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Introduction and Safety

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.

Safety

WARNING:
- The operator must be aware of safety precautions to prevent physical injury.
- Operating, installing, or maintaining the unit in any way that is not covered in this manual could cause death, serious personal injury, or damage to the equipment. This includes any modification to the equipment or use of parts not provided by Xylem. If there is a question regarding the intended use of the equipment, please contact a Xylem representative before proceeding.
- Do not change the service application without the approval of an authorized Xylem representative.

CAUTION:
You must observe the instructions contained in this manual. Failure to do so could result in physical injury, damage, or delays.

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

<table>
<thead>
<tr>
<th>Hazard level</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>DANGER:</td>
<td>A hazardous situation which, if not avoided, will result in death or serious injury</td>
</tr>
</tbody>
</table>
### Hazard Level

<table>
<thead>
<tr>
<th>Hazard level</th>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>WARNING:</strong></td>
<td>A hazardous situation which, if not avoided, could result in death or serious injury</td>
</tr>
<tr>
<td><strong>CAUTION:</strong></td>
<td>A hazardous situation which, if not avoided, could result in minor or moderate injury</td>
</tr>
<tr>
<td><strong>NOTICE:</strong></td>
<td>• A potential situation which, if not avoided, could result in undesirable conditions • A practice not related to personal injury</td>
</tr>
</tbody>
</table>

### Environmental Safety

#### The Work Area

- Always keep the station clean.

#### Waste and Emissions Regulations

- Observe these safety regulations regarding waste and emissions:
  - Appropriately dispose of all waste.
  - Handle and dispose of the processed liquid in compliance with applicable environmental regulations.
  - Clean up all spills in accordance with safety and environmental procedures.
  - Report all environmental emissions to the appropriate authorities.

### CAUTION: Radiation Hazard

- Do NOT send the product to Xylem if it has been exposed to nuclear radiation, unless Xylem has been informed and appropriate actions have been agreed upon.

### Electrical Installation

- For electrical installation recycling requirements, consult your local electric utility.

### Recycling Guidelines

- Always follow local laws and regulations regarding recycling.
User safety

General safety rules

These safety rules apply:

- Always keep the work area clean.
- Pay attention to the risks presented by gas and vapors in the work area.
- Avoid all electrical dangers. Pay attention to the risks of electric shock or arc flash hazards.
- Always bear in mind the risk of drowning, electrical accidents, and burn injuries.

Safety equipment

Use safety equipment according to the company regulations. Use this safety equipment within the work area:

- Hard hat
- Safety goggles, preferably with side shields
- Protective shoes
- Protective gloves
- Gas mask
- Hearing protection
- First-aid kit
- Safety devices

NOTICE:

Never operate a unit unless safety devices are installed. Also see specific information about safety devices in other chapters of this manual.

Electrical connections

Electrical connections must be made by certified electricians in compliance with all international, national, state, and local regulations. For more information about requirements, see sections dealing specifically with electrical connections.

Hazardous liquids

The product is designed for use in liquids that can be hazardous to your health. Observe these rules when you work with the product:

- Make sure that all personnel who work with biologically hazardous liquids are vaccinated against diseases to which they may be exposed.
- Observe strict personal cleanliness.

Wash the skin and eyes

Follow these procedures for chemicals or hazardous fluids that have come into contact with your eyes or your skin:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemicals or hazardous fluids in eyes</td>
<td>1. Hold your eyelids apart forcibly with your fingers.</td>
</tr>
<tr>
<td></td>
<td>2. Rinse the eyes with eyewash or running water for at least 15 minutes.</td>
</tr>
<tr>
<td></td>
<td>3. Seek medical attention.</td>
</tr>
<tr>
<td>Chemicals or hazardous fluids on skin</td>
<td>1. Remove contaminated clothing.</td>
</tr>
<tr>
<td></td>
<td>2. Wash the skin with soap and water for at least 1 minute.</td>
</tr>
<tr>
<td></td>
<td>3. Seek medical attention, if necessary.</td>
</tr>
</tbody>
</table>

Ex-approved products

Follow these special handling instructions if you have an Ex-approved unit.

Personnel requirements

These are the personnel requirements for Ex-approved products in potentially explosive atmospheres:
• All work on the product must be carried out by certified electricians and Xylem authorized mechanics. Special rules apply to installations in explosive atmospheres.
• All users must know about the risks of electric current and the chemical and physical characteristics of the gas, the vapor, or both present in hazardous areas.
• Any maintenance for Ex-approved products must conform to international and national standards (for example, IEC/EN 60079-17).

Xylem disclaims all responsibility for work done by untrained and unauthorized personnel.

Product and product handling requirements

These are the product and product handling requirements for Ex-approved products in potentially explosive atmospheres:

• Only use the product in accordance with the approved motor data.
• The Ex-approved product must never run dry during normal operation. Dry running during service and inspection is only permitted outside the classified area.
• Before you start work on the product, make sure that the product and the control panel are isolated from the power supply and the control circuit, so they cannot be energized.
• Do not open the product while it is energized or in an explosive gas atmosphere.
• Make sure that thermal contacts are connected to a protection circuit according to the approval classification of the product, and that they are in use.
• Intrinsically safe circuits are normally required for the automatic level-control system by the level regulator if mounted in zone 0.
• The yield stress of fasteners must be in accordance with the approval drawing and the product specification.
• Do not modify the equipment without approval from an Ex-approved Xylem representative.
• Only use parts that are provided by an Ex-approved Xylem representative.
• The thermal detectors fitted to the stator windings shall be connected into the motor control circuit in such a manner as to disconnect the supply to the motor in order to prevent the Temperature Class T3.
• The width of flameproof joints is more than the values specified in the tables of the IEC 60079-1 standard.
• The gap of flameproof joints is less than the values specified in Table 1 of the IEC 60079-1 standard.
• The equipment must be submerged during normal operation.

Guidelines for compliance

Compliance is fulfilled only when you operate the unit within its intended use. Do not change the conditions of the service without the approval of an Ex-approved Xylem representative. When you install or maintain explosion proof products, always comply with the directive and applicable standards (for example, IEC/EN 60079-14).

Minimum permitted liquid level

See the dimensional drawings of the product for the minimum permitted liquid level according to the approval for explosion proof products. If the information is missing on the dimensional drawing, the product must be fully submerged. Level-sensing equipment must be installed if the product can be operated at less than the minimum submersion depth.

Monitoring equipment

For additional safety, use condition-monitoring devices. Condition-monitoring devices include but are not limited to the following:

• Level indicators
• Temperature detectors
Product warranty

Coverage

Xylem undertakes to remedy defects in products from Xylem under these conditions:

• The faults are due to defects in design, materials, or workmanship.
• The faults are reported to a local sales and service representative within the warranty period.
• The product is used only under the conditions that are described in this manual.
• The monitoring equipment that is incorporated in the product is correctly connected and in use.
• All service and repair work that is done by Xylem authorized personnel.
• Genuine Xylem parts are used.
• Only Ex-approved spare parts and accessories that are authorized by an Ex-approved Xylem representative are used in Ex-approved products.

Limitations

The warranty does not cover defects that are caused by these situations:

• Deficient maintenance
• Improper installation
• Modifications or changes to the product and installation that are made without consulting a Xylem authorized representative
• Incorrectly executed repair work
• Normal wear and tear

Xylem assumes no liability for these situations:

• Bodily injuries
• Material damages
• Economic losses

Warranty claim

Xylem products are high-quality products with expected reliable operation and long life. However, should the need for a warranty claim arise, contact your local sales and service representative.

