alignment with and without piping		
2 Flushing of pipe lines and ensures no leakages		
3 Availability of sufficient liquid in sump / suction as per specifications		
4 Installation of all instruments <ul style="list-style-type: none">• Suction and delivery pressure gauges• Pressure switches• Temperature gauges• Any other as supplied/specified		
5 Operation of suction, delivery and inline valves		
6 Proper supports for piping and other allied equipments		
7 Availability of flushing/sealing liquid for stuffing box		
8 Free rotation of pump and drive shafts		
9 Lubrication of bearings		
10 Checking of insulation resistance of motor		
11 Proper cable termination		
12 Motor protection relay settings		
13 Check all interlocks as specified/provided		
14 No load trial operation of drive <ul style="list-style-type: none">• Direction of rotation is ok• Noise and vibration within limits• Bearing temperatures and winding temperatures are within limits• Overall operation is satisfactory		
15 Coupling of pump and drive and free rotation of shafts in coupled condition		
16 Suction valve is fully opened		
17 Pump is fully primed and all air is vented		
18 Delivery valve is closed (if required)		
19 Emergency shutdown is possible		

8.3.3 Normal starting and running checks

- When all the foregoing pre-start checks are satisfactory, start the pump and check the direction of rotation (indicated by a direction arrow on the pump casing) otherwise stop the pump immediately for correction of direction of rotation. Then run the pump at its rated speed.
- Check the ammeter reading to ensure that the motor is not being overloaded.
- Check that suction and delivery pressure gauges are connected. Test and make available any alarm, signals, interlock systems and any of the protective devices incorporated in the auxiliary and main pumping control system.
- Ensure that all electrical checks on motor, relay setting in panel etc have been carried out in accordance with the instructions of motor manufacturer.
- Ensure that stuffing box sealing water seal connection is provided as shown in GA Drawing.
- Check the mechanical seal for leak. In the start phase (and also after downtimes) slight leakage can be expected. Visual leakage checks are however required from time to time. Distinctly visible leakage will require an exchange of the seal. Wilo Mather and Platt offers a repair set containing all parts required for an exchange.
- Check that the bearing is not overheating. Bearings will normally run at a temperature of 30 °C-35 °C above ambient temperature. The ideal running temperature of bearings is 40 °C to 60 °C for ball bearings. The temperature should never exceed 82 °C for ball bearings. If the bearings are overheating its cause should be investigated immediately.
- If the foregoing checks are satisfactory, open the delivery valve slowly and bring the pump gradually up to its rated parameters indicated in the data sheet/name plate and based on pressure gauge and ammeter readings. Unless the pump is fitted with a special leak-off device, it should not be run for a long period against a closed delivery valve. Check that the driving unit is not being overloaded during valve opening. Overloading may occur if the pump is discharging into an empty system. If the pumping unit fails to generate at least its rated delivery pressure it must be stopped immediately, the cause ascertained,
- Check vibration of pump set and ensure that vibration level is within limits specified. Check that noise level is within stipulated limits.
- The pumps may be run for 8 hours trial operation and all the parameters like delivery pressure, current, bearing temperature, etc. Be recorded periodically.
- Make the following checks at regular intervals. It is recommended that they be made at every change of shift.
- Check the suction and discharge pressure gauge for normal operating pressure, if there is significant drop in the suction or discharge pressure the pump may have lost its supply. In the event of this fault occurring, the pump must be stopped immediately and the cause of liquid loss eliminated.
- Check the mechanical seal for overheating.

8.3.4 Sealing system



Mechanical seal

CAUTION! Risk of damaging the pump!

A mechanical seal must never operate without fluid and lubrication even for a short period of time.

Insure that the pump is completely full of water and vented before starting the pump. Small leakages can occur during the period of running-in, they should disappear after several hours of operation. If the leakages don't stop, shut down the pump disassemble the mechanical seal and control their condition.

8.3.5 Normal shutdown



WARNING! Risk of Burns!

If the fluid temperature and system pressure is high, close the isolation valves upstream and downstream of the pump. Initially let the pump cool.

- Close the delivery valve to reduce the load on the driving unit.
- Stop the driver of the pump.
- When the pump has come to rest, close the suction-isolating valve.
- Isolate any ancillary supplies.

8.3.6 Emergency Shutdown

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

9 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 pressure, allow the pump to cool down first and then depressurise the system.

