

Installation, Operation and
Maintenance Manual



e-HM Series

Multistage Horizontal Pump Unit

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1 Introduction and Safety

1.1 Introduction

1.1.1 Purpose of this manual

This manual provides information on how to do the following in the correct manner:

- Installation
- Operation
- Maintenance.



CAUTION:

This manual is an integral part of the unit. Make sure to have read and understood the manual before installing the unit and putting it to use. The manual must always be made available to the user, stored in the proximity of the unit, and well kept.

1.1.2 Supplementary instructions

The instructions and warnings of this manual apply to the standard unit as described in the sale documentation. Special version pumps may be supplied with supplementary instruction manuals. For situations not considered in the manual or in the sales document, contact Xylem or the Authorised Distributor.

1.2 Safety

1.2.1 Danger levels and safety symbols

Before using the unit, the user must read, understand and comply with the indications of the danger warnings in order to avoid the following risks:

- Injuries and health hazards
- Damage to the unit
- Unit malfunction.

Danger levels

Hazard level	Indication
 DANGER:	It identifies a dangerous situation which, if not avoided, causes serious injury, or even death.
 WARNING:	It identifies a dangerous situation which, if not avoided, may cause serious injury, or even death.
 CAUTION:	It identifies a dangerous situation which, if not avoided, may cause small or medium level injuries.
NOTICE:	It identifies a situation which, if not avoided, may cause damage to property but not to people.

Complementary symbols

Symbol	Description
 Electrical Hazard:	Electrical hazard
 CAUTION:	Magnetic hazard
 Hot Surface:	Hot surface hazard

1.2.2 User safety

Strictly comply with current health and safety regulations.

**WARNING:**

This unit must be used only by qualified users. Qualified users are people able to recognise the risks and avoid hazards during installation, use and maintenance of the unit.

Inexperienced users

**WARNING:**

For EU countries: this appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge, provided that they are being supervised and have been instructed on the use of the appliance in a safe way and understand the hazards involved. Children shall not play with the appliance. Cleaning and user maintenance shall not be carried out by children without supervision.

**WARNING:**

For countries outside the EU: 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 are being supervised and have been instructed on the 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.

1.2.3 Protection of the environment

Disposal of packaging and product

Comply with the current regulations on sorted waste disposal.

Leaking of fluid

If the unit contains lubricating fluid, take appropriate measures to prevent the dispersion of leaks into the environment.

1.2.4 Sites exposed to ionizing radiations

**WARNING: Ionizing radiation hazard**

If the unit has been exposed to ionizing radiations, implement the necessary safety measures for the protection of people. If the unit needs to be despatched, inform the carrier and the recipient accordingly, so that appropriate safety measures can be put in place.

2 Transport and storage

2.1 Handling of the packed unit



WARNING: Crushing hazard (limbs)

The unit and its components may be heavy: risk of crushing.



WARNING:

Always wear personal protective equipment.



WARNING:

Check the gross weight marked on the packaging.



WARNING:

Handle the unit in compliance with the current regulations on "manual load handling", to avoid undesirable ergonomic conditions causing risks of back-spine injury.



WARNING:

Take appropriate measures during transport, installation and storage to prevent contamination from external substances.

Depending on the model, the Manufacturer delivers the unit and its components in:

1. A cardboard box, or
2. A cardboard box with wooden base.

The type 2 packaging is intended for transport with a forklift truck; the lifting points are indicated in the figure.

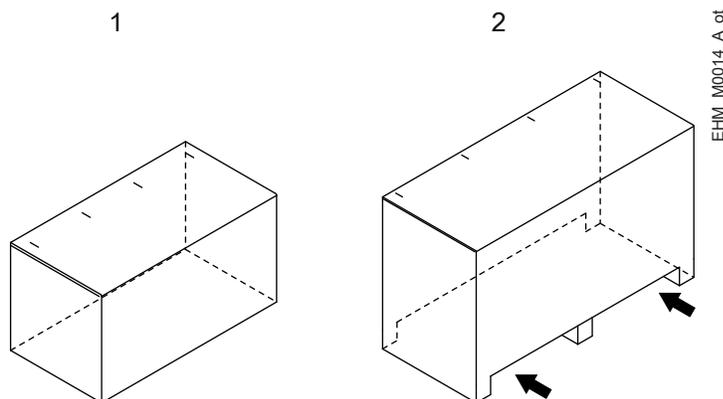


Figure 1: Packed product lifting points

2.2 Unit inspection upon delivery

2.2.1 Inspect the package

1. Check that quantity, descriptions and product codes match the order.
2. Check the packaging for any damage or missing components.
3. In case of immediately detectable damage or missing parts:
 - accept the goods with reserve, indicating any findings on the transport document, or
 - reject the goods, indicating the reason on the transport document.

In both cases, promptly contact Xylem or the Authorised Distributor from whom the product was purchased.

2.2.2 Unpacking and inspection of the unit



CAUTION: Cut and abrasion hazard

Always wear personal protective equipment.

1. Remove packing materials from the product.
2. Release the unit by removing the screws and/or cutting the straps, if fitted.
3. Check the unit for integrity and to make sure that there are no missing components.
4. In case of damage or missing components, promptly contact Xylem or the Authorised Distributor.

2.3 Unit handling

The unit must be harnessed and lifted as shown in the figure.

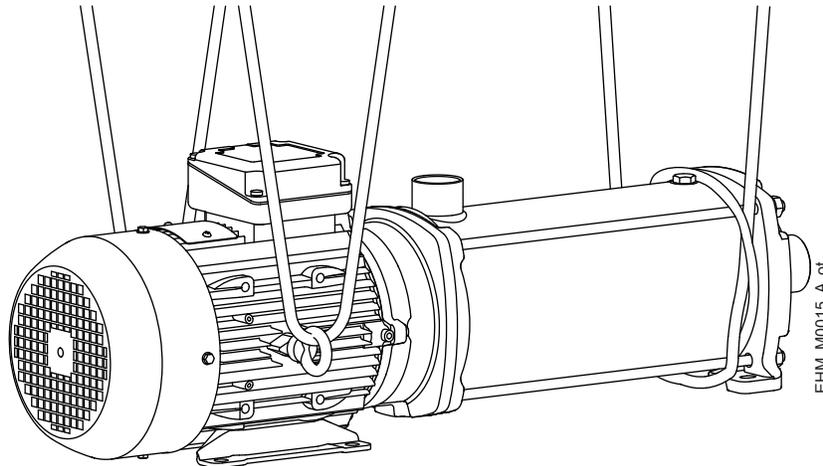


Figure 2: Lifting of the unit



WARNING:

Use cranes, ropes, lifting straps, hooks and clasps that comply with current regulations and that are suitable for the specific use.

NOTICE:

Make sure that the harnessing does not hit and/or damage the unit.



WARNING:

Lift and handle the unit slowly to avoid stability issues.



WARNING:

During handling, make sure to avoid injury to people and animals, and/or damage to property.

2.4 Storage

2.4.1 Storage of the packed unit

The unit must be stored:

- In a covered and dry place
 - Away from heat sources
 - Protected from dirt
 - Protected from vibrations
 - At an ambient temperature between -40°C and +60°C (-40°F and 140°F), and relative humidity between 5% and 95%.
-

NOTICE:

Do not place heavy loads on top of the unit.

NOTICE:

Protect the unit from collisions.



WARNING:

Take appropriate measures during transport, installation and storage to prevent contamination from external substances.

2.4.2 Long-term storage of the unit

1. Follow the same instructions for the storage of the packed unit.
2. Empty the unit by removing the drain plug. This operation is essential in exceptionally cold environments; any residual liquid in the unit could otherwise have an adverse effect on its condition and performance.

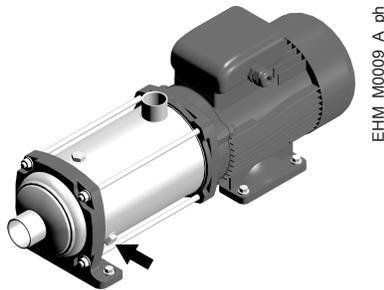


Figure 3: Drain plug

For further information about preparation for long-term storage, please contact Xylem or the Authorised Distributor.

