Installation, Operation, and
Maintenance Manual

886211_7.0

Concertor™

6020.180/090

FLYGT
a xylem brand

Table of Contents

1 Introduction and Safety

1.1 Introduction

Purpose of the manual

The purpose of this manual is to provide necessary information for working with the unit. Read this manual carefully before starting work.

Read and keep the manual

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

Intended use

WARNING:

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 and the surroundings. 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.

Other manuals

See also the safety requirements and information in the original manufacturer's manuals for any other equipment furnished separately for use in this system.

1.2 Safety terminology and symbols

About safety messages

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

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

Hazard levels

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

Special symbols

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

Electrical hazard	Magnetic fields hazard
 Electrical Hazard:	 CAUTION:

1.3 User safety

All regulations, codes, and health and safety directives must be observed.

The site

- Observe lockout/tagout procedures before starting work on the product, such as transportation, installation, maintenance, or service.
- Pay attention to the risks presented by gas and vapors in the work area.
- Always be aware of the area surrounding the equipment, and any hazards posed by the site or nearby equipment.

Qualified personnel

This product must be installed, operated, and maintained by qualified personnel only.

Protective equipment and safety devices

- Use personal protective equipment as needed. Examples of personal protective equipment include, but are not limited to, hard hats, safety goggles, protective gloves and shoes, and breathing equipment.
- Make sure that all safety features on the product are functioning and in use at all times when the unit is being operated.

1.4 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 operation. The volute must be filled with liquid during 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.

- 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 original Xylem spare parts that are provided by an Ex-approved Xylem representative.
- The thermal detectors that are fitted to the stator windings must be connected correctly to a separate motor control circuit and in use. The detectors disconnect the power supply to the motor timely. This action prevents the rise of temperatures above the temperature value for the approval classification.
- 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.

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

The approval for explosion proof products is predicated on a minimum permitted liquid level. See *Technical Reference* on page 59.

Monitoring equipment

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

- Level indicators
- Temperature detectors in addition to the stator thermal detectors

Any thermal detectors or thermal protection devices delivered with the pump must be installed and in use at all times.

1.5 Special hazards

Biological hazards

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 may come into contact with biological hazards are vaccinated against diseases to which they may be exposed.
- Observe strict personal cleanliness.

WARNING: Biological Hazard

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

Wash the skin and eyes

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

Condition	Action
Chemicals or hazardous fluids in eyes	1. Hold your eyelids apart forcibly with your fingers. 2. Rinse the eyes with eyewash or running water for at least 15 minutes. 3. Seek medical attention.

Condition	Action
Chemicals or hazardous fluids on skin	1. Remove contaminated clothing. 2. Wash the skin with soap and water for at least 1 minute. 3. Seek medical attention, if necessary.

1.6 Protecting the environment

Emissions and waste disposal

Observe the local regulations and codes regarding:

- Reporting of emissions to the appropriate authorities
- Sorting, recycling and disposal of solid or liquid waste
- Clean-up of spills

Exceptional sites

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.

1.7 Spare parts

CAUTION:

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

1.8 Warranty

For information about warranty, see the sales contract.

2 Transportation and Storage

2.1 Inspect the delivery

2.1.1 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.

2.1.2 Inspect the unit

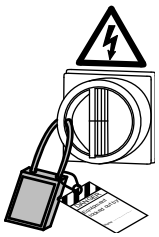
1. Remove packing materials from the product.
   Dispose of all packing materials in accordance with local regulations.
2. Inspect the product to determine if any parts have been damaged or are missing.
3. If applicable, unfasten the product by removing any screws, bolts, or straps.
   For your personal safety, be careful when you handle nails and straps.
4. Contact a sales representative if there is any issue.

2.2 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.

2.2.1 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 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.

2.3 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: –40°C (–40°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.

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.

Water-glycol mixtures: Units equipped with an internal closed-loop 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.

2.4 Storage guidelines

Storage location

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

NOTICE:

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

NOTICE:

Do not place heavy weights on the packed product.

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.

Packaging material stacking limit

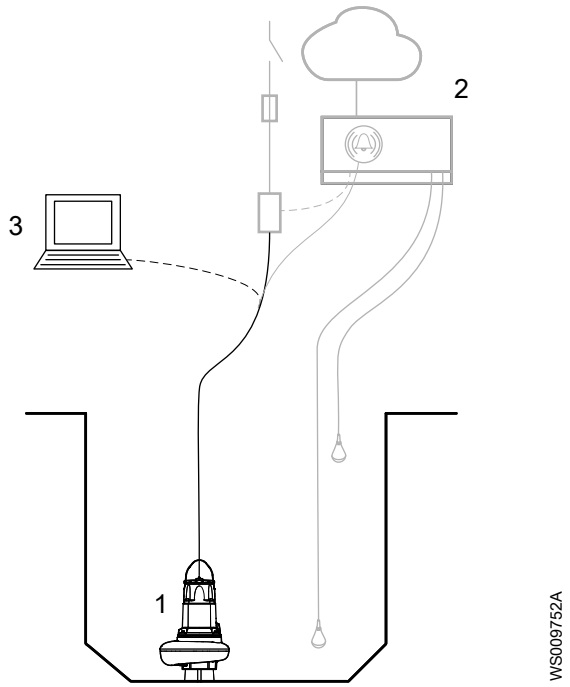
If the packaging material has an indicated stacking limit, then it is valid for 23°C (73°F) and 50% relative humidity. Depending on the material, other temperature and humidity ranges can reduce the stacking limit.

3 System Description

3.1 System overview

Concertor™ is a wastewater pumping system with integrated intelligent technology.

3.1.1 Concertor™ N



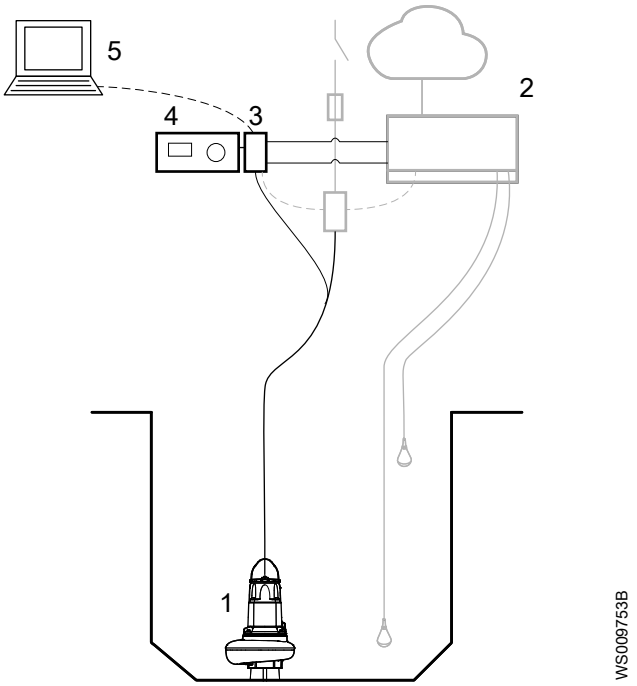
Parts

Number	Part	Description
1	Pump	A pump in the Concertor™ N system series.
2	Components outside of the Concertor™ system	• Contactors, fuses, relays • Controller / RTU / PLC • Level sensors • Cloud services • Pump sum-alarm I/O
3	PC application	Dirigo™ Service Tool gives access to settings and log files. Connection is made through cable leads T3 and T4.

Functions

- Pump clog detection
- Pump cleaning
- Soft-start
- Constant power
- Always correct rotation
- Pump sum-alarm I/O
- Change pump performance, Dirigo™ Service Tool

3.1.2 Concertor™ EA



Parts

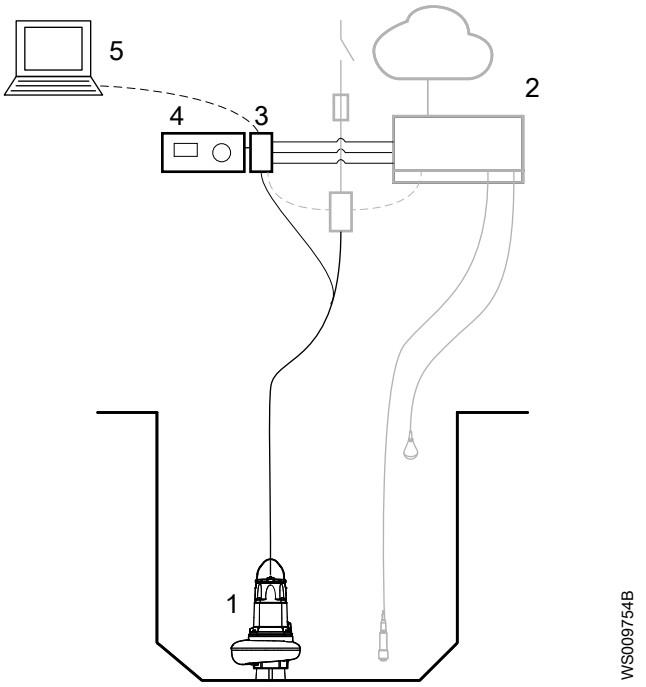
Number	Part	Description
1	Pump	A pump in the Concertor™ N system series.
2	Components outside of the Concertor™ system	• Contactors, fuses, relays • Controller / RTU / PLC • Level sensors • Cloud services • Pump sum-alarm I/O
3	Gateway, FPG 411	• The gateway starts and stops the pump based on the input signal from the external control system. – Digital input signal – Modbus • All the alarms are sent back to the external control system. • The operator changes the pump settings through the gateway. • Data is logged by and stored in the gateway.
4	HMI, FOP 312	The HMI is handheld, or mounted inside the cabinet or in the cabinet door. The HMI is optional.
5	Embedded web server	The embedded web server is an alternative interface with access to the same menu system as the HMI.

Functions

- Pump clog detection
- Pump cleaning
- Soft-start
- Soft-stop
- Constant power
- Always correct rotation
- Set-up wizard from HMI or webserver
- Set pump performance (pump stopped)
- Pump alarms with priority A or B, through I/O

- Pump and motor control alarms, HMI or Modbus
- Alarm handling
- Status and alarm history

3.1.3 Concertor™ DP



Parts

Number	Part	Description
1	Pump	A pump in the Concertor™ N system series.
2	Components outside of the Concertor™ system	• Contactors, fuses, relays • Controller / RTU / PLC • Level sensors or flow meters • Cloud services • Pump sum-alarm I/O
3	Gateway, FPG 412	• The gateway starts and stops the pump based on the input signal from the external control system. – Digital input signal – Analog input signal – Modbus • All the alarms are sent back to the external control system. • The operator changes the pump settings through the gateway. • Data is logged by and stored in the gateway.
4	HMI, FOP 312	The HMI is handheld, or mounted inside the cabinet or in the cabinet door. The HMI is optional.
5	Embedded web server	The embedded web server is an alternative interface with access to the same menu system as the HMI.

Functions

- External process control for dynamic pump performance, 4–20 mA or Modbus
- Pump clog detection
- Pump cleaning
- Soft-start

- Soft-stop
- Constant power
- Always correct rotation
- Set-up wizard from HMI or webserver
- Pump alarms with priority A or B, through I/O
- Pump and motor control alarms, HMI or Modbus
- Alarm handling
- Status and alarm history

4 Product Description

Products included

Product	Approvals
6020.180	Standard
6020.090	Ex-approved

4.1 Pump design

The pump is submersible, and driven by a control system that is connected to a permanent-magnet synchronous motor. For motor data, see *Technical Reference* on page 59.

