

e-LNE & e-LNT Series

In-Line Electric Pump Unit



a xylem brand



e-LNEE
e-LNES

Applicare qui l'adesivo col codice a barre



e-LNTE
e-LNTS

Apply the adhesive bar code nameplate here

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1 Introduction and Safety



1.1 Introduction

Purpose of this manual

The purpose of this manual is to provide the necessary information on how to do the following properly:

- Installation
- Operation
- Maintenance.



CAUTION:

Before installing and using the product, make sure that you read and fully understand this manual in all its parts. Improper use of the product can cause personal injuries and damage to property, as well as making the warranty null and void.

NOTICE:

This manual is an integral part of the product. It must always be made available to the user, stored in the proximity of the product, and well kept.

Supplementary instructions

The instructions and warnings in this manual apply to the standard version, as described in the sales document. Special version pumps may be supplied with supplementary instruction manuals. For situations not considered in this 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 product, and in order to avoid the following risks, make sure that you carefully read, understand and comply with the following danger warnings:

- Injuries and health hazards
- Damage to the product
- Product malfunction.

Hazard 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
	Magnetic hazard
	Hot surface hazard
	Ionizing radiation hazard
	Potentially explosive atmosphere hazard (ATEX EU Directive)
	Cut and abrasion hazard
	Crushing hazard (limbs)

Other symbols

Symbol	Description
	User Specific information for the users of the product.
	Installer / Maintenance technician Specific information for personnel responsible for the installation of the product within the system (hydraulic and/or electric system), and for maintenance operations.
	ATEX Product information for use in potentially explosive atmospheres (ATEX EU Directive)

1.2.2 User safety

Strictly comply with current health and safety regulations.



WARNING:

This product 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 product.

Inexperienced users



WARNING:

FOR THE EUROPEAN UNION

- 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 if they have been given supervision or instruction concerning 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 made by children without supervision.

FOR OTHER COUNTRIES

- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
- Children should be supervised to ensure that they do not play with the appliance.

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 product contains lubricating fluid, take appropriate measures to prevent the dispersal of leaks into the environment.

1.2.4 Sites exposed to ionizing radiations



WARNING: Ionizing radiation hazard

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

2 Transportation and Storage



2.1 Transportation of the packed product

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

- A. a cardboard box, or
- B. a cardboard box with wooden base, or
- C. a wooden crate.

Type B and C packaging are for transport with a forklift truck; the lifting points are indicated in Fig. 1.



WARNING: Crushing hazard (limbs)

- The product and its components may be heavy: risk of crushing
- Always wear personal protective equipment
- Check the gross weight marked on the packaging and use suitable lifting equipment
- Manual handling of the product must be in compliance with the current regulations on "manual load handling", to avoid unfavourable ergonomic conditions causing risks of back-spine injury.



WARNING:

If the product is designed to pump water for human consumption, take appropriate measures during transport to avoid contamination from external substances.

2.1.1 Inspect the delivery

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.

Unpacking and inspection of the product

1. Remove packing materials from the product.
2. Release the product by removing the screws and/or cutting the straps, if fitted.



CAUTION: Cut and abrasion hazard
Always wear personal protective equipment.

3. Check the product 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.

2.2 Handling the pump unit

The pump units must be harnessed and lifted as shown in Fig. 3.



WARNING: Crushing hazard (limbs)

- Do not use eyebolts screwed on the motor for handling the pump unit
- The eyebolts screwed onto the motor must be used only to move the pump unit upright from its horizontal position on the ground and only for as long as strictly necessary (see Fig. 2)
- Use cranes, ropes, lifting straps, hooks and clasps that comply with current regulations and that are suitable for the specific use
- Make sure that the harnessing does not damage the pump unit
- During the lifting operations, always avoid sudden movements that could compromise the stability of the load
- During handling, make sure to avoid injury to people and animals, and/or damage to property.

2.3 Storage

Storage of the packed product

The product must be stored:

- In a covered and dry place
- Away from heat sources
- Protected from dirt
- Protected from vibrations
- At an ambient temperature between -5°C and +40°C (23°F and 104°F).

