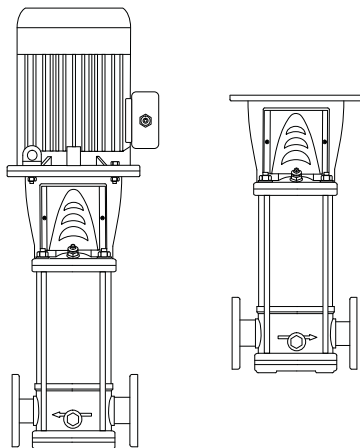


**e-SV 1-3-5-10-15-
22-33-46-66-92-125**



Applicare l'adesivo di codice a barre targhetta qui

Apply the adhesive bar code nameplate here

it	Manuale di installazione, uso e manutenzione	pl	Instalacja, eksploatacja i konserwacja
en	Installation, Operation, and Maintenance Manual	cs	Instalace, provoz a údržba
fr	Installation, fonctionnement et entretien	sk	Inštalácia, prevádzka a údržba
de	Montage, Betrieb und Wartung	hu	Beszereles, működtetés és karbantartás
es	Instalación, funcionamiento y mantenimiento	ro	Instalarea, exploatarea și întreținerea
pt	Instalação, Operação e Manutenção	bg	Инсталиране, Експлоатация и Обслужване
nl	Installatie, bediening en onderhoud	sl	Navodila za vgradnjo, delovanje in vzdrževanje
da	Installation, drift og vedligeholdelse	hr	Instaliranje, rad i održavanje
no	Installasjon, drift og vedlikehold	sr	Instaliranje, rad i održavanje
sv	Installations-, drift- och underhållsmanual	el	Εγκατάσταση, λειτουργία και συντήρηση
fi	Asennus, käyttö ja huolto	tr	Kurulum, Çalıştırma ve Bakım
is	Uppsetning, rekstur og viðhald	ru	Установка, эксплуатация и техобслуживание
et	Paigaldus, käitamine ja hooldus	uk	Встановлення, експлуатація та техобслуговування
lv	Uzstādīšana, ekspluatācija un apkope	ar	التركيب والتشغيل والصيانة
lt	Montavimas, eksploatavimas ir techninė priežiūra		



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:

- Persons with diminished capacities should not operate the product unless they are supervised or have been properly trained by a professional.
- 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
- Product malfunction

Hazard levels

Hazard level	Indication
DANGER:	A hazardous situation which, if not avoided, will result in death or serious injury
WARNING:	A hazardous situation which, if not avoided, could result in death or serious injury
CAUTION:	A hazardous situation which, if not avoided, could result in minor or moderate injury
NOTICE:	<ul style="list-style-type: none"> • A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury

Hazard categories

Hazard categories can either fall under hazard levels or let specific symbols replace the ordinary hazard level symbols.

Electrical hazards are indicated by the following specific symbol:



WARNING:

These are examples of other categories that can occur. They fall under the ordinary hazard levels and may use complementing symbols:

- Crush hazard
- Cutting hazard
- Arc flash hazard

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 described 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 Lowara 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, see *Figure 25*, *Figure 26*, or *Figure 27*.

1.6 EC DECLARATION OF CONFORMITY (TRANSLATION)

LOWARA SRL UNIPERSONALE, WITH HEADQUARTERS IN VIA VITTORIO LOMBARDI 14 - 36075 MONTECCHIO MAGGIORE VI - ITALIA, HEREBY DECLARES THAT THE FOLLOWING PRODUCT:

ELECTRIC PUMP UNIT (SEE LABEL ON FIRST PAGE)

FULFILLS THE RELEVANT PROVISIONS OF THE FOLLOWING EUROPEAN DIRECTIVES:

- MACHINERY DIRECTIVE: 2006/42/EC (THE TECHNICAL FILE IS AVAILABLE FROM LOWARA SRL UNIPERSONALE).
- ELECTROMAGNETIC COMPATIBILITY 2004/108/EC
- ECO-DESIGN 2009/125/CE, REGULATION (EC) 640/2009 (3 ~, 50 Hz, $P_N \geq 0,75$ kW) IF IE2 or IE3 MARKED

AND THE FOLLOWING TECHNICAL STANDARDS

- EN 809, EN 60335-1, EN 60335-2-41, EN 62233
- EN 61000-6-1:2007, EN 61000-6-3:2007
- EN 60034-30

PUMP (SEE LABEL ON THE FIRST PAGE)

FULFILLS THE RELEVANT PROVISIONS OF THE FOLLOWING EUROPEAN DIRECTIVES:

- MACHINERY 2006/42/EC (THE TECHNICAL FILE IS AVAILABLE FROM LOWARA SRL UNIPERSONALE).

AND OF THE FOLLOWING TECHNICAL STANDARDS:

- EN 809

MONTECCHIO MAGGIORE, 16.06.2011

AMEDEO VALENTE

(DIRECTOR OF ENGINEERING AND R&D)

rev.01

Lowara is a trademark of Lowara srl Unipersonale, subsidiary of Xylem Inc.

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

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.
3. If applicable, unfasten the product by removing any screws, bolts, or straps. For your personal safety, be careful when you handle nails and straps.
4. Contact your Sales and Service Department if anything is out of order.

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 unit can be transported either horizontally or vertically. Make sure that the 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.

- Use straps surrounding the motor if the power of the motor is between 0.25 kW and 4.0 kW.
- Use ropes or straps that are linked to the two flanges (eye bolts if provided) located near the mating zone between the motor and pump, if the power of the motor is between 5.5 kW and 55.0 kW.
- 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.
- To move the pump unit only, use straps firmly linked to the motor adapter.

For more information about how to securely harness the unit, see *Figure 4*.

Unit without motor

If the unit is not delivered with a motor, the calibrated fork-shaped shim is already inserted between the adapter and the transmission coupling. The

shim is inserted to keep the impeller stack in the correct axial position. In order to prevent damage during transportation the shaft is also held into place with expanded polystyrene and plastic straps.

The bolt and nuts used to fasten the motor are not included. For more information about how to couple the motor, see *Figure 23*.



WARNING:

A pump and motor that are purchased separately and then coupled together results in a new machine under the Machinery directive 2006/42/EC. The person making the coupling is responsible for all safety aspects of the combined unit.

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.
- Do not place heavy weights on the packed product.

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

This is a vertical, multistage, non-self priming pump, which can be coupled to standard electric motors. The pump can be used to pump:

- Cold water
- Warm water

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

Series	Material
1, 3, 5, 10, 15, 22	Stainless steel
33, 46, 66, 92, 125	Stainless steel and cast iron A special version is available where all parts are made of stainless steel.

The SV pumps 1, 3, 5, 10, 15, and 22 are available in different versions according to the position of the suction and delivery ports and the shape of the connection flange.

The product can be supplied as a pump unit (pump and electric motor) or only as a pump.

NOTICE:

If you have purchased a pump without motor, make sure that the motor is suitable for coupling to the pump.

Mechanical seal

Series	Basic characteristics
1, 3, 5	Nominal diameter 12 mm (0.47 in.), unbalanced, right hand rotation, K version (EN 12756)
10, 15, 22	Nominal diameter 16 mm (0.63 in.), unbalanced, right hand rotation, K version (EN 12756) Balanced with motor power ≥ 5 kW
33, 46, 66, 92, 125	Nominal diameter 22 mm (0.86 in.), balanced, right hand rotation, K version (EN 12756)

Intended use

The pump is suitable for:

- Civil and industrial water distribution systems
- Irrigation (for example, agriculture and sporting facilities)
- Water treatment
- Boiler feed
- Washing plants
- Cooling (for example, air conditioning and refrigeration)
- Fire fighting applications

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.