Intended use

The product is intended for moving waste water, sludge, raw and clean water. Always follow the limits given in *Technical Reference* on page 59. 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.

Illustrations

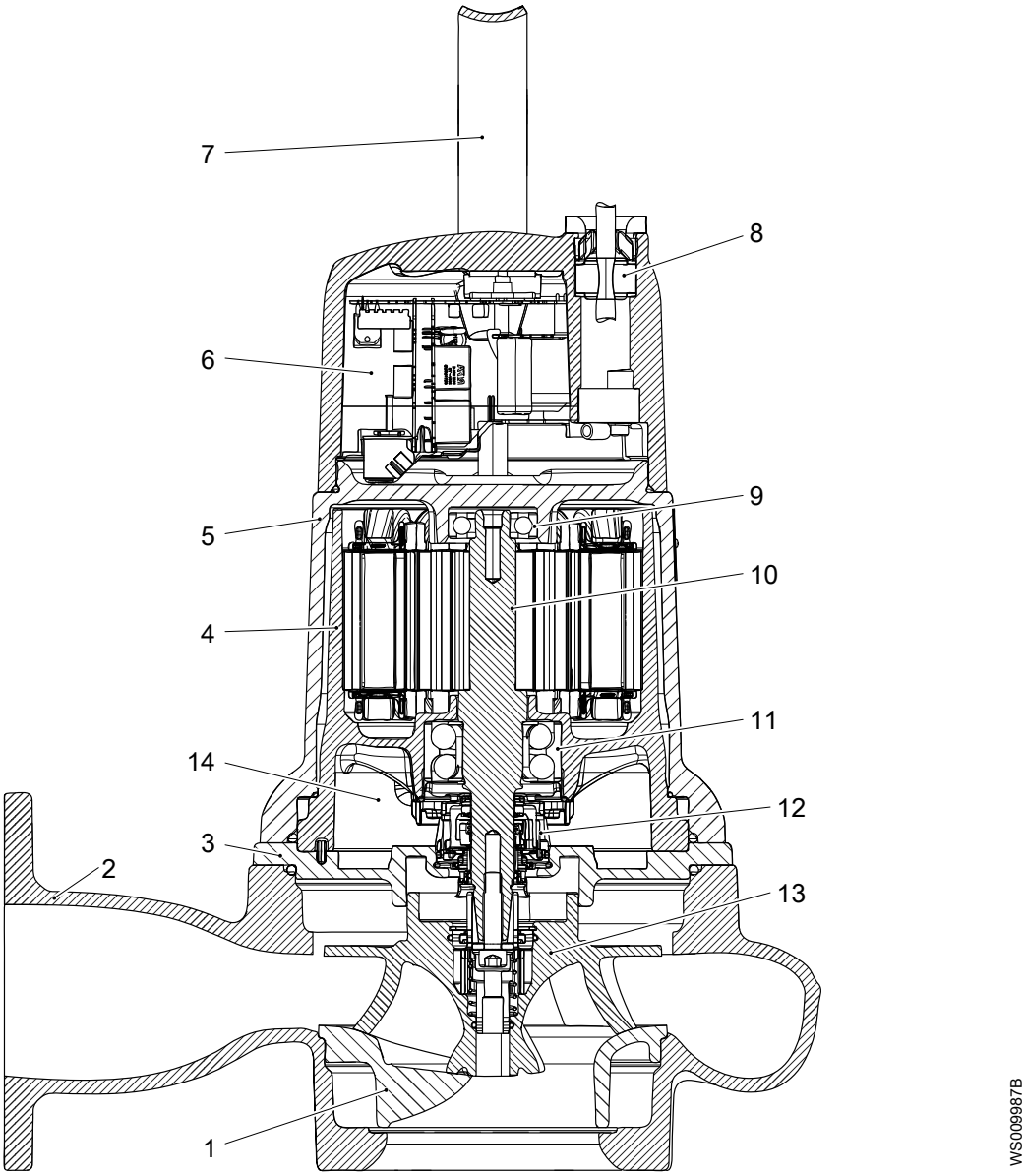


Figure 1: Outer casing of drive unit: Gray iron

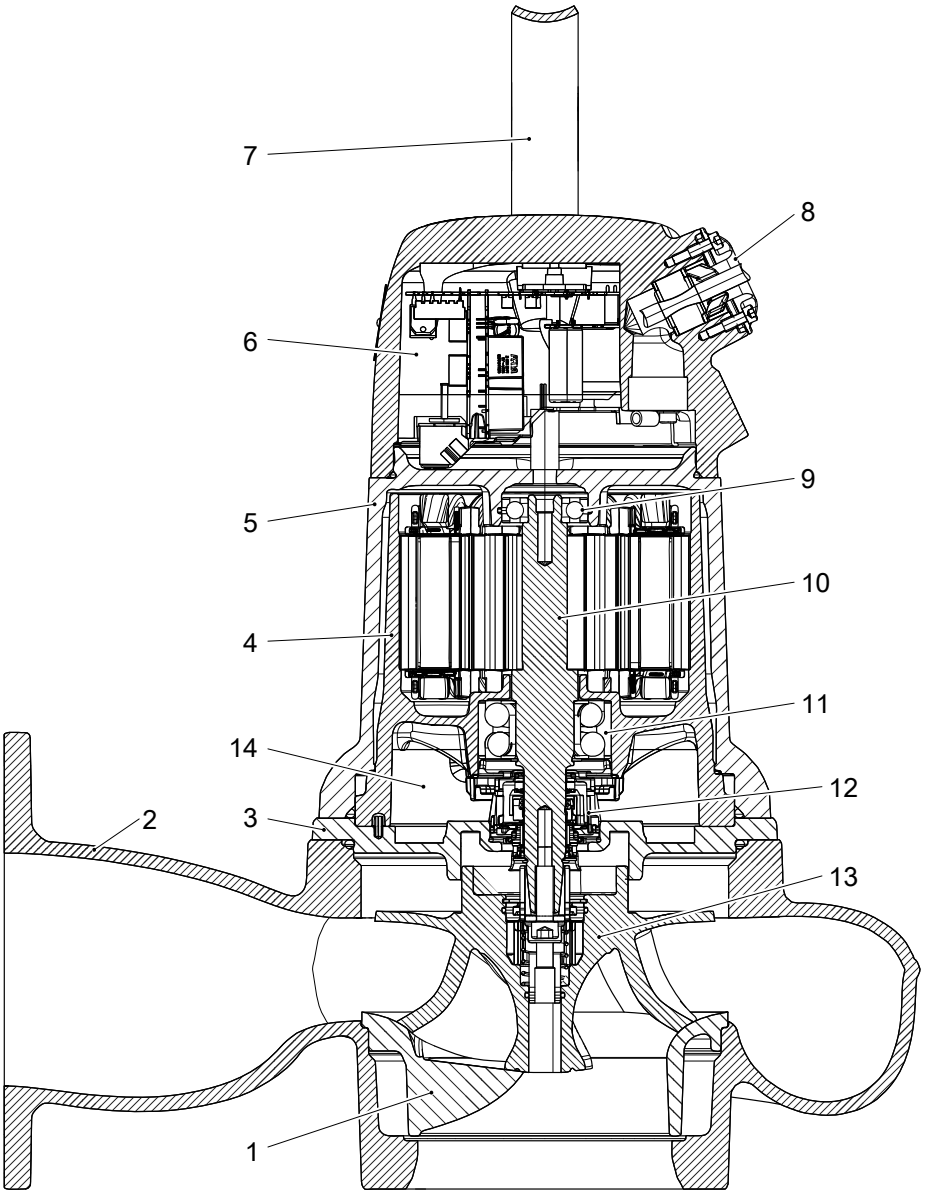


Figure 2: Outer casing of drive unit: Aluminum

Parts

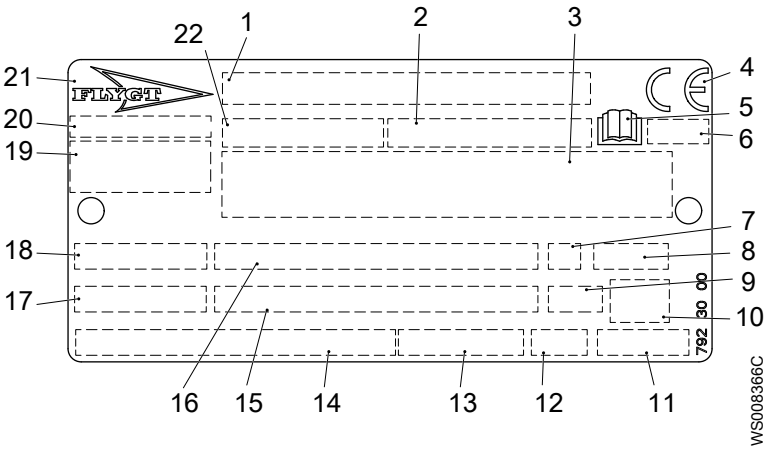
Position	Part
1	Insert ring with a guide pin
2	Pump housing, without flush valve connection
3	Seal housing cover
4	Stator housing unit with a leakage sensor
5	Cooling jacket / outer casing
6	Connection housing with integrated control system
7	Lifting handle
8	Cable entry
9	Support bearing
10	Shaft unit with a permanent magnet rotor
11	Main bearing

Position	Part
12	Mechanical seal Plug in seal with active seal design.
13	Adaptive-N impeller
14	Oil

Pressure class, discharge connection

LT/150	Low head
MT/100	Medium head
HT/80	High head

4.2 The data plate



1. Serial number, see *Product denomination* on page 19
2. Product number
3. Additional information
4. CE-marking
5. Read installation manual
6. Notified body (only for EN-approved Ex products)
7. Duty class
8. Degree of protection
9. Thermal class
10. Maximum submergence
11. Product weight
12. Direction of rotation: L=left, R=right
13. Nominal motor speed
14. Minimum rated voltage/rated current – maximum rated voltage/rated current
15. Maximum ambient temperature (2), rated shaft power (2)
16. Maximum ambient temperature (1), rated shaft power (1)
17. Power factor
18. Phase, type of current, frequency
19. Manufacturer
20. Country of origin
21. Brand
22. Sales denomination

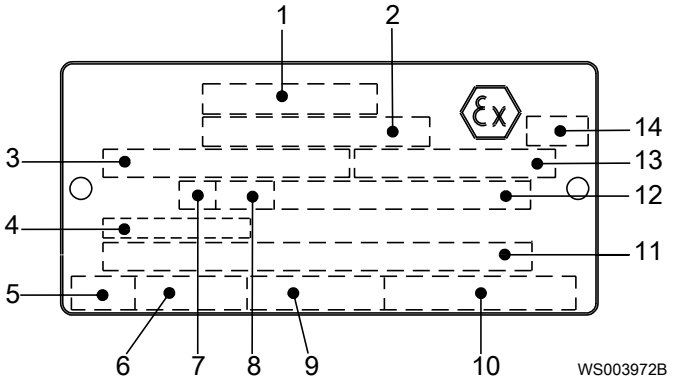
4.3 Approvals

Product approvals for hazardous locations

Pump	Approval
6020.090	European Norm (EN) • ATEX Directive • EN 60079-0:2012/A11:2013, EN 60079-1:2014, EN 13463-1:2009, EN 13463-5:2011 • ⟨Ex⟩ II 2 G c Ex db IIB T4 Gb
	IEC • IECEx scheme • IEC 60079-0, IEC 60079-1 • Ex d IIB T4 Gb
	FM (FM Approvals) • FM 3600:2011 • FM 3615:2005 • FM 3650:2013 • FM 3810:2005 • ANSI/ISA 61010-1:2012 • ANSI/IEC 60529:2004 • Explosion proof for use in Class I, Div. 1, Group C and D • Dust ignition proof for use in Class II, Div. 1, Group E, F and G • Suitable for use in Class III, Div. 1, Hazardous Locations

EN approval plate

This illustration describes the EN approval plate and the information that is contained in its fields.

