Wilo-MVI 10, 15, 30, 50, 80

GB Installation and operating instructions

F Notice de montage et de mise en service

E Instrucciones de instalación y funcionamiento

2 065 409-Ed. 01/2006-10-GRD

Fig. 1:

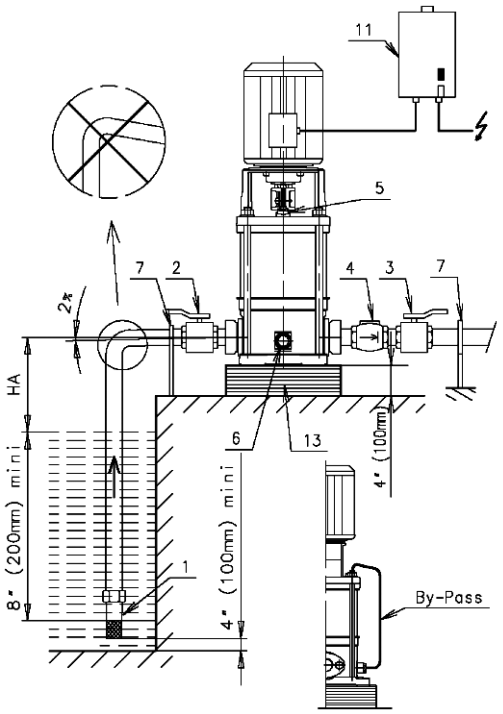


Fig. 2:

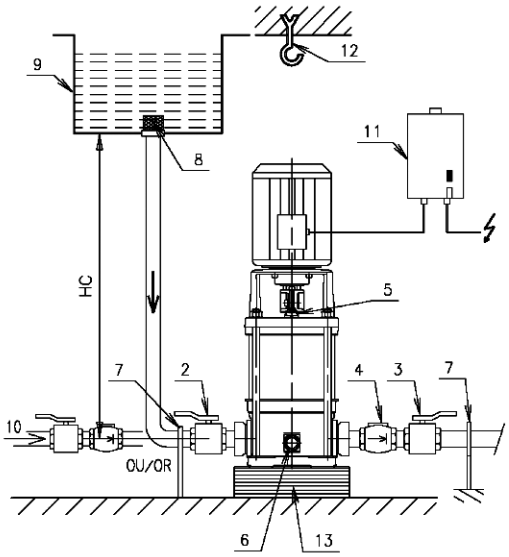


Fig. 3a: MVI 10, 15, 30

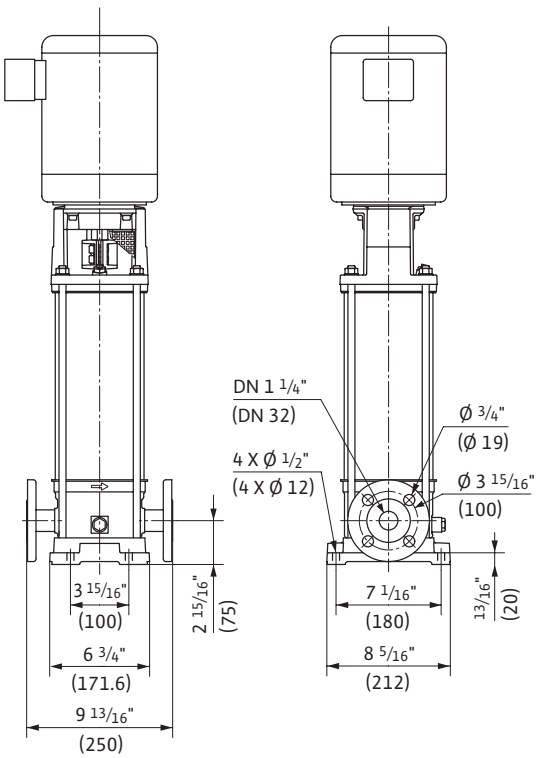


Fig. 3b: MVI 10, 15 NPT 1"; MVI 30 NPT 1 1/4"

