



NSCE



NSCS



NSC2

Applicare qui il codice a barre

Apply the adhesive bar code nameplate here

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Causa	Soluzione
I cuscinetti del motore sono usurati.	Rivolgersi al rappresentante di vendita e assistenza di zona.
Presenza di corpi estranei	Rivolgersi al rappresentante di vendita e assistenza di zona.

Causa	Soluzione
all'interno della pompa.	
Il girante striscia contro l'anello di usura	Rivolgersi al rappresentante di vendita e assistenza di zona.

Per ogni situazione non contemplata, fare riferimento al rappresentante di vendita e assistenza di zona.

## 1 Introduction and Safety



### 1.1 Introduction

#### Purpose of this manual

The purpose of this manual is to provide necessary information for:

- Installation
- Operation
- Maintenance



#### CAUTION:

Read this manual carefully before installing and using the product. Improper use of the product can cause personal injury and damage to property, and may void the warranty.

#### NOTICE:

Save this manual for future reference, and keep it readily available at the location of the unit.

#### 1.1.1 Inexperienced users



#### WARNING:

This product is intended to be operated by qualified personnel only.

Be aware of the following precautions:

- This product is not to be used by anyone with physical or mental disabilities, or anyone without the relevant experience and knowledge, unless they have received instructions on using the equipment and on the associated risks or are supervised by a responsible person.
- Children must be supervised to ensure that they do not play on or around the product.

### 1.2 Safety terminology and symbols

#### About safety messages

It is extremely important that you read, understand, and follow the safety messages and regulations carefully before handling the product. They are published to help prevent these hazards:

- Personal accidents and health problems
- Damage to the product and its surroundings
- Product malfunction

#### Hazard levels

Hazard level	Indication
<b>DANGER:</b>	A hazardous situation which, if not avoided, will result in death or serious injury
<b>WARNING:</b>	A hazardous situation which, if not avoided, could result in death or serious injury
<b>CAUTION:</b>	A hazardous situation which, if not avoided, could result in minor or moderate injury
<b>NOTICE:</b>	Notices are used when there is a risk of equipment damage or decreased performance, but not personal injury.

#### Special symbols

Some hazard categories have specific symbols, as shown in the following table.

Electrical hazard	Magnetic fields hazard
<b>Electrical Hazard:</b>	<b>CAUTION:</b>

#### Hot surface hazard

Hot surface hazards are indicated by a specific symbol that replaces the typical hazard level symbols:



#### CAUTION:

#### Description of user and installer symbols

Specific information for personnel in charge of installing the product in the system (plumbing and/or electrical aspects) or in charge of maintenance.
Specific information for users of the product.

#### Instructions

The instructions and warnings that are provided in this manual concern the standard version, as descri-

bed in the sales document. Special version pumps may be supplied with supplementary instruction leaflets. Refer to sales contract for any modifications or special version characteristics. For instructions, situations, or events that is not considered in this manual or the sales document, contact the nearest Service Center.

### 1.3 Disposal of packaging and product

Observe the local regulations and codes in force regarding sorted waste disposal.

### 1.4 Warranty

For information about warranty, see the sales contract.

### 1.5 Spare parts



#### WARNING:

Only use original spare parts to replace any worn or faulty components. The use of unsuitable spare parts may cause malfunctions, damage, and injuries as well as void the guarantee.



#### CAUTION:

Always specify the exact product type and part number when requesting technical information or spare parts from the Sales and Service Department.

For more information about the product's spare parts, visit sales network's website.

## 1.6 DECLARATIONS OF CONFORMITY

### 1.6.1 EC Declaration of Conformity (Original)

Xylem Service Italia S.r.l., with headquarters in Via Vittorio Lombardi 14 - 36075 Montecchio Maggiore VI - Italy, hereby declares that the product:

#### Electric pump unit (see label on first page)

fulfills the relevant provisions of the following European directives:

- Machinery 2006/42/EC (ANNEX II - natural or legal person authorised to compile the technical file: Xylem Service Italia S.r.l.)
- Eco-design 2009/125/EC, Regulation (EC) No 640/2009 & Regulation (EU) No 4/2014 (Motor 3 ~, 50 Hz, PN ≥ 0,75 kW) if IE2 or IE3 marked, Regulation (EU) No 547/2012 (Water pump) if MEI marked

and the following technical standards

- EN ISO 12100:2010, EN 809:1998+A1:2009, EN 60204-1:2006+A1:2009
- EN 60034-30:2009, EN 60034-30-1:2014

Montecchio Maggiore, 11.03.2016

Amedeo Valente  
(Director of Engineering and R&D)  
rev.01

### 1.6.2 EU Declaration of Conformity (No EMC01)

1. Apparatus model/Product:  
see label on first page
  2. Name and address of the manufacturer:  
Xylem Service Italia S.r.l.  
Via Vittorio Lombardi 14  
36075 Montecchio Maggiore VI  
Italy
  3. This declaration of conformity is issued under the sole responsibility of the manufacturer.
  4. Object of the declaration:  
electric pump
  5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:  
Directive 2014/30/EU of 26 February 2014 (electromagnetic compatibility)
  6. References to the relevant harmonised standards used or references to the other technical specifications, in relation to which conformity is declared:  
EN 61000-6-1:2007, EN 61000-6-3:2007  
+A1:2011
  7. Notified body: -
  8. Additional information: -
- Signed for and on behalf of:  
Xylem Service Italia S.r.l.

Montecchio Maggiore, 11.03.2016

Amedeo Valente  
(Director of Engineering and R&D)  
rev.01

Lowara is a trademark of Xylem Inc. or one of its subsidiaries.

## 2 Transportation and Storage



### 2.1 Inspect the delivery

1. Check the outside of the package for evident signs of damage.
2. Notify our distributor within eight days of the delivery date, if the product bears visible signs of damage.

#### Unpack the unit

1. Follow applicable step:
  - If the unit is packed in a carton, then remove the staples and open the carton.
  - If the unit is packed in a wooden crate, then open the cover while paying attention to the nails and straps.
2. Remove the securing screws or the straps from the wooden base.

#### 2.1.1 Inspect the unit

1. Remove packing materials from the product.  
Dispose of all packing materials in accordance with local regulations.
2. Inspect the product to determine if any parts have been damaged or are missing.

- If applicable, unfasten the product by removing any screws, bolts, or straps.

For your personal safety, be careful when you handle nails and straps.

- Contact the local sales representative if there is any issue.

## 2.2 Transportation guidelines

### Precautions



#### WARNING:

- Observe accident prevention regulations in force.
- Crush hazard. The unit and the components can be heavy. Use proper lifting methods and wear steel-toed shoes at all times.

Check the gross weight that is indicated on the package in order to select proper lifting equipment.

### Position and fastening

The pump or pump unit can be transported only horizontally. Make sure that the pump or pump unit is securely fastened during transportation and cannot roll or fall over.



#### WARNING:

Do not use eyebolts screwed on the motor for handling the whole electric pump unit.

Do not use the shaft end of the pump or of the motor to handle the pump, the motor or the unit.

- Eyebolts screwed onto the motor may be exclusively used to handle the individual motor or, in case of a not balanced distribution of weights, to partially lift the unit vertically starting from a horizontal displacement.

Pump unit must always be fixed and transported as shown in [Figure 5](#) (page 333), and the pump without motor must be fixed and transported as shown in [Figure 6](#) (page 333).

In this last case remove coupling guards from drive lantern and cross the lifting ropes/bands.

## 2.3 Storage guidelines

### Storage location

The product must be stored in a covered and dry location free from heat, dirt, and vibrations.

#### NOTICE:

Protect the product against humidity, heat sources, and mechanical damage.

#### NOTICE:

Do not place heavy weights on the packed product.

### 2.3.1 Long-term storage

If the unit is stored for more than 6 months, these requirements apply:

- Store in a covered and dry location.
- Store the unit free from heat, dirt, and vibrations.
- Rotate the shaft by hand several times at least every three months.

For questions about possible long-term storage treatment services, please contact your local sales and service representative.

### Ambient temperature

The product must be stored at an ambient temperature from -5°C to +40°C (23°F to 104°F).

## 3 Product Description



### 3.1 Pump design

The pump is a horizontal pump with volute casing close coupled to standard electric motors.

The pump can be used for handling:

- Cold or warm water
- Clean liquids
- Liquids which are not chemically and mechanically aggressive to the pump materials.

