



Wilo Mather and Platt – MISO/ PISO (ISO 2858) 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 MISO / PISO 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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Fig.1: Pump Handling [3.1]

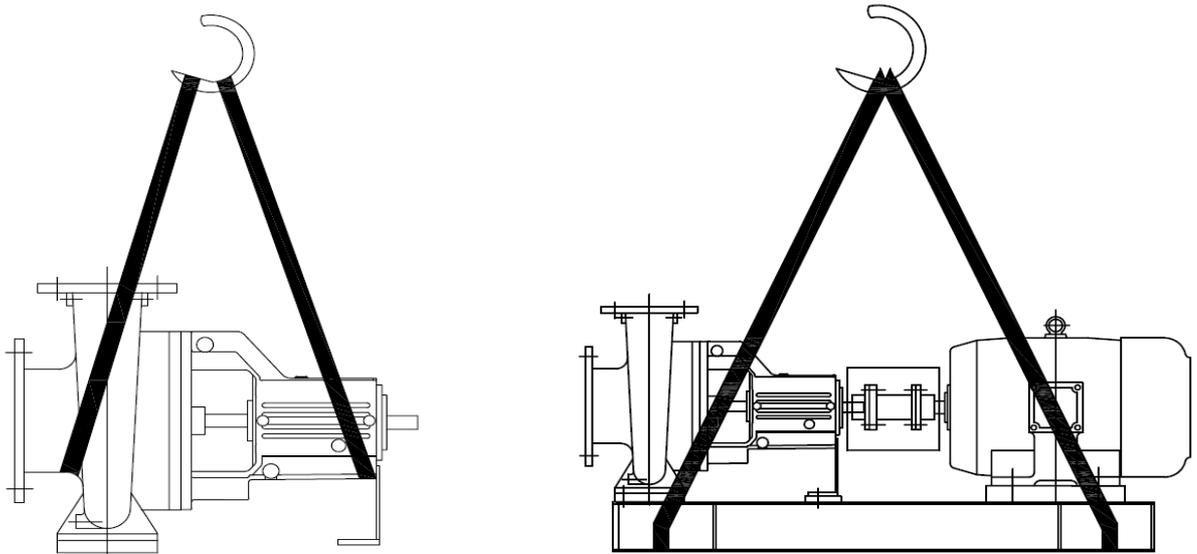


Fig.2: Engine driven pump [6.1.2]

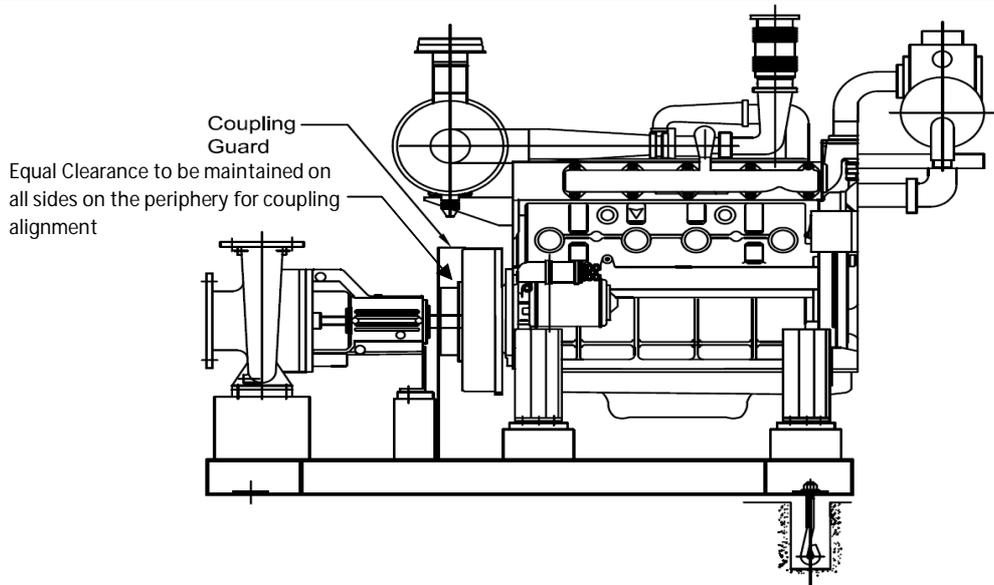


Fig.3: Pump Foundation [7.2.1]

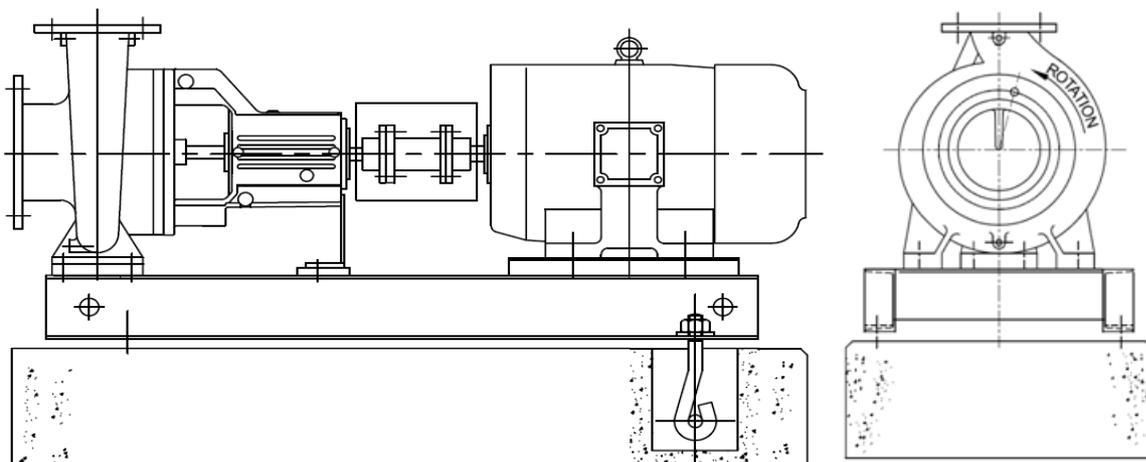


Fig.4: Leveling of Base-plate [7.2.2]

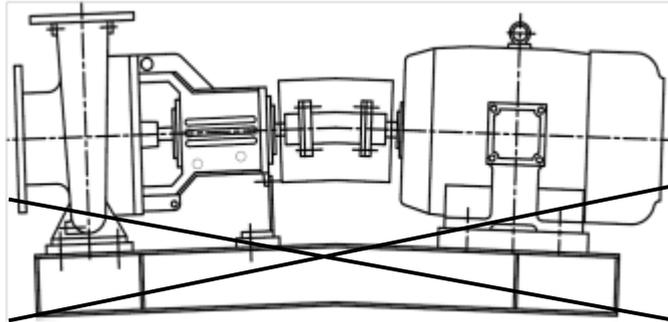


Fig.5: Coupling assembly [7.2.3]

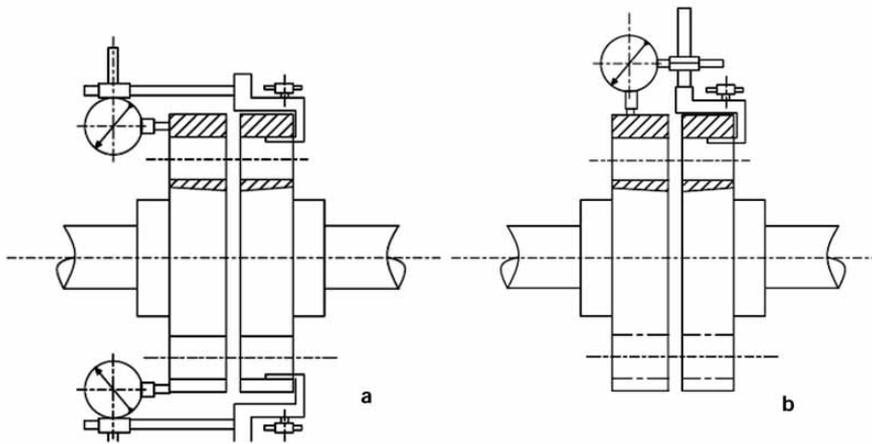


Fig.6: Forces and Moments [7.2.4]