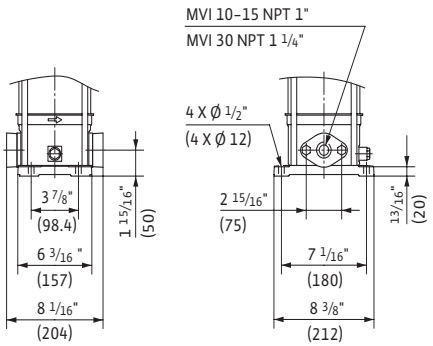


Fig. 3c: MVI 50, 80

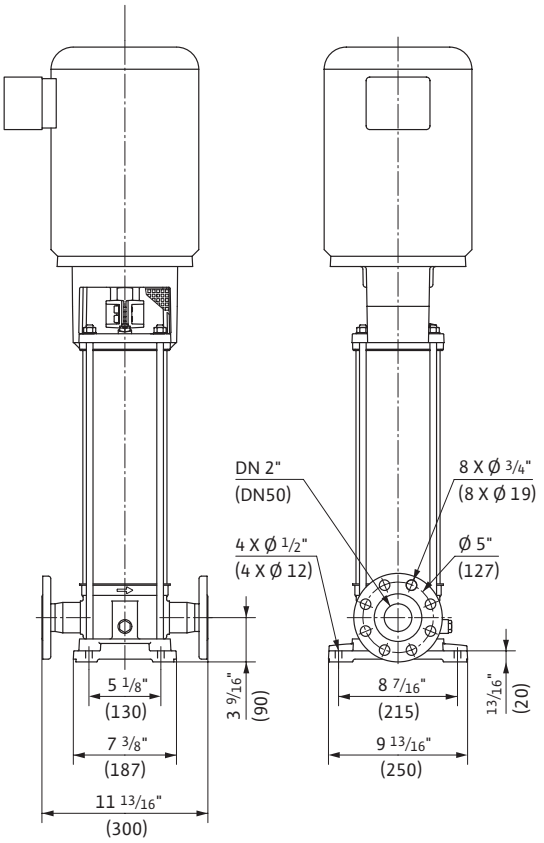


Fig. 3d: MVI 50 NPT 1 1/2"; MVI 80 NPT 2"

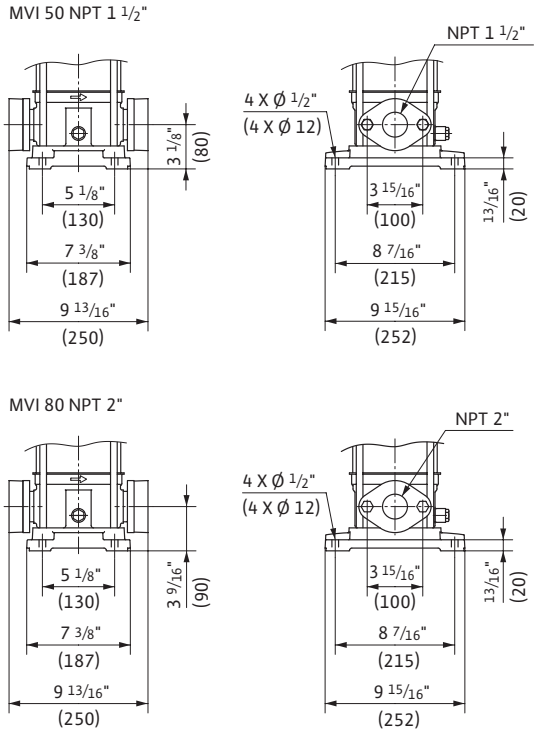


Fig. 4:

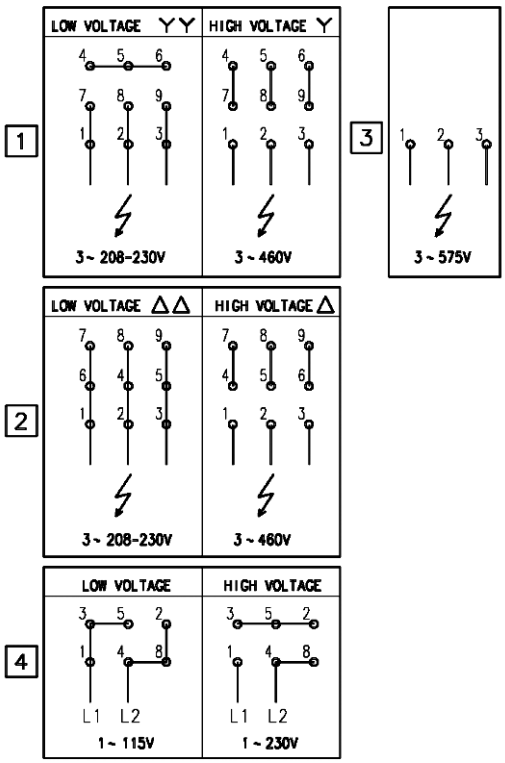
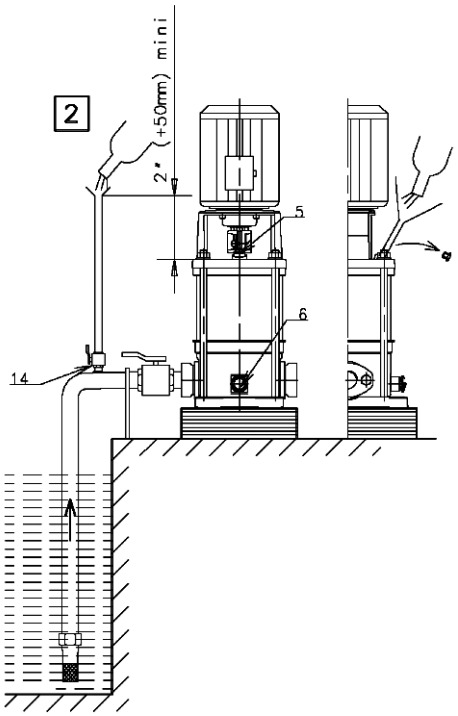


Fig. 5:



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1 General

1.1 About this document

These Installation and Operating Instructions form an integral part of the unit. They must be kept close to the unit and in readiness whenever required. Precise observance of these instructions is a pre-condition for use of the unit for the intended purpose and for its correct operation.
These Installation and Operating Instructions conform to the relevant version of the equipment and the underlying safety standards valid at the time of going to press.

2 Safety

These instructions contain important information which must be followed when installing and operating the pump. It is therefore imperative that they be read by both the installer and the operator before the pump is installed or started up.
Both the general safety instructions in the 'Safety precautions' section and those in subsequent sections indicated by danger symbols should be carefully observed.

2.1 Symbols and signal words used in these operating instructions

Symbols:

General Safety symbol

Hazards from electrical causes

NOTE:...

Signal words:

DANGER!
Imminently hazardous situation.
Will result in death or serious injury if not avoided.

WARNING!
The user can be exposed to (severe) injury. 'Warning' refers that harm to the user when the user is neglecting the procedure.

CAUTION!
The product is at risk of damage. 'Caution' refers to the product when the user is neglecting the procedures.

NOTE:
A NOTICE WITH USEFUL INFORMATION FOR THE USER IN RELATION TO THE PRODUCT. IT INFORMS THE USER TO POSSIBLE PROBLEMS.

2.2 Qualified Personnel

The personnel installing the pump must have the appropriate qualifications for this work.

2.3 Risks incurred by failure to comply with the safety precautions

Failure to comply with the safety precautions could result in personal injury or damage to the pump or installation. Failure to comply with the safety precautions could invalidate warranty and/or damage claims.
In particular, failure to comply with these safety precautions could increase the possibility of the following risks:

- the failure of important parts of the pump or installation,
- personal injury due to electrical and mechanical causes,
- material damage.

2.4 Safety precautions for the operator

Existing regulations for the prevention of accidents must be observed.
National Electrical Codes, local codes and regulations must be followed.

2.5 Safety precautions for inspection and installation

The operator must ensure that all inspection and installation work is carried out by authorized and qualified specialists who have carefully reviewed these instructions.
Work on the pump/unit must be carried out only with the pump switched off and at complete standstill.