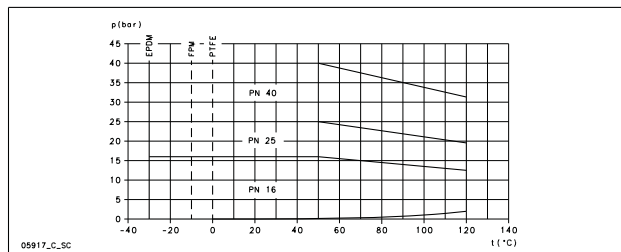
Special applications

Contact the Sales and Service Department 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.).
- If the pump will be installed horizontally, a special version and mounting brackets must be requested.
- Any situation that is different from the ones that is described and relate to the nature of the liquid.

3.2 Application limits**Maximum working pressure**

This flow chart shows the maximum working pressure depending on the pump model and the temperature of the pumped liquid.



The following formula is valid for motors that are provided with the drive-end bearing axially locked (such as the Lowara standard motors for e-SV), see Figure 6. For other situations, contact the Sales and Service Department.

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

- $P_{1\max}$ Maximum inlet pressure
 P_{\max} Maximum pressure generated by the pump
 PN Maximum operating pressure

Liquid temperature intervals

Version	Gasket	Minimum	Maximum ⁵	Maximum ⁶
Standard	EPDM	-30°C (-22°F)	90°C (194°F)	120°C (248°F)
Special	FPM (FKM)	-10°C (14°F)	90°C (194°F)	120°C ⁶ (248°F)
Special	PTFE	0°C (32°F)	90°C (194°F)	120°C (248°F)

For special requirements, contact the Sales and Service Department.

Maximum number of starts per hour

This table shows the number of starts allowed per hour for motors supplied by Lowara:

kW	0.25 - 3.00	4.00 - 7.50	11.0 - 15.0	18.5 - 22.0	30.0 - 37.0	45.0	55.0
Starts per hour	60	40	30	24	16	8	4

NOTICE:

If you use a different motor from the standard one supplied with the electric-pump, check the relevant instructions to find out the permitted number of starts per hour.

3.3 Data plate

The data plate is a metal label that is located on the adaptor. The data plate lists key product specifications. For more information, see Figure 1.

The data plate provides information regarding the material of the gasket and the mechanical seal. For information about how to interpret the code on the data plate, see Figure 2.

Product denomination

See Figure 3 for an explanation of the identification code for the pump and for an example.

WRAS label - Installation Requirements and Notes (for UK market only)

A WRAS label on the pump means it is a Water Regulations Advisory Scheme approved product. This product is suited to be used with cold potable water for human consumption. For more information, refer to IRNs R001 and R420 in the WRAS Water Fittings and Materials Directory (www.wras.co.uk).

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.

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, and water and power connections.

**WARNING:**

- 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.

⁵ EN 60335-2-41 is the norm about electric-related safety pumps for household and similar applications

⁶ Maximum 100°C for water

4.1 Earthing grounding



WARNING:

- Always connect the external protection conductor to earth (ground) terminal before making other electrical connections.
- You must earth (ground) all electrical equipment. This applies to the pump equipment, the driver, and any monitoring equipment. Test the earth (ground) lead to verify that it is connected correctly.
- If the motor cable is jerked loose by mistake, the earth (ground) conductor should be the last conductor to come loose from its terminal. Make sure that the earth (ground) 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].

4.2 Facility requirements

4.2.1 Pump location



DANGER:

Do not use this pump in environments that may contain flammable/explosive or chemically aggressive gasses 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*.

Pump positions and clearance

NOTICE:

Horizontal mounting of the pump requires special adaptation.

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:

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

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)

For more information, see *Figure 7*.

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

For more information about the performance, see *Figure 5*.

NOTICE:

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

4.2.2 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 the municipal authorities if the pump is connected to the municipal water system. If required by the authorities, install appropriate backflow-prevention device on the suction side.