3 Product Description

3.1 Designation

Multistage horizontal centrifugal pump unit with threaded ports, non-self-priming.

3.2 Data plate

The data plate is a label showing:

- The main unit details
- Identification code

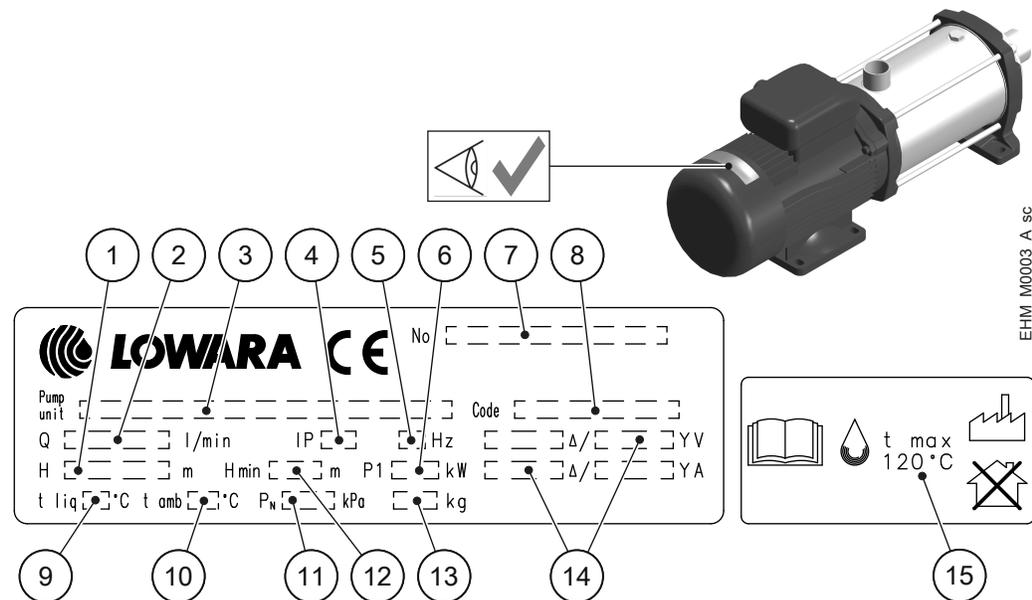


Figure 4: Data plate

Position number	Description
1	Head range
2	Flow rate
3	Pump unit type
4	Protection degree
5	Frequency
6	Power consumption
7	Serial number (date+progressive number)
8	Pump unit code
9	Maximum temperature of pumped liquid (for usage in compliance with EN 60335-2-41)
10	Maximum ambient operating temperature
11	Maximum operating pressure
12	Minimum head
13	Weight
14	Electrical data
15	Maximum temperature of pumped liquid (for usage outside the scope of EN 60335-2-41)

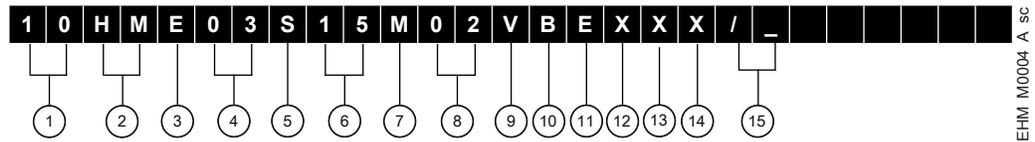


Figure 5: Identification code

Position number	Description	Notes			
1	Rated flow rate	10 = m ³ /h			
2	Series name	HM			
3	Motor operation	Empty = standard asynchronous motor H = with Hydrovar® X = other drivers E = e-SM			
4	Number of impeller	03 = 3 impellers			
5	Material	P = AISI 304 stainless steel with Noryl™ impellers S = AISI 304 stainless steel S = AISI 316 stainless steel			
6	Motor rated power	kW x 10			
7	Phase	M = Single-phase T = Three-phase			
8	Power supply voltages	<table border="0" style="width: 100%;"> <tr> <td style="width: 33%;"> 50 Hz standard asynchronous motor: 5H = 1x220-240V 5D = 1x110-120V 5R = 3x220-240/380-415V 5V = 3x380-415/660-690V 5P = 3x200-208/346-360V 5S = 3x255-265/440-460V 5T = 3x290-300/500-525V 5W = 3x440-460/-V 5Z¹ = 3x500-525/-V </td> <td style="width: 33%;"> 60 Hz standard asynchronous motor: 6F = 1x220-230V 6B = 1x110-115V 6C = 120-127V 6E = 1x200-210V 6P = 3x220-230/380-400V 6R = 3x255-277/440-480V 6V = 3x440-480/-V 6U = 3x380-400/660-690V 6L = 3x110-115/190-200V 6N = 3x200-208/346-360V 6T = 3x330-346/575-600V 6Z² = 3x575/-V </td> <td style="width: 33%;"> Power supply e-SM: 02 = 1x208-240V 04 = 3x380-460V 05 = 3x208-240/380-460V Asynchronous bi-frequency motor: BR = 3x230/400V 50Hz 3x265/460 V 60 Hz BV = 3x400/690V 50Hz 3x460/-V 60Hz </td> </tr> </table>	50 Hz standard asynchronous motor: 5H = 1x220-240V 5D = 1x110-120V 5R = 3x220-240/380-415V 5V = 3x380-415/660-690V 5P = 3x200-208/346-360V 5S = 3x255-265/440-460V 5T = 3x290-300/500-525V 5W = 3x440-460/-V 5Z ¹ = 3x500-525/-V	60 Hz standard asynchronous motor: 6F = 1x220-230V 6B = 1x110-115V 6C = 120-127V 6E = 1x200-210V 6P = 3x220-230/380-400V 6R = 3x255-277/440-480V 6V = 3x440-480/-V 6U = 3x380-400/660-690V 6L = 3x110-115/190-200V 6N = 3x200-208/346-360V 6T = 3x330-346/575-600V 6Z ² = 3x575/-V	Power supply e-SM: 02 = 1x208-240V 04 = 3x380-460V 05 = 3x208-240/380-460V Asynchronous bi-frequency motor: BR = 3x230/400V 50Hz 3x265/460 V 60 Hz BV = 3x400/690V 50Hz 3x460/-V 60Hz
50 Hz standard asynchronous motor: 5H = 1x220-240V 5D = 1x110-120V 5R = 3x220-240/380-415V 5V = 3x380-415/660-690V 5P = 3x200-208/346-360V 5S = 3x255-265/440-460V 5T = 3x290-300/500-525V 5W = 3x440-460/-V 5Z ¹ = 3x500-525/-V	60 Hz standard asynchronous motor: 6F = 1x220-230V 6B = 1x110-115V 6C = 120-127V 6E = 1x200-210V 6P = 3x220-230/380-400V 6R = 3x255-277/440-480V 6V = 3x440-480/-V 6U = 3x380-400/660-690V 6L = 3x110-115/190-200V 6N = 3x200-208/346-360V 6T = 3x330-346/575-600V 6Z ² = 3x575/-V	Power supply e-SM: 02 = 1x208-240V 04 = 3x380-460V 05 = 3x208-240/380-460V Asynchronous bi-frequency motor: BR = 3x230/400V 50Hz 3x265/460 V 60 Hz BV = 3x400/690V 50Hz 3x460/-V 60Hz			
9	Mechanical seal rotating part	Q = Silicon carbide(Q1) V = Aluminum oxide (ceramic)			
10	Mechanical seal fixed part	Q = Silicon carbide(Q1) B = Resin impregnated carbon			

¹ For uses outside the scope of EN 60335-2-41

² For uses outside the scope of EN 60335-2-41

Position number	Description	Notes
11	Elastomers	E = EPDM V = FPM K = FFPM (Kalrez®)
12	General characteristics	Empty = none A = Schuko plug + 3 m cable B = British standard plug + 2 m cable A = Australian standard plug + 2 m cable D = Documents or certificates on specific request E = Passivated and electro-polished F = Motor oversized by 2 sizes L = Seal housing + locking pin V = Air relief valve Z = other
13	General characteristics	Empty = none P = PTC in the coil S = Condensation heater D = Without condensation drain plugs U = UL approval (cURus) F = Mechanical seal internal flushing Z = Other, or several combined characteristics
14	Connections ³	Null = Threaded V = Victaulic® Z = Other, or several combined characteristics
15		Null = None Letter assigned by the manufacturer Other = see technical catalogue

3.2.1 Marks of safety approval

The presence of an electric safety approval mark, for example IMQ, TUV, IRAM, only refers to the pump unit.