2.6 Unauthorized alterations and manufacture of spare parts

Alterations to the pump or installation may only be carried out with the manufacturer's consent. The use of original spare parts and accessories authorized by the manufacturer will ensure safety. The use of any other parts may invalidate claims invoking the liability of the manufacturer for any consequences.

2.7 Improper use

The operational safety of the pump or installation supplied can only be guaranteed if it is used in accordance with paragraph 4 of the operating instructions. The limits given in the catalogue or data sheet must under no circumstances be exceeded.

3 Transport and interim storage

When receiving the material, check that there has been no damage during the transport. If shipping damage has occurred, take all necessary steps with the carrier within the allowed time.

CAUTION! Outside influences may cause damages
If the delivered material is to be installed later on, store it in a dry place and protect it from impacts and any outside influences (humidity, frost etc.).

Handle the pump carefully so as not to damage the unit prior to installation.

WARNING! Bodily injury
Due to the high centre of gravity and small pump footprint, beware of instability during handling to avoid the pump falling over.

4 Intended use (Application)

CAUTION! Possible damage of the pump
These pumps are intended for use with water only

Typical applications for the MVI pumps are clean fluids relatively free of abrasive particles in commercial, agricultural, industrial and municipal areas. Water supply, water towers, irrigation, high pressure wash down, fire protection, boiler feed, condensate return and pressure boosting systems.

Application areas:
- water distribution and boosting installations
- industrial circulation systems
- process fluids.
- cooling water circuits.
- fire-fighting and washing stations.
- watering installations, etc.

5 Technical data

5.1 Type key

Example: MVI220-02/1-1/A3/E80/3-575-14-T	
MVI	pump family
220	nominal flow in GPM at 60Hz / 2 poles
- 02	number of stages
/1	Number of reduced impellers
- 1	1 = stainless steel 304 2 = stainless steel 316L 3 = pump casing cast iron cataphoresis coated volute, 304 stainless steel hydraulic
/A3	P = Victaulic coupling A3 = ANSI Flange 300 lb O = 2 bolt oval flanges, NPT threaded
/E	Pump Seals E = O rings: EPDM (KTW/WRC) V = O rings: VITON
80	Only 1 digit Means: K = Standard seals with cardridge S = Standard seals without cardridge (EPDM or VITON materials depending on pump seals) 2 digits means special executions: 00 = mechanical seal Silicon carbide / Silicon carbide EPDM 80 = mechanical seal Silicon carbide / Silicon carbide EPDM cardrige system 10 = mechanical seal Silicon carbide / Silicon carbide VITON A0 = mechanical seal Silicon carbide / Silicon carbide VITON cardrige system 11 = mechanical seal Silicon carbide / Carbon VITON 01 = mechanical seal Silicon carbide / Carbon EPDM
/3	1 = Single phase 3 = Three phase nothing = Without motor
- 575	1-230 = Single phase 115/230 V 60 Hz 3-460 = Three phase 208-230/460 V 60 Hz 3-575 = Three phase 575 V 60 Hz
- 14	56 = 56C NEMA Motor Frame 14 = 143TC & 145TC 18 = 182TC & 184 TC 21 = 213TC & 215 TC 28 = 284TC & 286 TC 32 = 324TSC 36 = 364 TSC
-T	O = ODP Motor Enclosure T = TEFC

5.2 Data table

Maximum operating pressure	
Pump casing	Oval flange: 230 PSI (16 bar) ANSI flanges 300 lb: 360 PSI (25 bar) "Victaulic" flanges: 230 PSI (16 bar)
Maximum suction pressure	140 PSI (10 bar)
Temperature range	
Liquid temperatures	EPDM Version: 5 °F to 250 °F (- 15° to + 120 °C) VITON Version: 5 °F to 194 °F (- 15° to + 90 °C)
Ambient temperature	+104 °F Max (+ 40 °C)

5.2 Data table	
Electrical data	
Motor Enclosure:	ODP: Enclosure Type 1, for indoor use only TEFC: Enclosure Type 2
Insulation class:	F
Frequency	60 Hz
Voltages	1~: 115/230 V (± 10 %) 3~: 208-230 V/460 V, 575 V (± 10 %)
Others	
Minimum suction head:	according to NPSH of the pump
Ambient humidity:	<90 %
Noise level	Depends on pump size, rotation speed, working point, motor type: it can reach 77 dB(A) for ODP and 86 dB(A) for TEFC motors.