9.1 Routine maintenance and frequency of inspection

Centrifugal pump requires very little routine maintenance; however, serious troubles can be often avoided by regular observation and analysis of various working parameters. Some of the routine maintenance checks for this purpose are as under:

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

Routine maintenance			
Parts	Action	Period	Remarks
Mechanical Seal	Check for Leakage	Daily	5.6 gm/hr per pair of seal face
	Check for Leakage	Half yearly	If required replace with new pickings
Bearings	Check temperature	Weekly	Bearings are greased for life and are
Suction Pressure	Check Pressure	Daily	
Discharge Pressure	Check Pressure	Daily	
Flushing	Check Flow	Weekly	Flow through the Flushing pipes must be
Vibration	Vibration	Weekly	
Voltage and Current	Check for the rated values	Weekly	
Rotating element	Check the rotating for wear	Yearly	
Clearances	Check the clearances between	Yearly	If value of clearance is more, neck ring
Total Dynamic Head	Check Suction and Discharge TDH	Yearly	
Alignment	Check the alignment of pump with motor	Half yearly	For reference use pump motor GA Drawing

9.2 Overhaul maintenance

9.2.1 General information

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

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

Measurements should be taken and recorded of all wearable components at the first, and every 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.

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



NOTE:

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

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

The parts most likely to be affected are:

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

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9.3 Disassembling the pump

Assembly / Disassembly sequence for RN Pump

9.3.1 Disassembling of RN pump

- Isolate the pump motor electrically.
- Isolate the pump system by closing suction and delivery valve.
- Separate the motor first & Remove the coupling.
- Remove the bearing carrier & bush (1) from bottom.
- Support the bottom end of shaft using jack vertical position, So that distance of shaft end is maintained & shaft will not fall.
- If the bearing (5) is fitted it will have to be drawn off with the help of suitable tackle.
- Remove the bearing cartridge (6) using jacking screw.
- Remove the stay bar of the pumps.
- Remove the motor stool.(7)
- Remove the seal (8).
- Remove the stuffing box cover (9).
- Now remove the spacer sleeve (10) delivery sleeve (11).
- Remove the balance piston bush (12).
- Now safely remove the delivery cover (13).
- Remove the balance piston (14).
- Remove the delivery diffuser (15).
- The delivery end impeller (16) should be removed carefully. Removal of subsequent impellers, middle bodies and diffusers is effected in exactly the same way.
- Each impeller & key is stamped with number to enable it to be re-assembled in exact same sequence.
- Now carefully lift the suction cover from pump stool.

9.4 Examination of Internal components

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

9.4.1 Neck-ring

Use an internal micrometer to measure the bore of neck 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 impeller to neck ring clearance must be restored to the original design value by changing the neck ring and impeller where required.

9.4.2 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 balance valve cover or bore of suction cover 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 limit

9.4.3 Impeller

A) 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

Any of the above may be repaired, or if damage is extensive, impeller may need replacement. Further information should be sought from Service Dept., Pune before any decision on repair work is taken.

B) 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 neck diameter..

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 bush ID measured will give us the clearance between the two. Clearance thus obtained should not be more than 150% of maximum designed clearance.

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9.4.4 Bearings

The Bearings fitted on the Ring section pumps range are grease Lubricated for different Models. For list refer the chart.

Steps to follows during Ball bearing checking-

- Clean all the components using clean white spirit. Do not use chlorinated solvents such as trichloroethylene and carbon tetrachloride because they introduce a corrosion risk when used on ferrous materials.
- Visually inspect the bearing. The balls, the inner and outer tracks must all be free from chipping, cracks, abrasions or discoloration.
- Check that the parts of the cage are firmly fixed together.
- Visually inspect the bore for any sign of damage. Burrs or any scratches caused during bearing withdrawal should be carefully removed by hand application of a fine oilstone, the treatment being confined to the minimum possible area.
- Visually inspect the outside diameter for signs of fretting, any stains may be carefully polished off, but abrasion must be kept to the absolute minimum that is required, followed by cleaning.
- Check that bearing rotates freely and smoothly. If there is any doubt regarding the serviceability of the bearing it should be renewed. Inspect the Bearing Cage as follows:
 - Visually inspect the bore for any signs of fretting, any stains may be carefully polished off, but abrasion must be kept to the absolute minimum that is required, followed by cleaning.
 - Where fretting has occurred, bearing and housing should be clean and dry, and trial assembled. It is a transitional fit and may be described as a sucking fit without any detectable clearance or play between the outer race and the housing bore. Any assembly, which achieves this, may be considered as being acceptable, provided the bearing is serviceable. Assemblies, which do not achieve this degree.