³ In case of no further special configuration characters on the right, this character will be nil, otherwise it will be "X"

3.3 Denomination of the main components

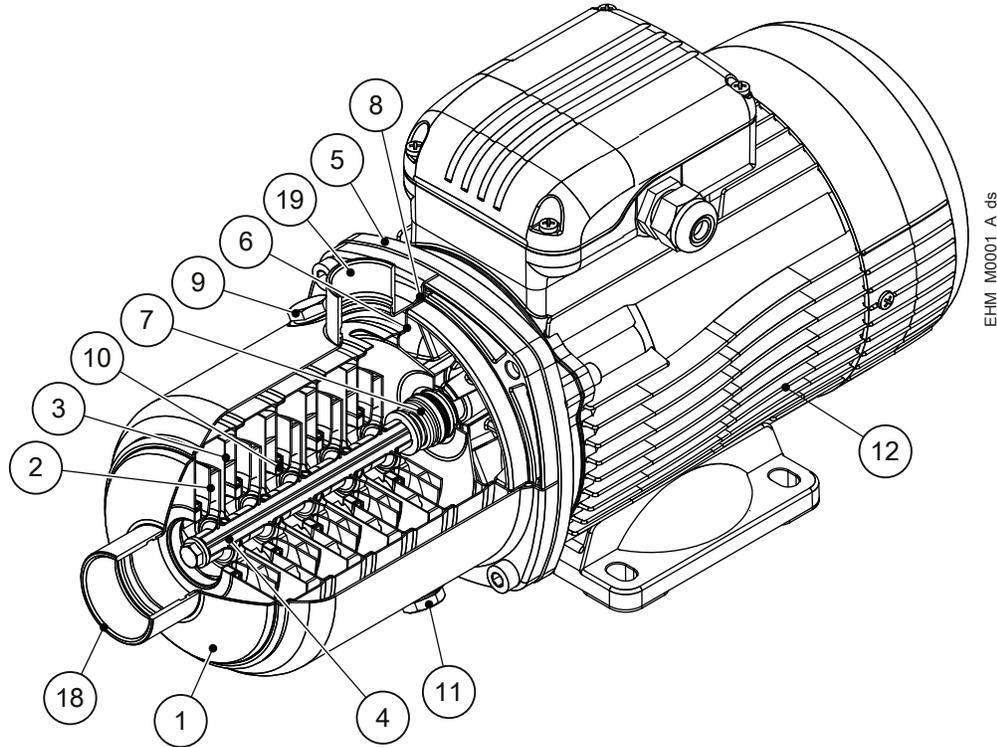


Figure 6: Pump unit with close-coupled body

Position number	Description	Position number	Description
1	Pump body	8	Elastomers
2	Impeller	9	Filling plug
3	Diffuser	10	Wear ring
4	Pump shaft	11	Drain plug
5	Motor adapter	12	Motor
6	Seal housing	18	Suction port
7	Mechanical seal	19	Discharge port

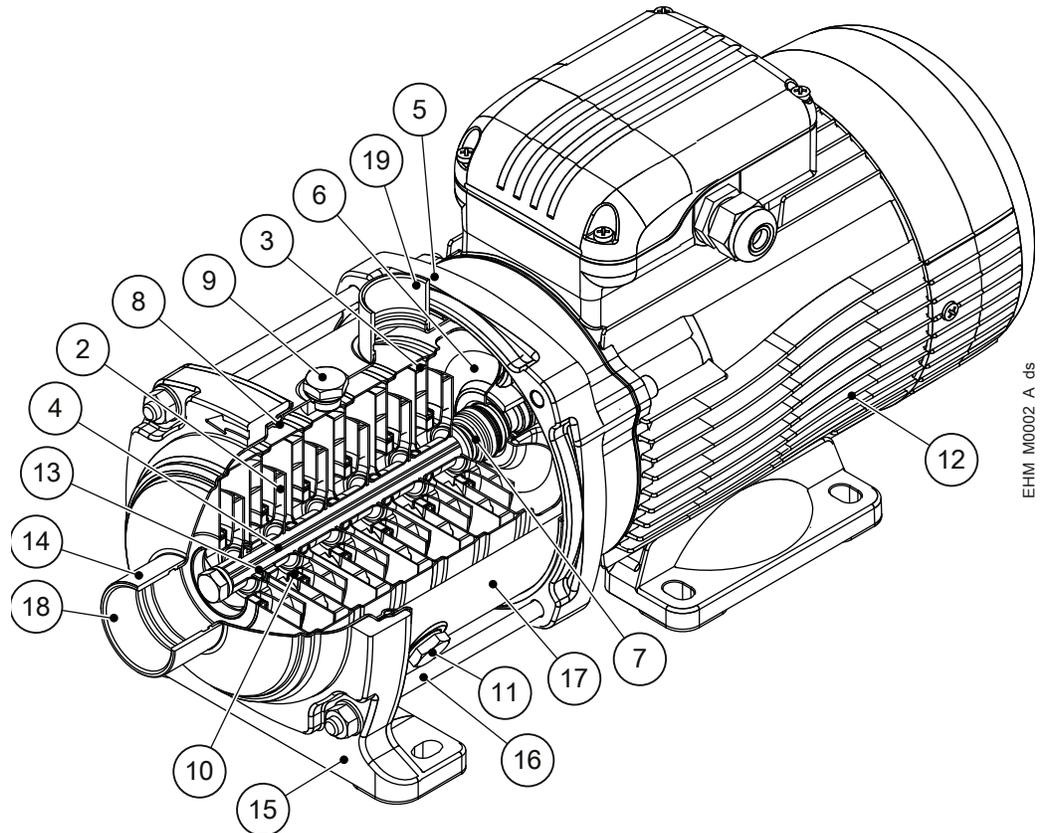


Figure 7: Pump unit with body with sleeve

Position number	Description	Position number	Description
2	Impeller	11	Drain plug
3	Diffuser	12	Motor
4	Pump shaft	13	Shaft sleeve and bush
5	Motor adapter	14	Head
6	Seal housing	15	Ring with foot
7	Mechanical seal	16	Tie rod
8	Elastomers	17	Outer sleeve
9	Filling plug	18	Suction port
10	Wear ring	19	Discharge port

3.4 Intended use

- Pressure boosting and water supply systems
- Washing and cleaning sector, including washing of vehicles
- Circulation of hot and cold liquids, for example water or water & glycol, for heating, cooling and air conditioning systems
- Water treatment applications
- Handling of moderately aggressive liquids.

3.4.1 Pumped liquids

- Hot water
- Cold water

- Clean liquids
 - Fluids chemically and mechanically compatible with the materials of the pump unit.
- Observe the operating limits in [Technical references](#) on page 34.

3.5 Improper use



WARNING:

The unit was designed and built for the use described in the section Intended Use. Any other use is prohibited, as it could compromise the safety of the user and the efficiency of the unit itself.



DANGER:

It is prohibited to use this unit to pump flammable and/or explosive liquids.



DANGER: Potentially explosive atmosphere hazard

It is prohibited to start the unit in environments with potentially explosive atmospheres or with combustible dusts.

3.5.1 Examples of improper use

- Pumping liquids not compatible with the construction materials of the unit
- Pumping hazardous, toxic, explosive, flammable or corrosive liquids
- Pumping drinking liquids other than water, for example wine or milk
- Pumping liquids containing abrasive, solid, or fibrous substances
- Using the unit for flow rates exceeding the flow rate indicated in the data plate.