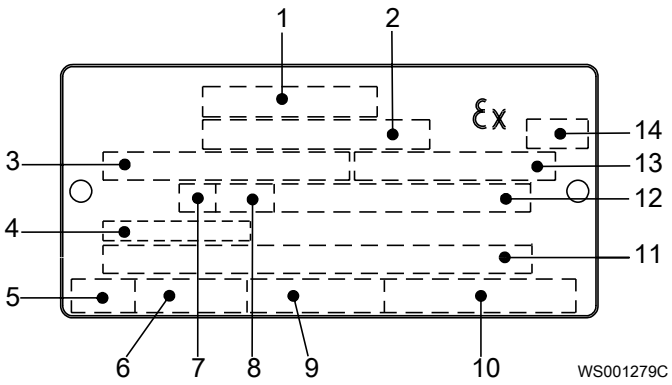


1. Approval
2. Approval authority and Approval number
3. Approved for drive unit
4. Cable entry temperature
5. Stall time
6. Starting current or Rated current
7. Duty class
8. Duty factor
9. Input power
10. Rated speed
11. Additional information
12. Maximum ambient temperature
13. Serial number
14. ATEX marking

IEC approval plate

This illustration describes the IEC approval plate and the information that is contained in its fields.

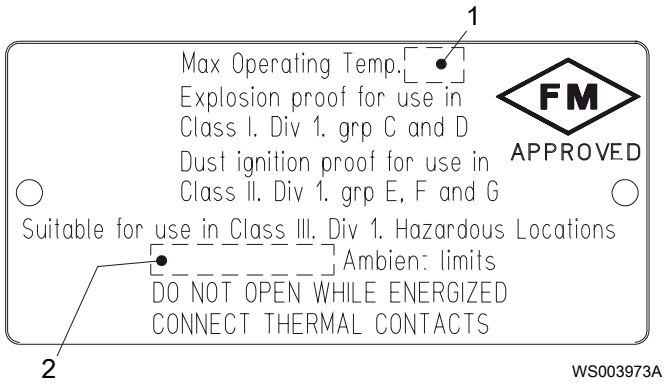
International Norm; not for EU member countries.



1. Approval
2. Approval authority and Approval number
3. Approved for drive unit
4. Cable entry temperature
5. Stall time
6. Starting current or Rated current
7. Duty class
8. Duty factor
9. Input power
10. Rated speed
11. Additional information
12. Maximum ambient temperature
13. Serial number
14. ATEX marking

FM approval plate

This illustration describes the FM approval plate and the information that is contained in its fields.



1. Temperature class
2. Maximum ambient temperature

4.4 Product denomination

Reading instruction

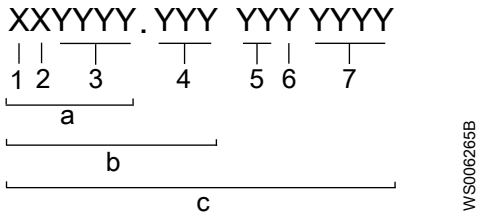
In this section, code characters are illustrated accordingly:

X = letter

Y = digit

The different types of codes are marked up with a, b and c. Code parameters are marked up with numbers.

Codes and parameters



Type of Callout	Number	Indication
Type of code	a	Sales denomination
	b	Product code
	c	Serial number

Type of Callout	Number	Indication
Parameter	1	Hydraulic end
	2	Type of installation
	3	Sales code
	4	Version
	5	Production year
	6	Production cycle
	7	Running number

5 Mechanical Installation

5.1 Precautions

General precautions

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

Electrical 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.

Hazardous atmospheres

- Check the explosion risk before you weld or use electric hand tools.

DANGER: Inhalation Hazard

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

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.

Site precautions

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

Fasteners

- Only use fasteners of the correct size and material.
- Replace all corroded or damaged fasteners.
- Make sure that all the fasteners are correctly tightened and that there are no missing fasteners.

5.2 Requirements

General requirements

- Use the dimensional drawing to make sure that the installation is correct.
- Always remove all debris and waste materials from the sump and piping before installation.

Piping requirements

NOTICE:

Never force piping to make a connection with a pump.

5.3 Make the mechanical installation

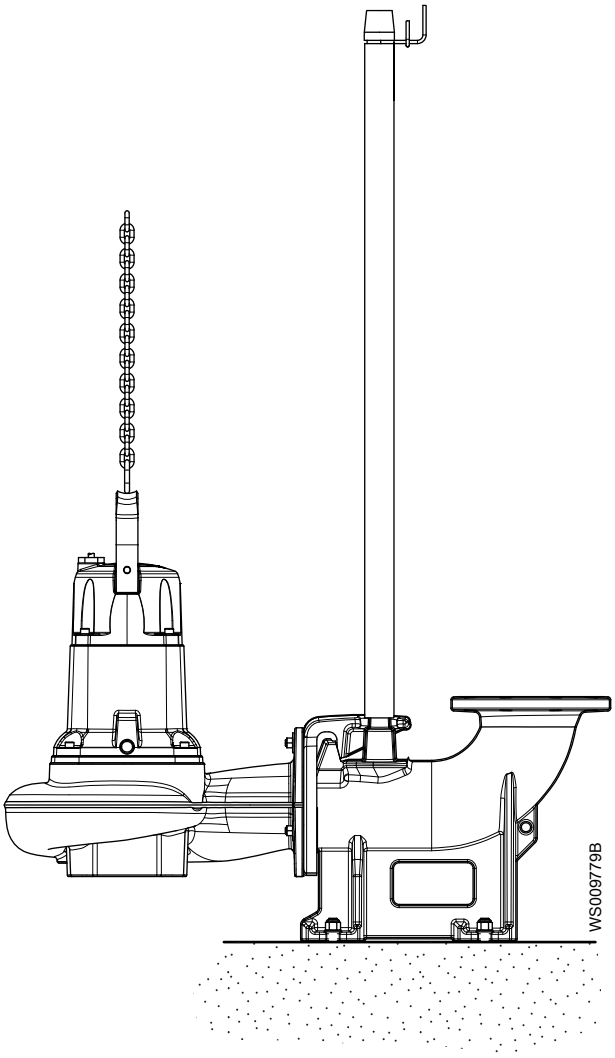
5.3.1 Prepare the site: new P-installation

For more information, see the separate accessories documentation.

1. Install the upper guide bar holder.
2. Prepare the base for the discharge connection.

   Make sure that the following requirements are fulfilled:
   - The base is aligned horizontally.
   - The anchor bolts are installed correctly.
   - The integrated lower guide bar support that is part of the discharge connection can be vertically aligned with the upper guide bar holder.
3. Put the discharge connection in position, and tighten the nuts.
4. Install the guide bars.
5. Connect the discharge pipe to the discharge connection.
6. Install the cable holders where they are needed.

5.3.2 Install the pump: P-installation



P Semipermanent, wet well arrangement with the pump installed on two guide bars. The connection to the discharge is automatic.

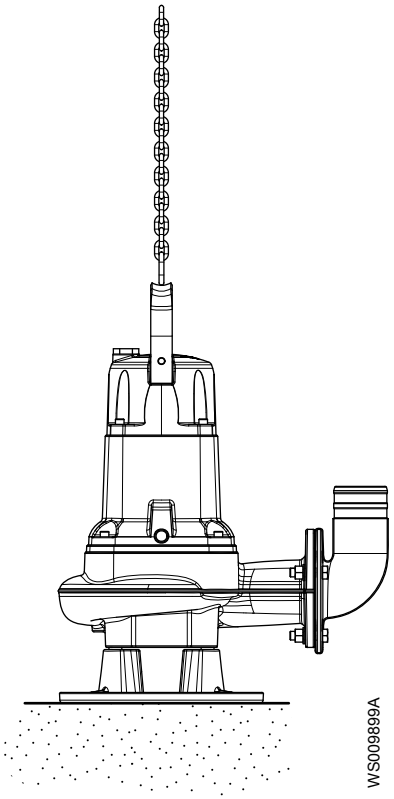
1. Install the sliding bracket unit on the pump.

   For more information, see the separate accessories documentation.
2. Attach a permanent lifting device to the pump. For example, use a stainless steel lifting chain with shackles.
3. Lower the pump along the guide bars.
4. Attach the permanent lifting device to the sump structure.
5. Secure the motor cable.

   Make sure that the cable cannot be sucked into the pump inlet and that it is not sharply bent or pinched.
6. Connect the motor cable according to the separate instructions.

Clean all the debris from the sump before the pump is started.

5.3.3 Install the pump: S-installation



S Portable semipermanent, wet well arrangement with hose coupling or flange for connection to the discharge pipeline.

1. Install the discharge connection unit on the pump.

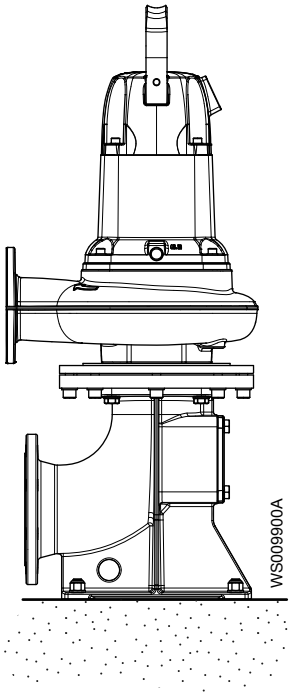
   For more information, see the separate accessories documentation.
2. Attach a permanent lifting device to the pump. For example, use a stainless steel lifting chain with shackles.
3. Make sure that the sump bottom is aligned horizontally.
4. Put the pump in position on the sump bottom.

   Make sure that the pump cannot fall over or sink.
5. Connect the discharge line to the discharge connection.
6. Attach the permanent lifting device to the sump structure.
7. Secure the motor cable.

   Make sure that the cable cannot be sucked into the pump inlet and that it is not sharply bent or pinched.
8. Connect the motor cable according to the separate instructions.

Clean all the debris from the sump before the pump is started.