### Intended use

The pump is suitable for:

- Water supply and water treatment
- Cooling and hot water supply in industries and building services
- Irrigation and sprinkler systems
- Heating systems

Additional uses for optional material:

- District heating
- General industry

### Improper use



#### WARNING:

Improper use of the pump may create dangerous conditions and cause personal injury and damage to property.

An improper use of the product leads to the loss of the warranty.

Examples of improper use:

- Liquids not compatible with the pump construction materials
- Hazardous liquids (such as toxic, explosive, flammable, or corrosive liquids)
- Potable liquids other than water (for example, wine or milk)

Examples of improper installation:

- Hazardous locations (such as explosive, or corrosive atmospheres).
- Location where the air temperature is very high or there is poor ventilation.
- Outdoor installations where there is no protection against rain or freezing temperatures.



#### DANGER:

Do not use this pump to handle flammable and/or explosive liquids.

### NOTICE:

- Do not use this pump to handle liquids containing abrasive, solid, or fibrous substances.
- Do not use the pump for flow rates beyond the specified flow rates on the data plate.

### Special applications

Contact the local sales and service representative in the following cases:

- If the density and/or viscosity value of the pumped liquid exceeds the value of water, such as water with glycol; as it may require a more powerful motor.
- If the pumped liquid is chemically treated (for example softened, deionized, demineralized etc.).
- Any situation that is different from the ones that is described and relate to the nature of the liquid.

### 3.2 Pump denomination

See [Figure 2](#) (page 318) for an explanation of the denomination code for the pump and one example.

### 3.3 Nameplate

The nameplate is a metal label that is located on the pump body or on drive lantern depending on model. The name plate lists key product specifications. For more information, see [Figure 1](#) (page 313)

The nameplate provides information regarding the impeller and casing material, the mechanical seal and their materials. For more information, see [Figure 3](#) (page 328).

### IMQ or TUV or IRAM or other marks (for electric pump only)

Unless otherwise specified, for products with a mark of electrical-related safety approval, the approval refers exclusively to the electrical pump.

### 3.4 Pump description

- Connection dimensions according EN 733 (models 32-125...-200; 40-125...-250; 50-125...-250; 65-125...-315; 80-160...-315; 100-200...-400; 125-250...-400; 150-315...-400).
- Volute casing pump with back pull out power end.

### 3.5 Material

The metallic parts of the pump that come in contact with water are made of the following:

Material code	Material casing / impeller	Standard/ Optional
CC	Cast iron/Cast iron	Standard
CB	Cast iron/ Bronze	Standard
CS	Cast iron/ Stainless steel	Standard
CN	Cast iron/ Stainless steel	Standard
DC	Ductil iron / Cast iron	Standard
DB	Ductil iron / Bronze	Standard

Material code	Material casing / impeller	Standard/ Optional
DN	Ductil iron / Stainless steel	Standard
NN	Stainless steel / Stainless steel	Standard
RR	Duplex/Duplex	Opzional

### 3.6 Mechanical seal

Unbalanced single mechanical seal acc. EN 12756, version K.

### 3.7 Application limits

#### Maximum working pressure

[Figure 4](#) (page 332) shows the maximum working pressure depending on the pump model and the temperature of the pumped liquid.

$$P_{1max} + P_{max} \leq PN$$

$P_{1max}$  Maximum inlet pressure

$P_{max}$  Maximum pressure generated by the pump

PN Maximum operating pressure

#### Liquid temperature intervals

[Figure 4](#) (page 332) shows the working temperature ranges.

For special requirements, contact the Sales and Service Department.

#### Maximum number of starts per hour

kW	0.25	4.00	11	18.5	30	45	90
	-	-	-	-	-	-	-
	3.00	7.50	15	22	37	75	160
Starts per hour	60	40	30	24	16	8	4

#### Noise level

For the sound pressure levels of pump equipped with standard supplied motor, see [Table 7](#) (page 333).

## 4 Installation



### Precautions



#### WARNING:

- Observe accident prevention regulations in force.
- Use suitable equipment and protection.
- Always refer to the local and/or national regulations, legislation, and codes in force regarding the selection of the installation site, plumbing, and power connections.



#### Electrical Hazard:

- Make sure that all connections are performed by qualified installation

technicians and in compliance with the regulations in force.