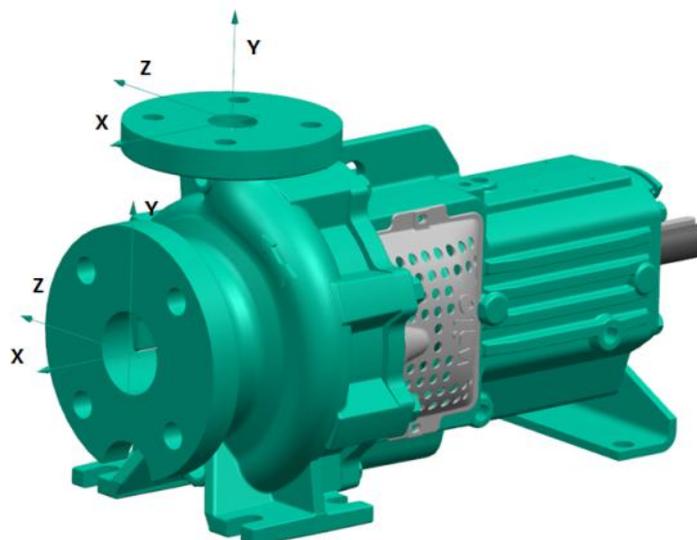
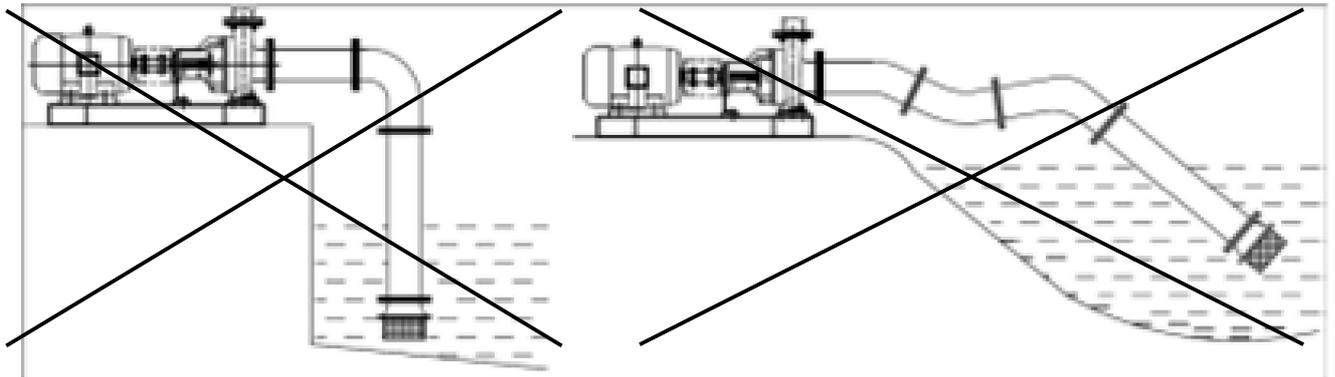
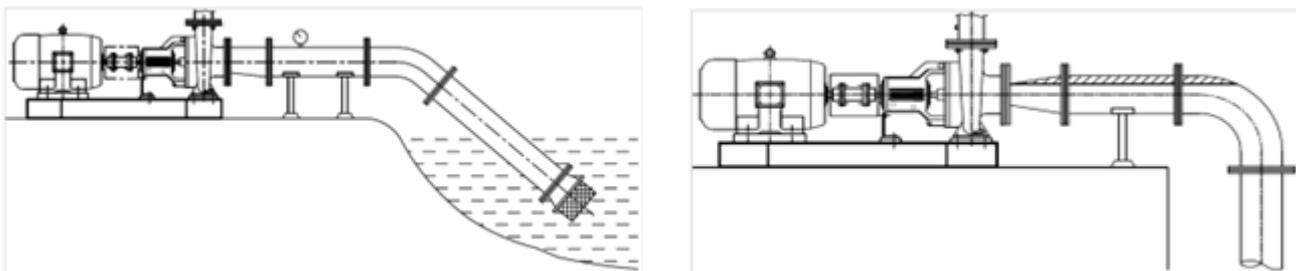


Fig.7: Suction line- Bad [7.2.5]



Bad Suction Layout which will cause air pockets and failure to pump

Fig.8: Suction line- Good [7.2.5]



Good suction layout

Fig.9:

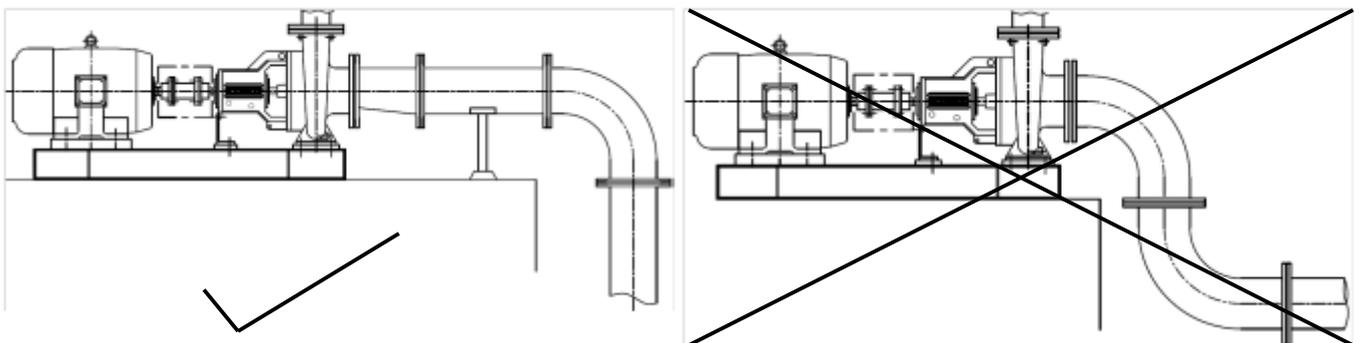


Fig.10: Suction line [7.2.5]

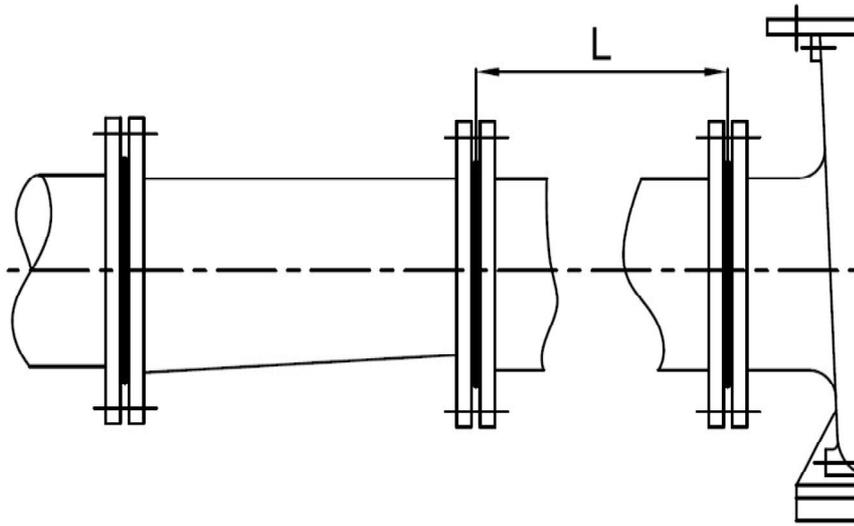
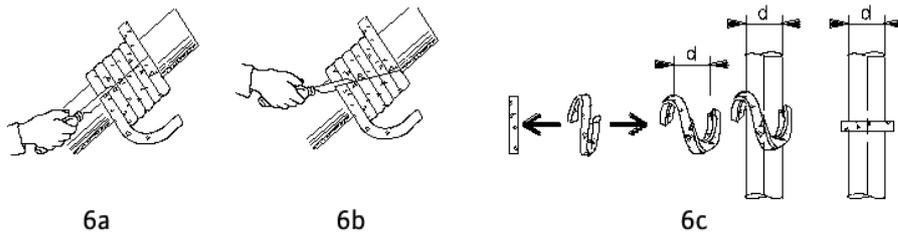