NOTICE:

- Do not place heavy loads on top of the product
- Protect the product from collisions
- Rotate the shaft by hand several times every three months.



WARNING:

If the product is designed to pump water for human consumption, take appropriate measures during storage to avoid contamination from external substances.

Long-term storage of the pump unit

1. Follow the same instructions for storage of the packaged product.
2. Empty the pump unit, undoing the cap F (see Fig. 11). This operation is essential in exceptionally cold environments; any residual liquid in the pump unit could otherwise have an adverse effect on its condition and performance.

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



3 Technical Description

3.1 Designation

Centrifugal pump unit with in-line suction and delivery flanges.

3.2 Denomination of the models

Model	Description
LNEE	Single-impeller, close-coupled with an impeller keyed directly to the motor shaft extension.
LNES	Single-impeller, rigid-coupled with a rigid coupling keyed to the standard motor shaft extension.
LNTE	Double volute, flap valve, close-coupled with an impeller keyed directly to the special motor shaft extension.
LNTS	Double volute, flap valve, rigid-coupled with a rigid coupling keyed to the standard motor shaft extension.

3.3 Data plate

The data plate is a label showing:

- The main product details (see Fig. 13)
- The identification code (see Fig. 14)

Marks of safety approval

For products with a mark of electrical-related safety approval such as IMQ, TUV, IRAM, etc., the approval refers exclusively to the pump unit.

3.4 Denomination of the main components

- For LNEE and LNES models, see Fig. 15
- For LNTE and LNTS models, see Fig. 16.

3.5 Intended use

HVAC:

- Liquid transfer in heating systems
- Liquid transfer in air-conditioning systems
- Liquid transfer in ventilation systems.

Water supply:

- Pressure boosting in commercial buildings
- Irrigation systems
- Water transfer for green houses.

Pumped liquids

- Cold or warm water
- Clean liquids
- Coolants
- Fluids chemically and mechanically compatible with the materials of the pump unit.

Always observe the limits indicated in the Technical Data chapter.

3.6 Improper use



WARNING:

The product was designed and built for the use described in the section Intended use. It is strictly prohibited to put the product to any other use, in order to guarantee the safety of the user and the efficiency of the same product at all times.



DANGER:

It is strictly prohibited to use this product to pump flammable or explosive liquids, or both.



DANGER: Potentially explosive atmosphere hazard

The operation of the pump unit in environments with potentially explosive atmospheres or with combustible dusts (e.g.: wood dust, flour, sugars and grains) is strictly forbidden.

Examples of improper use

- Pumping liquids that are not compatible with the pump unit construction materials
- Pumping hazardous, toxic, explosive, flammable or corrosive liquids
- Pumping liquids containing abrasive, solid, or fibrous substances
- Using the pump unit for flow rates beyond the specified flow rates on the data plate.

Examples of improper installation

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

3.7 Use in water distribution networks for human consumption

Be careful when connecting the pump 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 use the pump unit if it has been previously used to pump fluids other than drinking water
- Take appropriate measures during transport and storage to prevent contamination from external substances
- Remove the pump unit from its packaging soon before installation and make sure that it does not become contaminated
- After installation, run the pump unit for a few minutes with several users open in order to wash the inside of the system.

3.8 Special applications

Contact Xylem or the Authorised Distributor in the following cases:

- If liquids with a density and/or viscosity value exceeding that of water (such as water and glycol mixture) must be pumped
- If the pumped liquid is chemically treated (for example softened, deionized, demineralized etc.)
- Any situations different from the ones described and relating to the nature of the liquid.

4 Installation



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
- Always use suitable working tools
- When selecting the place of installation and connecting the unit to the hydraulic and electric power supplies, strictly comply with current regulations.



WARNING:

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

- It is prohibited to use the pump unit if it has been previously used to pump fluids other than drinking water
- Remove the pump unit from its packaging soon before installation and make sure that it does not become contaminated
- Observe all the requirements of the authorities and companies concerned.

4.1 Mechanical installation

The pump unit can be fitted:

- Directly on the pipes, if these are properly anchored and capable of taking its weight
- On a concrete foundation with optional brackets.