- Before starting work on the unit, make sure that the unit and the control panel are isolated from the power supply and cannot be energized. This applies to the control circuit as well.

## Grounding (earthing)



### Electrical Hazard:

- Always connect the external protection conductor to ground (earth) terminal before making other electrical connections.
- You must ground (earth) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the ground (earth) lead to verify that it is connected correctly.
- If the motor cable is jerked loose by mistake, the ground (earth) conductor should be the last conductor to come loose from its terminal. Make sure that the ground (earth) conductor is longer than the phase conductors. This applies to both ends of the motor cable.
- Add additional protection against lethal shock. Install a high-sensitivity differential switch (30 mA) [residual current device RCD].

## 4.1 Facility requirements

### 4.1.1 Pump location



#### ! DANGER:

Do not use this unit in environments that may contain flammable/explosive or chemically aggressive gases or powders.

#### Guidelines

Observe the following guidelines regarding the location of the product:

- Make sure that no obstructions hinder the normal flow of the cooling air that is delivered by the motor fan.
- Make sure that the installation area is protected from any fluid leaks, or flooding.
- If possible, place the pump slightly higher than the floor level.
- The ambient temperature must be between 0°C (+32°F) and +40°C (+104°F).
- The relative humidity of the ambient air must be less than 50% at +40°C (+104°F).
- Contact the Sales and Service Department if:
  - The relative air humidity conditions exceed the guidelines.
  - The room temperature exceeds +40°C (+104°F).
  - The unit is located more than 1000 m (3000 ft) above the sea level. The motor performance may need to be de-rated or replaced with a more powerful motor.

For information about which value to de-rate the motor with, see [Table 8](#) (page 337).

## Pump positions and clearance

Provide adequate light and clearance around the pump. Make sure that it is easily accessible for installation and maintenance operations.

### Installation above liquid source (suction lift)

The theoretical maximum suction height of any pump is 10.33m. In practice, the following affect the suction capacity of the pump:

- Temperature of the liquid
- Elevation above the sea level (in an open system)
- System pressure (in a closed system)
- Resistance of the pipes
- Own intrinsic flow resistance of the pump
- Height differences

The following equation is used to calculate the maximum height above the liquid level which the pump can be installed:

$$(p_b * 10.2 - Z) \geq \text{NPSH} + H_f + H_v + 0.5$$

$p_b$	Barometric pressure in bar (in closed system is system pressure)
NPSH	Value in meter of the pump intrinsic flow resistance
$H_f$	Total losses in meters caused by passage of liquid in the suction pipe of the pump
$H_v$	Steam pressure in meters that correspond to the temperature of the liquid T °C
0.5	Recommended safety margin (m)
Z	Maximum height at which the pump can be installed (m)

$(p_b * 10.2 - Z)$  must always be a positive number.

For more information, see [Figure 9](#) (page 337).

#### NOTICE:

Do not exceed the pumps suction capacity as this could cause cavitation and damage the pump.

## 4.1.2 Piping requirements

### Precautions



#### ! WARNING:

- Use pipes suited to the maximum working pressure of the pump. Failure to do so can cause the system to rupture, with the risk of injury.
- Make sure that all connections are performed by qualified installation technicians and in compliance with the regulations in force.

#### NOTICE:

Observe all regulations issued by authorities having jurisdiction and by companies managing the public water supplies if the pump is connected to a public water system. If required, install appropriate back-flow-prevention device on the suction side.

### Piping checklist

Check that the following requirements are met:

- All piping is independently supported, piping must not place a burden on the unit.
- Flexible pipes or unions are used, in order to avoid transmission of pump vibrations to the pipes and vice versa.
- Use wide bends, avoid using elbows which cause excessive flow resistance.
- The suction piping is perfectly sealed and air-tight.
- If the pump is used in an open circuit, then the diameter of the suction pipe is suited to the installation conditions. The suction pipe must not be smaller than the diameter of the suction port.
- If the suction piping must be larger than the suction side of the pump, then an eccentric pipe reducer is installed.
- If the pump is placed above liquid level, a foot valve is installed at the end of the suction piping.
- The foot valve is fully immersed into the liquid so that air cannot enter through the suction vortex, when the liquid is at the minimum level and the pump is installed above the liquid source.
- Appropriately sized on-off valves are installed on the suction piping and on the delivery piping (downstream to the check valve) for regulation of the pump capacity, for pump inspection, and for maintenance.
- Appropriately sized on-off valve is installed on the delivery piping (downstream to the check valve) for regulation of the pump capacity, for pump inspection, and for maintenance.
- In order to prevent back flow into the pump when pump is turned off a check valve is installed on the delivery piping.