Fig.11: Stuffing box packing [7.2.7]



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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 80dB (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 MISO / PISO 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 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 and 2

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 MISO / PISO pumps horizontally 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 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. MISO / PISO pumps are used in water supply, water-circulating systems and process, injection water, spray pond, air-conditioning, water treatment, Sprinkler & drip irrigation, 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

 	
Type-	_____
OA No-	_____
Q m ³ /h	H m
RPM-	_____
Made by Wilo Mather and Platt Pumps Ltd. India	

5.2 Type key

MISO 150-500	
MISO/PISO	Name of the range
150	Delivery nozzle diameter
500	Max. Impeller diameter

5.3 General description

Limits of usage of the standard range

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

Property	Value	Remarks
Speed	2900, 1450 1/min	Model dependent
Discharge nominal diameters DN	32 up to 200	
Flange standard	PN 16/25	
Limit of fluid temperature (min. /max.)		
- Mechanical seal version [°C]	-20 up to +120	
- Gland packing version [°C]	-20 up to +80	
Limits of ambient temperature (min. /max.) [°C]	-16 up to +40	other on request
Ambient humidity	< 90 %	other on request
Max. operating pressure	16 bar, generally	10 bar for some models
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 on in technical leaflets
Electrical connections	3~230V, 50Hz (≤4kW) 3~400V, 50Hz (≥5,5kW)	Other frequency, voltages, please contact manufacturer

5.4 Scope of delivery

Pump can be delivered

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

5.5 Accessories

- Companion Flange
- Foundation bolts
- Shims

6 Description and function

6.1 Description of the product

MISO / PISO pumps are horizontal, single stage volute casing pumps with nominal outputs and flange dimensions meeting ANSI B16.1 CLASS 125 FF (FOR CAST IRON FLANGES) / ANSI B16.5 CLASS 150 RF (FOR STEEL FLANGES). Their back pull out construction enables the disassembly of the complete bearing unit towards the drive side without removing the pump casing from the pipe work. MISO / PISO pumps are preferably used when pure or turbid liquids, not containing solid particles, are handled.

6.1.1 Shaft Seal

Depending on the application, different shaft sealing executions are offered

It is advised to use the stuffing box version in the following installation configurations:

- If the pump draws from a suction line,
- If the pump has a feed line with a pressure of less than 0.5 bar.
- If the pumped liquid is at or near its boiling point.

6.1.2 Engine driven pump

An engine driven pump set is the unitization of a bare shaft pump and a Diesel engine on the same base plate. Refer to the engine installation manual. The engine driven pump set is supplied with the foundation bolts for grounding. Use the one supplied or equivalent of bigger size. Ensure a correct electrical earth connection between engine, base plate and main earth. (Figure 2)



NOTE:

Before starting the pump please cross check the alignment of pump and engine on the base plate, coupling bush fitment, clearness on the periphery of the coupling. If any difference in the centre height is observed please use shims of suitable thickness to overcome the misalignment.

Connection Details

No.	Pump	1P2	6B1	8B1	Pump	1P2	6B1	8B1	11L	11D
1	MISO 32-125	1/4"	1/2"	1/2"	PISO 32-125	1/4"	1/2"	1/2"	1/4"	1/4"
2	MISO 32-160	1/4"	1/2"	1/2"	PISO 32-160	1/4"	1/2"	1/2"	1/4"	1/4"
3	MISO 32-200	1/4"	1/2"	1/2"	PISO 32-200	1/4"	1/2"	1/2"	1/4"	1/4"
4	MISO 32-250	3/8"	1/2"	1/2"	PISO 32-250	3/8"	1/2"	1/2"	1/4"	3/8"
5	MISO 50-125	1/4"	1/2"	1/2"	PISO 50-125	1/4"	1/2"	1/2"	1/4"	1/4"
6	MISO 50-160	1/4"	1/2"	1/2"	PISO 50-160	1/4"	1/2"	1/2"	1/4"	1/4"
7	MISO 40-200	1/4"	1/2"	1/2"	PISO 40-200	3/8"	1/2"	1/2"	1/4"	1/4"
8	MISO 40-250	3/8"	1/2"	1/2"	PISO 40-250	3/8"	1/2"	1/2"	1/4"	3/8"
9	MISO 40-315	3/8"	1/2"	1/2"	PISO 40-315	1/4"	1/2"	1/2"	1/4"	3/8"
10	MISO 65-125	1/4"	1/2"	1/2"	PISO 65-125	1/4"	1/2"	1/2"	1/4"	1/4"
11	MISO 65-160	1/4"	1/2"	1/2"	PISO 65-160	1/4"	1/2"	1/2"	1/4"	1/4"
12	MISO 50-200	1/4"	1/2"	1/2"	PISO 50-200	1/4"	1/2"	1/2"	1/4"	1/4"
13	MISO 50-250	3/8"	1/2"	1/2"	PISO 50-250	3/8"	1/2"	1/2"	1/4"	3/8"
14	MISO 50-315	3/8"	1/2"	1/2"	PISO 50-315	3/8"	1/2"	1/2"	1/4"	3/8"
15	MISO 65-200	3/8"	1/2"	1/2"	PISO 65-200	3/8"	1/2"	1/2"	1/4"	3/8"
16	MISO 65-250	3/8"	1/2"	1/2"	PISO 65-250	3/8"	1/2"	1/2"	1/4"	3/8"
17	MISO 65-315	3/8"	1/2"	1/2"	PISO 65-315	3/8"	1/2"	1/2"	1/4"	3/8"
18	MISO 80-250	3/8"	1/2"	1/2"	PISO 80-250	3/8"	1/2"	1/2"	1/4"	3/8"
19	MISO 100-200	3/8"	3/8"	1/2"	PISO 100-200	3/8"	3/8"	1/2"	1/4"	3/8"
20	MISO 100-250	3/8"	1/2"	1/2"	PISO 100-250	3/8"	1/2"	1/2"	1/4"	3/8"
21	MISO 100-315	3/8"	3/4"	1/2"	PISO 100-315	3/8"	3/4"	1/2"	1/4"	3/8"
22	MISO 100-400	3/8"	3/4"	1/2"	PISO 100-400	3/8"	3/4"	1/2"	1/4"	3/8"
23	MISO 100-500	3/8"	3/4"	3/4"	PISO 100-500	3/8"	3/4"	3/4"	1/4"	1/2"
24	MISO 150-200	3/8"	3/4"	1/2"	PISO 150-200	3/8"	3/4"	1/2"	1/4"	3/8"
25	MISO 125-250	3/8"	3/4"	1/2"	PISO 125-250	3/8"	3/4"	1/2"	1/4"	3/8"
26	MISO 125-315	3/8"	3/4"	1/2"	PISO 125-315	3/8"	3/4"	1/2"	1/4"	3/8"
27	MISO 125-400	3/8"	3/4"	1/2"	PISO 125-400	3/8"	3/4"	1/2"	1/4"	3/8"
28	MISO 125-500	3/8"	3/4"	3/4"	PISO 125-500	3/8"	3/4"	3/4"	1/4"	1/2"
29	MISO 150-250	3/8"	3/4"	1/2"	PISO 150-250	3/8"	3/4"	1/2"	1/4"	3/8"
30	MISO 150-315	3/8"	3/4"	3/4"	PISO 150-315	3/8"	3/4"	3/4"	1/4"	1/2"
31	MISO 150-400	3/8"	3/4"	3/4"	PISO 150-400	3/8"	3/4"	3/4"	1/4"	1/2"
32	MISO 150-500	3/8"	3/4"	3/4"	PISO 150-500	3/8"	3/4"	3/4"	1/4"	1/2"
33	MISO 200-315	3/8"	3/4"	3/4"	PISO 150-315	3/8"	3/4"	3/4"	1/4"	1/2"

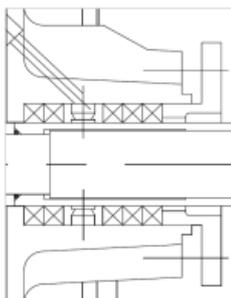
1P2: Pressure Gauge; 6B1: Casing Drain; 8B1: Gland Drain; 11L: Constant level oiler; 11D: Oil Drain

6.1.3 Sealing system

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

Gland Pack

For correct operation of the pack gland as light leakage (20-40 drops per minute) is essential. If the leakage is reduced too much by re-tightening the packing, the packing rings will be destroyed.