3.5.2 Examples of improper installation

- Explosive and corrosive atmospheres
- Areas where the air temperature is very high and/or there is poor ventilation
- Outdoor without protection from weather conditions.

3.6 Use in water distribution networks for human consumption

If the unit is intended for water supply to people and/or animals:



WARNING:

It is prohibited to pump drinking water after use with other fluids.



WARNING:

Take appropriate measures during transport, installation and storage to prevent contamination from external substances.



WARNING:

Remove the unit from its packaging just before installation to prevent contamination from external substances.

**WARNING:**

After installation, run the unit for a few minutes with several users open in order to wash the inside of the system.

4 Installation

4.1 Precautions

Make sure you have read and understood the safety instructions in the Introduction and Safety chapter before starting work.



WARNING:

Always wear personal protective equipment.



WARNING:

Always use suitable working tools.



WARNING:

When selecting the place of installation and connecting the unit to the hydraulic and electric power supplies, strictly comply with current regulations.

When connecting the unit to a public or private aqueduct, or to a well for the supply of water for human and/or animal consumption:



WARNING:

It is prohibited to pump drinking water after use with other fluids.



WARNING:

Remove the unit from its packaging just before installation to prevent contamination from external substances.



WARNING:

Observe all the provisions of the authorities and companies concerned.

4.2 Mechanical installation

4.2.1 Installation area

- If possible, place the unit in a raised position in relation to the floor.
- Make sure that any leaks will not cause flooding to the installation area or submerge the unit.
- Observe the instructions given in [Operating environment](#) on page 34.

Air clearance between a wall and the motor fan grille

- To ensure suitable ventilation: ≥ 100 mm.
- To permit inspection and removal of the motor: ≥ 300 mm. If the space available is any less, refer to the technical catalogue.

4.2.2 Permitted positions

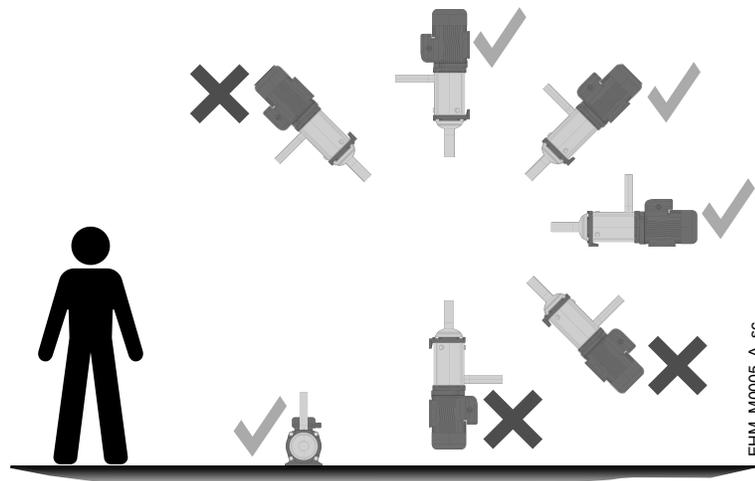


Figure 8: Unit position

4.2.3 Fastening of the unit

1. If present, remove the plugs covering the suction and discharge ports.
2. Place the unit on a level and sturdy surface.
3. Using a spirit level, make sure that the unit is level.
4. Align the suction and discharge ports to their piping.
5. Fasten the units using bolts (4 or 6 depending on the model), tightening at a torque of 10 Nm (88 lbf-in).

NOTICE:

Only for models with body with sleeve, if the temperature of the pumped liquid exceeds 50°C (122°F), only fasten bolts A; see the figure below.

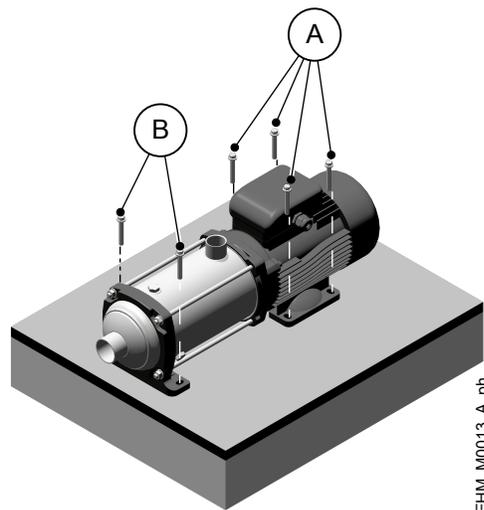


Figure 9: Fastening of the unit

4.2.4 Reducing vibrations

The motor and the flow of liquids in the pipes may cause vibrations, which can be exacerbated by incorrect installation of the unit and pipes. See [Hydraulic connection](#) on page 18.

4.3 Hydraulic connection



DANGER:

All the hydraulic and electrical connections must be completed by a technician possessing the technical-professional requirements outlined in the current regulations.



WARNING:

Piping must be sized to ensure safety at the maximum operating pressure.



WARNING:

Install appropriate seals between the unit couplings and the pipings.

4.3.1 Guidelines for the hydraulic system

Refer to the representative hydraulic diagrams; see the figures below.

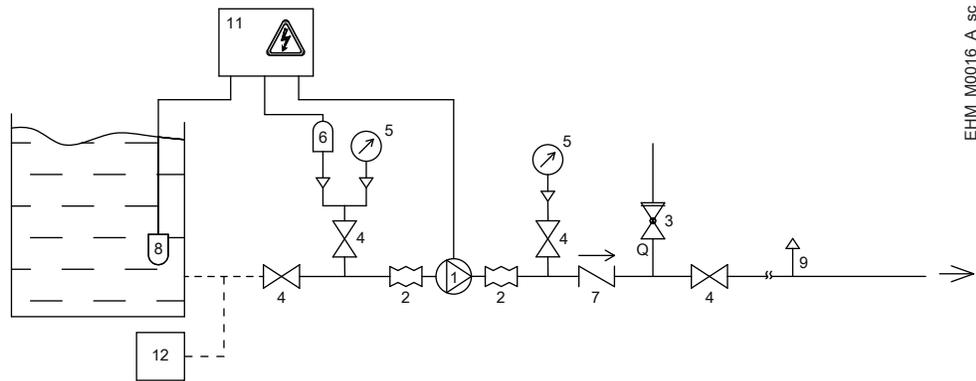


Figure 10: Positive suction head installation diagram

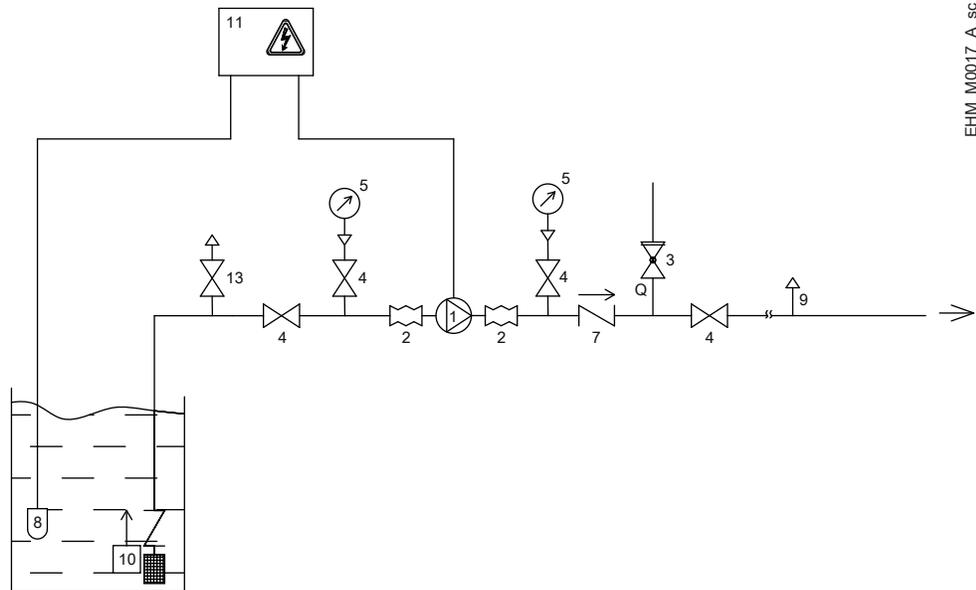
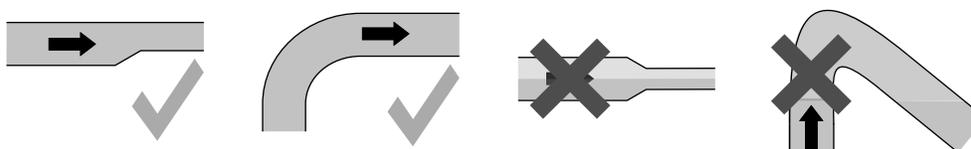