Outline and pipe dimensions:
See fig. 3a - d

5.3 Scope of Supply

- Installation and operating instructions
- Flanges:
  - Oval two bolt style: companion flanges, bolts and gaskets are included with the pump.
  - ANSI 300lb: pump delivered with gaskets and bolts without counter-flanges (accessories as option),
  - Victaulic type with rapid hose coupling for Victaulic bracket: pump delivered without brackets (accessories as option).

5.4 Accessories

- By-pass kit
- Counter Flanges (300 # round type, various connections and Oval 2 bolt threaded)

6 Description and function

6.1 Product description (see fig. 1 & 2)

1-Strainer-foot valve
2-Pump suction valve
3-Pump discharge valve
4-Non-return valve
5-Venting and filling plug
6-Drain-priming plug
7-Pipe supports
8-Strainer
9-Storage tank
10-Town water supply
11-Motor starter
12-Lifting hook
13-Foundation block
HA: Maximum suction head
HC: Minimum inlet pressure

6.2 Design of pump and motor

Vertical multistage in-line, glanded (with mechanical seal) centrifugal pump. Motor standard NEMA frame type, coupled to the pump with a shaft coupling and coupling guards.

7 Installation and electrical connection

Installation and electrical work in compliance with any local codes and by qualified personnel only!

WARNING! Bodily injury
Existing regulations for the prevention of accidents must be observed.

WARNING! Electrical shock hazard
Dangers caused by electrical energy must be excluded.
National Electrical Codes, local codes and regulations must be followed.

7.1 Installation

- The pump must be installed in a dry, well-ventilated and frost-free place.

CAUTION! Possible damage of the pump
Dirt and solder drops into the pump body can effect the pump operation.
- **It is recommended that any welding and soldering work be done before installing the pump.**
- **Thoroughly flush the system out before installing the pump.**

WARNING! Risk of accident by hot surfaces
The pump must be positioned so that someone cannot come into contact with the hot pump surfaces while operation.

- Install the pump in a dry place protected from frost and as close as possible to the water in a suction lift application.
- Locate the pump in an accessible location to facilitate inspection and maintenance. The pump must be installed in a vertical configuration on a concrete base.
- For especially heavy pumps, place a hook or a ring of sufficient capacity (total weight of pump) to allow the use of a hoist or similar device for the servicing and repair of the pump.
- Install the pump on a concrete block (at least 4" / 10 cm high). Consider an vibration insulation pad between the concrete base and pump in locations where noise might cause problems.
- The installation surface must be level and flat: any tilting of the pump could cause premature bearing wear.

7.2 Hydraulic connection

- The installation and connection dimensions are given in fig. 3.
  - Pump with two bolt oval flanges: Pipe is threaded (NPT) directly into the companion flanges supplied with the pump.
  - Pump with round 300 lb flange have accessory companion flagnes (counter flanges) that attach to system piping in a manner dependant on the flange type (threaded NPT, weld neck etc.).
- When fitting the oval flange, only the bolts supplied should be used. The use of longer bolts might damage the base of the pump.
- The fluid flow direction is indicated on the pump body.
- Pump must be installed in such a way that it is not stressed by the pipework. The pipes must be attached so that the pump does not bear their weight.
- It is recommended that isolation valves be installed on the suction and discharge side of the pump. This will save having to drain and refill the system if the pump needs replacing.
- It is recommended that the pipe leading into the suction side of the pump has a minimum length which is three times as long as the pipe diameter.
- A check valve should be placed on the discharge pipe to protect it from water hammer.
- Note: To pump water with a large content of air or hot water, we recommend installing the by-pass kit.

Fig. 2: Flooded or pressurized suction applications

- For direct connection to a public drinking water system please refer to local plumbing codes for the requirement of a back flow protection device.
- For indirect connection via a tank, the suction pipe must have a strainer, to keep any impurities out of the pump.