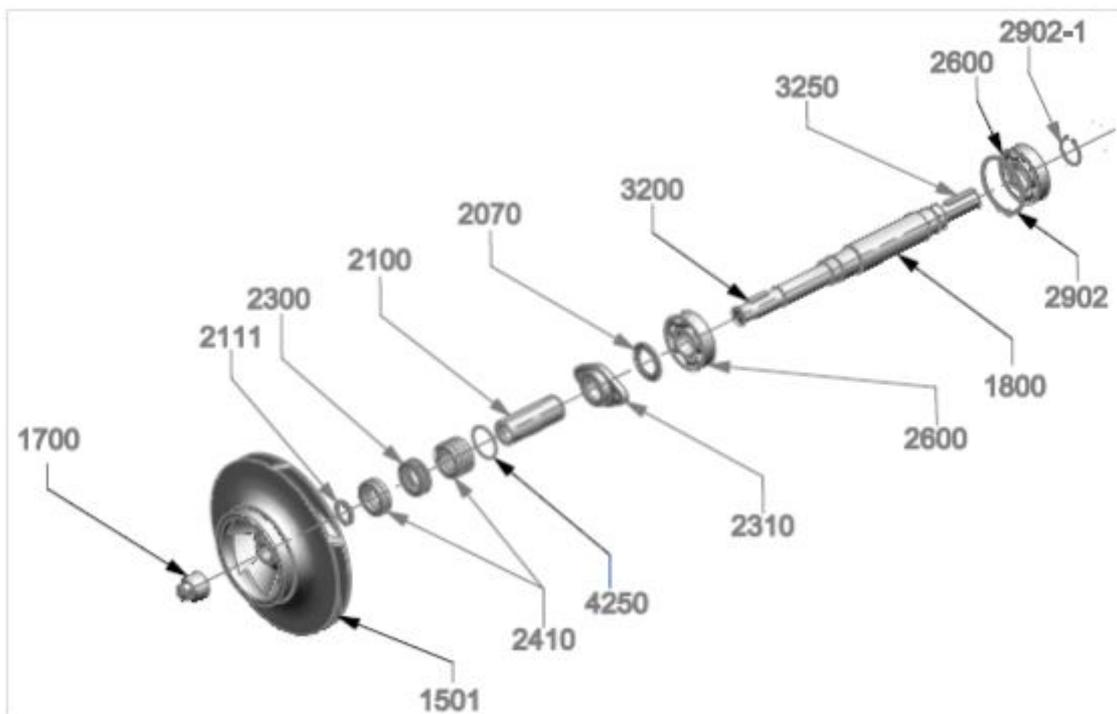
Mechanical Seal

During running, a slight leakage may occur. If the pump is equipped with an external flush, quench or heating, the flush, quench or heating supply has to be switched on before the pump is started. The mechanical seal must be allowed to cool before the next restart.

6.1.4 Rotating element

The rotating element of MISO pump consist of following parts

For gland pack version pumps			
No.	Part description	No.	Part description
1700	Impeller nut	2310	Gland
1501	Impeller	2070	Thrust collar
2111	Spacer sleeve	2600	Bearing
2300	Log ring	3200	Impeller key
2410	Gland packing	1800	Shaft
4250	O-ring	3250	Coupling key
2100	Shaft sleeve	2902	Cir-clip



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 bare shaft pump

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

It is mandatory that those components should be CE certified and the coupling guard must comply with the regulation EN 953.

7.1.1 Electrical motor selection

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

Shaft power	$P_2 \leq 4 \text{ kW}$	$4 \text{ kW} < P_2 \leq 10 \text{ kW}$	$10 \text{ kW} < P_2 \leq 40 \text{ kW}$	$40 \text{ kW} \leq P_2$
Recommended power margin	25 %	20 %	15 %	10 %

Example:

- Duty point: 100 m³/h — 35 m — pump efficiency 78 %
- Pump shaft power: 12.5 kW
- Electrical motor rating (including margin):
 $12.5 \cdot 1.15 = 14.3 \text{ kW}$
- IEC motor power rating available: 15 kW

Use a foot mounted motor B3 (IM 1001) which comply with the IEC34-1 standard.

7.1.2 Coupling selection

Use a semi-flexible coupling to link the pump to the driver.

Select the size of the coupling in accordance with the recommendation of the coupling manufacturer. Strictly follow the coupling manufacturer's instructions for the fitting of the coupling between the pump and the motor. (The coupling must comply with the standard EN349). The alignment of the pumps and the motor must be checked after the installation of the pump set on its foundation and when the piping is connected. In addition an alignment control must take place when the system works at its nominal temperature. The coupling guard must comply with the EN 953 standards in order to avoid any contact with rotating parts during operations.

7.1.3 Selection of a base plate

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

7.1.4 Pump set assembling

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



Note:

If coupling guard is supplied loose, then kindly drill and fit it on the base plate at proper location.

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

7.2 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.

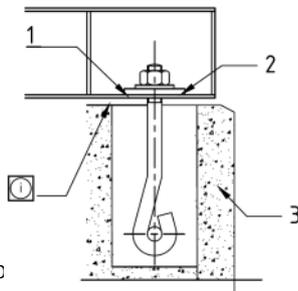
7.2.1 Foundations

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 (refer figure 3).

Foundation bolt

- 1 Erection packers
- 2 Finish grout
- 3 Concrete



NOTE:

Leave top of foundation rough, do not finish with trowel.

- A pipe sleeve about 2 ½ diameters larger 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, build the foundation in a pit lined with appropriate insulation material in order to avoid vibration transmission to the ground.



CAUTION! Risk of material damage!

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

- It is insufficient to check level on the machined pads of base plate with a spirit level because it is possible that some types of errors will not be revealed or will be accepted as being within acceptable limits. These distortions as shown in figure 4. Therefore it is necessary to use I-beam straight edge along with engineer's master level.

7.2.2 Leveling and installing the base plate

CAUTION! Risk of material damage!

Pumps and drivers that are received with both machines mounted on a common base plate are checked for alignment before shipment.

However during shipment, storage it may get disturbed.

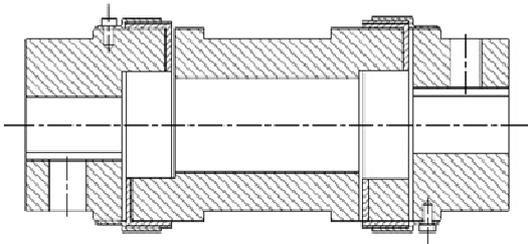
- Use I-beam straight edge and an engineer's master level (with accuracy of 0.02 mm / meter) for leveling the base plate. I-beam should rest on the machined surfaces of the base plate, or on the leveling pads if provided. These machined surfaces where level is being checked must be clean and free from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

7.2.3 Coupling assembly

Install the coupling avoiding hard blows; if necessary warm them for an easier fitting. Arrange the pump and motor on a level base. The shaft ends must be perfectly concentric. The distance between each half of the RB (RATHI) coupling must be 2 - 3 mm. For spacer couplings, the distance between shaft is mentioned in &10-2 – value "X" (100 / 140 / 180mm.)