4.1.1 Installation area

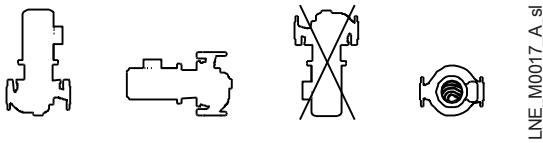
1. If possible, install the pump unit above the level of the floor.
2. Make sure that the installation area is protected against any fluid leaks or flooding.
3. Observe the requirements in the section Operating environment.

Air clearance between a wall and the motor fan grille

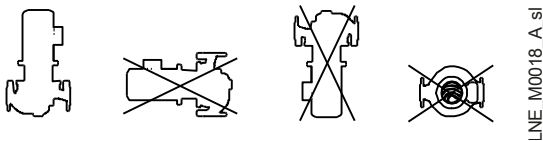
- To ensure suitable ventilation: ≥ 100 mm
- To permit inspection and removal of the motor: ≥ 300 mm.
If the space available is any less, refer to the technical catalogue.

4.1.2 Permitted positions

Motor power <7.5 kW



Motor power ≥ 9.2 kW



See also the section Guidelines for the hydraulic system.

4.1.3 Installation on concrete foundation

Foundation requirements

1. The dimensions must be adapted to the choice of bracket:
 - Supporting base kit for LNE models, see Fig. 4
 - Bracket kit for LNE models, see Fig. 5 and Fig. 6
 - Supporting base kit for LNT models, see Fig. 7.
2. The surface should be as flat and level as possible.
3. Use concrete of compressive strength class C12/15 which meets the requirements of exposure class XC1 according to EN 206-1.

Anchoring the pump unit to the foundation

1. Remove the plugs covering the flanges, if present.
2. Place the pump unit on the foundation and check it with a spirit level.

3. Align the pump unit and the flanges of the pipes on both sides of the pump unit; check alignment of the bolts.
4. Tighten the foundation bolts evenly and firmly.

4.1.4 Reducing vibrations

The motor and flow of liquids in the pipes may cause vibrations which can be exacerbated by incorrect installation of the pump unit and pipes. To reduce vibrations:

- Anchor the pump unit properly to a concrete foundation
- Install vibration dampers and anti-vibration joints (see Fig. 17 and Fig. 18).

4.2 Hydraulic connection



WARNING:

- All the hydraulic connections must be completed by an installer possessing the technical-professional requirements outlined in the current regulations
- Use pipes of a suitable size that can withstand the maximum operating pressure; the system may otherwise collapse and pose the risk of physical injury and damage to property.

4.2.1 Guidelines for the hydraulic system

1. Refer to the representative hydraulic diagrams in Fig. 17 (positive suction head installation) and Fig. 18 (suction lift installation).
2. The liquid should flow in the direction of the arrow on the body of the pump unit.
3. Do not install the pump unit at the lowest point of the system, to avoid the accumulation of sediments.
4. Install an automatic relief valve at the highest point of the system to eliminate air bubbles.
5. Remove any welding flash, deposits and impurities in the pipes that could damage the pump unit; install a filter if necessary.
6. Support the pipes independently to prevent these from weighing on the pump unit.
7. In the case of suction lift installation, assemble the pipes at an angle upwards to the pump unit to avoid air pockets.
8. Install anti-vibration joints on the suction and delivery sides of the pump unit to reduce the transmission of vibrations between the pump unit and system.
9. In order to reduce flow resistance, the pipe on the suction side must be:
 - As short and straight as possible and without bottlenecks, covering a length equal to at least six times the diameter of the flange.
 - Wider than the suction flange; if necessary, install an eccentric reducer that is horizontal on top
 - With bends of as wide a radius as possible
 - Without traps and 'goosenecks'

- With valves, when applicable, with a low specific flow resistance.
10. In the case of suction lift installation, check that no vortexes can occur at the end of the suction pipe, at the point of the foot check valve.
 11. Install a check valve on the delivery side to prevent the liquid from flowing back into the pump unit when this is at standstill.
 12. 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 delivery side, for checking the actual operating pressure of the pump unit.
 13. To exclude the pump unit from the system for the purpose of maintenance, install:
 - An on-off valve on the suction side
 - An on-off valve on the delivery side, downstream of the check valve and pressure gauge, useful also for regulating the flow.
 14. On the suction side, install a device to prevent the absence of liquid or a minimum pressure device; if the liquid is drawn from a tank or basin, install a float or probes.