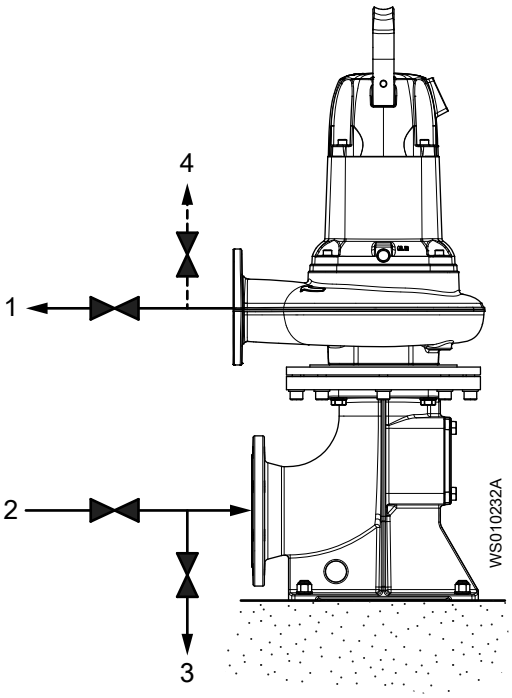
5.3.4 Install the pump: T-installation



T Vertical permanent, dry well arrangement with flange connection to the suction and discharge piping.

These items are required:

- Shutoff valves
- Air vent on the discharge side between the pump and the check valve



1. Discharge line
2. Suction line
3. Line to drain
4. Air vent

NOTICE:

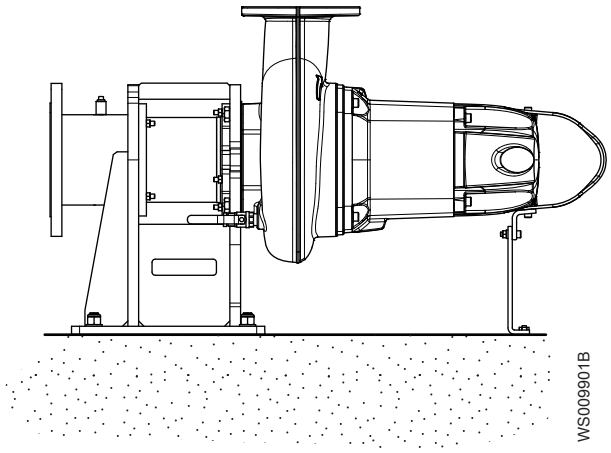
The risk of freezing is particularly high in T- or Z-installations.

1. Install the pump:
   a) Bolt the pipe suction unit to the concrete base.
   b) Bolt the pump to the pipe suction unit.

   For more information, see the separate accessories documentation.
2. Connect the suction line and the discharge line.
3. Connect the motor cable according to the separate instructions.
4. Make sure that the weight of the pump does not put strain on the piping.
5. Bleed air through the air vent.

Clean all the debris from the sump before the pump is started.

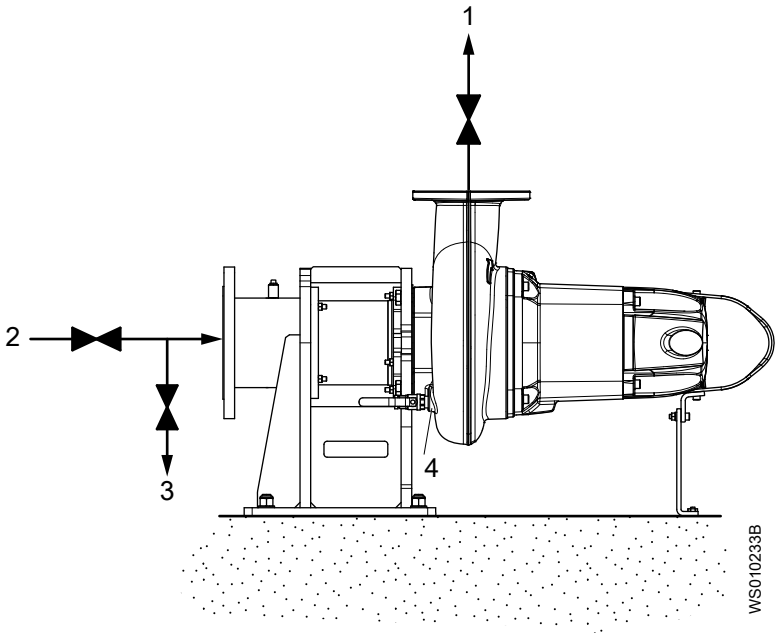
5.3.5 Install the pump: Z-installation



Z Horizontal permanent, dry well arrangement with flange connection to the suction and discharge piping.

These items are required:

- Shutoff valves



1. Discharge line
2. Suction line

3. Line to drain
4. Drainage plug

NOTICE:

The risk of freezing is particularly high in T- or Z-installations.

1. Install the pump:

   Make sure that the drainage plug faces downwards.

   a) Bolt the suction connection to the concrete base.
   b) Bolt the pump to the suction connection.
   c) Connect the suction line and the discharge line.
   d) Install the holder and the optional service cart and rail system.

   For more information, see the separate accessories documentation.
2. Connect the motor cable according to the separate instructions.
3. Make sure that the weight of the pump does not put strain on the piping.

Clean all the debris from the sump before the pump is started.

6 Electrical Installation

6.1 Precautions

General precautions

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

Electrical 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.

Permanent magnet motor

WARNING: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

Hazardous atmospheres

- Check the explosion risk before you weld or use electric hand tools.

DANGER: Inhalation Hazard

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

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.

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 and 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.

Time to zero energy state

This product contains high voltage capacitors that take time to discharge after the power supply is disconnected. Voltage is present at the terminals and in the motor control unit for up to one minute after the disconnection of the power supply.

The STOP function does not remove the voltages.

6.2 Requirements

General requirements

- To connect the unit to the public mains, the supply authority may need to be informed first. For more information, check the local regulations and codes. When the unit is connected to the public power supply, it may cause flickering of incandescent lamps when started.
- The mains voltage and frequency must be in accordance with the specifications on the data plate.
- Fuses or circuit breakers must be installed between the power supply and the unit.
- All fuses and circuit breakers must have the correct rating, and comply with the local regulations.
- For FM-approved pumps, a leakage sensor must be connected and in use to meet the approval requirements.

NOTICE:

Do not use Variable Frequency Drive (VFD) with this unit.

NOTICE:

Do not use any type of soft start equipment with this unit.

Cable requirements

NOTICE:

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

- The cables must be in good condition, not have any sharp bends, and not be pinched.
- The cables 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 outer diameter of the cable.
- The minimum bending radius must not be below the acceptable value.
- If a cable is used again, then a short piece must be peeled off. Make sure 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.
- The voltage drop in long cables must be considered. The rated voltage of the drive unit is the voltage that is measured at the cable connection point in the unit.
- The cables must be long enough for maintenance work.
- For SUBCAB® cables, the twisted pair copper foil must be trimmed.
- All unused conductors must be insulated.
- The cables must be run so that they cannot be sucked into the unit.
- The cables must comply with the local regulations.
- A screened SUBCAB® cable must be used between the pump and the gateway or controller.

For more information, contact the sales and service representative.

Electromagnetic compatibility

Make sure that the equipment or system in which the product is incorporated complies with the electromagnetic compatibility (EMC) legislation of that country.

The unit complies with and is approved according to EMC Directive 2014/30/EU. In the European Union, equipment in which the unit is incorporated must comply with the same directive.

The unit is not intended to be used in low-voltage public networks which supply domestic premises, without a 3–phase VFD mains filter to reduce radio frequency interference.

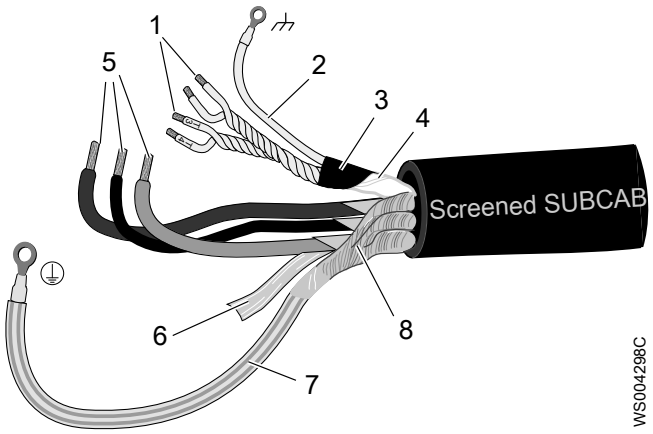
- Without a 3–phase VFD mains filter, the unit is expected to cause interference in accordance with EN 61800-3 category C3.
- With 3–phase VFD mains filter 85 03 10 installed, the unit complies with EN 61800-3 category C2.

For more information, contact the sales and service representative.

6.3 Make the electrical connections

6.3.1 Prepare the SUBCAB® cables

This section applies to screened SUBCAB® cables with twisted-pair control cores.



1. T1+T2 and T3+T4 twisted pairs in control element
2. Drain wire in control element (bare copper wire)
3. Screened copper pt-foil
4. Insulation sheath (jacket) for control element
5. Power cores
6. Aluminum foil
7. Ground (earth) core with green/yellow shrink hose
8. Uncovered screen/braided wire

Figure 3: The prepared screened SUBCAB® cable

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.

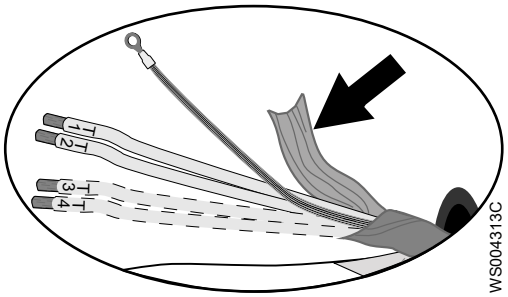


Figure 4: Copper foil on control element.

   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:
   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.
4. Connect to ground (earth):

- Screw: Fit cable terminals to the ground (earth) core and the power cores.
- Terminal block: Leave the core ends as they are.

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

6.3.2 Connect the motor cable to the pump

At delivery from the factory, the motor cable is usually already connected to the pump.

If the cable is not supplied or must be replaced, then contact the sales and service representative. Unauthorized personnel who opens the connection housing can void the warranty.

6.3.3 Connect the motor cable to mains and to the 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:

Do not use Variable Frequency Drive (VFD) with this unit.

NOTICE:

Do not use any type of soft start equipment with this unit.

NOTICE:

For insulation tests, the test voltage must be maximum 250 V. The resistance must be minimum 1 megohm. Only measurements between phase and ground (earth) give valid results.

NOTICE:

The control leads T3 and T4 must never be extended or broken up in sections. Spliced control leads can result in interference and signal loss.

- T3, T4: Pump communication
- T1, T2: Sum alarm. The sum alarm relay is normally closed. The rating is 250 VAC, 5 A.

  All alarms including leakage, temperature alarms, and failed pump cleaning cycle, are included in the sum alarm.

  On Ex-approved pumps, thermal contacts are connected in series with the sum alarm. The T1 and T2 leads must always be connected to a protection circuit that disconnects the power supply to the pump when the contact opens.

  NOTICE:

  Thermal contacts must never be exposed to voltages higher than 250 V, breaking current maximum 5 A. It is recommended that they are connected to 24 V over separate fuses to protect other automatic equipment.

The monitoring equipment can consist of different components.

1. Connect the control leads T1–T4 to the monitoring equipment.

System	Connections
Concertor™ N	1. Connect T1 and T2 to the external controller. 2. Isolate T3 and T4.