Fig. 1: Suction lift applications

- To avoid any loss of head, use the shortest possible suction pipe and keep it free of bends that would increase the piping friction losses.
- **Connections have to be correctly sealed: No air entrance is allowed on the suction pipe (2 %). See figure 1**

CAUTION! Possible damage of the pump caused by cavitation (boiling water at the eye of the first impeller
Do not install in a suction lift position with fluids above 175 deg F (80 Deg C). Please refer to the chart below for NPSH required corrections for suction lift applications above sea level.

Altitude	Loss of head
0 ft	0.0 ft
1000 ft	1.2 ft
2000 ft	2.4 ft
3000 ft	3.5 ft
5000 ft	5.7 ft
7000 ft	7.6 ft
10000 ft	10.7 ft

Temperature	Loss of suction head (HA)	Temperature	Loss of suction head (HA)
20 °C	0.20 mCL	70 °F	0.70 ft
30 °C	0.40 mCL	90 °F	1.50 ft
40 °C	0.70 mCL	100 °F	2.00 ft
50 °C	1.20 mCL	120 °F	3.70 ft
60 °C	1.90 mCL	140 °F	5.70 ft
70 °C	3.10 mCL	160 °F	10.10 ft
80 °C	4.70 mCL	180 °F	16.20 ft
90 °C	7.10 mCL	200 °F	26.20 ft
100 °C	10.30 mCL	210 °F	32.60 ft

7.3 Electrical connection

WARNING! Electrical shock hazard
Dangers caused by electrical energy must be excluded.

- **Electrical work by a qualified electrician only!**
- **National Electrical Codes, local codes and regulations must be strictly followed.**
- **All electrical connections must be performed after the electrical supply has been switched off and secured against unauthorized switching.**
- **For safe installation and operation a proper grounding of the pump to the power supply's grounding terminals is required.**

- The electrical characteristics (frequency, voltage, nominal current) of the motor are mentioned on the name plate: check if it complies with the mains supply used.
- The pump must be connected to the power supply by a solid cable equipped with a grounded plug-connection or a main power switch.
- Three-Phase motors must be connected to an approved motor starter. The set nominal current of which must correspond to the electrical data on the pump name plate
- The supply cable must be laid so that it never touches the pipe work and/or the pump and motor casing.

- The pump/installation should be grounded in compliance with local regulations. A ground fault interrupter can be used as extra protection.
- The connection to the network must be in accordance with the connection plan (see Fig. 4).
- The position of the terminal box can be changed a quarter turn by removing the motor attachment screws (if necessary, remove the coupling guards) and turning the motor to the desired position.

WARNING! Bodily injury!
Refit the attachment screws of the motor and the coupling guards.

WARNING! Electrical shock hazard
DO NOT FORGET TO CONNECT TO GROUND.

- The electric motors used on the pumps can be connected to a frequency converter. Strictly follow the instructions given by the data sheet of the converter's manufacturer.
  The converter must not generate voltage peaks at the motor terminals higher than 850 V and dU/dt (Voltage/Time variation) higher than 2500 V/µs. If the value of the voltage signal are higher than those, risk of damage the motor are to forecast.In the contrary provide a LC filter (inductance – capacitor) between the converter and the motor. It must be connected to the motor with a minimum length cable, armoured if necessary.

8 Start up

8.1 Preliminary rinsing

WARNING! Health hazard
Pumps are tested regarding hydraulic features in factory, some water may remain in them. It is recommended for hygiene purposes, to carry out a rinsing of the pump before any using with potable water supply.

8.2 System filling – Venting

CAUTION! Possible damage of the pump
Never operate the pump dry.

Two standard cases:
- **Fig. 1: Suction lift applications**
- **Fig. 2: Flooded or pressurized suction applications** on storage tank (9) or town water supply (10) with dry-running protection system.

Air evacuation process with pump under pressure (see fig. 2):
- Close the discharge valve (3)
- Open the venting plug (5), and the suction valve (2) and completely fill the pump.
- Close the venting plug only after water flows out with no visible air at the venting plug.