4.2.2 Forces and torques for flanges

The maximum allowable forces and torques applied by the pipes on the flanges of the pump unit are given in:

- Tab. 9, anchoring directly on the pipes
- Tab. 10, anchoring on the concrete foundation.

The data are valid for:

- Single-impeller and double volute pump units
- EN-GJL-250 pump units with cast iron body
- Suction side (DNS) and delivery side (DND).

4.3 Electrical connection



DANGER: Electrical hazard

- The connection to the electric power supply must be completed by an electrician possessing the technical-professional requirements outlined in the current regulations
- 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.

4.3.1 Grounding (earthing)



DANGER: Electrical hazard

- Always connect the external protection conductor to the ground terminal before attempting to make any other electrical connections
- Connect all the electrical accessories of the pump unit and motor to the ground
- Check that the protection conductor (ground) is longer than the phase conductors; in case of accidental disconnection of the power supply conductor, the protection conductor (ground) must be the last one to detach

itself from the terminal

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

4.3.2 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.

4.3.3 Guidelines for the control panel

NOTICE:

The control panel must match the ratings of the pump unit on the data plate. Improper combinations could compromise the protection of the motor.

1. The control panel must protect the motor⁹ against overloading and short circuits; install suitable protection (thermal relay or overload cut-out switch, see table).

Pump unit	Protection
Single phase standard ≤ 2.2 kW	<ul style="list-style-type: none"> • Automatic reset thermal-amperometric protection, in-built (motor protector) • Short circuit, must be supplied by the installer.¹⁰
Three-phase ¹¹	<ul style="list-style-type: none"> • Thermal, must be supplied by the installer • Short circuit, must be supplied by the installer.

2. Equip the control panel with a system for protection against dry running to which a pressure switch (or float switch or sensors 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.

⁹ Or, frequency converter plus motor

¹⁰ Fuses aM (motor starting), or magneto-thermal switch with curve C and $I_{cn} \geq 4.5$ kA or other equivalent device

¹¹ Overload thermal relay with trip class 10 A + fuses aM (motor starting) or motor protection magneto-thermal switch with starting class 10 A

4.3.4 Motor guidelines



WARNING: Crushing hazard (limbs)

The pump unit could restart inadvertently after the motor cools down (single-phase motors with automatic reset thermal overload protection): risk of physical injury.

NOTICE:

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

4.3.5 Electrical connection of the motor¹²

1. Open the terminal box cover.
2. Connect the power conductors, see Fig. 12.
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.

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.

4.3.6 Operation with variable speed drive

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, of size 315 S/M and above, are exposed to the risk of harmful current: 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	dV/dt [V/μs]
------------	--------------	--------------

¹² Or, frequency converter plus motor

	[V]	
up to 90R (500 V)	> 650	> 2200
from 90R to 180R	> 1400	> 4600
over 180R	> 1600	> 5200

Otherwise, use a motor with reinforced insulation¹³ and a sinusoidal filter.

5 Use and operation



Precautions



WARNING:

- Check that the protection devices of the joint are installed, when applicable
- Make sure that the drained liquid cannot cause damage or injuries.



WARNING: Crushing hazard (limbs)

Risk of automatic restarting.



WARNING: Hot surface hazard

- Be aware of the extreme heat generated by the pump unit
- It is prohibited to put combustible material near the pump unit.

NOTICE:

- It is prohibited to operate the pump unit when dry, without priming and below the minimum rated flow rate
- It is prohibited to operate the pump unit with the on-off valves on the suction and delivery sides closed
- It is prohibited to use the pump unit in the case of cavitation
- The pump unit must be filled and vented properly before it can be started
- The maximum pressure delivered by the pump unit, determined by the available suction pressure, must not exceed the nominal pressure.