Suction and discharge 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 airtight.
- 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.
- 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 water inside the pump.

For illustrations that show the piping requirements, see *Figure 12*.

4.3 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 high-sensitivity differential switch (30 mA) [residual current device RCD] to provide additional protection against electric shock
 - 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 $\leq 1,5$ kW	<ul style="list-style-type: none"> • Built-in automatic reset thermal-amperometric protection (motor protector) • Short circuit protection (must be supplied by the installer)⁷
Three phase electric pump and other single phase pumps ⁸	<ul style="list-style-type: none"> • Thermal protection (must be supplied by the installer) • Short circuit protection (must be supplied by the installer)

- 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 water is pumped from a water system, use a pressure switch.
 - When the water 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 and sprinkler systems.

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.
- Only use single-phase or three-phase motors whose size and power comply with the European standards.

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

Frequency Hz	Phase ~	UN [V] \pm %
50	1	220 – 240 \pm 6
	3	230/400 \pm 10
		400/690 \pm 10
60	1	220 – 230 \pm 6
	3	220/380 \pm 5
		380/660 \pm 10

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.

Electric pump with motor:

Type	Cable gland Outer cable diameter range in mm		
	M20 x 1.5, 6–12	M25 x 1.5, 13–18	M32 x 1.5, 18–25
SM	X	–	–
PLM	X	X	X
LLM	X	X	X

4.4 Install the pump

4.4.1 Mechanical installation

For information about the pump base and anchor holes, see *Figure 13*.

1. Put the pump onto the concrete foundation or equivalent metal structure.
If the transmission of vibrations can be disturbing, provide vibration-damping supports between the pump and the foundation.
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. Anchor the pump securely with bolts to the concrete foundation or metal structure.

4.4.2 Electrical installation

1. To facilitate the connection, the motor can be rotated to obtain the most convenient position for the connection:
 - a) Remove the four bolts that attach the motor to the pump.
 - b) Rotate the motor to the desired position. Do not remove the coupling between the motor shaft and the pump shaft.
 - c) Replace the four bolts and tighten them.
2. Remove the screws of the terminal box cover.
3. Connect and fasten the power cables according to the applicable wiring diagram.
For wiring diagrams, see *Figure 14*. The diagrams are also available on the back of the terminal box cover.
 - a) Connect the earth (ground) lead.
Make sure that the earth (ground) lead is longer than the phase leads.
 - b) Connect the phase leads.
4. Replace the terminal box cover.

NOTICE:

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

5. 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.

⁷ fuses aM (motor starting), or magneto-thermal switch with curve C and $I_{cn} \geq 4,5$ kA or other equivalent device.

⁸ Overload thermal relay with operation class 10A + fuses aM (motor starting) or motor protection magneto-thermal switch with operation class 10A.

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.
- To prevent overheating of the internal pump-components, make sure that a minimum water flow is always guaranteed when the pump is running. If this cannot be achieved, then a bypass or re-circulate line is recommended. Refer to the minimal nominal flow rate values given in the Appendix.
- 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 (water mains, gravity tank) and the maximum pressure that is delivered by the pump must not exceed the maximum working pressure allowed (nominal pressure PN) for the pump.
- Do not use the pump if cavitation occurs. Cavitation can damage the internal components.
- If you pump hot water, you must guarantee a minimum pressure on the suction side to prevent cavitation.

Noise level

For information about noise levels emitted by units equipped with a Lowara supplied motor, see *Table 10*.

5.1 Prime the pump

For information about plug placement, see *Figure 15*.

Installations with liquid level above the pump (suction head)

For an illustration that shows the pump parts, see *Figure 16*.