Warranty duration

Any part or parts found to be defective within the warranty period shall be replaced at no charge to the dealer during the warranty period. The warranty period shall exist for a period of twelve (12) months from date of installation or eighteen (18) months from date of manufacture, whichever is shorter.

Spare parts

Xylem guarantees that spare parts will be available for 15 years after the manufacture of this product has been discontinued.
Transportation and Storage

Inspect the delivery

Inspect the package
1. Inspect the package for damaged or missing items upon delivery.
2. Note any damaged or missing items on the receipt and freight bill.
3. File a claim with the shipping company if anything is out of order.
   If the product has been picked up at a distributor, make a claim directly to the distributor.

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 the local sales representative if there is any issue.

Transportation guidelines

Precautions

DANGER: Crush Hazard
Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

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.

Lifting
Always inspect the lifting equipment and tackle before starting any work.

WARNING: Crush Hazard
1) Always lift the unit by its designated lifting points. 2) Use suitable lifting equipment and ensure that the product is properly harnessed. 3) Wear personal protective equipment. 4) Stay clear of cables and suspended loads.

NOTICE:
Never lift the unit by its cables or hose.

Lifting eyebolts
When lifting eyebolts are used for lifting the unit, the following guidelines apply:
- they always have to be screwed in firmly against the base
- the angle between them must not be greater than 90°
Lifting equipment

Lifting equipment is always required when handling the unit. It must fulfill the following requirements:

- The minimum height (contact your local sales and service representative for information) between the lifting hook and the floor must be sufficient to lift the unit.
- The lifting equipment must be able to hoist the unit straight up and down, preferably without the need for resetting the lifting hook.
- The lifting equipment must be securely anchored and in good condition.
- The lifting equipment must support the weight of the entire assembly and must only be used by authorized personnel.
- Two sets of lifting equipment must be used to lift the unit for repair work.
- The lifting equipment must be dimensioned to lift the unit with any remaining pumped media in it.
- The lifting equipment must not be oversized.

**CAUTION: Crush Hazard**

Over-dimensioned lifting equipment can lead to injury. A site-specific risk analysis must be done.

Temperature ranges for transportation, handling and storage

Handling at freezing temperature

At temperatures below freezing, the product and all installation equipment, including the lifting gear, must be handled with extreme care.

Make sure that the product is warmed up to a temperature above the freezing point before starting up. Avoid rotating the impeller/propeller by hand at temperatures below the freezing point. The recommended method to warm the unit up is to submerge it in the liquid which will be pumped or mixed.

**NOTICE:**

Never use a naked flame to thaw the unit.

Unit in as-delivered condition

If the unit is still in the condition in which it left the factory - all packing materials are undisturbed - then the acceptable temperature range during transportation, handling and storage is: -50°C (-58°F) to +60°C (+140°F).

If the unit has been exposed to freezing temperatures, then allow it to reach the ambient temperature of the sump before operating.

Lifting the unit out of liquid

The unit is normally protected from freezing while operating or immersed in liquid, but the impeller/propeller and the shaft seal may freeze if the unit is lifted out of the liquid into a surrounding temperature below freezing.

Units equipped with an internal cooling system are filled with a mixture of water and 30% glycol. This mixture remains a flowing liquid at temperatures down to -13°C (9°F). Below -13°C (9°F), the viscosity increases such that the glycol mixture will lose its flow properties.
However, the glycol-water mixture will not solidify completely and thus cannot harm the product.
Follow these guidelines to avoid freezing damage:
1. Empty all pumped liquid, if applicable.
2. Check all liquids used for lubrication or cooling, both oil and water-glycol mixtures, for the presence of unacceptable amounts of water. Change if needed.

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.

Long-term storage

If the unit is stored more than six months, then the following apply:
- Before operating the unit after storage, it must be inspected with special attention to the seals and the cable entry.
- The impeller/propeller must be rotated every other month to prevent the seals from sticking together.
Product Description

Pump design

The pump is submersible, and driven by an electric motor.

Intended use

The product is intended for moving wastewater, sludge, raw and clean water. Always follow the limits that are given in Application limits (page 50). If there is a question regarding the intended use of the equipment, please contact a local sales and service representative before proceeding.

DANGER: Explosion/Fire Hazard

Special rules apply to installations in explosive or flammable atmospheres. Do not install the product or any auxiliary equipment in an explosive zone unless it is rated explosion-proof or intrinsically-safe. If the product is EN/ATEX-, MSHA- or FM-approved, then see the specific EX information in the Safety chapter before taking any further actions.

NOTICE:

Do NOT use the pump in highly corrosive liquids.

The pump is not suitable to pump abrasive solids.

Spare parts

- Modifications to the unit or installation should only be carried out after consulting with Xylem.

- Original spare parts and accessories that are authorized by Xylem are essential for compliance. The use of other parts can invalidate any claims for warranty or compensation. For more information contact your Xylem representative.

Parts: standard version
<table>
<thead>
<tr>
<th>Position</th>
<th>Denomination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shaft</td>
<td>Stainless steel with an integrated rotor.</td>
</tr>
<tr>
<td>2</td>
<td>Stator housing</td>
<td>Cooled by ambient liquid.</td>
</tr>
<tr>
<td>3</td>
<td>Motor</td>
<td>For information about the motor, see Motor data (page 50).</td>
</tr>
<tr>
<td>4</td>
<td>Mechanical seal</td>
<td>Type: Mechanical face seal.</td>
</tr>
<tr>
<td>5</td>
<td>Oil housing</td>
<td>Includes coolant that lubricates and cools the seals; acts as a buffer between the pumped fluid and the electric motor</td>
</tr>
<tr>
<td>6</td>
<td>Impeller</td>
<td>K-impeller</td>
</tr>
<tr>
<td>7</td>
<td>Main bearing</td>
<td>Two-row angular contact ball bearing</td>
</tr>
<tr>
<td>8</td>
<td>Thermal contact</td>
<td>The pump is equipped with thermal contacts, see Monitoring Equipment (page 13).</td>
</tr>
<tr>
<td>9</td>
<td>Support bearing</td>
<td>Single-row ball bearing</td>
</tr>
</tbody>
</table>

**Parts: Ex-version**

![Diagram of pump components](image)

<table>
<thead>
<tr>
<th>Position</th>
<th>Denomination</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Shaft</td>
<td>The shaft is made of stainless steel, with an integrated rotor.</td>
</tr>
<tr>
<td>2</td>
<td>Impeller</td>
<td>K-impeller</td>
</tr>
<tr>
<td>3</td>
<td>Mechanical seals</td>
<td>Type: Mechanical face seal</td>
</tr>
<tr>
<td>4</td>
<td>Seal housing</td>
<td>Includes a coolant that lubricates and cools the seals; the housing acts as a buffer between the pumped fluid and the electric motor.</td>
</tr>
<tr>
<td>5</td>
<td>Main bearing</td>
<td>The bearing consisting of a two-row angular contact ball bearing.</td>
</tr>
</tbody>
</table>
Monitoring Equipment

The following applies to the monitoring equipment of the pump:

- The stator incorporates thermal contacts connected in series that activates the alarm at overtemperature.
- The thermal contacts open at 140°C (285°F).
- Ex-approved pumps must have thermal contacts connected to the control panel.
- The sensors must be connected to either the SMR 311 monitoring equipment or an equivalent equipment.
- The monitoring equipment must be of a design that makes automatic restart impossible.
- Information in the junction box shows if the pump is equipped with optional sensors.