5.1 Filling - Priming

5.1.1 Positive suction head installation

1. Close the on-off valves on the suction and delivery sides, see Fig. 17
2. Loosen the relief valve H, see Fig. 11



WARNING:

- Be aware of the direction of the vent hole and make sure that the liquid coming out cannot cause damage or injury
- In the case of liquids that are excessively hot or cold, pay particular attention the risk of injury.

¹³ Available on request

3. Open the on-off valve on the suction side sufficiently to ensure the smooth flow of liquid out of valve H.
4. Close the valve H.
5. Open both the on-off valves slowly and fully.

5.1.2 Suction lift installation

1. Close the on-off valve on the delivery side, see Fig. 18
2. Open the on-off valve on the suction side.
3. Loosen the relief valve H, see Fig. 11.



WARNING:

- Be aware of the direction of the vent hole and make sure that the liquid coming out cannot cause damage or injury
- In the case of liquids that are excessively hot or cold, pay particular attention the risk of injury.

4. Unfasten cap G1.
5. Fill the pump unit until the liquid comes out of the hole.
6. Wait 5 minutes and top up with more liquid if necessary.
7. Re-fasten cap G1.
8. Close the valve H.

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

1. Check that the pump unit has been installed and filled properly.
2. Check that the pump unit is connected to the mains power supply.
3. Check that the shaft can turn smoothly.
4. Locate the arrows on the adapter, joint or cover to determine the correct direction of rotation of the motor.
5. In rapid succession:
 - a) Start the pump unit
 - b) Check the direction of rotation through the coupling guard or through the motor fan cover
 - c) Stop the pump unit.

5.2.1 Wrong rotation direction

1. Disconnect the power supply.
2. Invert two of the three wires of the power cable in the terminal board of the motor or in the control panel, see Fig. 12.
3. Connect the power supply.
4. In rapid succession:
 - a) Start the pump unit
 - b) Check the direction of rotation through the coupling guard or through the motor fan cover
 - c) Stop the pump unit.

5.3 Start-up

NOTICE:

- It is strictly prohibited to operate the pump unit with the delivery on-off valve closed or at zero flow rate: this can cause the liquid to overheat and damage the pump unit.
- If there is a risk of the pump unit running at zero flow rate, install a bypass circuit to guarantee a minimum flow rate; refer to the technical catalogue for the minimum flow rate values.

1. Check that all the operations in the sections on Filling - Priming and Checking the direction of rotation have been carried out properly.
2. Almost fully close the on-off valve on the delivery side, see Fig. 17 or 18.
3. Fully open the on-off valve on the suction side.
4. Start the pump unit
5. Gradually open the on-off valve on the delivery side until it is half open.
6. Loosen the relief valve H and keep it open until the liquid flows out smoothly, see Fig. 11.
7. Close the valve H.
8. Gradually open the on-off valve on the delivery side until it is completely open.

Note for models LNTE and LNTS: repeat this procedure for both pump units.

After the start-up procedure, check that:

- No liquid is leaking from the pump unit or pipes
- The maximum pressure delivered by the pump unit, determined by the available suction pressure, must not exceed the nominal pressure
- The current absorbed is within the rated limits (and therefore calibrate the thermal overload protection of the motor)
- There is no unwanted noise or vibrations
- The flap valve works properly (models LNTE and LNTS)
- At zero flow rate, the delivery pressure corresponds to the nominal pressure



WARNING:

If the pump unit is used to pump water for human and/or animal consumption, run it for a few minutes with several users open in order to wash the inside of the system.

Settling of the mechanical seal

The pumped liquid lubricates the contact surfaces of the mechanical seal; under normal conditions, a small amount of liquid may leak out.

When the pump unit is run for the first time or immediately after the seal is replaced, more liquid may leak out temporarily.

To help the seal settle and to reduce leaking, close and open the on-off valve on the delivery line two or three times with the pump unit running.

5.4 Stopping

1. Shut the on-off valve located on the delivery line.
2. Stop the pump unit and check that the motor slows down gradually.

5.4.1 Frequency of start-ups and stops

See the chapter on Technical Data for the maximum number of hourly start-ups.

Notes for models LNTE and LNTS:

- The pump unit in use and the one in standby must alternate regularly to ensure even distribution of the hours of operation: make the change manually or install an automatic controller
- When pumping domestic hot water, the pump units should alternate at least once a day to prevent any deposits from clogging the pump unit on standby.