System	Connections
Concertor™ EA Concertor™ DP	1. For a standard pump, isolate T1 and T2. 2. For an Ex-approved pump, connect T1 and T2 to the external controller. 3. Connect T3 and T4 to the gateway.

2. Connect the drain wire to functional ground (earth).
3. Connect the mains leads (L1, L2, L3, and ground (earth)).

   To prevent uncontrolled running of the pump if monitoring equipment failure occurs, a contactor is recommended.

   If a 3–phase VFD mains filter is used, then connect the mains leads through the filter. For more information, see *Electromagnetic compatibility* on page 30 and separate documentation that is delivered with the filter.
4. Connect the uncovered screen of the motor cable to ground (earth).

   The impedance between the uncovered screen and the grounding point must be less than 5 milliohms.

   The uncovered screen can be attached to the mounting plate with clamps.

6.4 Cable charts

Connection plate

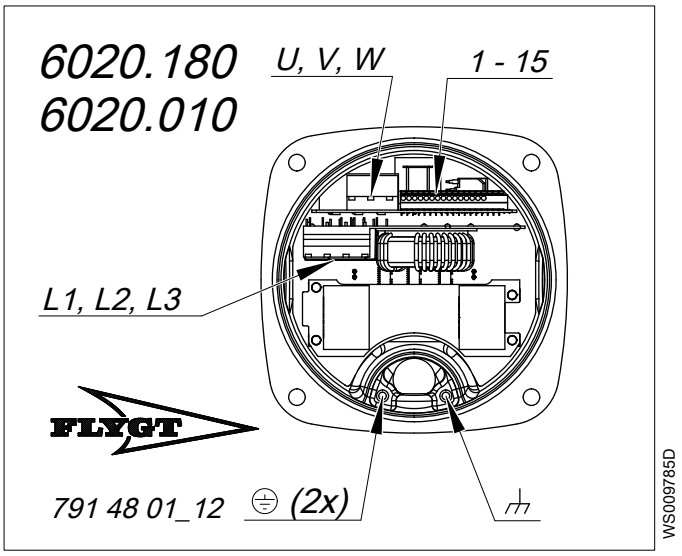


Figure 5: 6020.180, 6020.010

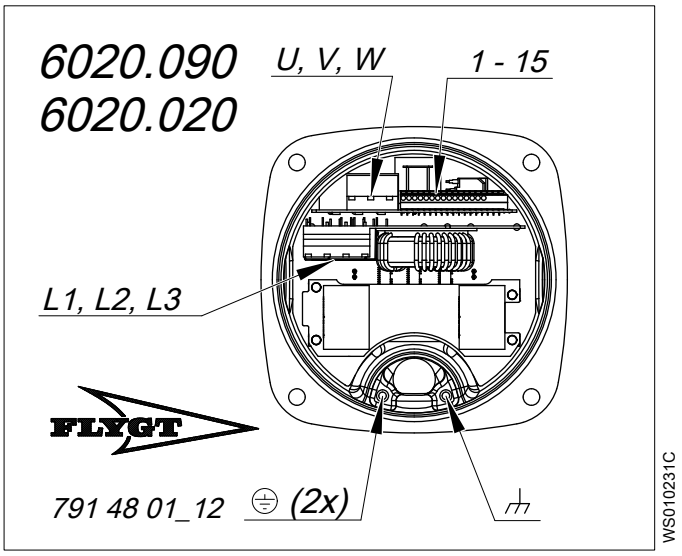


Figure 6: 6020.090, 6020.020

Connections

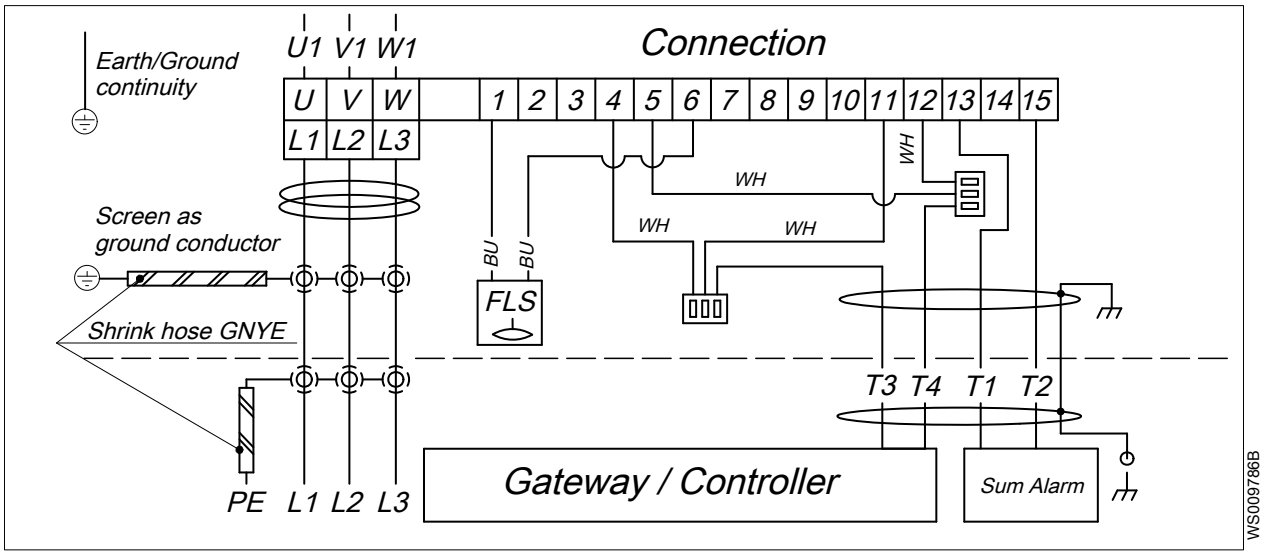


Figure 7: 6020.180, 6020.010

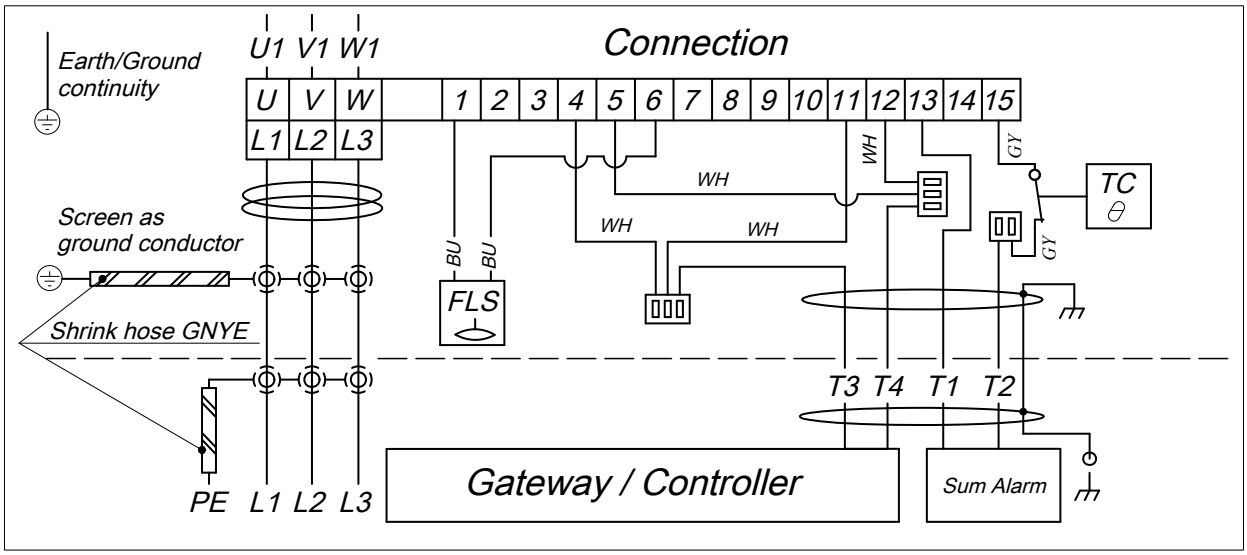
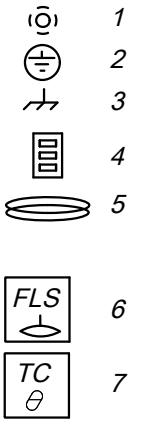


Figure 8: 6020.090, 6020.020

Symbols and denominations

GENERAL SYMBOLS AND DENOMINATIONS		
Cable lead colors and marking		=Screen
Motor cable	Stator leads	=Ground
L1=BN	U1=RD	=Functional ground
L2=BK	V1=BN	=Terminal block
L3=GY	W1=YE	=Electrical filters (toroid cores)
Control cores	BN=Brown BK=Black WH=White RD=Red GY=Grey BU=Blue YE=Yellow GNYE=Green-Yellow	=Leakage sensor
T1=WH T2=WH T3=WH T4=WH		=Thermal contacts

WS009787B



1. Screen
2. Ground (earth)
3. Functional ground (earth)
4. Terminal block
5. Electrical filters: toroid cores
6. Leakage sensor
7. Thermal contacts

Color code standard

Code	Description
BN	Brown
BK	Black
WH	White
OG	Orange
GN	Green
GNYE	Green-Yellow
RD	Red
GY	Grey
BU	Blue
YE	Yellow

7 Operation

7.1 Precautions

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 sound power level of the product is lower than 70 dB(A). However, in some installations the resulting sound pressure level may exceed 70 dB(A) 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.

7.2 Start the pump

CAUTION: Crush Hazard

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

Before the pump is started, the following requirements must be fulfilled:

- The pump is free from damage.
- There is oil in the oil housing.
- The cables are correctly tightened and free from damage.
- The monitoring equipment is correctly connected and free from damage.
- All system components are correctly installed. See *System Description* on page 10 and separate documentation.

1. Remove the fuses or open the circuit breaker, and check that the impeller can rotate freely.

WARNING: Crush Hazard

Never put your hand into the pump housing.

2. Turn on the power supply for the system.

   Make sure that the external controller, the gateways, and the pump receive power.

   The pump runs at preset values.

For more information about the operation of the system, see the System Installation and Operation Manual.

7.3 Alarm handling

7.3.1 Alarms and messages

The alarms are divided into two categories:

- Application specific alarms
- Gateway alarms

Active alarms are visible in the HMI and in the alarm register accessible through the fieldbus with Modbus RTU protocol.

7.3.2 Service in case of alarm

Before any action is taken, always use the Dirigo™ Service Tool application, or a gateway together with an HMI, to analyze the alarms.

Alarm source	Action
FLS leakage sensor	1. Check for liquid in the stator housing. 2. If any, drain all the liquid. 3. If liquid was found, check the mechanical seal unit, the O-rings, and the cable entry.
Thermal sensors Thermal contacts, for Ex-approved versions	– Check the cooling effect of the surrounding environment. – If applicable, then check the start and stop levels. – For T and Z installations, check that the cooling jacket has the recommended material.
The overload protection	Check that the impeller can rotate freely.

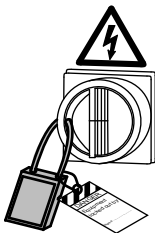
8 Maintenance

Precautions

Before starting work, make sure that the safety instructions in the chapter *Introduction and Safety* on 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.
- Make sure that the work area is well-ventilated before you open any vent or drain valves, remove any plugs, or disassemble the unit.
- 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.