If other manufacturer couplings are used, follow the manufacturer's instructions. After installation on the foundation and connecting the pipe work, the coupling alignment must be checked and realigned, if necessary. Moreover, after reaching the operating temperature the alignment of the coupling must be checked again. The coupling requires a guard that meets DIN31001 in order to avoid accidental contact during operation.

In any event, the operating instructions of the coupling manufacturer must be followed, since the coupling is a component incorporated by Wilo Mather & Platt.



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.

Radial alignment

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

Alignment Tolerances

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

Alignment of the pumps and its driving units

- When the base 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 recommend that all hollow pockets in the base plate shall be filled after curing of earlier grout.

The following procedures outline recommended practice given in BS-3170 in 1972 (Appendix A) for checking shaft alignment. This method is independent of the trueness of the coupling or shaft and is, therefore, not affected by canted coupling faces or eccentricity of the outside diameter of 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.



CAUTION! Risk of material damage!

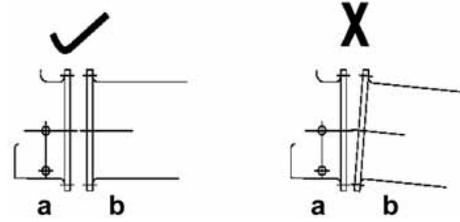
All the alignments (angular as well as radial) have to be carried out by using 3 dial indicators, simultaneously.

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

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 (Figure 6). All pipe work attached to the pump must be fully supported and the mating faces of the pipe flanges must be parallel and all bolt holes coinciding with each other. (See table of maximum forces on flanges) It is important, therefore, that alignment of the pump and motor should be rechecked after the pipes are finally fitted. Resetting or supporting the pipes must correct any deviation in the alignment.



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

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

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

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

Nominal Sizes of Flanges

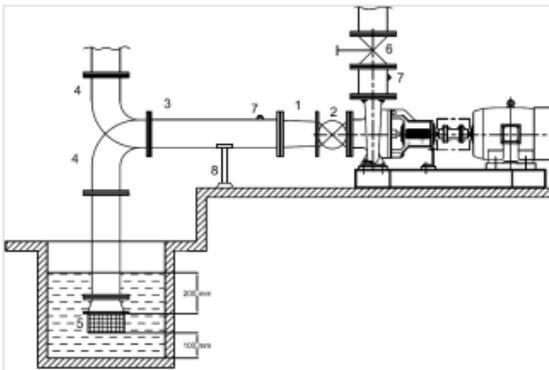
Flange size [mm]		50	65	80	100	125	150	200	250
Forces (N)	F_x	710	890	1070	1420	1955	2490	3780	5340
	F_y	890	1130	1330	1780	2490	3110	4890	6670
	F_z	580	710	890	1160	1600	2050	3110	4450
Moments (Nm)	M_x	460	690	950	1330	1760	2300	3530	5020
	M_y	230	435	470	680	1020	1180	1760	2440
	M_z	350	530	720	1000	1360	1760	2580	3800

*For casing in Stainless Steel use multiplying factor of 1.5 with above values

7.2.5 Suction line

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

- It is recommended that a strainer is installed in front of the suction pipe with a filter surface of at least 3 times the pipe cross section (approx. 100 meshes/cm²).
- The suction opening of the suction line should be well below the liquid level, and a strainer should be used.
- The strainer must be far enough from the bottom to avoid excessive inlet losses, which could impair pumping performance. It is advisable to check that there is no leakage.
- A shut-off valve should be installed in the feed line. It must be closed for maintenance work. It should be installed in order to avoid air pockets forming in the spindle cap, i.e. with the spindle in a horizontal position or pointing vertically 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
- 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 Stuffing box packing (figure 11)



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

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

7.2.8 Mechanical seal



CAUTION! Damage to the pump

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

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

7.2.9 Pressure gauge connections

CAUTION! Risk of leakage of the fluid!

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

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

7.2.10 Electrical connection



WARNING! Danger of electric shock

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

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

7.2.11 Operation with frequency converter

- The rotation speed can be adjusted in the operating limits of the pump given in the technical data. The electrical motors can be driven by a frequency converter in order to adapt the pump performances to 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.
- The converter should never generate voltage peaks to the motor connection higher than 850V and deliver voltage variations $\Delta U/\Delta t$ greater than 2500 V/ μ s.
- If the above conditions cannot be fulfilled, an appropriate filter should be placed between the frequency converter and the motor. Please contact the frequency converter manufacturer for guidance in the selection of this filter.
- Strictly follow the Frequency converter manufacturer instructions.
- The minimum rotation speed of the pump should never go below 40% of the nominal speed.

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.

8.2 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.

8.2.3 Pumps operating on hot liquids

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

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

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	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 <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 		
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		

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.

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

- Check the mechanical seal for leak. In the start phase (and also after downtimes) slight leakage can be expected. Visual leakage checks are however required from time to time. Distinctly visible leakage will require an exchange of the seal. Wilo 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 and 40 °C to 55 °C for bush bearings. The temperature should never exceed 82 °C for ball bearings and 75 °C for bush bearings. If the bearings are overheating its cause should be investigated immediately.
- If the foregoing checks are satisfactory, open the delivery valve slowly and bring the pump gradually up to its rated parameters indicated in the data sheet/name plate and based on pressure gauge and ammeter readings. Unless the pump is fitted with a special leak-off device, it should not be run for a long period against a closed delivery valve. Check that the driving unit is not being overloaded during valve opening. Overloading may occur if the pump is discharging into an empty system. If the pumping unit fails to generate at least its rated delivery pressure it must be stopped immediately, the cause ascertained,
- Check vibration of pump set and ensure that vibration level is within limits specified. Check that noise level is within stipulated limits.
- The pumps may be run for 8 hours trial operation and all the parameters like delivery pressure, current, bearing temperature, etc. Be recorded periodically.
- Make the following checks at regular intervals. It is recommended that they be made at every change of shift.
- Check the suction and discharge pressure gauge for normal operating pressure, if there is significant drop in the suction or discharge pressure the pump may have lost its supply. In the event of this fault occurring, the pump must be stopped immediately and the cause of liquid loss eliminated.
- Check the mechanical seal or stuffing box assembly for overheating.

8.3.4 Sealing system

Gland packing

CAUTION! Risk of damaging the pump!

If the gland plate is too tight, the packing stuff will be immediately damage.

At the beginning of the operation, the leak at the gland packing should be important. It should reduce progressively after several hours by a balanced and reasonable tightening the gland plate. The gland packing must operate without excessive temperature. The correct setting of the gland packing let a permanent leak around 1 or 2 drops per seconds.

If this leak is too much and cannot be adjusted with the gland plate, the packing stuffing's are worn and must be replaced.

Mechanical seal

CAUTION! Risk of damaging the pump!