WARNING! Bodily injury
Pump under pressure! In hot water, a stream of water may escape from the venting port.Take all required precautions as regards persons and motor.

Air evacuation process with pump in suction (see fig. 5):
Two possible cases:
1st case (see fig. 5.1)
- Close the discharge valve (3), open the suction valve (2)
- Remove the venting plug (5)
- Unscrew the bottom drain-priming plug (6) located on the pump casing 4 to 5 turns.
- Put a funnel into the venting plug port and completely fill the pump and the suction pipe.
- After water flows out with no visible air at the vent plug , filling is complete.
- Screw the venting plug and the bottom drain-priming plug back in.

2nd case (see fig. 5.2)
Filling can be made easier by fitting on the suction pipe of the pump, a vertical pipe fitted with a Ø ½" ball valve and a funnel.

NOTE:
The length of the pipe must be at least 2 inches (50 mm) taller than the venting plug level.
- Close the discharge valve (3), open the suction valve (2).
- Open the ball valve and the venting plug.
- Unscrew 4 to 5 turns the drain-priming plug (6).
- Fill the pump and the suction pipe completely until water flows out of the venting plug (5).
- Close the ball valve (which can be left in place), remove the pipe and close the bleed device (5) and reseat the drain-priming plug (6).

Dry-running protection
To ensure that the pump is always primed, we recommend to protect it with a pressure switch or a float switch.

8.3 Confirm correct rotation

Prior to turning the pump on ensure the rotating assembly is free of any binding.

WARNING! Electrical shock hazard
Dangers caused by electrical energy must be excluded.
Do not attempt the following unless 100% sure power is off.

- Remove either one or both coupling guards.
- Turn the coupling by hand to make sure the pump turns freely without sticking.
- Once the correct rotation has been confirmed (refer to three-phase or single-phase procedure noted below) re-install the coupling guard(s) before the power is activated full time.

CAUTION! Possible damage of the pump
Prior to starting the pump there must be fluid at the seal area.

Three-phase motor
- Switch on the motor by briefly pressing the circuit-breaker and check that it turns in the direction indicated by the arrow located on the lantern or on the identification label of the pump.
- If the rotation is backwards insure power is off and switch two of the three motor leads and recheck the rotation. Once proper rotation is confirmed a amperage balance is recommended across each of the three phases – maximum allowable difference is +/- 5 %.

Single phase motor
- Typically the rotation should be correct on single phase applications however if the pump seems to lack performance please check the rotation. If running backwards refer the motor nameplate for instructions to reverse rotation.

8.4 Starting up

WARNING! Risk of scalding
Under some pump or installation operating conditions (temperature of pumped liquid, volume flow), the whole pump, including the motor, may become very hot. There is a real risk of burns just from touching the pump.

CAUTION! Possible damage of the pump
The pump must not operate at zero flow (closed discharge valve) for more than 10 minutes with cold water (T < 104 °F (40 °C)) and more than 5 minutes above 140 °F (60 °C).
We recommend to ensure a minimum flow of about 10 % of the nominal flow of the pump to avoid the formation of a vapour lock at the top of the pump.

- Keep the discharge valve closed.
- Start the pump
- Open venting plug to drain air. If no water leaks within 20 seconds, close the plug and stop the pump, then wait 20 seconds to allow air to settle.
- Start again the pump.
- If necessary (particularly if the suction height exceeds 16 ft – 5 m) repeat these operations.
- If water leaks at draining plug (it means the pump delivers its pressure), slowly open the discharge valve. The pump has to be primed.
- Check discharge pressure for pressure fluctuations with a pressure gauge. If fluctuations are present please check the inlet conditions and/or re-prime the pump.
- To insure all air has been removed, close the discharge valve and the draining plug, then stop the pump 20 seconds, start the pump again and open the draining plug. Do it as long as air comes out
- Open the discharge valve fully or at a desired position determined by the installation.
- Check that the current input does not exceed the value indicated on the motor data plate.

9 Maintenance / Service

All servicing should be performed by an authorized service representative!