**WARNING:**

Do not use the on-off valve on the discharge side in the closed position in order to throttle the pump for more than a few seconds. If the pump must operate with the discharge side closed for more than a few seconds, a bypass circuit must be installed to prevent overheating of the liquid inside the pump.

For illustrations that show the piping requirements, see [Figure 10](#) (page 338) and [Figure 11](#) (page 338).

**4.2 Electrical requirements**

- The local regulations in force overrule these specified requirements.
- In the case of fire fighting systems (hydrants and/or sprinklers), check the local regulations in force.

**Electrical connection checklist**

Check that the following requirements are met:

- The electrical leads are protected from high temperature, vibrations, and collisions.
- The power supply line is provided with:
  - A short-circuit protection device
  - A mains isolator switch with a contact gap of at least 3 mm

**The electrical control panel checklist**

**NOTICE:**

The control panel must match the ratings of the electric pump. Improper combinations could fail to guarantee the protection of the motor.

Check that the following requirements are met:

- The control panel must protect the motor against overload and short-circuit.
- Install the correct overload protection (thermal relay or motor protector).

Pump Type	Protection
Single phase standard electric pump ≤ 2.2 kW	<ul style="list-style-type: none"> <li>– Built-in automatic reset thermal-ampereometric protection (motor protector)</li> <li>– Short circuit protection (must be supplied by the installer)<sup>3</sup></li> </ul>
Three phase electric pump <sup>4</sup>	<ul style="list-style-type: none"> <li>– Thermal protection (must be supplied by the installer)</li> <li>– Short circuit protection (must be supplied by the installer)</li> </ul>

- The control panel must be equipped with a dry-running protection system to which a pressure switch, float switch, probes, or other suitable device is connected.
- The following devices are recommended for use on the suction side of the pump:
  - When the liquid is pumped from a water system, use a pressure switch.
  - When the liquid is pumped from a storage tank or reservoir, use a float switch or probes.
- When thermal relays are used, relays that are sensitive to phase failure are recommended.

**The motor checklist**



**WARNING:**

- Read the operating instructions in order to ensure whether a protection device is provided if another motor other than the standard is used.
- If the motor is equipped with automatic thermal protectors, be aware of the risk of unexpected starts in connection to overload. Do not use such motors for fire-fighting applications.

**NOTICE:**

- Only use dynamically balanced motors with a half-sized key in the shaft extension (IEC 60034-14) and with normal vibration rate (N).
- The mains voltage and frequency must agree with the specifications on the data plate.

In general, motors can operate under the following mains voltage tolerances:

<sup>3</sup> fuses aM (motor starting), or magneto-thermal switch with curve C and I<sub>cn</sub> ≥ 4,5 kA or other equivalent device.

<sup>4</sup> Overload thermal relay with trip class 10A + fuses aM (motor starting) or motor protection magneto-thermal switch with starting class 10A.

Frequency Hz	Phase ~	UN [V] ± %
50	1	220 – 240 ± 6
	3	230/400 ± 10
60	1	220 – 230 ± 6
	3	220/380 ± 5

Use cable according to rules with 3 leads (2+earth/ground) for single phase versions and with 4 leads (3+earth/ground) for three phase version.

### 4.3 Install the pump



#### 4.3.1 Mechanical installation

Check the following before installation:

- Use a concrete of compressive strength class C12/15 which meets the requirements of exposure class XC1 to EN 206-1.
- The mounting surface must have set and must be completely horizontal and even.
- Observe the weights indicated.

#### Install the pump set

For examples of horizontal and vertical installations, see [Figure 12](#) (page 340).

Check that the foundation has been prepared in accordance with the dimensions given in the outline drawing/general arrangement drawing.