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

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



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 rou

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

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

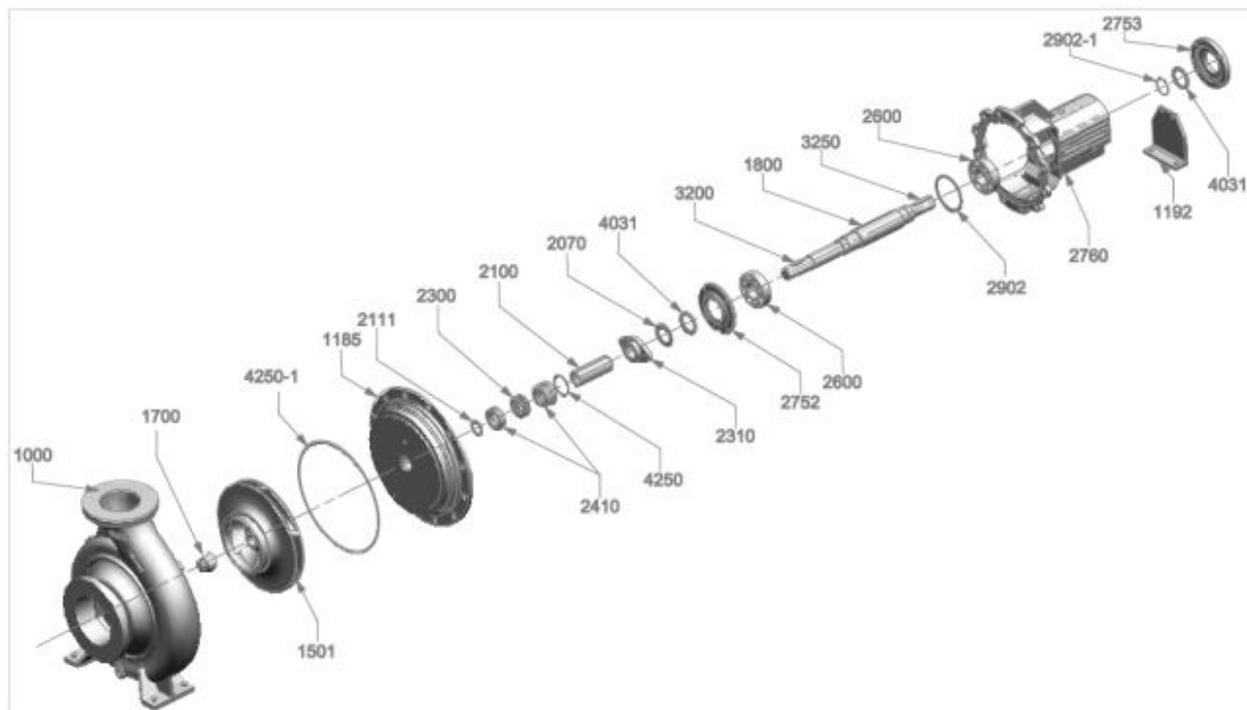
British and Metric sizes.

- 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

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

Property class	Torque	Nominal diameter – Coarse thread						
		M6	M8	M10	M12	M14	M16	M20
8.8	Nm	9.2	22	44	76	122	190	300
	Ft. lb	6.8	16.2	32.5	56	90	140	221

9.3 Disassembling the pump



Exploded view of MISO pump (Gland pack version)

Gland pack version			
No.	Description	No.	Description
1000	Casing	2600	Bearing
1185	Back cover	2752	Bearing end cover (NDE)
1192	Support foot	2753	Bearing end cover (DE)
1501	Impeller	2760	Bearing housing
1700	Impeller nut	2902	Internal circlip
1800	Shaft	2902-1	External circlip
2070	Water deflector	3200	Key (impeller)
2100	Shaft sleeve	3250	Key (coupling)
2111	Spacer sleeve	4250	O ring for sleeve
2300	Logging ring	4250-1	O ring for casing
2310	Gland	4031	Lip seal
2410	Gland packing		

- Strip the coupling and remove the spacer if fitted.
- Unfasten nuts holding frame adaptor to pump casing and lift off rotating element with bearing housing.
- Impeller can be drawn off after removing impeller nut.
- Remove gland & back cover.
- Draw shaft sleeve off the shaft

Note: Where coupling without spacer is fitted, it will be necessary to move driving unit away from the pump before this operation can be carried out.

Note: Unnecessary removal of the bearings should be avoided because frequent removal of the bearings can damage it and cause deterioration of the interference fit. Bearings should be removed Only, if they need close inspection. Symptoms which will act as a guide are the condition of the

lubricant, the bearing running temperature and the noise level during the operation.

For PISO pumps

- First drain out the oil completely
- Rest procedure for dismantling of pump is same as of ET pumps
-

9.4 Reassembling the pump

- Press Drive End bearing onto shaft, pushing on inner ring
 - Fit external cir-clip
 - Vacuum and blow out all cavities of bearing Housing
 - Mount the bearing housing onto the shaft
 - Press Non Drive End bearing on shaft
 - Fasten outer bearing cover assembly
 - Secure inner bearing cover assembly
 - Fit deflector & coupling key
 - Place back cover on bench. Insert the packing / Logging ring set into the stuffing box
 - Fit gland into stuffing box
 - Hold gland with nuts finger tight
 - Fasten back cover assembly to frame adaptor
 - Fit the sleeve & rotate shaft- check for rubbing
 - Fit impeller key tightly, fit the gasket on front and back side of the impeller and tap Impeller lightly into place
 - Tighten impeller nut, steady shaft at coupling end
 - Check operating gap 0.5- 1.5 mm in between back cover & impeller
 - Lightly grease 'O' ring and fit
 - Stand casing on suction flange
 - Vacuum and blow out all cavities
 - Grease seal ring area all around
 - Lower rotating element assembly into casing take care of 'O' ring (Place the bearing housing in vertical position for ease of assembly)
 - Fit all stud & nut
 - Check free rotation of shaft
 - Bolt on support foot finger tight
 - Adjust support foot and tighten bolt
 - Fit casing plug
- For PISO pumps**
- Press the coupling end bearing first
 - Then slide in the oil thrower
 - Now place the impeller end bearing
 - Rest procedure is same as that of MISO pumps
 - After completion of reassembly of pump, fill the bearing housing with oil of proper grade and quantity

9.5 Recommended spare parts

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

For 2 years of normal operation:

- Mechanical seal or Packing, ball bearings and the different gasket required for the dismantling of the pump.

For 3 years of normal operation:

- Mechanical seal or Packing, ball bearings and the different gasket required for the dismantling of the pump, wear rings and their nuts. For the pumps equipped with Gland packing, include the gland plate and lubrication spacer.

For 5 years of normal operation:

The maintenance of the MISO / PISO 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 shut down timing.

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.

Recommended spare parts (Gland pack version)			
No.	Description	Quantity	Recommended Spare Parts
For MISO pumps			
1	Bearing housing	1	
2	Back cover	1	
3	Support foot	1	
4	Gland	1	+
5	Casing	1	
6	Impeller	1	
7	Neck ring	1	+
8	Logging ring	1	+
9	Shaft	1	
10	Key (coupling)	1	+
11	Gland packing	6	+
12	Key (impeller)	1	+
13	Shaft sleeve	1	
14	Spacer sleeve	1	
15	Bearing end cover	2	
16	Impeller nut	1	
17	Internal circlip	1	
18	External circlip	1	
19	Bearing (impeller end)	1	
20	Lip seal	2	+
21	Water deflector	2	
22	O ring for casing	1	+
23	Impeller wearing ring	1	+
24	Bearing (coupling end)	1	+
25	O ring for sleeve	1	+
For PISO pumps (additional to above parts)			
1	Oil thrower	1	
2	Constant oil leveler	1	
3	Breather plug	1	

Recommended spare parts (Mechanical seal version)			
No.	Description	Quantity	Recommended Spare Parts
For MISO pumps			
1	Bearing housing	1	
2	Back cover	1	
3	Support foot	1	
4	Casing	1	
5	Impeller	1	
6	Neck ring	1	+
7	Shaft	1	
8	Key (coupling)	1	
9	Key (impeller)	1	+
10	Shaft sleeve	1	
11	Spacer sleeve	1	
12	Bearing end cover	2	
13	Impeller nut	1	
14	External circlip	1	+
15	Bearing (impeller end)	1	+
16	Mechanical seal	1	+
17	Lip seal	2	
18	Water deflector	2	
19	O ring for casing	1	+
20	Impeller wearing ring	1	+
21	Bearing (coupling end)	1	+
22	O ring for sleeve	1	+
For PISO pumps (additional to above parts)			
1	Oil thrower	1	
2	Constant oil leveler	1	
3	Breather plug	1	

10 Faults, Causes and Remedies

Symptoms	Possible cause of trouble and remedies (Each number is defined in the table below)
-- Output too low	1,2,3,4,5
-- Pump does not prime or only intermittently	6,7,8
-- Pump leaks	9,10
-- Temperature of the pump increases	7,11,13
-- Noisy pump	10,11,14,15
-- The motor contactor trips	8,10,16,17