NOTE:

An incorrect fit can allow one or both of the bearing tracks to creep, which will affect the running accuracy and the assembly and dismantling of a pump. Creep is the slow rotation of one track relative to its seating, it is undesirable since the spindle and the bore of the bearing or the housing and the outside -diameter of the bearing may become worn. Creep is not due to friction within a bearing but is generally caused due to radial loads rotating or oscillating in respect to fixed point on the track. If creep has occurred the interference fit of the bearing must be restored, either by metal spraying or chromium plating and regrinding the seating to the correct diameter; interference fits must not simulated by knurling, scoring or distortion of the seating on which creep has occurred because such practices are ineffective and creep will quickly reoccur. Even if the bearing is prevented from creeping it will usually be distorted by the seating, and failure will result caused by local overloading and high frequency vibration.

- Examine the abutment. Abutment for ball bearings must be flat and square with the axis-of rotation.

The radius at the root of an abutment must be smaller than the corner radius of the track located against the abutment. The edge of the abutment must be reduced or chamfered; a burred edge can tilt or distort a bearing track.

- If after inspection, the bearing is reusable, completely coat all parts with a rust preventive oil, working it well into the internal parts of the bearing. Wrap in clean greaseproof paper and store until required for replacement or refit on to the spindle if needed. In case of immediate use, coating of rust preventive oil is not necessary.

9.4.5 Mechanical seal

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

9.5 Reassembling the pump

9.5.1 Disassembling of RN pump

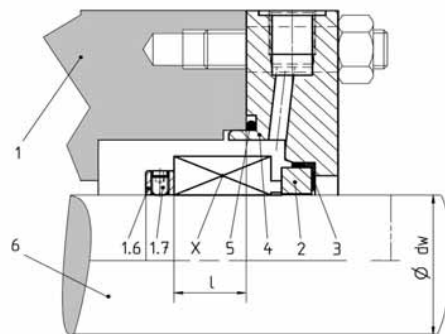
- Before re-building, all joint faces should be cleaned & all burrs removed from the ends of impeller bosses, sleeves & sleeve nuts as it is essential that all faces meet squarely.
- Place the suction cover on pump stool. Drop the shaft through the suction cover & let the shaft rest on jack.
- Push the suction side sleeve. Fit the first impeller key & push the first impeller.
- Spread the thin coating of joining compound over the corners on suction cover.
- Place the diffuser & middle bodies. It should fall quite easily into its spigots & from this point the process is repeated.
- Care should be taken to see that the vents of the middle bodies are correctly set on top of the casing.
- Then place the balance piston over the end impeller.
- Place the delivery cover correctly & then place the balance piston bush such that it should fall easily between balance

piston & del cover gap.

- Push the delivery side sleeve & spacer sleeve & place the stuffing box cover.
- Place the seal (kindly mark the positions first & then tight) .
- Place the motor stool on delivery cover and match the position of holes.
- When the motor stool is fitted stay bars inserted & pinched up. Then the stay bar & nuts to be tightened evenly, working diagonally across cover, & tightening each nut a little at a time to prevent uneven strain.
- Place the bearing cartridge, Push thrust collar & roller bearings.
- The shaft should now be adjusted with the help of lock nut & lock washer so that impeller is in correct running position.
- The ideal running position is with the centerline of the impeller corresponding with the centerline of diffuser.
- Fit the coupling to shaft & place the motor on motor stool & tighten it using fasteners.
- Finally make all the connections as per drawing.