Figure 11: Suction lift installation diagram

Position number	Description	Position number	Description
1	Pump unit	8	Electrode probes or float
2	Anti-vibration joint	9	Automatic relief valve
3	Overpressure safety on-off valve	10	Foot check valve with filter
4	On-off valve	11	Electric panel
5	Pressure gauge	12	Pressurised circuit
6	Minimum pressure switch	13	Filling on-off valve
7	Check valve		

1. Do not install the unit at the lowest point of the system, to avoid the accumulation of sediments.
2. Install an automatic relief valve at the highest point of the system to eliminate air bubbles.
3. Remove any welding residues, deposits and impurities in the pipes that could damage the unit; install a filter if necessary.
4. Support the pipes independently to prevent them from weighing on the unit.
5. To reduce the transmission of vibrations between the unit and the system and vice versa, install:
 - anti-vibration joints on the suction and discharge sides of the unit
 - dampers between the unit and the surface on which it is installed.
6. In order to reduce flow resistance, the pipe on the suction side must be:
 - As short and as straight as possible
 - For the section connected to the unit, straight and without bottlenecks, covering a length equal to at least six times the diameter of the suction port
 - Wider than the suction port; if necessary, install an eccentric reducer that is horizontal on top
 - Without bends; if this cannot be avoided, bends of a radius as wide as possible
 - Without traps and 'goosenecks'
 - With valves with a low specific flow resistance.



7. Install a check valve on the discharge side to prevent the liquid from flowing back into the pump unit when this is at standstill.
8. Install a pressure gauge (or a vacuum pressure gauge, in the case of suction lift installation) on the suction side, and a pressure gauge on the discharge side, for checking the actual operating pressure of the pump unit.
9. To exclude the unit from the system for the purpose of maintenance, install:
 - An on-off valve on the suction side
 - An on-off valve on the discharge side, downstream of the check valve and pressure gauge, also useful for regulating the flow rate.
10. On the suction side, install a device to prevent the absence of liquid (float or probes), or a minimum pressure device.
11. Sufficiently submerge the end of the suction pipe in the liquid, in order to prevent any air from penetrating through the suction vortex when the level is at the minimum.
12. In case of suction lift installation, the suction pipe must have an increasing slope towards the unit exceeding 2%; to avoid air pockets; also install:

- A foot valve that guarantees full opening (full section)
- A filling on-off valve to facilitate the removal of the air and priming.

4.4 Electrical connection



DANGER:

All the hydraulic and electrical connections must be completed by a technician possessing the technical-professional requirements outlined in the current regulations.



DANGER: Electrical hazard

Before starting work, check that the unit is unplugged and that the pump unit, the control panel and the auxiliary control circuit cannot restart, even unintentionally.

4.4.1 Ground



DANGER: Electrical hazard

Always connect the external protection conductor (ground) to the ground terminal before attempting to make any other electrical connections.



DANGER: Electrical hazard

Connect all the electrical accessories of the pump unit and motor to the ground.



DANGER: Electrical hazard

Check that the external protection conductor (ground) is longer than the phase conductors; In case of accidental disconnection of the unit from the phase conductors, the protection conductor must be the last one to detach itself from the terminal.



DANGER: Electrical hazard

Install suitable systems for protection against indirect contact, in order to prevent lethal electric shocks.

4.4.2 Guidelines for electrical connection

1. Check that the electrical leads are protected against:
 - High temperature
 - Vibrations
 - Collisions.
2. Check that the power supply line is provided with:
 - A short circuit protection device of appropriate size
 - A mains isolator switch with a contact gap of at least 3 mm.

4.4.3 Guidelines for the electric panel

NOTICE:

The electric panel must match the ratings on the unit data plate. Improper combinations could damage the motor.

1. The electric panel must protect the motor against overloading and short circuits; install a suitable device (thermal relay or overload cut-out switch; see the table)
2. Fit the electric panel with a system for protection against dry running to which a pressure switch (or float switch, probes, or other suitable devices) must be connected.
3. Install these devices on the suction side:
 - A pressure switch, in the case of connection to the mains water supply
 - A float switch or probes, in the case of liquid drawn from a tank or basin.
4. When thermal relays are used, the type sensitive to phase failure is recommended.

Table 1: Motor protection devices

Pump unit	Protection
Single phase standard ≤ 1.5 kW	<ul style="list-style-type: none"> • Automatic reset thermal-ampere protection, in-built (motor protector) • From short circuit, to be supplied by the installer⁴.
Three-phase and single-phase ⁵	<ul style="list-style-type: none"> • Thermal, must be supplied by the installer • Short circuit, must be supplied by the installer.

4.4.4 Motor guidelines



WARNING: Injuries hazard

The unit, equipped with a single-phase motor with automatic reset thermal overload protection, could restart inadvertently after it has cooled down: risk of physical injury.

1. Open the terminal box cover.
2. Connect the power supply conductor; see the figure below, or the wiring diagram shown inside the terminal box cover.
3. Connect the protection conductor (ground), making sure that it is longer than the phase conductors.
4. Connect the phase leads.
5. Close the terminal box cover and tighten all the screws and cable glands.

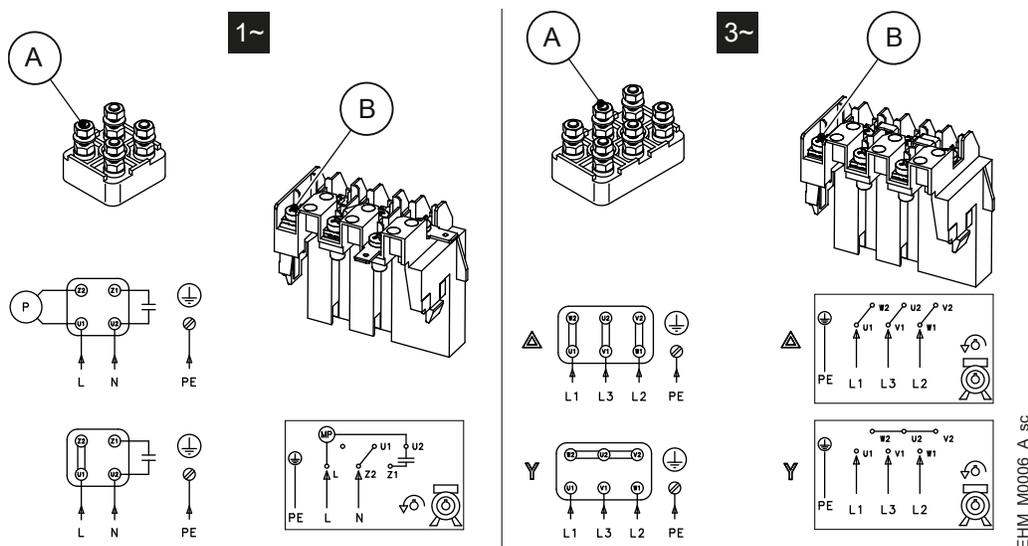


Figure 12: Electrical connection and tightening torques

⁴ aM fuses (motor start-up), or thermal magnetic switch with C curve and $I_{cn} \geq 4.5$ kA, or other similar device

⁵ Trip class 10 A overload thermal relay + aM fuses (motor starting), or start class 10 A motor protection thermal magnetic switch

	A					B
Wrench [mm]	M4	M5	M6	M8	M10	-
Tightening torque [Nm] / [lbf.in]	1,2 / 11	2,5 / 22	4,0 / 35	8,0 / 71	15,0 / 133	1,2 / 11

Motor without automatic reset thermal overload protection

1. If the motor is used with full load, then set the value to the nominal current value on the data plate of the pump unit.
2. If the motor is used with partial load, then set the value of the operating current measured with a current pincer.
3. For three-phase motors with star-delta starting system, set the thermal relay downstream of the switching circuit at 58% of the rated or operating current.