Optional sensors

LD  LD is a miniature float switch for detection of liquid in the stator housing. Due to its design it is best suited for pumps in a vertical position. The LD sensor is installed in the bottom of the stator housing.

The data plate

The data plate is a metal label located on the main body of the pump. The data plate lists key product specifications.

Ex- and MSHA-approved products also have approval plates. They are described below, if applicable.
The name plate

The name plate is a metal label located on the main body of the pump. This plate lists key product specifications for the branded pump.

Approvals

This section describes the special approvals that explosion-proof products have. For more information, please contact your sales representative.

FM

This illustration describes the approval plate for Factory Mutual (FM) and the information contained in its fields.
1. Temperature class
2. Maximum ambient temperature

Figure 1: FM approval plate
Installation

Install the pump

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* (page 3) have been read and understood.

**DANGER: Electrical Hazard**

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.

**DANGER: Inhalation Hazard**

Before entering the work area, make sure that the atmosphere contains sufficient oxygen and no toxic gases.

**Hazardous atmospheres**

**DANGER: Explosion/Fire Hazard**

Special rules apply to installations in explosive or flammable atmospheres. Do not install the product or any auxiliary equipment in an explosive zone unless it is rated explosion-proof or intrinsically-safe. If the product is EN/ATEX-, MSHA- or FM-approved, then see the specific EX information in the Safety chapter before taking any further actions.

**WARNING: Explosion/Fire Hazard**

Do not install CSA-approved products in locations that are classified as hazardous in the National Electric Code(TM), ANSI/NFPA 70-2005.

**General requirements**

These requirements apply:

- Use the pump dimensional drawing in order to ensure proper installation.

Before installing the pump, do the following:

- Provide a suitable barrier around the work area, for example, a guard rail.
- Make sure that equipment is in place so that the unit cannot roll or fall over during the installation process.
- Check the explosion risk before you weld or use electric hand tools.
- Check that the cable and cable entry have not been damaged during transport.
- Always remove all debris and waste material from the sump, inlet piping, and discharge connection, before you install the pump.
- Always check the impeller rotation before lowering the pump into the pumped liquid.

**NOTICE:**

- Do not run the pump dry.
- Never force piping to make a connection with a pump.

**Authority regulation**

Vent the tank of a sewage station in accordance with local plumbing codes.
Fasteners

- Only use fasteners of the proper size and material.
- Replace all corroded fasteners.
- Make sure that all fasteners are properly tightened and that there are no missing fasteners.

Install with guide rail

In the P-installation, the pump is installed on a stationary discharge connection, and operates either completely or partially submerged in the pumped liquid. These requirements and instructions only apply when the installation is made according to the dimensional drawing.

These items are required:

- Guide bars
- Guide bar bracket for attaching the guide equipment to the access frame or to the upper part of the sump
- Level regulators or other control equipment for start, stop, and alarm
- Cable holder for holding the cable and regulating the height of the level regulators
- Access frame (with covers) to which the upper guide bar bracket and cable holder can be attached
- Discharge connection for connecting the pump to the discharge line
  The discharge connection has a flange which fits the pump casing flange and a bracket for attaching the guide equipment.
- Fasteners for the discharge connection
- Anchor bolts

1. Run a cable between the sump and the stator and monitoring equipment. Make sure that the cable is neither sharply bent, nor pinched.
2. Install the access frame:
   a) Place the access frame in position and align it horizontally.
   b) Grout the frame in place.
3. Grout the anchor bolts in place. Be careful when you align and position the discharge connection in relation to the access frame.
4. Place the discharge connection in position, and tighten the nuts.
5. Install the guide bars:
   a) Secure the guide bars in the bracket.
   b) Check that the guide bars are placed vertically. Use a level or a plumb line.
6. Connect the discharge pipe to the discharge connection.
7. Prepare for the level regulator:
   a) Bolt the cable holder to the access frame.
   b) Attach the level regulator cable to the cable holder and adjust the height of the level regulator.
   c) Protect bolts and nuts with a corrosion-preventive compound.
8. Lower the pump along the guide bars.
9. Secure the motor cable:
   a) Fasten the permanent lifting device to the pump and to the access frame. For example, you can use a stainless-steel lifting chain with shackles.
   b) Fasten the cable to the cable holder.
   Make sure that the cable cannot be sucked into the pump inlet or that it is neither sharply bent, or pinched. Support straps are required for deep installations.
   c) Connect the motor cable and the starter and monitoring equipment according to the separate instructions.
   Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 31)

Clean all debris from the sump before starting the pump.

**Install with stand**

In the S-installation, the pump is transportable and intended to operate either completely or partially submerged in the pumped liquid. The pump is equipped with a connection for hose or pipe and stands on a base stand.

These requirements and instructions only apply when the installation is made according to the dimensional drawing. For information about the different installation types, see Parts List.
1. Run the cable so that it has no sharp bends, is not pinched, and cannot be sucked into the pump inlet.
2. Connect the discharge line.
3. Lower the pump into the sump.
4. Place the pump on the base and make sure it cannot fall over or sink. Alternatively, the pump can be suspended with a lifting chain just above the sump bottom. Make sure that the pump cannot rotate at startup or during operation.
5. Connect the motor cable and the starter and monitoring equipment according to the separate instructions. Make sure that the impeller rotation is correct. For more information, see Check the impeller rotation (page 31).

Make the electrical connections

General precautions

**DANGER: Electrical Hazard**
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.

**WARNING: Electrical Hazard**
Risk of electrical shock or burn. A certified electrician must supervise all electrical work. Comply with all local codes and regulations.

**WARNING: Electrical Hazard**
There is a risk of electrical shock or explosion if the electrical connections are not correctly carried out, or if there is fault or damage on the product. Visually inspect equipment for damaged cables, cracked casings or other signs of damage. Make sure that electrical connections have been correctly made.

**WARNING: Crush Hazard**
Risk of automatic restart.

**CAUTION: Electrical Hazard**
Prevent cables from becoming sharply bent or damaged.

**NOTICE:**
Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the cable ends dry at all times.

Requirements

These general requirements apply for electrical installation:

- The supply authority must be notified before installing the pump if it will be connected to the public mains. When the pump is connected to the public power supply, it may cause flickering of incandescent lamps when started.
- The mains voltage and frequency must agree with the specifications on the data plate. If the pump can be connected to different voltages, then the connected voltage is specified by a yellow sticker close to the cable entry.
• The fuses and circuit breakers must have the proper rating, and the pump overload protection (motor protection breaker) must be connected and set to the rated current according to the data plate and if applicable the cable chart. The starting current in direct-on-line start can be up to six times higher than the rated current.
• The fuse rating and the cables must be in accordance with the local rules and regulations.
• If intermittent operation is prescribed, then the pump must be provided with monitoring equipment supporting such operation.
• If stated on the data plate, then the motor is convertible between different voltages.
• The thermal contacts/thermistors must be in use.
• For FM-approved pumps, a leakage sensor must be connected and in use in order to meet approval requirements.