1. Close the on-off valve located downstream from the pump. Select the applicable steps:
2. Series 1, 3, 5:
 - a) Loosen the drain plug pin (2).
 - b) Remove the fill and vent plug (1) and open the on-off valve upstream until the water flows out of the hole.
 - c) Tighten the drain plug pin (2).
 - d) Replace the fill and vent plug (1).
3. Series 10, 15, 22, 33, 46, 66, 92, 125:
 - a) Remove the fill and vent plug (1) and open the on/off valve upstream until the water flows out of the hole.
 - b) Close the fill and vent plug (1). Fill plug (3) can be used instead of (1).

Installations with liquid level below the pump (suction lift)

For an illustration that shows the pump parts, see *Figure 17*.

1. Open the on-off valve located upstream from the pump and close the on-off valve downstream. Select the applicable steps:
2. Series 1, 3, 5:
 - a) Loosen the drain plug pin (2).
 - b) Remove the fill and vent plug (1) and use a funnel to fill the pump until water flows out of the hole.
 - c) Replace the fill and vent plug (1).
 - d) Tighten the drain plug pin (2).
3. Series 10, 15, 22, 33, 46, 66, 92, 125:
 - a) Remove the fill and vent plug (1) and use a funnel (4) to fill the pump until water flows out of the hole.
 - b) Replace the fill and vent plug (1). Fill plug (3) can be used instead of (1).

5.2 Check the rotation direction (three-phase motor)

Follow this procedure before startup.

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, 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 14*.
 - c) Check the direction of rotation again.

5.3 Start the pump

Before starting the pump, make sure that:

- The pump is correctly connected to the power supply.
 - The pump is correctly primed according to instruction in the *Prime the pump*.
 - 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*.

6 Maintenance**Precautions****WARNING:**

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

**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

The pump does not require any scheduled routine maintenance. 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 Sales and Service Department 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.

6.2 Torque values

For information about torque values, see *Table 18*, *Table 19*, or *Table 20*.

For information about the applicable thrust and torques on the flanges by the piping, see *Figure 21*.

6.3 Replace the electric motor

The pump is supplied with a calibrated fork-shaped shim designed to facilitate the motor coupling and replacement operations.

- See instructions about how to replace the motor in *Figure 23*. If the calibrated fork-shaped shim is not available use a 5 ± 0.1 mm (0.2 ± 0.004 in.) shim.

6.4 Replace the mechanical seal

Series	Instruction
1, 3, 5	Contact the Sales and Service Department.
10, 15, 22: ≤ 4 kW	Contact the Sales and Service Department.
10, 15, 22: > 4 kW	See the instructions in <i>Figure 24</i> . Use alcohol for cleaning and lubrication.
33, 46, 66, 92, 125	See the instructions in <i>Figure 24</i> . Use alcohol for cleaning and lubrication.

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.

Cause	Remedy
The protective device against dry running has tripped.	Check the water 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 water.

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"> Restore the power supply. Make sure all electrical connections to the power supply are intact.
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"> water level in the tank, or the mains pressure protective device and its connecting cables
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"> power supply electrical connection

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 Sales and Service Department.
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 Sales and Service Department.

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 earth (ground) leakage.	Check the insulation of the electrical system components.

7.8 The pump runs but delivers too little or no water



Cause	Remedy
There is air inside the pump or the piping.	<ul style="list-style-type: none"> Bleed the air
The pump is not correctly primed.	Stop the pump and repeat the prime procedure. If the problem continues: <ul style="list-style-type: none"> Check that the mechanical seal is not leaking. Check the suction pipe for perfect tightness. Replace any valves that are leaking.
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 Sales and Service Department.
The piping is clogged.	Check and clean the pipes.
The rotation direction of the impeller is wrong (three-phase version).	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"> Decrease the suction lift Increase the diameter of the suction pipe

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"> The suction pipe The foot valve or the check valve 	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">• The suction pipe• The foot valve or the check valve	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 Sales and Service Department.
There are foreign objects inside the pump.	Contact the Sales and Service Department.

For any other situation, refer to the Sales and Service Department.