4.4.5 Operation with frequency converter

The three-phase motors can be connected to a frequency converter for speed control.

- The converter exposes the insulation of the motor to a greater load determined by the length of the connecting cable: observe the requirements of the Manufacturer of the frequency converter
- For applications requiring silent operation, install an outlet filter between the motor and the converter; a sinusoidal filter can reduce the noise even further
- The bearings of the motors, from size 315 S/M and up, are exposed to the risk of harmful currents: use electrically insulated bearings.
- The conditions of installation must guarantee protection against voltage peaks between the terminals and/or dV/dt in the table:

Motor size	Voltage peak [V]	dV/dt [V/ μ s]
up to 90R (500 V)	> 650	> 2200
from 90R to 180R	> 1400	> 4600
over 180R	> 1600	> 5200

Otherwise, use a motor with reinforced insulation ⁶and a sinusoidal filter.

⁶ Available on request

5 Operation

5.1 Precautions



WARNING: Injuries hazard

Check that the protection devices of the coupling are installed, when applicable: risk of physical injury.



WARNING:

Make sure that the drained liquid cannot cause damage or injuries.



WARNING: Electrical hazard

Check that the unit is properly connected to the mains power supply.



WARNING: Injuries hazard

The unit, equipped with a single-phase motor with automatic reset thermal overload protection, could restart inadvertently after it has cooled down: risk of physical injury.



WARNING: Hot surface hazard

Be aware of the extreme heat generated by the unit.



WARNING:

It is prohibited to put combustible materials near the unit.

NOTICE:

Check that the shaft can turn smoothly.

NOTICE:

It is prohibited to operate the unit when dry, not primed and below the minimum rated flow rate.

NOTICE:

It is prohibited to operate the unit with the on-off valves on the suction and discharge sides closed.

NOTICE:

It is prohibited to use the unit in the case of cavitation.

NOTICE:

The unit must be filled and vented properly before it can be started.

NOTICE:

The maximum pressure of the unit at the discharge, at the discharge side, determined by the pressure available on the suction side, must not exceed the maximum pressure (PN).

5.2 Filling - Priming

NOTICE:

The unit must be filled and vented properly before it can be started.

5.2.1 Positive suction head installation

**WARNING:**

In the case of liquids that are excessively hot or cold, pay attention to the risk of injury.

1. Close the on-off valve on the suction (C) and discharge (A) side.
2. Loosen the filling plug (B).
3. Slowly open the on-off valve (C) until the liquid regularly comes out from the filling hole; if necessary, loosen the plug further (B).
4. Replace the plug (B).
5. Open both the on-off valves slowly and fully.

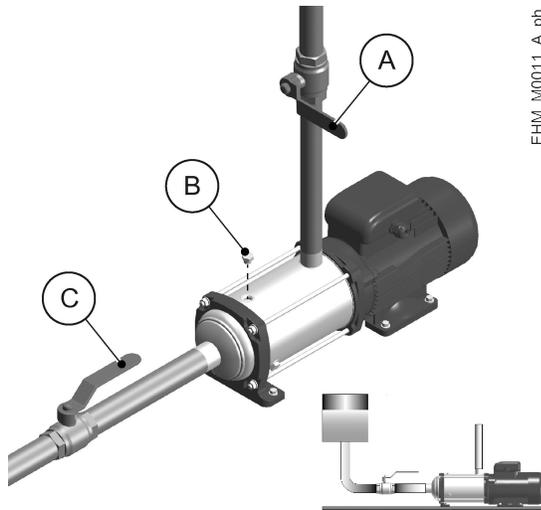


Figure 13: Positive suction head installation priming

5.2.2 Suction lift installation

**WARNING:**

In the case of liquids that are excessively hot or cold, pay attention to the risk of injury.

1. Close the on-off valve (A) on the discharge side.
2. Remove the filling plug (B).
3. Fill the pump unit until the liquid comes out of the hole.
4. Wait a few minutes and top up with more liquid if necessary.
5. Remove any air that might be present through the relief valve of the suction pipes (see [Guidelines for the hydraulic system](#) on page 18).
6. Replace the plug (B).

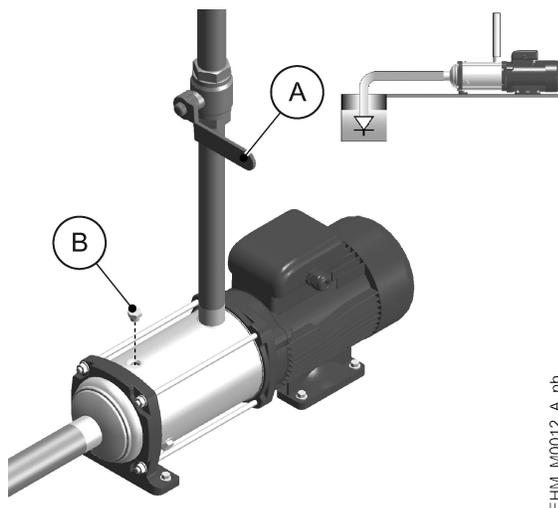


Figure 14: Suction lift installation priming

5.3 Checking the direction of rotation (three-phase motors)

Before starting the pump unit:

NOTICE:

Check that the shaft can turn smoothly.

1. Locate the arrows on the adapter, coupling or cover to determine the correct direction of rotation of the motor.
2. Start the pump unit.
3. Check the direction of rotation through the coupling protection or through the motor cover
4. Stop the pump unit.

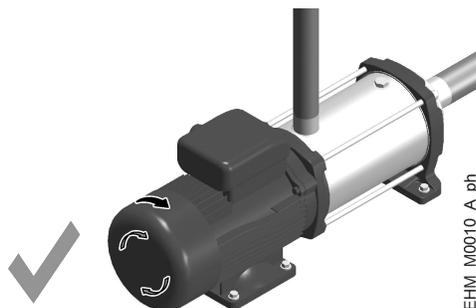


Figure 15: Motor rotation direction

5.3.1 Wrong rotation direction

1. Disconnect the power supply.
2. Invert two of the three wires of the power cable in the terminal box of the motor or in the control panel.
3. Connect the power supply.
4. Start the pump unit.
5. Check the direction of rotation through the coupling protection, or through the motor fan cover
6. Stop the pump unit.

5.4 Start-up

NOTICE:

It is prohibited to operate the unit with the discharge on-off valve closed or at zero flow rate: this can cause the liquid to overheat and damage the unit.

NOTICE:

If there is a risk of the unit running at a flow rate below the minimum expected, install a bypass circuit.

NOTICE:

Check that the shaft can turn smoothly.

1. Check that all the operations indicated in *Filling - Priming* on page 24 and *Checking the direction of rotation (three-phase motors)* on page 25 have been completed correctly.
2. Shut off the discharge on-off valve almost completely.
3. Fully open the suction on-off valve.
4. Start the unit.
5. Gradually open the on-off valve on the discharge side until it is half open.
6. Wait a few minutes and then fully open the discharge on-off valve.

After the start-up procedure, with the pump unit in operation, check that:

- No liquid is leaking from the unit or pipes
 - The maximum pressure of the unit at the discharge, at the discharge side, determined by the pressure available on the suction side, must not exceed the maximum pressure (PN)
 - The current absorbed is within the rated limits (calibrate the thermal overload protection of the motor)
 - There is no unwanted noise or vibrations
 - At zero flow rate, the pressure at the discharge corresponds to the expected nominal pressure
 - No vortices can occur at the end of the suction pipe, at the point of the foot check valve (suction lift installation).
-

NOTICE:

If the units does not deliver the required pressure, repeat the operations in *Filling - Priming* on page 24.