Cables

These are the requirements to follow when you install cables:
• The cables must be in good condition, not have any sharp bends, and not be pinched.
• The sheathing must not be damaged and must not have indentations or be embossed (with markings, etc.) at the cable entry.
• The cable entry seal sleeve and washers must conform to the outside diameter of the cable.
• The minimum bending radius must not be below the accepted value.
• If using a cable which has been used before, a short piece must be peeled off when refitting it so that the cable entry seal sleeve does not close around the cable at the same point again. If the outer sheath of the cable is damaged, then replace the cable. Contact a local sales and service representative.
• The voltage drop in long cables must be taken into account. The drive unit’s rated voltage is the voltage measured at the cable connection point in the pump.
• For SUBCAB® cables, the twisted pair copper foil must be trimmed.

Grounding (earthing)

Grounding (earthing) must be done in compliance with all local codes and regulations.

DANGER: Electrical Hazard
All electrical equipment must be grounded (earthed). Test the ground (earth) lead to verify that it is connected correctly. Frequently inspect electrical systems to ensure that the path to ground is continuous.

WARNING: Electrical Hazard
If the power cable is jerked loose, then the ground (earth) conductor must be the last conductor to come loose from its terminal. Make sure that the ground (earth) conductor is longer than the phase conductors at both ends of the cable.

WARNING: Electrical Hazard
Risk of electrical shock or burn. You must connect an additional ground- (earth-) fault protection device to the grounded (earthed) connectors if persons are likely to come into contact with liquids that are also in contact with the pump or pumped liquid.

Prepare the SUBCAB® cables

This section applies to SUBCAB® cables with twisted-pair control cores.
<table>
<thead>
<tr>
<th>The prepared SUBCAB® cable</th>
<th>The prepared screened SUBCAB® cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. T1+T2 twisted pairs in control element</td>
<td>1. T1+T2 and T3+T4 twisted pairs in control element</td>
</tr>
<tr>
<td>2. Drain wire in control element (bare copper wire)</td>
<td>2. Drain wire in control element (bare copper wire)</td>
</tr>
<tr>
<td>4. Insulation sheath (jacket) or PT-foil for control element</td>
<td>4. Insulation sheath (jacket) for control element</td>
</tr>
<tr>
<td>5. Power cores</td>
<td>5. Power cores</td>
</tr>
<tr>
<td>6. Ground (earth) core</td>
<td>6. Aluminum foil</td>
</tr>
<tr>
<td>7. Ground (earth) core with green/yellow shrink hose</td>
<td>7. Ground (earth) core with green/yellow shrink hose</td>
</tr>
<tr>
<td>8. Uncovered screen/braided wire</td>
<td>8. Uncovered screen/braided wire</td>
</tr>
</tbody>
</table>

1. Peel off the outer sheath at the end of the cable.
2. Prepare the control element:
   a) Peel the sheath (if applicable) and the copper foil.
      The copper foil is a screen and is conductive. Do not peel more than necessary, and remove the peeled foil.
   b) Put a white shrink hose over the drain wire and the cable terminal.
   c) Fit a cable lug on the drain wire.
   d) Twist T1+T2 and T3+T4.
   e) Put a shrink hose over the control element.
      Make sure that the conductive copper foil and drain wire is covered.
3. Prepare the ground (earth) core for SUBCAB™ cable:
   a) Peel the yellow-green insulation from the ground (earth) core.
   b) Check that the ground (earth) core is at least 10% longer than the phase cores in the cabinet.
   c) If applicable, put a cable lug on the ground core.
4. Prepare the ground (earth) core for screened SUBCAB™ cable:
   a) Untwist the screens around the power cores.
   b) Put a yellow-green shrink hose over the ground (earth) core.
      Leave a short piece uncovered.
   c) If applicable, put a cable lug on the screened ground core.
d) Twist all power core screens together to create a ground (earth) core and fit a cable terminal to the end.

e) Check that the ground (earth) core is at least 10% longer than the phase cores in the cabinet.

5. How is the connection to ground (earth) made?
   • Screw: Fit cable terminals to the ground (earth) core and the power cores.
   • Terminal block: Leave the core ends as they are.

6. Prepare the main leads:
   a) Remove the aluminum foil around each power core.
   b) Peel the insulation from each power core.

Connect the motor cable to the pump: standard version

NOTICE:
Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable dry at all times.

For more information about the cable entry, see the Parts list.
1. Remove the entry gland screw from the stator housing.
   This provides access to the closed end splice.
2. Check the data plate to see which connections are required for the power supply.
3. Arrange the connections on the closed end splices in accordance with the required power supply.
4. Connect the mains leads (L1, L2, L3, and ground (earth) ) according to applicable cable chart.
   The ground (earth) conductor must be 50 mm (2.0 in.) longer than the phase conductors in the junction box of the unit.
5. Make sure that the pump is correctly connected to ground (earth).
6. Make sure that any thermal contacts incorporated in the pump are properly connected to the closed end splices.
7. Install the entry gland screw on the stator housing.

Connect the motor cable to the pump: Ex-version

NOTICE:
Leakage into the electrical parts can cause damaged equipment or a blown fuse. Keep the end of the motor cable dry at all times.
1. Entrance cover
2. O-ring

For more information about the cable entry, see the Parts list.
1. Remove the entrance cover and the O-ring from the stator housing.
   This provides access to the terminal board.
2. Check the data plate to see which connections are required for the power supply.
3. Arrange the connections on the terminal board in accordance with the required power supply.
   Links (jumper strips) are not used with the Y/D start.
4. Connect the mains leads (L1, L2, L3, and ground (earth)) according to applicable cable chart.
   The ground (earth) lead must be 100 mm (4.0 in.) longer than the phase leads in the junction box of the unit.
5. Make sure that the pump is correctly connected to ground (earth).
6. Connect the control leads to the applicable terminal board.
7. Make sure that any thermal contacts incorporated in the pump are properly connected to the terminal board.
8. Install the entrance cover and the O-ring on the stator housing.
9. Fasten the screws on the entrance flange so that the cable insertion assembly bottoms out.

Connect the motor cable to the starter and monitoring equipment

DANGER: Explosion/Fire Hazard
Special rules apply to installations in explosive or flammable atmospheres. Do not install the product or any auxiliary equipment in an explosive zone unless it is rated explosion-proof or intrinsically-safe. If the product is EN/ATEX-, MSHA- or FM-approved, then see the specific EX information in the Safety chapter before taking any further actions.

NOTICE:
- Thermal contacts are incorporated in the pump.
- Thermal contacts must never be exposed to voltages higher than 250 V, breaking current maximum 4 A. It is recommended that they are connected to 24 V over separate fuses to protect other automatic equipment.

1. If thermal contacts are included in the pump installation, then connect the T1 and T2 control conductors to the monitoring equipment.
NOTICE:
Ex-approved products must always have the thermal contacts connected irrespective of the ambient temperature.

2. Connect the mains leads (L1, L2, L3, and ground (earth)) to the starter equipment.
For information about the phase sequence and the color codes of the leads, see Cable charts (page 24).

3. Check the functionality of the monitoring equipment:
   a) Check that the signals and the tripping function work properly.
   b) Check that the relays, lamps, fuses, and connections are intact.
Replace any defective equipment.

Cable charts
Description
This topic contains general connection information. It also provides cable charts that show connection alternatives for use with different cables and power supply.