Causes	Remedies
1 Back pressure too high	Regulate a new the operating point
2 Pump or pipe work ,not	Vent and fill the pump as well as the suction or in flow line
3 Suction lift too high or positive suction head too low	Check the liquid level; open the shut off valves on the suction side. Clean the filters / strainers
4 Impeller sealing gap too large	Replace worn parts
5 Wrong direction of rotation	Change the motor connection
6 Pump casing ,shaft seal, foot	Replace the casing seal. Check the shaft seal. Check the flange connections
7 Suction lift too high or positive suction head too low	Check the liquid level; open the shut off valves on the suction side. Clean the filters on the suction side
8 Loose or jammed parts in the	Open and clean the pump
9 Casing bolts not correctly	Check the tightening torque of the casing bolts
10 Mechanical seal leaks	Check the seal surfaces and rubber material of the mechanical seal. In case of damages exchange mechanical seal
11 Pump or pipe work not	Vent and fill the pump as well as the suction line or in flow line
12 Pump is running against closed	Open the shut off valve on discharge side
13 Pump or pipe work not	Purge of air the pump and the pipe work
14 Pump is not properly leveled or	Check the pump leveling and alignment
15 Foreign material in the pump	Dismantle and clean the pump
16 Earth fault	Check the earth connection. Check the potential causes such as damaged wirings or cables, leakages on electrical parts
17 Operating conditions outside	Refer to pump operating conditions stated in technical data

11 Decommissioning and recycling

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

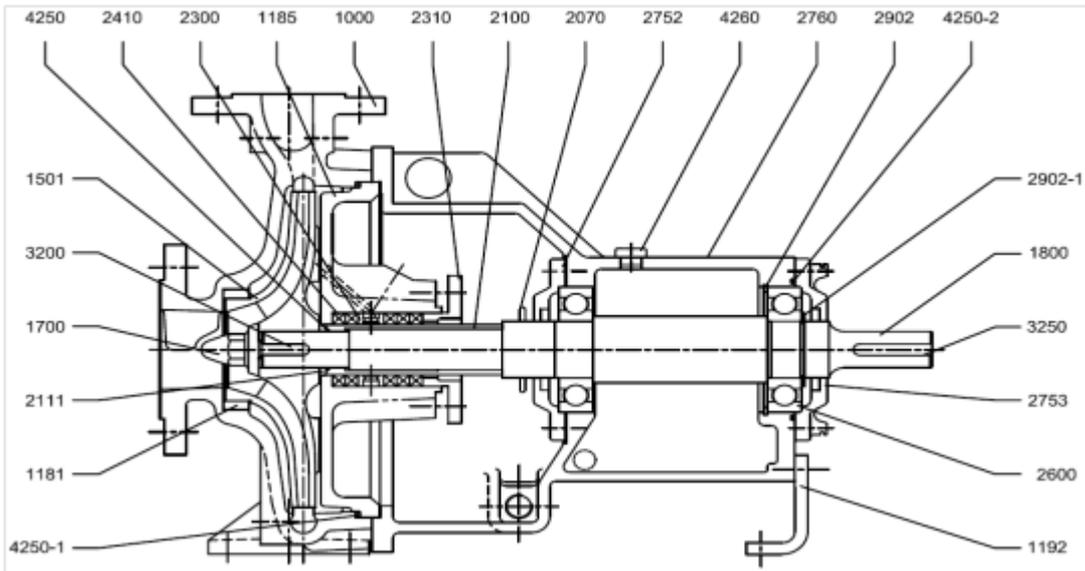
The Wilo Mather and Platt's pumps do not contain any dangerous substances. The major part of the pump is recyclable. The disposal and recycling of the pump sets must be done in accordance with the local in force regulations.

The dismantling must be done by qualified personal.

Clean and decontamination must be achieved before any transportation or recycling

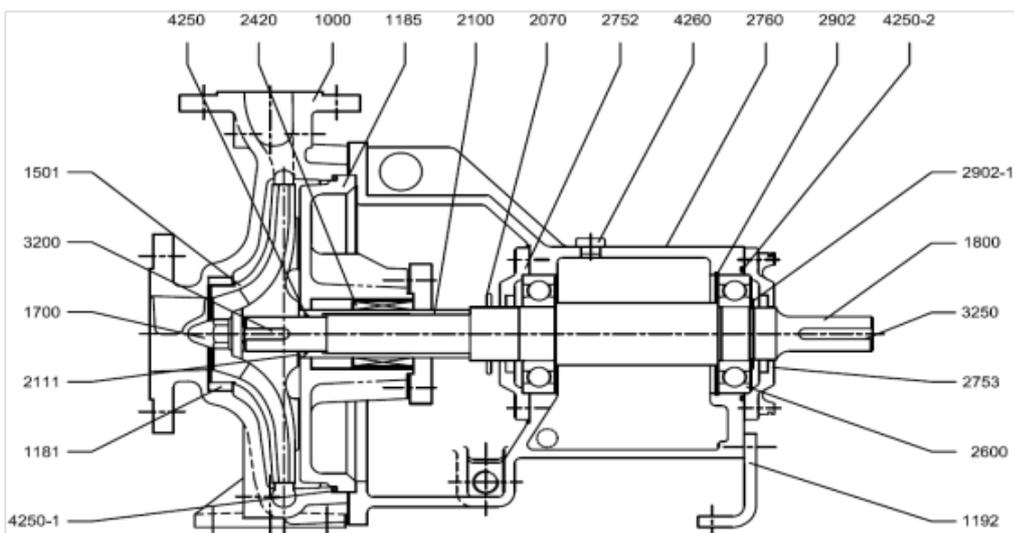
Annexure

Cross sectional Drawing of MISO Gland pack pump (Grease lubricated)



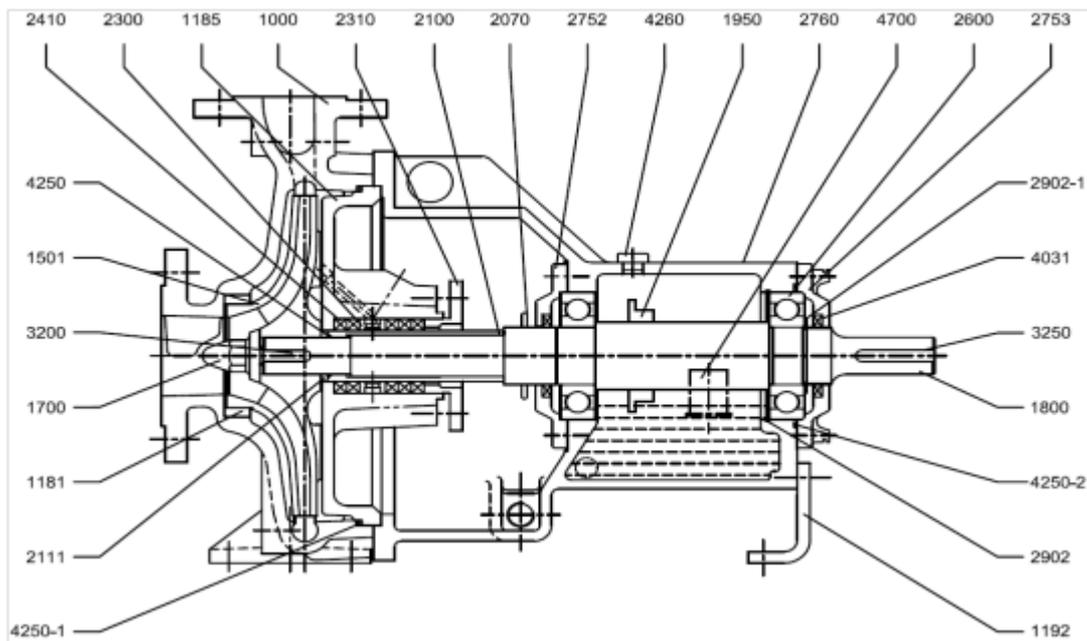
No.	Part No.	Part Name	No.	Part No.	Part Name
1	1000	Casing	14	2600	Bearing
2	1181	Neck ring	15	2752	Bearing end cover (NDE)
3	1185	Back cover	16	2753	Bearing end cover (DE)
4	1192	Support foot	17	2760	Bearing housing
5	1501	Impeller	18	2902	Internal circlip
6	1700	Impeller nut	19	2902-1	External circlip
7	1800	Shaft	20	3200	Key (impeller)
8	2070	Water deflector	21	3250	Key (coupling)
9	2100	Shaft sleeve	22	4250	O ring for sleeve
10	2111	Spacer sleeve	23	4250-1	O ring for casing
11	2300	Logging ring	24	4250-2	O ring for Brg. Hsg.
12	2310	Gland	25	4260	Breather plug
13	2410	Gland packing			