Type	Motor Size	Number of Poles	Type of Fastening
A	Up to 132	2– and 4–pole	Mount on ground using the volute casing feet.
B	From 160 to 200	2–pole	Mount on ground using the pump and motor feet. Shims are required under the pump and motor feet.
	From 160 to 280	4–pole	
C	250	2–pole	Mount on ground using the pump and motor feet. Shims are required under the pump and motor feet.
D	Up to 132	2– and 4–pole	Mount on ground using the volute casing feet.

Type	Motor Size	Number of Poles	Type of Fastening
E	From 160 to 280	2– and 4–pole	Mount on ground using the motor feet

1. Position the pump set on the foundation and level it with the help of a spirit level that is placed on the discharge port.  
The permissible deviation is 0.2 mm/m.
2. Remove the plugs covering the ports.
3. Align the pump and piping flanges on both sides of the pump. Check the alignment of the bolts.
4. Fasten the piping with bolts to the pump. Do not force the piping into place.
5. Use shims for height compensation, if necessary.
6. Tighten the foundation bolts evenly and firmly.

Note:

- If the transmission of vibrations can be disturbing, provide vibration-damping supports between the pump and the foundation.

#### 4.3.2 Piping checklist

Check that the following are adhered to:

- The suction lift line has been laid with a rising slope, at positive suction head line with a downward slope towards the pump.
- The nominal diameters of the pipelines are at least equal to the nominal diameters of the pump ports.
- The pipelines have been anchored in close proximity to the pump and connected without transmitting any stresses or strains.



#### CAUTION:

Welding beads, scale and other impurities in the piping damage the pump.

- Free the piping from any impurities.
- If necessary, install a filter.

#### 4.3.3 Electrical installation

1. Remove the screws of the terminal box cover.
2. Connect and fasten the power cables according to the applicable wiring diagram.

For wiring diagrams, see [Figure 13](#) (page 341). The diagrams are also available on the back of the terminal box cover.

- a) Connect the ground (earth) lead.  
Make sure that the ground (earth) lead is longer than the phase leads.
  - b) Connect the phase leads.
3. Mount the terminal box cover.

#### NOTICE:



Tighten the cable glands carefully to ensure protection against cable slipping and humidity entering the terminal box.

4. If the motor is not equipped with automatic reset thermal protection, then adjust the overload protection according to the list below.
  - If the motor is used with full load, then set the value to the nominal current value of electric pump (data plate)
  - If the motor is used with partial load, then set the value to the operating current (for example measured with a current pincer).
  - If the pump has a star-delta starting system, then adjust the thermal relay to 58% of the nominal current or operating current (only for three-phase motors).

## 5 Commissioning, Startup, Operation, and Shutdown



### Precautions



#### WARNING:

- Make sure that the drained liquid does not cause damage or injuries.
- The motor protectors can cause the motor to restart unexpectedly. This could result in serious injury.
- Never operate the pump without the coupling guard correctly installed.



#### CAUTION:

- The outer surfaces of the pump and motor can exceed 40°C (104°F) during operation. Do not touch with any part of the body without protective gear.
- Do not put any combustible material near the pump.

### NOTICE:

- Never operate the pump below the minimum rated flow, when dry, or without prime.
- Never operate the pump with the delivery ON-OFF valve closed for longer than a few seconds.
- Never operate the pump with the suction ON-OFF valve closed.
- Do not expose an idle pump to freezing conditions. Drain all liquid that is inside the pump. Failure to do so can cause liquid to freeze and damage the pump.
- The sum of the pressure on the suction side (mains, gravity tank) and the maximum pressure that is delivered by the pump must not exceed the maximum working pressure that is allowed (nominal pressure PN) for the pump.
- Do not use the pump if cavitation occurs. Cavitation can damage the internal components.

### 5.1 Fill the pump

For information about additional pump connections, see [Figure 14](#) (page 341).

#### Installations with liquid level above the pump (suction head)

For an illustration that shows where pump plugs are, see [Figure 15](#) (page 343).

1. Close the on-off valve located downstream from the pump.
2. Remove the fill (3) or gauge plug (1) and open the on/off valve upstream until the water flows out of the hole.
  - a) Close the fill (3) or gauge plug (1).

#### Installations with liquid level below the pump (suction lift)

For an illustration that shows where pump plugs are, see [Figure 16](#) (page 345).