Connection locations
The figures in this section illustrate how to interpret the connection strip symbols.
Color code standard

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN</td>
<td>Brown</td>
</tr>
<tr>
<td>BK</td>
<td>Black</td>
</tr>
<tr>
<td>WH</td>
<td>White</td>
</tr>
<tr>
<td>OG</td>
<td>Orange</td>
</tr>
<tr>
<td>GN</td>
<td>Green</td>
</tr>
<tr>
<td>GNYE</td>
<td>Green-Yellow</td>
</tr>
<tr>
<td>RD</td>
<td>Red</td>
</tr>
<tr>
<td>GY</td>
<td>Grey</td>
</tr>
<tr>
<td>BU</td>
<td>Blue</td>
</tr>
<tr>
<td>YE</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
Colors and marking of leads

<table>
<thead>
<tr>
<th>COLOR STANDARD</th>
<th>STATOR LEADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>BN = Brown</td>
<td>U1,U5 = RD</td>
</tr>
<tr>
<td>BK = Black</td>
<td>U2 = GN</td>
</tr>
<tr>
<td>WH = White</td>
<td>V1,V5 = BN</td>
</tr>
<tr>
<td>OG = Orange</td>
<td>V2 = BU</td>
</tr>
<tr>
<td>GN = Green</td>
<td>W1,W5 = YE</td>
</tr>
<tr>
<td>GN/YE = Green-Yellow</td>
<td>W2 = BK</td>
</tr>
<tr>
<td>RD = Red</td>
<td>T1,T2 = WH or YE</td>
</tr>
<tr>
<td>GY = Grey</td>
<td></td>
</tr>
<tr>
<td>BU = Blue</td>
<td></td>
</tr>
<tr>
<td>YE = Yellow</td>
<td></td>
</tr>
</tbody>
</table>

*SUBCAB AWG

**Ground conductor is stranded around core

GC=Ground check

<table>
<thead>
<tr>
<th>COLORS AND MARKING OF THE MAIN LEADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mains</td>
</tr>
<tr>
<td>-------</td>
</tr>
<tr>
<td>L1</td>
</tr>
<tr>
<td>L2</td>
</tr>
<tr>
<td>L3</td>
</tr>
<tr>
<td>L1</td>
</tr>
<tr>
<td>L2</td>
</tr>
<tr>
<td>L3</td>
</tr>
</tbody>
</table>

Screen (WH) - |

GC - - - YE

Figure 6: Motor connection
Figure 7: 6 leads
Figure 8: Functional ground

Figure 9: 9 leads parallel
Figure 10: 9 leads serial
Sensors connection

Color and marking of control leads

<table>
<thead>
<tr>
<th>Control</th>
<th>SUBCAB 4GX/7G</th>
<th>SUBCAB AWG</th>
<th>H07RN-F*</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>WH T1</td>
<td>OG</td>
<td>BK 4</td>
</tr>
<tr>
<td>T2</td>
<td>WH T2</td>
<td>BU</td>
<td>BK 5</td>
</tr>
</tbody>
</table>

*IF Y/D-start, sensors not connected

θ (Thermal Contacts) + LD

Max 12 V

Thermal Contacts LD Disconnected

Max 12 V

Sensor connection characteristics

The values have a 10 % tolerance.

<table>
<thead>
<tr>
<th>Sensors</th>
<th>Value (mA)</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD and thermal contact</td>
<td>0</td>
<td>Overtemperature</td>
</tr>
<tr>
<td></td>
<td>7.8</td>
<td>OK</td>
</tr>
<tr>
<td></td>
<td>36</td>
<td>Leakage</td>
</tr>
</tbody>
</table>
Check the impeller rotation

CAUTION: Crush Hazard
The starting jerk can be powerful. Make sure nobody is close to the unit when it is started.

1. Start the motor.
2. Stop the motor after a few seconds.
3. Check that the impeller rotates according to this illustration.

The correct direction of impeller rotation is clockwise when you look at the pump from above.

4. If the impeller rotates in the wrong direction, then transpose two phase leads (3-phase) and do this procedure again.
Before taking the unit into operation, check the following:

- All recommended safety devices are installed.
- The cable and cable entry have not been damaged.
- All debris and waste material has been removed.

**NOTICE:**

Never operate the pump with the discharge line blocked, or the discharge valve closed.

**WARNING:** Crush Hazard

Risk of automatic restart.

**Distance to wet areas**

**WARNING:** Electrical Hazard

Risk of electrical shock or burn. You must connect an additional ground- (earth-) fault protection device to the grounded (earthed) connectors if persons are likely to come into contact with liquids that are also in contact with the pump or pumped liquid.

**CAUTION:** Electrical Hazard

Risk of electrical shock or burn. The equipment manufacturer has not evaluated this unit for use in swimming pools. If used in connection with swimming pools then special safety regulations apply.

**Noise level**

**NOTICE:**

The noise level of the product is lower than 70 dB. However, the noise level of 70 dB may be exceeded in some installations and at certain operating points on the performance curve. Make sure that you understand the noise level requirements in the environment where the product is installed. Failure to do so may result in hearing loss or violation of local laws.

**Start the pump**

**WARNING:** Explosion/Fire Hazard

During operation the Ex-approved product must be fully submerged, to avoid overheating.

**CAUTION:** Crush Hazard

The starting jerk can be powerful. Make sure nobody is close to the unit when it is started.

**NOTICE:**

Make sure that the rotation of the impeller is correct. For more information, see Check the impeller rotation.
1. Check the oil level in the oil housing. Applicable for standard version.
2. Check the coolant level in the seal housing. Applicable for Ex-version.
3. Remove the fuses or open the circuit breaker, and check that the impeller can be rotated freely.

**WARNING: Crush Hazard**
Never put your hand into the pump housing.

4. Conduct insulation test phase to ground. To pass, the value must exceed 5 megaohms.
5. Check that the monitoring equipment (if any) works.
6. Start the pump.
Maintenance

Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* (page 3) have been read and understood.

---

**DANGER: Crush Hazard**

Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

---

**WARNING: Biological Hazard**

Infection risk. Rinse the unit thoroughly with clean water before working on it.

---

**CAUTION: Crush Hazard**

Make sure that the unit cannot roll or fall over and injure people or damage property.

---

Make sure that you follow these requirements:

- Check the explosion risk before you weld or use electrical hand tools.
- Allow all system and pump components to cool before you handle them.
- Make sure that the product and its components have been thoroughly cleaned.
- Do not open any vent or drain valves or remove any plugs while the system is pressurized. Make sure that the pump is isolated from the system and that pressure is relieved before you disassemble the pump, remove plugs, or disconnect piping.

**Ground continuity verification**

A ground (earth) continuity test must always be performed after service.

**Maintenance guidelines**

During the maintenance and before reassembly, always remember to perform these tasks:

- Clean all parts thoroughly, particularly O-ring grooves.
- Change all O-rings, gaskets, and seal washers.
- Lubricate all springs, screws, O-rings with grease.

During the reassembly, always make sure that existing index markings are in line.

The reassembled drive unit must always be insulation-tested and the reassembled pump must always be test-run before normal operation.

**Torque values**

All screws and nuts must be lubricated to achieve correct tightening torque. Screws that are screwed into stainless steel must have the threads coated with suitable lubricants to prevent seizing.