Cross sectional Drawing of MISO Mechanical seal pump (Grease lubricated)



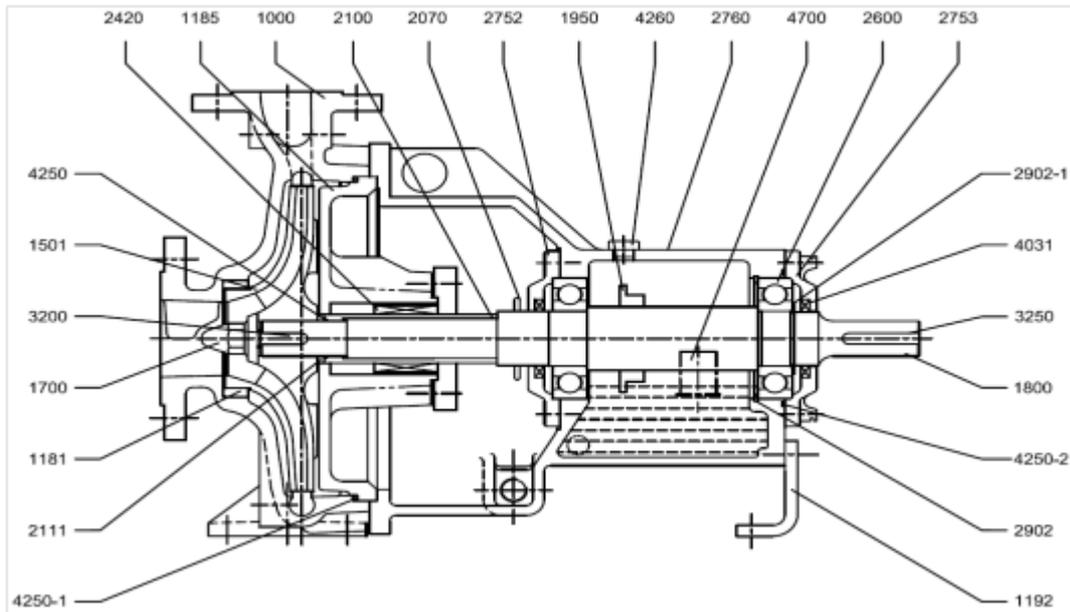
No.	Part No.	Part Name	No.	Part No.	Part Name
1	1000	Casing	13	2752	Bearing end cover (NDE)
2	1181	Neck ring	14	2753	Bearing end cover (DE)
3	1185	Back cover	15	2760	Bearing housing
4	1192	Support foot	16	2902	Internal circlip
5	1501	Impeller	17	2902-1	External circlip
6	1700	Impeller nut	18	3200	Key (impeller)
7	1800	Shaft	19	3250	Key (coupling)
8	2070	Water deflector	20	4250	O ring for sleeve
9	2100	Shaft sleeve	21	4250-1	O ring for casing
10	2111	Spacer sleeve	22	4250-2	O ring for Brg. Hsg.
11	2420	Mechanical seal	23	4260	Breather plug
12	2600	Bearing			

Cross sectional Drawing of PISO Gland pack pump (Oil lubricated)



No.	Part No.	Part Name	No.	Part No.	Part Name
1	1000	Casing	15	2600	Bearing
2	1181	Neck ring	16	2752	Bearing end cover (NDE)
3	1185	Back cover	17	2753	Bearing end cover (DE)
4	1192	Support foot	18	2760	Bearing housing
5	1501	Impeller	19	2902	Internal circlip
6	1700	Impeller nut	20	2902-1	External circlip
7	1800	Shaft	21	3200	Key (impeller)
8	1950	Oil thrower	22	3250	Key (coupling)
9	2070	Water deflector	23	4250	O' ring for sleeve
10	2100	Shaft sleeve	24	4250-1	O ring for casing
11	2111	Spacer sleeve	25	4250-2	O ring for Brg. Hsg.
12	2300	Logging ring	26	4260	Breather plug
13	2310	Gland	27	4700	Oil level indicator
14	2410	Gland packing			

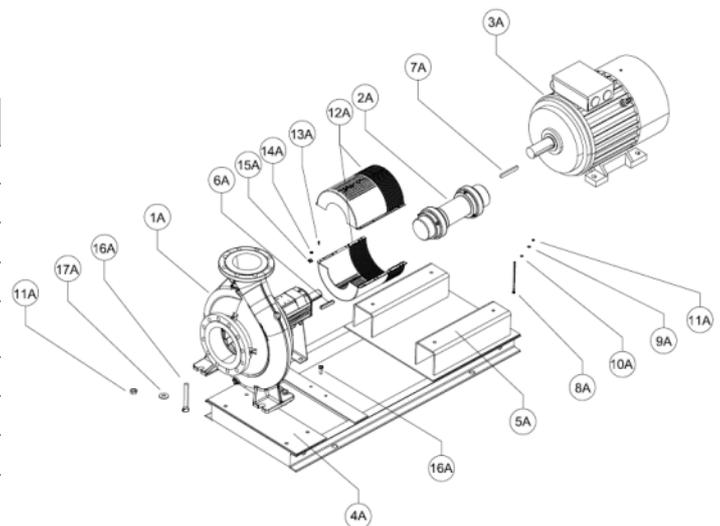
Cross sectional Drawing of PISO Mechanical seal pump (Oil lubricated)



No.	Part No.	Part Name	No.	Part No.	Part Name
1	1000	Casing	14	2752	Bearing end cover (NDE)
2	1181	Neck ring	15	2753	Bearing end cover (DE)
3	1185	Back cover	16	2760	Bearing housing
4	1192	Support foot	17	2902	Internal circlip
5	1501	Impeller	18	2902	External circlip
6	1700	Impeller nut	19	3200	Key (impeller)
7	1800	Shaft	20	3250	Key (coupling)
8	1950	Oil thrower	21	4250	O ring for sleeve
9	2070	Water deflector	22	4250-1	O ring for casing
10	2100	Shaft sleeve	23	4250-2	O ring for Brg. Hsg.
11	2111	Spacer sleeve	26	4260	Breather plug
12	2420	Mechanical seal	27	4700	Oil level indicator
13	2600	Bearing			

Exploded View

No.	Part Name	No.	Part Name
1A	Bare shaft pump	9A	Washer
2A	Coupling	10A	Lock nut
3A	Motor	11A	Hex nut
4A	Base frame	12A	Coupling guard
5A	Spacer C plate	13A	Non losable fixing set
6A	Key (pump shaft)	14A	Hex head Screw
7A	Key (motor shaft)	15A	Washer
18A	Hex Head Screw		



Oil details for PISO pumps (ISO Grade 46 oil)

Manufacture	Bush type Bearings	Grease Lubricated Bearing
Indian Oil Corporation	Servo System-46	Servogem-2/3
Hindustan Petroleum	Enclor-46	Lithon-2/3
Bharat Petroleum	Hydral-46	Multipurpose Grease-3

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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Mather+Platt

A WILO BRAND

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