WARNING:

After startup, run the unit for a few minutes with several users open in order to wash the inside of the system.



5.4.1 Settling of the mechanical seal

The pumped liquid lubricates the seal faces of the mechanical seal; under normal conditions, a small amount of liquid may leak out. When the unit is run for the first time, or immediately after the seal is replaced, more liquid may temporarily leak out. To help the seal settle and to reduce leaking:

1. Close and open the on-off valve on the discharge line two or three times with the unit running.
2. Stop and start the unit two or three times.

5.5 Stopping

1. Shut the on-off valve located on the discharge line.
2. Stop the pump unit and check that the motor slows down gradually.
3. Gradually re-open the on/off valve and check that the motor remains still.

6 Maintenance

6.1 Precautions

Make sure to read and understand the safety instructions before starting work.



WARNING:

Maintenance must be done by a technician possessing the technical-professional requirements outlined in the current regulations.



WARNING:

Always wear personal protective equipment.



WARNING:

Always use suitable working tools.



WARNING:

In the case of liquids that are excessively hot or cold, pay attention to the risk of injury.



DANGER: Electrical hazard

Before starting work, check that the unit is unplugged and that the pump unit, the control panel and the auxiliary control circuit cannot restart, even unintentionally.



DANGER: Electrical hazard

If the unit is connected to the frequency converter, disconnect the mains power supply and wait at least 10 minutes for the residual current to dissipate.

6.2 Maintenance every 4000 hours of operation or every year

When the first of the two limits is reached:

1. Measure the pressure at zero flow rate and compare it with the pressure measured during initial start-up; if the pressure has decreased by more than 15%, check the condition of impeller, pump body and wear rings.
2. Check the unit for unwanted noise and vibrations.
3. Check that there is no liquid leaking from the unit or pipes.
4. Check that all the screws and bolts of the unit and pipes are properly fastened.
5. Check that the insulation resistance of the motor is greater than 500 M Ω , applying a test voltage of 500 Vdc for 1 minute.
6. Check the terminal board of the motor for any signs of overheating and arc flashes.
7. Check the condition of the motor's cooling fan and clean it.

6.3 Long periods of inactivity

1. Close the on-off valve on the suction side.
2. Completely empty the unit.
3. Protect the unit against freezing.
4. Before restarting the unit, check that the shaft is rotating freely, without mechanical impediments.

6.4 Ordering spare parts

Identify the spare parts with the product codes directly on the site www.lowara.com/spark.
Contact Xylem or the Authorised Distributor for technical information.

7 Troubleshooting

7.1 Precautions



WARNING:

Maintenance must be done by a technician possessing the technical-professional requirements outlined in the current regulations.



WARNING:

Observe the safety requirements in the chapters on Operation and Maintenance.



WARNING:

If a fault cannot be corrected or is not mentioned, contact Xylem or the Authorised Distributor.

7.2 The unit does not start

Cause	Remedy
Power supply cut off	Restore the power supply
The thermal overload protection of the motor has been triggered	Reset the thermal overload protection on the control panel or the unit
The device that detects the absence of liquid or minimum pressure has been triggered	Top up the liquid or restore minimum pressure
Power supply cable is damaged	Replace the power supply cable
The capacitor, if present, is faulty	Replace the capacitor
Control panel faulty	Check and repair or replace the control panel
Motor (coil) faulty	Check and repair or replace the motor

7.3 The differential protection device (RCD) is activated

Cause	Remedy
Motor leaking	Check and repair or replace the motor
Unsuitable type of differential	Check the type of differential

7.4 The motor thermal overload protection or the fuses trigger when the unit starts

Cause	Remedy
It is calibrated at a value too low in relation to the rated current of the motor	Recalibrate
Missing power supply phase	Check the power supply and restore the phase
Loose and/or faulty connections of the thermal overload protection	Tighten or replace the clamps and terminals
Loose and/or incorrect and/or faulty (star-delta) connections in the terminal board of the motor	Tighten or replace the clamps and terminals
Motor (coil) faulty	Check and repair or replace the motor

Cause	Remedy
Pump unit mechanically seized up	Check and repair the unit
Power supply cable is damaged	Replace the power supply cable
Check valve faulty	Replace the check valve
Foot check valve faulty	Replace the foot check valve

7.5 The thermal motor protection trips

The motor thermal overload protection triggers occasionally, or after the unit has been running for a few minutes

Cause	Remedy
It is calibrated at a value too low in relation to the rated current of the motor	Recalibrate
Input voltage outside the rated limits	Make sure the voltage values are correct
Unbalanced input voltage	Make sure the voltage of the three phases is balanced
Incorrect working curve (flow rate greater than the maximum permitted flow rate)	Reduce the required flow rate
Liquid too dense, presence of solid or fibrous substances (unit overloaded)	<ul style="list-style-type: none"> • Reduce the density of the liquid and/or • Remove the solid substances and/or • Increase the size of the motor
Room temperature too high, exposure to sunlight	<ul style="list-style-type: none"> • Lower the temperature at the point of the thermal overload protection and/or • Protect against direct sunlight
Unit faulty	Send the unit to an authorised workshop for testing

7.6 The unit runs but there is little or no flow rate

Cause	Remedy
Motor turns in the wrong direction	Check the direction of rotation and change it if necessary
Incorrect priming (there are air bubbles in the suction pipe or in the unit)	Repeat the priming procedure
Cavitation	Increase the NPSH ⁷ available in the system
Check valve locked in closed or partially closed position	Replace the check valve
Foot check valve locked in closed or partially closed position	Replace the foot check valve
Discharge pipe throttled	Remove the throttling
Piping and/or unit clogged	Remove the clogging

7.7 When turned off, the unit turns in the opposite direction

Cause	Remedy
Check valve faulty	Replace the check valve
Foot check valve faulty	Replace the foot check valve

7.8 The unit produces excessive noise and/or vibrations

Cause	Remedy
Cavitation	Increase the NPSH ⁸ available in the system

⁷ Net Positive Suction Head

⁸ Net Positive Suction Head

Cause	Remedy
Unsuitable anchoring to the ground	Check the anchoring to the ground
Resonance	Check the installation
Anti-vibration joints not installed	Install anti-vibration joints on the suction and discharge sides of the unit
Foreign bodies in the unit	Remove the foreign bodies
Motor bearings worn or faulty	Replace the motor bearings
The unit does not turn freely due to a mechanical fault	Send the unit to an authorised workshop for testing

7.9 The unit starts up too frequently (automatic start/stop)

Cause	Remedy
Incorrect priming (there are air bubbles in the suction pipe or in the unit)	Repeat the priming procedure
Check valve locked in closed or partially closed position	Replace the check valve
Foot check valve locked in closed or partially closed position	Replace the foot check valve
Starting device (pressure switch, sensor, etc.) set incorrectly or faulty	Adjust or replace the starter
Expansion vessel <ul style="list-style-type: none"> no pre-charge, or undersized, or not installed 	<ul style="list-style-type: none"> Pre-charge the expansion vessel, or replace the expansion vessel with another suitable one, or install an expansion vessel
Oversized unit	Contact Xylem or the Authorised Distributor

7.10 The unit never stops (automatic start/stop)

Cause	Remedy
The required flow rate is greater than the one expected	Reduce the required flow rate
Discharge pipe leaking	Eliminate the leaks
Motor turns in the wrong direction	Check the direction of rotation and change it if necessary
Pipes, on-off valves or filter clogged with impurities	Remove the impurities
Starting device (pressure switch, sensor, etc.) set incorrectly or faulty	Adjust or replace the starter
The unit runs but there is little or no flow rate	See The thermal motor protection trips on page 31.