If there is a question regarding the tightening torques, please contact the local sales and service representative.
Screws and nuts

Table 1: Stainless steel, A2 and A4, torque Nm (ft-lbs)

<table>
<thead>
<tr>
<th>Property class</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
<th>M16</th>
<th>M20</th>
<th>M24</th>
<th>M30</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>1.0 (0.74)</td>
<td>2.0 (1.5)</td>
<td>3.0 (2.2)</td>
<td>8.0 (5.9)</td>
<td>15 (11)</td>
<td>27 (20)</td>
<td>65 (48)</td>
<td>127 (93.7)</td>
<td>220 (162)</td>
<td>434 (320)</td>
</tr>
<tr>
<td>70, 80</td>
<td>2.7 (2)</td>
<td>5.4 (4)</td>
<td>9.0 (6.6)</td>
<td>22 (16)</td>
<td>44 (32)</td>
<td>76 (56)</td>
<td>187 (138)</td>
<td>364 (268)</td>
<td>629 (464)</td>
<td>1240 (915)</td>
</tr>
<tr>
<td>100</td>
<td>4.1 (3)</td>
<td>8.1 (6)</td>
<td>14 (10)</td>
<td>34 (25)</td>
<td>66 (49)</td>
<td>115 (84.8)</td>
<td>248 (183)</td>
<td>481 (355)</td>
<td>–</td>
<td>–</td>
</tr>
</tbody>
</table>

Table 2: Steel, torque Nm (ft-lbs)

<table>
<thead>
<tr>
<th>Property class</th>
<th>M4</th>
<th>M5</th>
<th>M6</th>
<th>M8</th>
<th>M10</th>
<th>M12</th>
<th>M16</th>
<th>M20</th>
<th>M24</th>
<th>M30</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.8</td>
<td>2.9 (2.1)</td>
<td>5.7 (4.2)</td>
<td>9.8 (7.2)</td>
<td>24 (18)</td>
<td>47 (35)</td>
<td>81 (60)</td>
<td>194 (143)</td>
<td>385 (285)</td>
<td>665 (490)</td>
<td>1310 (966.2)</td>
</tr>
<tr>
<td>10.9</td>
<td>4.0 (2.9)</td>
<td>8.1 (6)</td>
<td>14 (10)</td>
<td>33 (24)</td>
<td>65 (48)</td>
<td>114 (84)</td>
<td>277 (204)</td>
<td>541 (399)</td>
<td>935 (689)</td>
<td>1840 (1357)</td>
</tr>
<tr>
<td>12.9</td>
<td>4.9 (3.6)</td>
<td>9.7 (7.2)</td>
<td>17 (13)</td>
<td>40 (30)</td>
<td>79 (58)</td>
<td>136 (100)</td>
<td>333 (245)</td>
<td>649 (480)</td>
<td>1120 (825.1)</td>
<td>2210 (1630)</td>
</tr>
</tbody>
</table>

Hexagon screws with countersunk heads

For hexagon socket head screws with countersunk head, maximum torque for all property classes must be 80% of the values for property class 8.8 above.

Change the oil: standard version

This image shows the plugs that are used to change the oil.

1. Oil plug

Empty the oil

![CAUTION: Compressed Gas Hazard](image)

Air inside the chamber may cause parts or liquid to be propelled with force. Be careful when opening. Hold a rag over the plug to prevent liquid from spraying out.

1. Place the pump in a horizontal position and unscrew the oil plug.
2. Place a container under the pump and turn the pump.
3. Unscrew the other oil plug.
   If this hole has the markings "oil in", raise the pump upright for a short period of time during drainage in order to drain all the oil.

Fill with oil

The oil should be a medical white oil of paraffin type that fulfills FDA 172.878 (a) and viscosity close to VG32.
1. Replace the O-rings of the oil plugs.
2. Refit an oil plug in the hole that faces downwards or is marked "oil out", and tighten.
   Tightening torque: 20 Nm (15 ft-lb).
3. Fill with oil through the hole on the opposite side or the hole marked "oil in".
   If the hole is marked "oil in", slightly tilt the pump and lower it again in order to fill the pump with the correct quantity.
   Quantity: approximately 2.1 L (2.2 qt).

4. Refit the oil plug and tighten.
   Tightening torque: 20 Nm (15 ft-lb).
Change the coolant: Ex-version

1. Inspection plug
2. Coolant plugs

Empty the coolant

**CAUTION: Compressed Gas Hazard**

Air inside the chamber may cause parts or liquid to be propelled with force. Be careful when opening. Hold a rag over the plug to prevent liquid from spraying out.

1. Empty the coolant in the inspection chamber:
   a) Remove the inspection plug.
   b) Pump out any coolant from the inspection chamber, as shown here.
c) Replace the inspection plug and O-ring and tighten.
Tightening torque: 44 Nm (33 ft-lbs)

2. Empty the coolant:
   a) Place the pump in a horizontal position, or leave it upright to use a pump to empty the coolant.
   b) If the pump is laid in a horizontal position, place a container under the pump.
   c) Remove the coolant plugs and empty the coolant.
Fill with coolant

Use a coolant that is a mixture of 70% water and 30% monopropylene glycol. The monopropylene glycol must fulfill the Xylem material standard M0800.82.0002. An example of an acceptable coolant is DOWCAL 200™ from Dow Chemical Company.

**NOTICE:**
Deionized or distilled water must be used in the water-glycol mixture.

If the pumped liquid includes potable water or substances to be ingested, then contact your local Xylem sales representative.

1. Fill with coolant until it overflows through the opposite hole, as shown here.
   Quantity: approximately 2.2 L (2.3 qt.)

2. Replace the O-rings.

3. Tighten the coolant plugs.
   Tightening torque: 44 Nm (33 ft-lb)
Service the pump

<table>
<thead>
<tr>
<th>Type of service</th>
<th>Purpose</th>
<th>Inspection interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial inspection</td>
<td>To make a check up of the pump condition by a Xylem authorized service representative and, based on the result and findings from these measures, to determine the intervals for periodical inspection and major overhaul for the specific installation.</td>
<td>Within the first year of operation.</td>
</tr>
<tr>
<td>Periodical inspection</td>
<td>To prevent operational interruptions and machine breakdown. Measures to secure performance and pump efficiency are defined and decided for each individual application. It can include such things as impeller trimming, wear part control and replacement, control of zinc-anodes and control of the stator.</td>
<td>Up to every year. Applies to normal applications and operating conditions at media (liquid) temperatures &lt;40°C.</td>
</tr>
<tr>
<td>Major overhaul</td>
<td>To secure a long operating lifetime for the product. It includes replacement of key components and the measures taken during an inspection.</td>
<td>Up to every 3 years. This interval apply to normal applications and operating conditions at media (liquid) temperatures &lt;40°C.</td>
</tr>
</tbody>
</table>

NOTICE:
Shorter intervals may be required when the operating conditions are extreme, for example with very abrasive or corrosive applications or when the liquid temperatures exceed 40°C (104°F).