6 Maintenance



Precautions

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



WARNING:

- Maintenance must be done by a technician possessing the technical-professional requirements outlined in the current regulations
- Always wear personal protective equipment
- Always use suitable working tools
- Make sure that the drained liquid cannot cause damage or injuries.



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.
- If the pump unit is connected to the frequency converter (optional), wait at least 10 minutes after unplugging the unit for the residual current to dissipate.

6.1 Maintenance every 4000 hours of operation or every year¹⁴

1. Measure the pressure at zero flow rate and compare it with the pressure measured during initial start-up; if it has decreased by more than 15%, check the condition of the impeller, body of the pump and wear rings.
2. Check the pump unit for unwanted noise and vibrations.
3. Use the relief valve V to remove any air bubbles in the pump unit.
4. Check that there is no liquid leaking from the pump unit or pipes.
5. Check that all the screws and bolts of the pump unit and pipes are properly fastened.
6. Check that the insulation resistance of the motor is greater than 500 MΩ, applying a test voltage of 500 Vdc for 1 min.
7. Check the terminal board of the motor for any

¹⁴ When the first of the two limits is reached

signs of overheating and arc flashes.

8. Check the condition of the motor's cooling fan and clean it.
9. Models LNTE and LNTS: test operation of the flap valve by running the motors one at a time and checking that the motor not in operation turns in the correct direction.

6.2 Maintenance every 20000 hours of operation or every 2 years¹⁵

1. Replace the mechanical seal.
2. Replace the O-ring.

6.3 Maintenance every 20000 hours of operation or every 5 years¹⁶

Replace the motor bearings (only for greased for life bearings).

6.4 Maintenance of the regreasable motor bearings

Refer to the data plate and instructions of the motor for information on the type of grease and how often it needs to be topped up or replaced.

6.5 Blind flanges for mod. LNTE and LNTS

If maintenance needs to be carried out on one of the pump units, a coupling flange (optional, see Fig. 8) can be fitted to run the other pump unit in the meantime.

6.6 Long periods of inactivity

1. Close the on-off valve on the suction side.
2. Completely empty the pump unit.
3. Protect the pump unit against freezing.

6.7 Tightening torques of the threaded connections

See Fig. 11.

6.8 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.

¹⁵ When the first of the two limits is reached

¹⁶ When the first of the two limits is reached

7 Troubleshooting



Precautions



WARNING:

- Faults must be corrected by a technician possessing the technical-professional requirements outlined in the current regulations
- Observe the safety requirements in the chapters on Use and Operation and Maintenance
- If a fault cannot be corrected or is not mentioned, contact Xylem or the Authorised Distributor.

7.1 The pump unit is turned on but does not work

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 in the control panel or the one in the pump 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 condenser is faulty, if present	Replace the condenser
Control panel faulty	Check and repair or replace the control panel
Motor (coil) faulty	Check and repair or replace the motor

7.2 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

7.3 The thermal overload protection of the motor is triggered when the pump 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
Pump unit mechanically seized up	Check and repair the pump 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 valve
Flap valve damaged, worn or faulty (models LNTE and LNTS)	Replace the flap valve

7.4 The thermal overload protection of the motor is triggered occasionally, or after the pump 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 (pump 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
Pump unit faulty	Send the pump unit to an authorised workshop for testing

7.5 The pump unit runs but delivers too little or no liquid

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 pump unit)	Repeat the priming procedure
Cavitation	Increase the NPSH 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 valve
Flap valve damaged, worn or faulty (models LNTE and LNTS)	Replace the flap valve
Delivery pipe throttled	Remove the throttling
Piping and/or pump unit clogged	Remove the clogging

7.6 The pump unit turns the other way when turned off

Cause	Remedy
Check valve faulty	Replace the check valve
Foot check valve faulty	Replace the foot valve
Flap valve damaged, worn or faulty (models LNTE and LNTS)	Replace the flap valve