WARNING! Electrical shock hazard
Dangers caused by electrical energy must be excluded.
All electrical work must be performed after the electrical supply has been switched off and secured against unauthorized switching.

WARNING! Risk of scalding
At high water temperatures and system pressure close isolating valves before and after the pump. First, allow pump to cool down.

- No special maintenance in operation.
- Keep the pump and the motor perfectly clean.
- In case of prolonged stopping, if there is no risk of frost, it is best not to drain the pump.
- The bearing holding the coupling is lubricated for its total lifetime and does not require any lubrication. It is recommended to grease the motor shaft end as well as the coupling boring with a high adhering grease (type type D321R Molikote or 8191 Loctite for example) to facilitate any further diassembling.

Motors without lubricating devices

- Bearings are lubricated for their lifetime and do not require any lubrication.

Motors with lubricating devices

- See instructions put on motor. If missing, lubricate every 5 000 hours with a grease resistant to high temperature.

Mechanical seals

- The mechanical seal does not require any maintenance in operation. It must never operate dry.

10 Faults, causes and remedies

WARNING! Electrical shock hazard
Dangers caused by electrical energy must be excluded.
All electrical work must be performed after the electrical supply has been switched off and secured against unauthorized switching.

WARNING! Risk of scalding
At high water temperatures and system pressure close isolating valves before and after the pump. First, allow pump to cool down.

DEFAULTS/CAUSES	REMEDIES
1) Pump turns but no delivery	
a) The internal parts are obstructed by particles	a) Dismantle the pump and clean it
b) Suction pipe obstructed	b) Clean all the pipes
c) Air in suction pipes	c) Check tightness of the whole pipe up to the pump and make it tight
d) Pump has lost it's prime	d) Fill the pump to prime again. Check foot valve is tight
e) Suction pressure is too low, it causes cavitation noise	e) Too high loss of head on suction or suction head (check the NPSH of the pump installed and of the installation)
f) The supply voltage of the motor is too low	f) Check the voltage on the terminals of the motor and the cross-section of the conductors
2) The pump vibrates	
a) Loose on its foundation	a) Check and tighten completely the nuts of the stud bolts
b) Particles obstructing the pump	b) Dismantle the pump and clean it
c) Rotation variances	c) Check the pump turns freely without abnormal sticking
d) Bad electrical connection	d) Check the connections to the pump motor
3) The motor overheats	
a) Voltage too low	a) Check voltage on terminals of the motor, it should be within ± 10 % in 50 Hz or ± 6 % in 60 Hz of the rated voltage
b) Pump obstructed by particles	b) Dismantle the pump and clean it
c) Ambient temperature above +40 °C	c) The motor is aimed at operating at a maximum ambient temperature of + 40°C
d) Election connection problem in terminal box	d) Be in conformity with the motor plate and see figure 4
e) Phase imbalance on three phase	e) Check amperage at each leg, if more than 5 % variance total call electrician to balance (rotate all three legs)
4) The flow is irregular	
a) The suction head (HA) is not adequate	a) Study again the installation conditions and the recommendations described in this instruction
b) The suction pipe has a lower diameter than the one of the pump	b) The suction pipe must have the same diameter as the suction pump port
c) The strainer and the suction pipe are partially obstructed	c) Remove and clean

WARNING! Health hazard
If the liquid is toxic, corrosive or dangerous for human being, WILO must be informed or the qualified person in charge of the repairing. In this case, clean the pump to ensure a complete safety to the repairing man.

If the fault cannot be remedied, please contact your local sanitary and heating specialist or WILO customer services.

11 Spare parts

All spare parts must be ordered through your local specialist and/or Wilo Customer Services.
In order to avoid returns and incorrect orders, please specify the name plate data for all orders.

WILO USA LLC
1290 North 25th Ave.
Melrose Park, IL
USA
60160
Phone: (866) 945-6872
(WILO USA)
FAX: (403) 277-9456

Wilo Canada Inc.
Bay 7 – 2915
10th Ave. N.E.
Calgary, Alberta, T2A 5L4
CANADA
Phone: (403) 276-9456
(WILO CDN)
FAX: (403) 277-9456

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