7.11 The unit is leaking

Cause	Remedy
Worn mechanical seal	<ul style="list-style-type: none"> Replace the mechanical seal, or Fit a mechanical seal with harder seal faces
Mechanical seal damaged due to thermal shock (presence of air bubbles in the unit)	Replace the mechanical seal
Defective mechanical seal	Replace the mechanical seal
Mechanical seal damaged due to temperature of the liquid outside the rated limits	Replace the mechanical seal with another of a suitable make
Mechanical seal damaged due to chemical incompatibility with the liquid	Replace the mechanical seal with a model chemically compatible with the pumped liquid

7.12 The motor becomes excessively hot

Cause	Remedy
Room temperature outside the rated limits	Lower the room temperature
Cooling fan of the motor clogged or damaged	Clean or replace the cooling fan
The unit starts up too frequently	See The unit produces excessive noise and/or vibrations on page 31
The frequency converter, if present, has not been calibrated properly	See the frequency converter manual

7.13 The frequency converter (if present) is in error mode or turned off

Cause	Remedy
See the frequency converter manual	See the frequency converter manual

8 Technical references

8.1 Operating environment

Non-aggressive and non-explosive atmosphere.

8.1.1 Temperature

Phase ~	Min. temperature to max. [°C] / [°F]	Notes
1	-15 to 45 / 5 to 113	
	-15 to 40 / 5 to 104	Only for models 1HM06S/N, 3HM03S/N, 3HM02P, 5HM02S/N and with 0.95 kW motor
3	-15 to 50 / 5 to 122	

8.1.2 Relative air humidity

< 50% at +40°C (104°F).

8.1.3 Elevation

< 1000 m (3280 ft) above sea level.

NOTICE:

If the temperature and humidity exceed the stated limits, contact Xylem or the Authorised Distributor.

NOTICE:

If the unit is installed at an altitude greater than the stated one, reduce the power output of the motor according to the coefficients below, or replace it with a more powerful one.

Table 2: Motor power reduction coefficient

Altitude [m] / [ft]	Ambient temperature [°C] / [°F]								
	0 / 32	10 / 50	20 / 68	30 / 86	40 / 104	45 / 113	50 / 122	55 / 131	60 / 140
0 / 0	1.00	1.00	1.00	1.00	1.00	0.95	0.90	0.85	0.80
500 / 1640	1.00	1.00	1.00	1.00	1.00	0.95	0.90	0.85	0.80
1000 / 3280	1.00	1.00	1.00	1.00	1.00	0.95	0.90	0.85	0.80
1500 / 4921	0.97	0.97	0.97	0.97	0.97	0.92	0.87	0.82	0.78
2000 / 6561	0.95	0.95	0.95	0.95	0.95	0.90	0.85	0.80	0.76

8.2 Temperature of pumped liquid

The pressure-temperature diagram in the figure shows the operating limits of the unit. Contact Xylem or the Authorised Distributor for special needs.

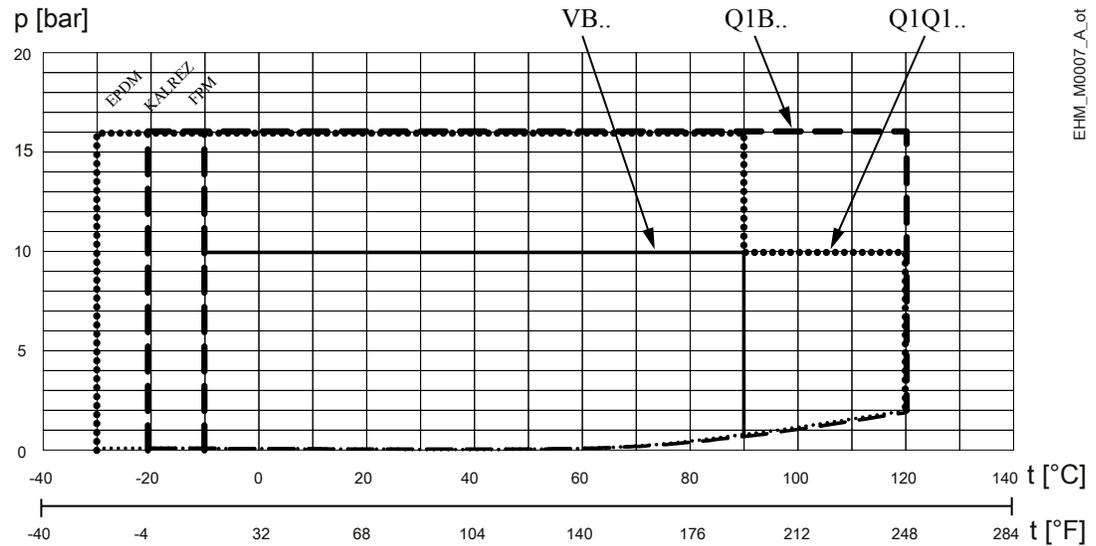


Figure 16: Temperature-pressure diagram

8.3 Operating pressure

See [Temperature of pumped liquid](#) on page 34 for the maximum operating pressure, for the unit model and the temperature of the pumped liquid:

$$P1_{\max} + P_{\max} \leq PN$$

P1_{max}= Maximum input pressure

P_{max}= Maximum generated pressure

PN= Maximum operating pressure

8.4 Maximum hourly start-ups

Unit rated power [kW]	0.25 to 3	4 to 7.50	11 to 15	18.5 to 22	30 to 37	45 to 75	90 to 160
No. of start-ups at regular intervals per h	60	40	30	24	16	8	4

8.5 Protection class

IP 55.

8.6 Electrical specifications

See the motor data plate.

8.7 Permitted tolerances for the supply voltage

Frequency [Hz]	50		60	
Phase ~	1	3	1	3
UN [V] ± %	220 to 240 ± 6	230/400 ± 10 400/690 ± 10	220 to 230 ± 6	220/380 ± 5 380/660 ± 10
No. of conductors + earth	2+1	3+1	2+1	3+1

8.8 Noise level

The free field LA sound pressure level measured at a distance of one metre from the unit is less than 70 dB (A).

Power [kW]	0.3	0.4	0.50	0.55	0.75	0.95	1.1	1.5	2.2	3	4	5.5
LA noise level [dB±3]	52	52	52	55	55	55	60	60	60	60	60	60

8.9 Materials

The table shows the materials in contact with the liquid.

Code	Material		
	Pump body	Impellers	Diffusers
HM..P	Stainless steel/AISI 304	Technopolymer	Stainless steel/AISI 304
HM..S	Stainless steel/AISI 304	Stainless steel/AISI 304	Stainless steel/AISI 304
HM..N	Stainless steel/AISI 316	Stainless steel/AISI 316	Stainless steel/AISI 316

9 Disposal

9.1 Precautions



WARNING:

The unit must be disposed of through approved companies specialised in the identification of different types of materials (steel, copper, plastic, etc.)



WARNING:

It is prohibited to dispose of lubricating fluids and other hazardous substances in the environment.

10 Declarations

10.1 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:

pump unit (see label on SAFETY manual)

fulfils 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 \geq 0.75 kW) if IE2 or IE3 marked,

and the following technical standards

- EN 809:1998+A1:2009, EN 60335-1:2012+A11:2014, EN 60335-2-41:2003+A1:2004+A2:2010, EN 62233:2008
- EN 60034-30:2009, EN 60034-30-1:2014

Montecchio Maggiore, 11.03.2016

Amedeo Valente

(Director of Engineering and R&D)

rev.02



10.2 EU Conformity Declaration (n. EMCD08)

1. Product / Device model: (see label on SAFETY manual)
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: Pump Unit
5. The object of the declaration described above is in conformity with the relevant Union harmonization legislation: 2014/30/EU Directive of 26 February 2014 (electromagnetic compatibility)
6. References to the relevant harmonized 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.00



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

11 Warranty

11.1 Information

For information on the warranty refer to the documentation of the sale contract.

Xylem |'zīləm|

- 1) The tissue in plants that brings water upward from the roots;
- 2) a leading global water technology company.

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services settings. Xylem also provides a leading portfolio of smart metering, network technologies and advanced analytics solutions for water, electric and gas utilities. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

For more information on how Xylem can help you, go to www.xylem.com



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Italy

Visit our Web site for the latest version of this document and more information

The original instruction is in English. All non-English instructions are translations of the original instruction.

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