1. All pipe system empty:
  - a) Open the on-off valve located upstream from the pump.
  - b) Remove the fill plug (3) and the gauge plug (1). Use a funnel to fill the pump through the fill hole until the water flows out of this hole.
  - c) Tighten the fill plug (3) and the gauge plug (1).
2. Filled discharge pipe system:
  - a) Open the on-off valve located upstream from the pump and open the on-off valve downstream.
  - b) Remove the gauge plug (1) until water flows out of this hole.
  - c) Tighten the gauge plug (1).

### 5.2 Check the rotation direction (three-phase motor)

Follow this procedure before start-up.

1. Locate the arrows on the adaptor or the motor fan cover to determine the correct rotation direction.
2. Start the motor.
3. Quickly check the direction of rotation through the coupling guard or through the motor fan cover.
4. Stop the motor.
5. If the rotation direction is incorrect, then do as follows:
  - a) Disconnect the power supply.
  - b) In the terminal board of the motor or in the electric control panel, exchange the position of two of the three wires of the supply cable.

For the wiring diagrams, see [Figure 13](#) (page 341).

  - c) Check the direction of rotation again.

### 5.3 Start the pump

The responsibility for checking the correct flow and the temperature of the pumped liquid rests with the installer or owner.

Before starting the pump, make sure that:

- The pump is correctly connected to the power supply.
- The pump is correctly filled according to instructions in *Fill the pump* (chapter 5).
- The on-off valve located downstream from the pump is closed.

1. Start the motor.
2. Gradually open the on-off valve on the discharge side of the pump.  
At the expected operating conditions, the pump must run smoothly and quietly. If not, refer to [Troubleshooting](#) (page 21).

## 6 Maintenance



### Precautions



#### Electrical Hazard:

Disconnect and lock out electrical power before installing or servicing the unit.



#### WARNING:

- Maintenance and service must be performed by skilled and qualified personnel only.
- Observe accident prevention regulations in force.
- Use suitable equipment and protection.
- Make sure that the drained liquid does not cause damage or injuries.

### 6.1 Service

If the user wishes to schedule regular maintenance deadlines, they are dependent on the type of pumped liquid and on the operating conditions of the pump.

Contact the local sales and service representative for any requests or information regarding routine maintenance or service.

Extraordinary maintenance may be necessary to clean the liquid end and/or replace worn parts.

#### Motor bearings

After approximately five years, the grease in the motor bearings is so aged that a replacement of the bearings is recommended. The bearings must be replaced after 25000 operating hours or according to the motor supplier maintenance instructions, whichever is shorter.

#### Motor with regreasable bearings

Follow motor supplier maintenance instructions.

### 6.2 Inspection checklist

Check for leakage of the mechanical seal. Replace the mechanical seal if leakage is found.

### 6.3 Disassemble and replace the pump parts

For more information about spare parts and assembly and disassembly of the pump, contact the local sales and service representative.

## 7 Troubleshooting



### 7.1 Troubleshooting for users

The main switch is on, but the electric pump does not start.



Cause	Remedy
The thermal protector incorporated in the pump (if any) has tripped.	Wait until the pump has cooled down. The thermal protector will automatically reset.
The protective device against dry running has tripped.	Check the liquid level in the tank, or the mains pressure.

The electric pump starts, but the thermal protection trips a varying time after.

Cause	Remedy
There are foreign objects (solids or fibrous substances) inside the pump which have jammed the impeller.	Contact the Sales and Service Department.
The pump is overloaded because it is pumping liquid that is too dense and viscous.	Check the actual power requirements based on the characteristics of the pumped liquid and then contact the Sales and Service Department.

The pump runs but delivers too little or no liquid.

Cause	Remedy
The pump is clogged.	Contact the Sales and Service Department.

The troubleshooting instructions in the tables below are for installers only.

### 7.2 The main switch is on, but the electric pump does not start



Cause	Remedy
There is no power supply.	<ul style="list-style-type: none"> <li>• Restore the power supply.</li> <li>• Make sure all electrical connections to the power supply are intact.</li> </ul>
The thermal protector incorporated in the pump (if any) has tripped.	Wait until the pump has cooled down. The thermal protector will automatically reset.
The thermal relay or motor protector in the electric control panel has tripped.	Reset the thermal protection.
The protective device against dry running has tripped.	Check the: <ul style="list-style-type: none"> <li>• liquid level in the tank, or the mains pressure</li> <li>• protective device and its connecting cables</li> </ul>
The fuses for the pump or auxiliary circuits are blown.	Replace the fuses.