Inspection

<table>
<thead>
<tr>
<th>Service item</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cable</td>
<td>1. If the outer jacket is damaged, replace the cable.</td>
</tr>
<tr>
<td></td>
<td>2. Check that the cables do not have any sharp bends and are not pinched.</td>
</tr>
<tr>
<td>Connection to power</td>
<td>Check that the connections are properly tightened.</td>
</tr>
<tr>
<td>Electrical cabinets</td>
<td>Check that they are clean and dry.</td>
</tr>
<tr>
<td>Impeller</td>
<td>1. Check the impeller clearance.</td>
</tr>
<tr>
<td></td>
<td>2. Adjust the impeller, if necessary.</td>
</tr>
<tr>
<td>Stator housing : standard version</td>
<td>1. Drain all liquid, if any.</td>
</tr>
<tr>
<td>Inspection chamber: Ex-version</td>
<td>2. Check the resistance of the leakage sensor.</td>
</tr>
<tr>
<td></td>
<td>Normal value approximately 1200 ohms, alarm approximately 430 ohms.</td>
</tr>
<tr>
<td></td>
<td>Applicable for Ex-version.</td>
</tr>
<tr>
<td></td>
<td>Normal value approximately 1530 ohms, alarm approximately 330 ohms.</td>
</tr>
<tr>
<td></td>
<td>Applicable for standard version.</td>
</tr>
<tr>
<td>Insulation</td>
<td>Use a megger maximum 1000 V.</td>
</tr>
<tr>
<td></td>
<td>1. Check that the resistance between the ground (earth) and phase lead is more than 5 megaohms.</td>
</tr>
<tr>
<td></td>
<td>2. Conduct a phase-to-phase resistance check.</td>
</tr>
<tr>
<td>Junction box</td>
<td>Check that it is clean and dry.</td>
</tr>
<tr>
<td>Lifting device</td>
<td>Check that local safety regulations are followed.</td>
</tr>
<tr>
<td>Lifting handle : Ex-version</td>
<td>1. Check the screws.</td>
</tr>
<tr>
<td></td>
<td>2. Check the condition of the lifting handle.</td>
</tr>
<tr>
<td></td>
<td>3. Replace if necessary.</td>
</tr>
<tr>
<td>Lifting eye bolts: Standard version</td>
<td>1. Check that they are screwed firmly against the base.</td>
</tr>
<tr>
<td></td>
<td>2. Check that they are situated on same plane.</td>
</tr>
<tr>
<td></td>
<td>3. Check the condition of the lifting eye bolt.</td>
</tr>
<tr>
<td></td>
<td>4. Replace if necessary.</td>
</tr>
</tbody>
</table>
### Service in case of alarm

For information about indication values for sensors, see *Sensor connection characteristics* (page 30).

### Replace the impeller

**Required tools:**
- 10 mm hexagon bit adapter with an extension of at least 125 mm (4.92 in.)
- Impeller puller

If applicable, contact your local sales and service representative for correct type and size.

<table>
<thead>
<tr>
<th>Service item</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support and main bearing</td>
<td>Replace the bearings with new bearings.</td>
</tr>
<tr>
<td>Mechanical seal</td>
<td>Replace with new seal units.</td>
</tr>
</tbody>
</table>
• Rod (wooden or copper) for locking the impeller in place, if applicable.
• Two crowbars, if applicable

WARNING:
• If you fail with the impeller installation, you must redo the installation procedure from the beginning.
• When laying the pump on its side, do not allow the weight of the pump to rest on any portion of the impeller. The impeller must not be allowed to make contact with the concrete floor or other hard and rough surfaces.

CAUTION: Cutting Hazard
Worn parts can have sharp edges. Wear protective clothing.

Remove the impeller

CAUTION: Cutting Hazard
Sharp edges. Wear protective clothing.

1. Place the pump in a horizontal position.
2. Remove the impeller:
   a) Lock the impeller in place by inserting a rod through the pump housing outlet.
   b) Remove the impeller screw.
   c) Turn the adjustment screw counterclockwise until the impeller breaks free from the shaft.
   d) Hand-tighten the impeller screw to prevent it from falling off.
   e) Remove the rod.
3. Raise the pump.
4. Remove the drive unit from the pump housing:
   a) Remove the pump housing screws.
   b) Remove the drive unit from the pump housing.
5. Remove the impeller:
   a) Place the drive unit horizontally.
   b) Remove the impeller screw.
   c) Remove the impeller and the conical sleeve.

Install the impeller

1. Prepare the shaft:
   a) Polish off any flaws with a fine emery cloth.
      The end of the shaft must be clean and free from burrs.
   b) Coat the inner conic, the outer cylindrical surfaces, and the thread of the conical sleeve with a thin layer of grease.
      The proper lubrication is grease for bearings, for example Exxon Mobil Unirex N3, Mobil Mobilith SHC 220 or equivalent.

   **NOTICE:**
   Surplus grease can cause the impeller to become loose. Remove surplus grease from conical and/or cylindrical surfaces of shafts and/or sleeves.

2. Mount the impeller:
   a) Lubricate the threads of the impeller screw and the washer.
      Always use a new impeller screw.
   b) Adjust the adjustment screw so that it is flush with the sleeve.
3. Fit the pump housing:
   a) Fit a new and lubricated O-ring on the seal housing cover.
   b) Lubricate the pump housing screws.
   c) Raise the drive unit.
   d) Place the drive unit into the pump housing.
   e) Tighten the screws in diagonal sequence.
      Tightening torque: 76 Nm (56 ft-lb)

4. Remove the impeller screw:
   a) Place the pump horizontally.
   b) Lock the impeller in place by inserting a rod through the pump housing outlet.
   c) Remove the impeller screw and the washer.
5. Adjust the impeller:
   a) Using a hexagon-bit adapter, turn the adjustment screw clockwise until the impeller makes contact with the pump housing.
   b) Tighten it a further 1/8 turn (45°).

6. Fasten the impeller:
   a) Fit the lubricated washer and impeller screw.
   b) Tighten the impeller screw.
      \[ \text{Tightening torque: } 76 \text{ Nm (56 ft-lb)} \]
   c) Tighten it a further 1/8 turn (45°).
   d) Remove the rod that is used to lock the impeller.
   e) Check that the impeller can rotate freely.
Troubleshooting

Introduction

DANGER: Electrical Hazard
Troubleshooting a live control panel exposes personnel to hazardous voltages. Electrical troubleshooting must be done by a qualified electrician.

Follow these guidelines when troubleshooting:
• Disconnect and lock out the power supply except when conducting checks that require voltage.
• Make sure that no one is near the unit when the power supply is reconnected.
• When troubleshooting electrical equipment, use the following:
  • Universal instrument multimeter
  • Test lamp (continuity tester)
  • Wiring diagram

The pump does not start

DANGER: Crush Hazard
Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

NOTICE:
Do NOT override the motor protection repeatedly if it has tripped. Doing so may result in equipment damage.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| An alarm signal has been triggered on the control panel. | Check that:
  • The impeller rotates freely.
  • The sensor indicators do not indicate an alarm.
  • The overload protection is not tripped.
  If the problem still persists: Contact the local sales and service representative. |
| The pump does not start automatically, but can be started manually. | Check that:
  • The start level regulator is functioning. Clean or replace if necessary.
  • All connections are intact.
  • The relay and contactor coils are intact.
  • The control switch (Man/Auto) makes contact in both positions.
  Check the control circuit and functions. |
| The installation is not receiving voltage.  | Check that:
  • The main power switch is on.
  • There is control voltage to the start equipment.
  • The fuses are intact.
  • There is voltage in all phases of the supply line.
  • All fuses have power and that they are securely fastened to the fuse holders.
  • The overload protection is not tripped.
  • The motor cable is not damaged. |
### Cause
The impeller is stuck.

### Remedy
- Clean:
  - The impeller
  - The sump in order to prevent the impeller from clogging again.

If the problem persists, then contact the local sales and service representative.