Precautions for handling permanent magnet synchronous motors

WARNING: Magnetic Hazard

Magnetic fields can damage cardiac pacemaker and other medical implants. Stay clear of the permanent-magnet rotor, when disassembled from the motor.

WARNING: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

CAUTION: Crush Hazard

The rotor is a permanent magnet. Do not use tools which can be attracted to magnetic fields near the rotor, and do not allow the rotor to come near steel items.

Assembly and disassembly of permanent magnet synchronous motors must be performed by qualified personnel and according to relevant instructions.

Inspect the work area before permit-required hot work

WARNING: Explosion/Fire Hazard

Before starting any permit-required hot work such as welding, gas cutting, grinding, or using electrical handtools, do the following: 1. Check the explosion risk. 2. Provide sufficient ventilation.

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.

8.1 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, then contact a sales or authorized service representative.

Screws and nuts

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

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

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

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

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.

8.2 Maintenance intervals

Type of maintenance	Purpose	Inspection interval
Initial inspection	A Xylem-authorized personnel checks the pump condition. From the results, the personnel recommends the intervals for the periodical inspection and overhaul for the installation.	Within the first year of operation.
Periodical inspection	The inspection prevents operational interruptions and machine breakdowns. The measures to increase performance and pump efficiency are decided for each application.	Up to 12,000 hours or three years, whichever comes first.
Overhaul	The overhaul lengthens the operating lifetime of the product. It includes the replacement of key components and the measures that are taken during an inspection.	Up to 24,000 hours or six years, whichever comes first.

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).

8.2.1 Inspection

The list is valid for initial inspection and periodical inspection.

Service item	Action
Cable	1. If the outer jacket is damaged, replace the cable. 2. Check that the cables do not have any sharp bends and are not pinched.
Electrical connections	Check that the connections are properly secured.
Electrical cabinets	Check that they are clean and dry.
Impeller	1. Check the clearance. 2. If necessary, adjust.
Stator housing	Drain any liquid. For more information, see *Drain the liquid from the stator housing* on page 42.
Level regulators	Check the condition and functionality.
Lifting device	Check that the local safety regulations are followed.
Lifting handle	1. Check the screws. 2. Check the condition of the lifting handle and the chain. 3. If necessary, replace.
Oil	If necessary, fill with new oil. For more information, see *Change the oil* on page 43.
O-rings	1. Replace the O-rings of the oil plugs. 2. Replace the O-ring of the inspection plug. 3. Lubricate the new O-rings.
Overload protection and other protections	Check the correct settings.
Personnel safety devices	Check the guard rails, covers, and other protections.
Thermal contacts, for Ex-approved versions	Normally closed circuit; interval 0–1 ohm.
Voltage and amperage	Check the running values.

Service item	Action
Corrosion	Check for corrosion and paint damages. If necessary, touch up. If applicable, install zinc anodes.
Zinc anodes	If applicable, replace the zinc anodes. Anodes are replaced when the anode mass is reduced to a selected fraction of its initial mass. The recommended interval for the selection fraction is 0.25–0.50 (25–50%).

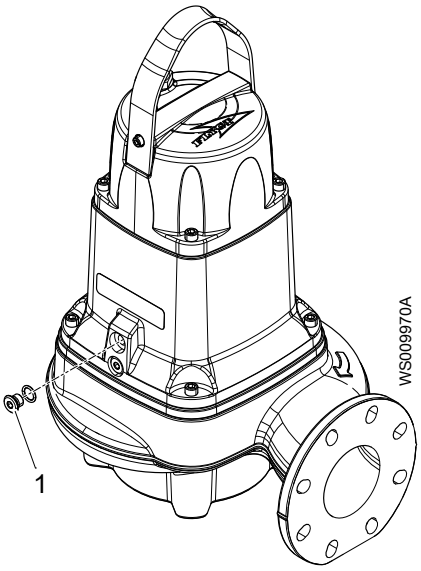
8.2.2 Overhaul

The basic repair kit includes O-rings, seals, and bearings.

For an overhaul, do the following in addition to the tasks listed under Inspection.

Service item	Action
Support and main bearing	Replace the bearings with new bearings.
Mechanical seal	Replace with new seal units.

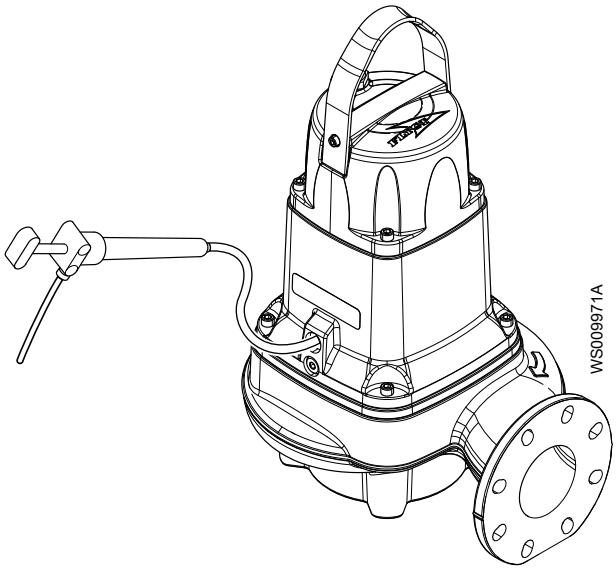
8.3 Drain the liquid from the stator housing



Item	Label	Description
1	INSP	Inspection plug for inspection and drainage

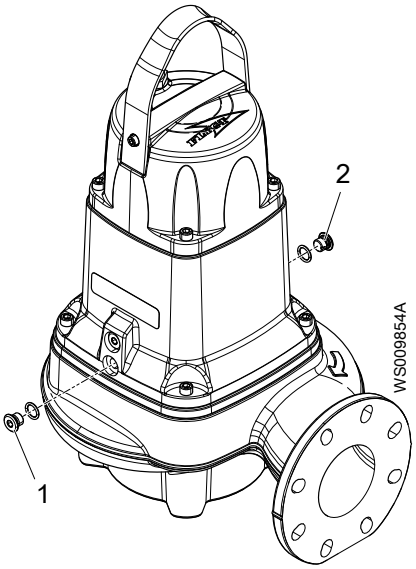
Figure 9: Inspection plug

1. Remove the inspection plug.
2. Pump out the liquid.



3. Replace the O-ring and install the inspection plug.
   Tightening torque: 22 Nm (16 ft-lb).

8.4 Change the oil



Item	Label	Description
1	OIL OUT	Oil plug for the oil drainage
2	OIL IN	Oil plug for the oil refill

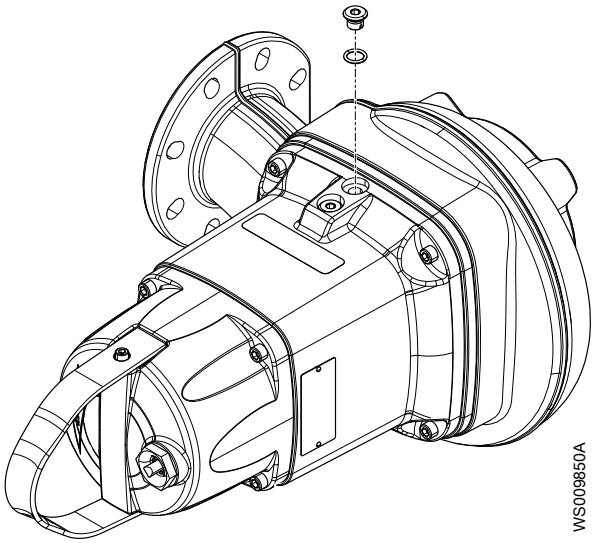
Figure 10: Oil plugs

Empty the oil

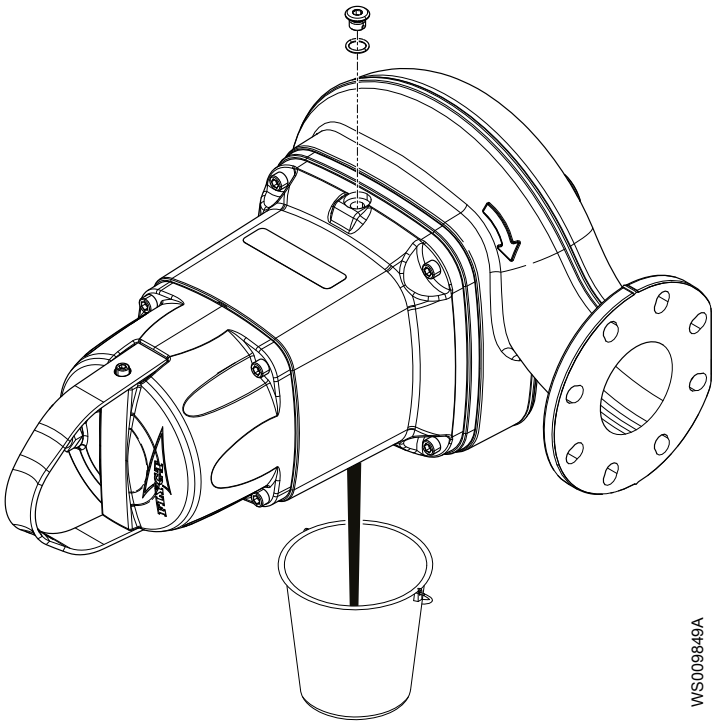
CAUTION: Compressed Gas Hazard

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. Put the pump in a horizontal position so that OIL OUT faces upwards and unscrew the oil plug.



2. Put a container under the pump and turn the pump.
   Remove the oil plug, OIL IN, to simplify the process.

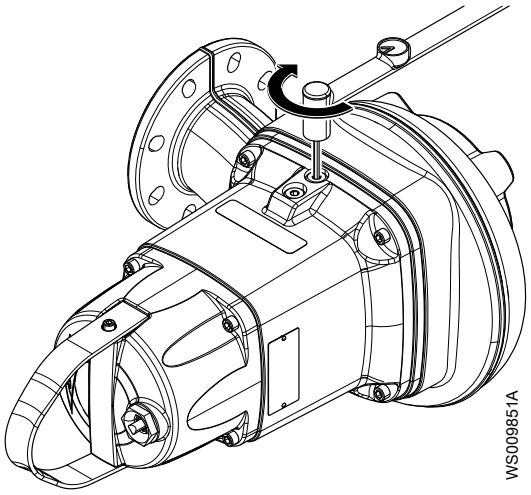


Fill with oil

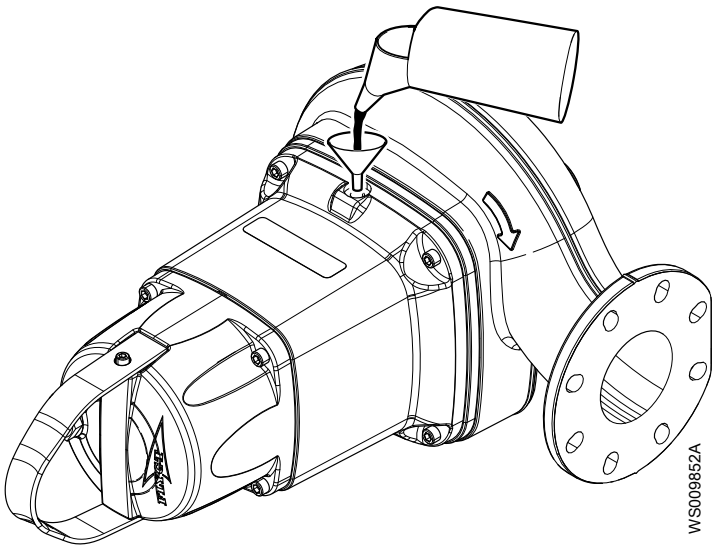
The oil must be a medical white oil of paraffin type that fulfills FDA Sec. 172.878 (a) requirements. The viscosity must be close to VG32. These oil types are suitable:

- Statoil MedicWay 32™
- BP Enerpar M 004™
- Shell Ondina 927™
- Shell Ondina X430™

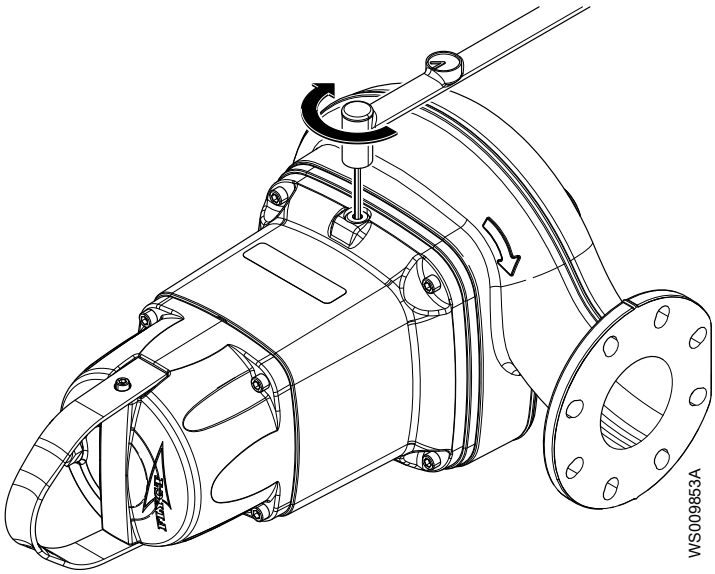
1. Replace the O-rings of the oil plugs.
2. Turn the pump so that OIL OUT faces upwards.
3. Refit and tighten the oil plug, OIL OUT.
   Tightening torque: 22 Nm (16 ft-lb)



4. Turn the pump so that OIL IN faces upwards.
5. Fill with oil.
   Quantity: 1.0 L (1.1 quarts)



6. Refit and tighten the oil plug, OIL IN.
   Tightening torque: 22 Nm (16 ft-lb)



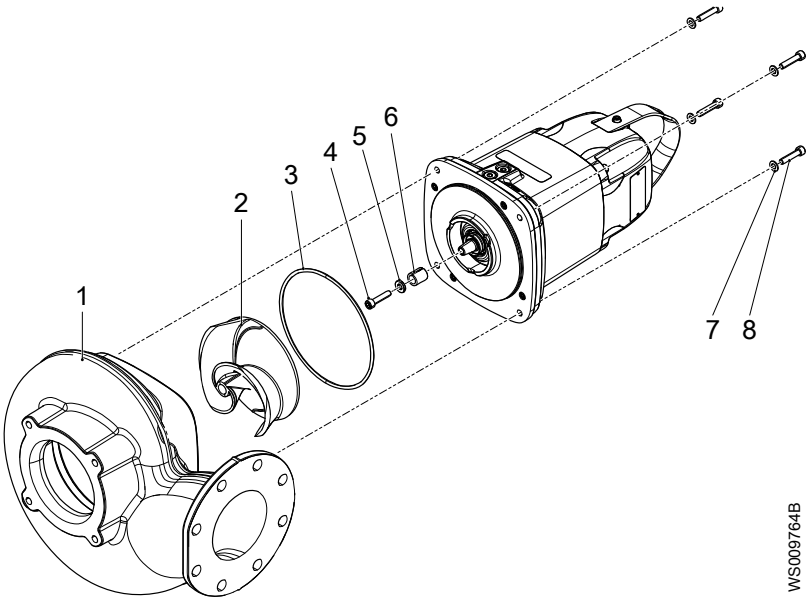
8.5 Replace the impeller: P, S, T, Z installations

CAUTION: Cutting Hazard

Worn parts can have sharp edges. Wear protective clothing.

NOTICE:

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.

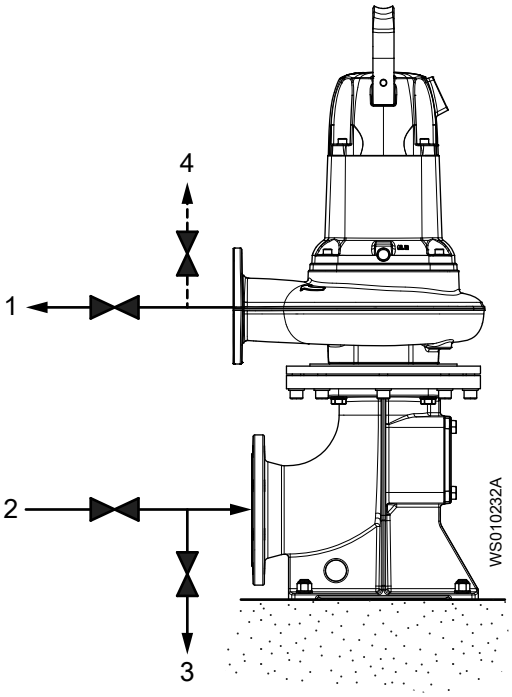


1. Pump housing
2. Impeller
3. O-ring
4. Impeller screw
5. Washer
6. Clamping sleeve
7. Washers

   Washers are not used for all configurations.
8. Screws

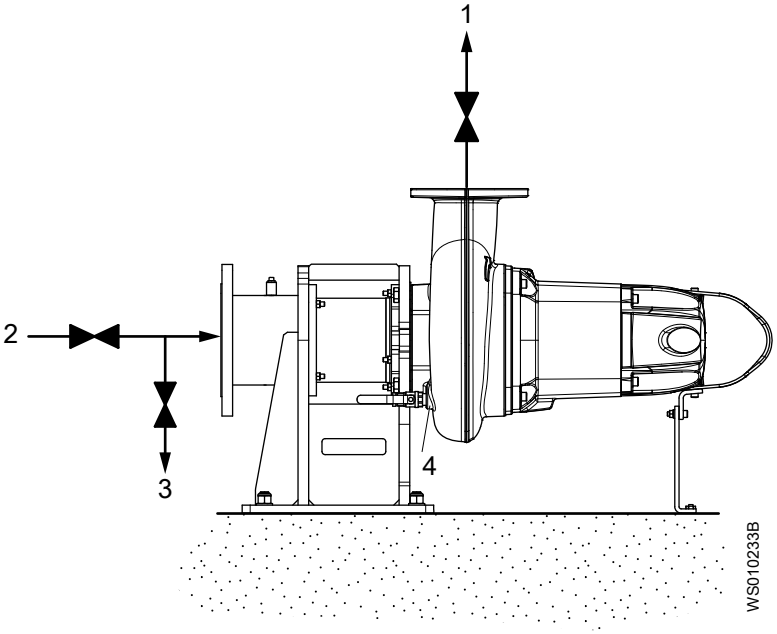
8.5.1 Remove the pump from the installation: T, Z installations

The pump must be removed from the installation before the impeller is replaced.



1. Discharge line
2. Suction line
3. Line to drain
4. Air vent

Figure 11: T installation



1. Discharge line
2. Suction line
3. Line to drain
4. Drainage plug

Figure 12: Z installation

1. Close the suction and discharge valves.
2. Drain the pump.
3. Remove the pump from the installation.

8.5.2 Remove the impeller

1. Put the pump in a horizontal position on the workbench.
2. Loosen the impeller screw until the impeller is free from the clamping sleeve.

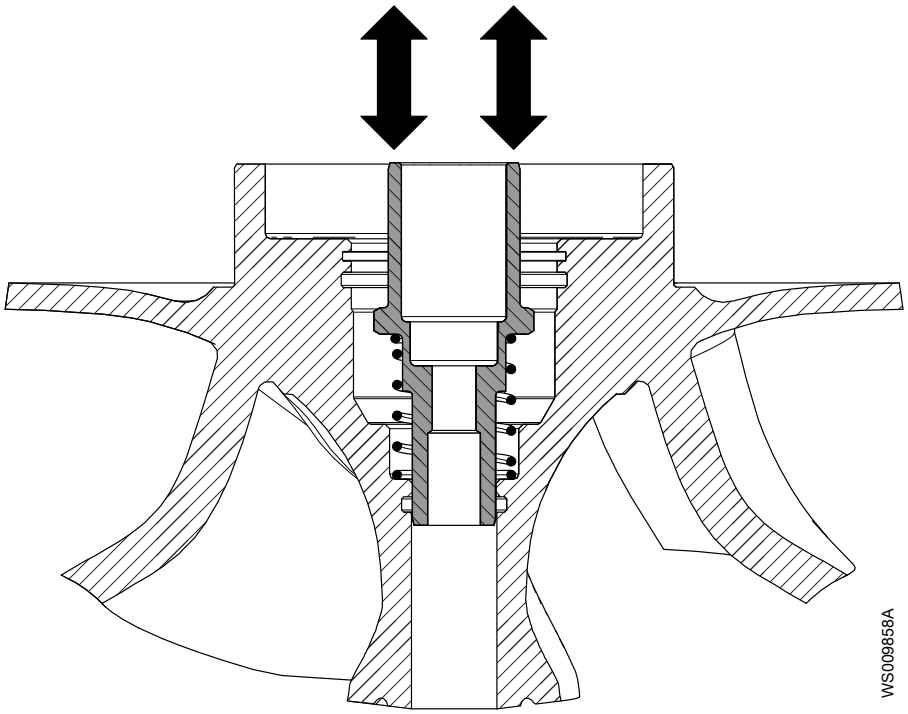
   Prevent the impeller from rotating. Insert a rod through the pump housing outlet.
3. Put the pump in an upright position on the workbench.
4. Remove the screws between the drive unit and the pump housing.
5. Lift and remove the drive unit. Put the drive unit in a horizontal position on the workbench.
6. Remove the impeller.

   The impeller rests in the insert ring.
7. Remove the O-ring.
8. Remove the impeller screw, the washer, and the sleeve.

8.5.3 Install the impeller

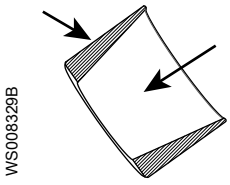
1. Before installation of the impeller, push the sleeve to check that it moves freely up and down.

   When the sleeve is released, it must be fully pushed out again. If the sleeve does not move freely, or does not come fully out, then replace the impeller unit.



2. Prepare the shaft:
   a) Make sure that the end of the shaft is clean and free from burrs.

      Polish off any flaws with a fine emery cloth.
   b) Coat the inner conic and the outer cylindrical surfaces of the 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 the equivalent.