7.7 The pump unit produces excessive noise and/or vibrations

Cause	Remedy
Cavitation	Increase the NPSH available in the system
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 delivery lines of the pump unit
Foreign bodies in the pump unit	Remove the foreign bodies
Motor bearings worn or faulty	Replace the motor bearings
The pump unit does not turn freely due to a mechanical fault	Send the pump unit to an authorised workshop for testing
Motor turns in the wrong	Check the direction of

direction	rotation and change it if necessary
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7.8 The pump starts up too frequently (automatic start/stop)

Cause	Remedy
Incorrect priming (there are air bubbles in the suction pipe or in the pump 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 valve
Flap valve damaged, worn or faulty (models LNTE and LNTS)	Replace the flap valve
Starter (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
Pump unit oversized	Contact Xylem or the Authorised Distributor

7.9 The pump unit never stops (automatic start/stop)

Cause	Remedy
The required flow rate is greater than the one expected	Reduce the required flow rate
Delivery pipe leaking	Eliminate the leaks
Motor turns in the wrong direction	Check the direction of rotation and change it if necessary
Pipes, valves or filter clogged with impurities	Remove the impurities
Starter (pressure switch, sensor, etc.) set incorrectly, or faulty	Adjust or replace the starter
The pump unit runs but delivers too little or no liquid	See Par. 7.5

7.11 The mechanical seal is leaking

Cause	Remedy
Worn mechanical seal	<ul style="list-style-type: none"> Replace the mechanical seal, or Fit a mechanical seal with harder contact surfaces
Mechanical seal damaged due to thermal shock (presence of air bubbles in the pump 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 one of a make 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 pump unit starts up too frequently	See Par. 7.8
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 Data



8.1 Operating environment

Non-aggressive and non-explosive atmosphere.

Temperature

From 0°C (+32°F) to +40°C (104°F).

Relative air humidity

< 50% at +40°C (104°F).

Elevation

< 1000 m (3280 ft) above sea level.

NOTICE:

- If the temperature and humidity exceed the stated limits, contact Xylem or the Authorised Distributor
- If the pump unit is installed at an altitude greater than the stated one, reduce the power output of the motor (see Tab. 20) or replace it with an oversized one.

8.2 Liquid temperature

The pressure-temperature diagram in Fig. 19 shows the operating limits of the pump unit. Contact Xylem or the Authorised Distributor for special needs.

8.3 Operating pressure

See Fig. 19 for the maximum operating pressure of the model of pump unit and the temperature of the pumped liquid:

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

$P_{1\max}$ = Maximum inlet pressure

P_{\max} = Maximum pressure generated by the pump

PN = Maximum operating pressure

8.4 Maximum hourly start-ups

Pump unit rated power [kW]	0.25	4.00	11	18.5	30	45	90
	÷	÷	÷	÷	÷	÷	÷
	3.00	7.50	15	22	37	75	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]	Phase ~	UN [V] ± %	No. of conductors
50	1	220-240 ± 6	3 (2 + Ground)
	3	230/400 ± 10	4 (3 + Ground)
400/690 ± 10			
60	1	220-230 ± 6	3 (2 + Ground)
	3	220/380 ± 5	4 (3 + Ground)
380/660 ± 10			

8.8 Noise level

The sound pressure levels of the pump unit are in Tab. 22 (two-pole motor) and Tab. 23 (three-pole motor), where:

- LpA Sound pressure level measured in free field at a distance of one metre from the pump unit
LwA Sound power level (if LpA > 80 dB).

8.9 Materials

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

code	Casing/impeller material	Status
CS	Cast iron/stainless steel	Standard
CC	Cast iron/Cast iron	Standard
CB	Cast iron/Bronze	Optional
CN	Cast iron/stainless steel	Optional
CR	Cast iron/Duplex stainless steel	Optional

8.10 Mechanical seal

Unbalanced single acc. EN 12756, version K.

9 Disposal



WARNING:

In compliance with the directives in force:

- The product must be disposed of through approved companies specialised in the identification of different types of material (steel, copper, plastic, etc.)
- 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:

Electric pump unit (see label on first page)

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 ≥ 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

Montecchio Maggiore, 11.03.2016

Amedeo Valente
(Director of Engineering and R&D)

rev.01

10.2 EU Declaration of Conformity (No EMCD17)

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.

11 Warranty

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