---

## The pump does not stop when a level sensor is used

**DANGER: Crush Hazard**
Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| The pump is unable to empty the sump to the stop level. | Check that:  
  - There are no leaks from the piping and/or discharge connection.  
  - The impeller is not clogged.  
  - The non-return valve(s) are functioning properly.  
  - The pump has adequate capacity. For information:  
    Contact the local sales and service representative. |
| There is a malfunction in the level-sensing equipment. | • Clean the level regulators.  
  • Check the functioning of the level regulators.  
  • Check the contactor and the control circuit.  
  • Replace all defective items. |
| The stop level is set too low. | Raise the stop level. |

If the problem persists, then contact the local Xylem service shop.

---

## The pump starts-stops-starts in rapid sequence

<table>
<thead>
<tr>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
</table>
| The pump starts due to back-flow which fills the sump to the start level again. | Check that:  
  - The distance between the start and stop levels is sufficient.  
  - The non-return valve(s) work(s) properly.  
  - The length of the discharge pipe between the pump and the first non-return valve is sufficiently short. |

| The self-holding function of the contactor malfunctions. | Check:  
  - The contactor connections.  
  - The voltage in the control circuit in relation to the rated voltages on the coil.  
  - The functioning of the stop-level regulator.  
  - Whether the voltage drop in the line at the starting surge causes the contactor’s self-holding malfunction. |

If the problem persists, then contact the local Xylem service shop.

---

## The pump runs but the motor protection trips

**DANGER: Crush Hazard**
Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.
NOTICE:
Do NOT override the motor protection repeatedly if it has tripped. Doing so may result in equipment damage.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The motor protection is set too low.</td>
<td>Set the motor protection according to the data plate and if applicable the cable chart.</td>
</tr>
<tr>
<td>The impeller is difficult to rotate by hand.</td>
<td>• Clean the impeller.</td>
</tr>
<tr>
<td></td>
<td>• Clean out the sump.</td>
</tr>
<tr>
<td></td>
<td>• Check that the impeller is properly trimmed.</td>
</tr>
<tr>
<td>The drive unit is not receiving full voltage on all three phases.</td>
<td>• Check the fuses. Replace fuses that have tripped.</td>
</tr>
<tr>
<td></td>
<td>• If the fuses are intact, then notify a certified electrician.</td>
</tr>
<tr>
<td>The phase currents vary, or they are too high.</td>
<td>Contact the local sales and service representative.</td>
</tr>
<tr>
<td>The insulation between the phases and ground in the stator is defective.</td>
<td>1. Use an insulation tester. With a 1000 V DC megger, check that the insulation between the phases and between any phase and ground is &gt; 5 megaohms.</td>
</tr>
<tr>
<td></td>
<td>2. If the insulation is less, then do the following:</td>
</tr>
<tr>
<td></td>
<td>Contact the local sales and service representative.</td>
</tr>
<tr>
<td>The density of the pumped fluid is too high.</td>
<td>Make sure that the maximum density is 1100 kg/m3 (9.2 lb/US gal)</td>
</tr>
<tr>
<td></td>
<td>• Change the impeller, or</td>
</tr>
<tr>
<td></td>
<td>• Change to a more suitable pump</td>
</tr>
<tr>
<td></td>
<td>• Contact the local sales and service representative.</td>
</tr>
<tr>
<td>There is a malfunction in the overload protection.</td>
<td>Replace the overload protection.</td>
</tr>
</tbody>
</table>

If the problem persists, then contact the local Xylem service shop.

The pump delivers too little or no water

DANGER: Crush Hazard
Moving parts can entangle or crush. Always disconnect and lock out power before servicing to prevent unexpected startup. Failure to do so could result in death or serious injury.

NOTICE:
Do NOT override the motor protection repeatedly if it has tripped. Doing so may result in equipment damage.

<table>
<thead>
<tr>
<th>Cause</th>
<th>Remedy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The impeller rotates in the wrong direction.</td>
<td>• If it is a 3-phase pump, then transpose two phase leads.</td>
</tr>
<tr>
<td></td>
<td>• If it is a 1-phase pump, then do the following:</td>
</tr>
<tr>
<td></td>
<td>Contact the local sales and service representative.</td>
</tr>
<tr>
<td>One or more of the valves are set in the wrong positions.</td>
<td>• Reset the valves that are set in the wrong position.</td>
</tr>
<tr>
<td></td>
<td>• Replace the valves, if necessary.</td>
</tr>
<tr>
<td></td>
<td>• Check that all valves are correctly installed according to media flow.</td>
</tr>
<tr>
<td></td>
<td>• Check that all valves open correctly.</td>
</tr>
<tr>
<td>The impeller is difficult to rotate by hand.</td>
<td>• Clean the impeller.</td>
</tr>
<tr>
<td></td>
<td>• Clean out the sump.</td>
</tr>
<tr>
<td></td>
<td>• Check that the impeller is properly trimmed.</td>
</tr>
<tr>
<td>The pipes are obstructed.</td>
<td>To ensure a free flow, clean out the pipes.</td>
</tr>
<tr>
<td>The pipes and joints leak.</td>
<td>Find the leaks and seal them.</td>
</tr>
<tr>
<td>Cause</td>
<td>Remedy</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>There are signs of wear on the impeller, pump, and casing.</td>
<td>Replace the worn parts.</td>
</tr>
<tr>
<td>The liquid level is too low.</td>
<td>• Check that the level sensor is set correctly.</td>
</tr>
<tr>
<td></td>
<td>• Depending on the installation type, add a means for priming the pump, such as a foot valve.</td>
</tr>
</tbody>
</table>

If the problem persists, then contact the local Xylem service shop.
# Technical Reference

## Motor data

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor type</td>
<td>Squirrel-cage induction motor</td>
</tr>
<tr>
<td>Frequency</td>
<td>60 Hz</td>
</tr>
<tr>
<td>Supply</td>
<td>3-phase</td>
</tr>
<tr>
<td>Starting method</td>
<td>Direct on-line</td>
</tr>
<tr>
<td>Maximum starts per hour</td>
<td>30 evenly spaced starts per hour</td>
</tr>
<tr>
<td>Code compliance</td>
<td>IEC 60034-1</td>
</tr>
<tr>
<td>Voltage variation without overheating</td>
<td>±10%, provided that it does not run continuously at full load</td>
</tr>
<tr>
<td>Voltage imbalance tolerance</td>
<td>2%</td>
</tr>
<tr>
<td>Stator insulation class</td>
<td>H (180°C [360°F])</td>
</tr>
</tbody>
</table>

## Application limits

<table>
<thead>
<tr>
<th>Data</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liquid temperature</td>
<td>40°C (104°F) maximum</td>
</tr>
<tr>
<td>Liquid density</td>
<td>1100 kg/m³ (9.2 lb per US gal) maximum</td>
</tr>
<tr>
<td>pH of the pumped media (liquid)</td>
<td>5.5–14</td>
</tr>
<tr>
<td>Depth of immersion</td>
<td>20 m (65 ft) maximum</td>
</tr>
<tr>
<td>Other</td>
<td>For the specific weight, current, voltage, power ratings, and speed of the pump, see the data plate of the pump.</td>
</tr>
</tbody>
</table>
Xylem |ˈzɪləm|

1) The tissue in plants that brings water upward from the roots
2) A leading global water technology company

We’re 12,500 people unified in a common purpose: creating innovative solutions to meet our world’s water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. 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, backed by a legacy of innovation.

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