9.5.2 Reassembly of Pump with Mechanical seal

- Extreme cleanliness must be observed during installation, and damage to the seal faces and mounting rings must be avoided
- Place the adjusting ring of mechanical seal at its pre marked position
- Place the grab screw(13) at its position on the adjusting ring, but tight it yet
- The O-rings may be oiled to reduce friction, during installation of the seal. EP-rubber O-rings should not come into contact with oil or grease; In this case lubrication with glycerin or water is recommended.
- Never cover the sliding faces with a lubricant as they must be assembled completely dry, clean and dust-free.
- When pressing in stationery seals, make sure that the pressure distribution is uniform. The O-ring must be fitted using water or alcohol only.
- Crowned drive pins must be replaced whenever the seal is dismantled. During insertion of the stationary seats, especially those of special carbon, care must be taken to exert pressure evenly.
- Now check the distance of seal as shown in the figure and adjust its value as per values given table
- Forrest parts follow the above explained procedure as per gland pack version pump



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



NOTE:

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

9.6 Recommended spare parts

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

For 2 years of normal operation:

- Mechanical seal, ball bearings required for the dismounting of the pump.

For 3 years of normal operation:

- Mechanical seal, ball bearings required for the dismounting of the pump,

Wear rings and their nuts.

For 5 years of normal operation:

Then in order to facilitate this operation we strongly recommended purchasing a batch of part with the pump in order to reduce the shut down timing.

It is strongly recommended to purchase the original spare 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

10 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
-- Pump vibrates or it is noisy	2,3,4,9,10,11,21,23,24,25,26,27,28,30,35,41,42,43, 44,45,46,47
-- Bearings have short life	24,26,27,28,35,36,41,42,43,44,45,46,47
-- Pump overheats and seizes	1,4,21,22,24,27,28,35,36,41

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

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25	Shaft bent	Dismantle and check, Replace shaft
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Causes		Remedies
26	Rotating part rubbing on stationary part	Incorrect assembly, correct the assembly
27	Bearing worn	Check lubrication, shaft run out, alignment, replace if required
28	Wearing rings worn	Replace
29	Impeller damaged	Replace
30	Casing gasket defective, permitting internal leakage	Replace
31	Shaft or shaft sleeves worn or scored at	Replace
32	Shaft running out of center because of worn bearings or misalignment	Rectify
33	Rotor out of balance, causing vibration	Balance the rotor
34	Cooling liquid not being provided to water-cooled stuffing boxes	Provide
35	Dirt or grit in sealing, liquid leading to scoring of shaft or shaft sleeve	Provide clean liquid for flushing
36	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
37	Excessive grease in antifriction bearing housing or lack of cooling, causing excessive bearing temperature	Attend
38	Lack of lubrication	Provide proper lubrication
39	Improper installation of antifriction	Rectify or replace bearing
40	Dirt in bearings	Investigate the cause and clean bearing
41	Rusting of bearings from water in housing	Arrest water ingress
42	Excessive cooling of water cooled bearing, resulting in condensation of atmospheric moisture in bearing housing	Reduce cooling water flow

11 Decommissioning and recycling

The disposal of all material or debris must be done in order to protect the environment.

The Wilo Mather and Platt's 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 dismantling must be done by qualified personal.

Clean and decontamination must be achieved before any transportation or recycling

Recommended Bolting & Screw torques

Failure of threaded fasteners due to over-tightening can occur by bolt shank fracture or by stripping of the nut and / or bolt's thread. a bolt or screw assembled with a nut of appropriate class is intended to provide an assembly capable of being tightened to the bolt proof load without thread stripping occurring.

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

1. Material of screw
2. Parent metal
3. Whether the screw is untreated or plated
4. Whether the screw is dry or lubricated
5. The depth of the thread

Installation and operating instructions Wilo Mather and Platt –Ring Section Pumps

Tightening torques – Untreated Screw (blackfinish); Coefficient of Friction 0.14

Property class

		M6	M8	M10	M12	M16	M20	M24	M27	M30	M33	M36	M39
5.6	Nm	4.6	11	22	39	95	184	315	470	636	865	1111	1440
	Ft. lb	3.3	8.1	16	28	70	135	232	346	468	637	819	1062
8.8	Nm	10.5	26	51	89	215	420	725	1070	1450	1970	2530	3290
	Ft. lb	7.7	19	37	65	158	309	534	789	1069	1452	1865	2426
10.9	Nm	15	36	72	125	305	590	1020	1510	2050	2770	3680	4520
	Ft. lb	11	26	53	92	224	435	752	1113	1511	2042	2625	3407
12.9	Nm	18	43	87	150	365	710	1220	1810	2450	3330	4260	5550
	Ft. lb	13	31	64	110	269	523	899	1334	1805	2455	3156	4093

Pre-Starting Checks for Pump set

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



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