**7.3 The electric pump starts, but the thermal protector trips or the fuses blow immediately after**



Cause	Remedy
The power supply cable is damaged.	Check the cable and replace as necessary.
The thermal protection or fuses are not suited for the motor current.	Check the components and replace as necessary.
The electric motor is short circuit.	Check the components and replace as necessary.
The motor overloads.	Check the operating conditions of the pump and reset the protection.

**7.4 The electric pump starts, but the thermal protector trips or the fuses blow a short time after**



Cause	Remedy
The electrical panel is situated in an excessively heated area or is exposed to direct sunlight.	Protect the electrical panel from heat source and direct sunlight.
The power supply voltage is not within the working limits of the motor.	Check the operating conditions of the motor.
A power phase is missing.	Check the <ul style="list-style-type: none"> <li>• power supply</li> <li>• electrical connection</li> </ul>

**7.5 The electric pump starts, but the thermal protector trips a varying time after**



Cause	Remedy
There are foreign objects (solids or fibrous substances) inside the pump which have jammed the impeller.	Contact the local sales and service representative.
The pumps delivery rate is higher than the limits specified on the data plate.	Partially close the on-off valve down stream until the delivery rate is equal or less than the limits specified on the data plate.
The pump is overloaded because it is pumping liquid that is too dense and viscous.	Check the actual power requirements based on the characteristics of the pumped liquid and replace the motor accordingly.
The motor bearings are worn.	Contact the local sales and service representative.

**7.6 The electric pump starts, but the system's general protection is activated**



Cause	Remedy
A short circuit in the electrical system.	Check the electrical system.

**7.7 The electric pump starts, but the system's residual current device (RCD) is activated**



Cause	Remedy
There is an ground (earth) leakage.	Check the insulation of the electrical system components.

**7.8 The pump runs but delivers too little or no liquid**



Cause	Remedy
There is air inside the pump or the piping.	<ul style="list-style-type: none"> <li>• Bleed the air</li> </ul>
The pump is not correctly primed.	Stop the pump and repeat the prime procedure. If the problem continues: <ul style="list-style-type: none"> <li>• Check that the mechanical seal is not leaking.</li> <li>• Check the suction pipe for perfect tightness.</li> <li>• Replace any valves that are leaking.</li> </ul>
The throttling on the delivery side is too extensive.	Open the valve.
Valves are locked in closed or partially closed position.	Disassemble and clean the valves.
The pump is clogged.	Contact the local sales and service representative.
The piping is clogged.	Check and clean the pipes.
The rotation direction of the impeller is wrong .	Change the position of two of the phases on the terminal board of the motor or in the electric control panel.
The suction lift is too high or the flow resistance in the suction pipes is too great.	Check the operating conditions of the pump. If necessary, do the following: <ul style="list-style-type: none"> <li>• Decrease the suction lift</li> <li>• Increase the diameter of the suction pipe</li> </ul>

**7.9 The electric pump stops, and then rotates in the wrong direction**



Cause	Remedy
There is a leakage in one or both of the following components: <ul style="list-style-type: none"> <li>• The suction pipe</li> <li>• The foot valve or the check valve</li> </ul>	Repair or replace the faulty component.
There is air in the suction pipe.	Bleed the air.

### 7.10 The pump starts up too frequently



Cause	Remedy
There is a leakage in one or both of the following components: <ul style="list-style-type: none"> <li>• The suction pipe</li> <li>• The foot valve or the check valve</li> </ul>	Repair or replace the faulty component.
There is a ruptured membrane or no air pre-charge in the pressure tank.	See the relevant instructions in the pressure tank manual.

### 7.11 The pump vibrates and generates too much noise



Cause	Remedy
Pump cavitation	Reduce the required flow rate by partially closing the on-off valve downstream from the pump. If the problem persists check the operating conditions of the pump (for example height difference, flow resistance, liquid temperature).
The motor bearings are worn.	Contact the local sales and service representative.
There are foreign objects inside the pump.	Contact the local sales and service representative.
Impeller rubs on the wear ring	Contact the local sales and service representative.

For any other situation, refer to the local sales and service representative.



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Contact your supplier or local sales and service representative

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