NOTICE:

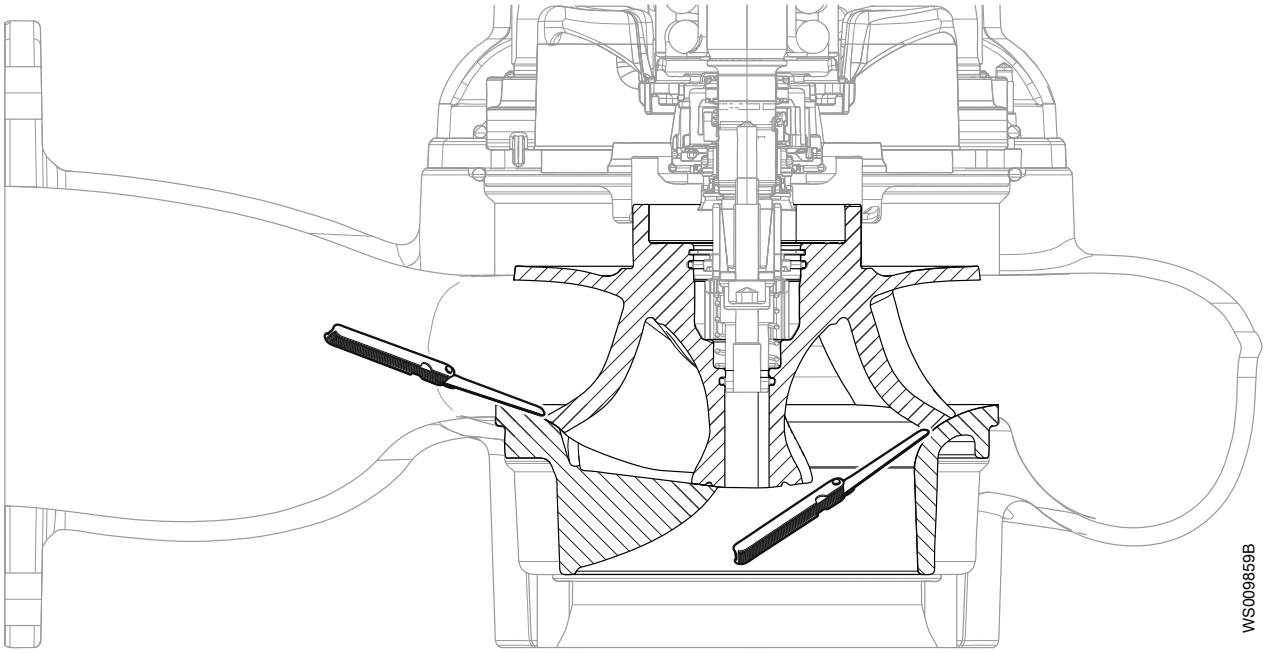
Surplus grease can cause the impeller to become loose. Remove surplus grease from conical and/or cylindrical surfaces of shafts and/or sleeves.

3. Lubricate the shaft and the impeller screw.
4. Install the clamping sleeve, washer, and impeller screw on the shaft. Do not tighten the screw.
5. Install the impeller on the shaft. Tighten the impeller screw by hand.
6. Put a new and lubricated O-ring on the motor assembly.
7. Put the pump housing in an upright position on the workbench.
8. Install the drive unit.
   a) Suspend the drive unit in the lifting handle.
   b) Lower the drive unit until it sits on top of the pump housing.
      Make sure that the motor cable gland is turned away from the pump outlet.
   c) Tighten the drive unit to the pump housing.
9. Suspend the pump in the lifting handle.
10. Adjust the impeller:
    a) Put a rod through the outlet to lock the impeller in position.
    b) Loosen the impeller screw until the impeller sits in the insert ring.
    c) Tighten the impeller screw.
       Tightening torque: 44 Nm (33 ft-lb)
    d) Tighten the screw a further 1/8 turn (45°).
    e) Check that the impeller can rotate freely.

WARNING: Crush Hazard

Beware of the pinch point hazard between the rotating impeller and the guide pin.

    f) Use an extended feeler gauge to make sure that the impeller clearance is 0.1–0.7 mm (0.004–0.028 in).



If the requirement is not fulfilled, then repeat the steps.

11. Install the pump.

T installation: Bleed air through the air vent.

9 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

Grounding of connection housing and stator housing

Both the connection housing and the stator housing must be grounded (earthed) always.

Time to zero energy state

This product contains high voltage capacitors that take time to discharge after the power supply is disconnected. Voltage is present at the terminals and in the motor control unit for up to one minute after the disconnection of the power supply.

The STOP function does not remove the voltages.

9.1 Dirigo™ Service Tool

Description

Dirigo™ Service Tool is a software application with connection hardware. The application is for service personnel. The application is installed on any PC that fulfills the requirements, and the PC is connected to the pump. The application is an alternative to the gateway with HMI for some operations.

The application is used for troubleshooting, testing, and settings.

Parts

- Software application
- USB dongle
- CD-ROM with drivers

The USB dongle

The USB dongle is a USB-to-RS485 converter with terminals for T3 and T4. The USB dongle is used for the connection between the PC and the pump.

Only use isolated USB dongles that are recommended by the local sales and service representative.

Communication

The communication uses Modbus RTU.

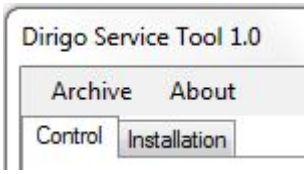
PC requirements

The operative system of the PC must be Windows™ 7 or later.

The PC must be equipped with a CD-ROM reader or internet connection.

The software application

The interface consists of drop-down menus and tabs.



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The menus are used for application settings and maintenance.

The tabs are used for the monitoring and control of the pump.

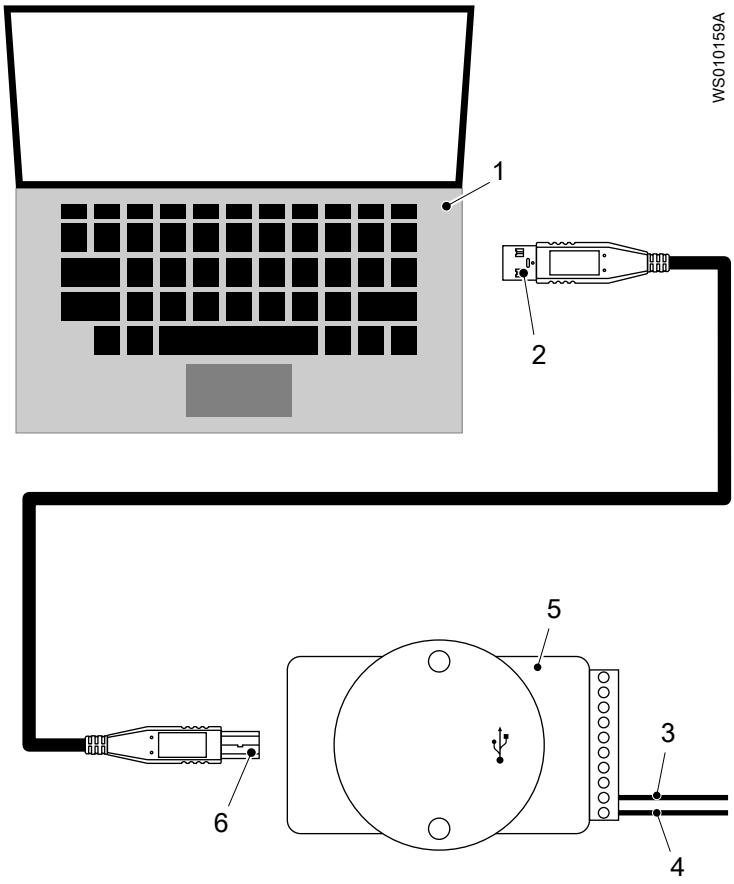
Tab	Overview
Control	The tab contains quick control buttons and shows the current operation.
Installation	The tab contains installation information.

The values that are typed are confirmed by pressing the **Enter** key on the PC.

Install the application and drivers

1. Contact the local sales and service representative for the latest version of the application. Run the executable file on the PC.
2. If the drivers for the USB dongle are not automatically installed over internet, then install the drivers from the CD-ROM.

Connect the PC to the pump



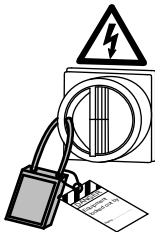
WS010159A

1. PC
2. USB A
3. T3
4. T4
5. USB dongle
6. USB B

1. Turn off and lock out the power supply to the pump.

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.



2. Connect T3 and T4 from the motor cable of the pump to the USB dongle.

   Only use isolated USB dongles that are recommended by the local sales and service representative.

   If T3 and T4 are connected to a gateway, then first disconnect the leads.

Terminal	Lead
TX+	T4
TX-	T3

3. Connect the USB port on the USB dongle to a USB port on the PC.
4. Turn on the PC and start the software application.

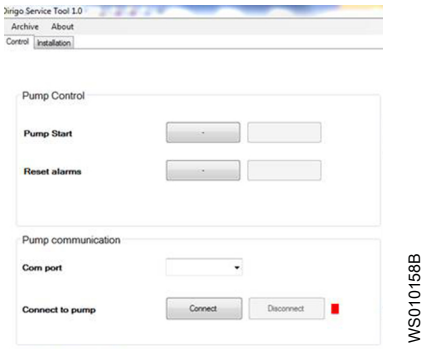
See *Run Dirigo Service Tool* on page 53.

Run Dirigo™ Service Tool

Make sure to take all necessary precautions and to follow all applicable requirements before the power supply is turned on. See *Electrical Installation* on page 28.

1. In the software application, set the correct value for **Com port** under **Control** > **Pump communication**.

   See **Control Panel** > **Device Manager** for the correct value.



2. Turn on the power supply to the pump.

   The pump starts to operate directly.

WARNING: Crush Hazard

Moving parts can entangle or crush. Make sure nobody is close to the unit when it is started.

3. Select **Connect**.

   The software application starts to communicate with the pump and the pump stops.

WARNING: Crush Hazard

Risk of automatic restart.

If the communication fails and the unit continues to operate, then turn off the power supply to the pump. For more information, see *Troubleshooting* on page 51.

4. Use the software application interface to read and write data.
   See *The software application* on page 52.
5. To disconnect the software application, select **Disconnect**.
   The pump starts and the software application stops to communicate with the pump.
6. Turn on and off again the power supply to the pump.

Upgrade the software application

1. Uninstall previous versions of the software application.
   See **Control Panel** > **Programs and Features** > **Dirigo Service Tool**.
2. Contact the local sales and service representative for the latest version of the application.
3. Run the executable file on the PC.

9.2 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.

WARNING: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

Cause	Remedy
The installation is not receiving voltage.	Check that: • The main power switch is on. • The fuses are intact. • There is voltage in all phases of the supply line. • All fuses have power and are securely fastened to the fuse holders. • The motor cable is not damaged.
The sum alarm is active.	Contact a sales or authorized service representative or use the Dirigo™ Service Tool application to read the alarm codes.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.3 The impeller does not rotate

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: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

Cause	Remedy
The impeller is stuck.	• Check that the impeller can be rotated. • Clean the impeller. • Clean the sump.

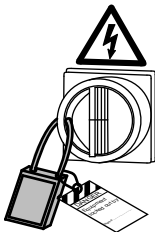
If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.4 The pump starts but stops after 10 seconds

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: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

Cause	Remedy
The FLS triggers the sum alarm because of leakage into the drive unit.	Check that the FLS triggers the sum alarm: 1. Turn off and on the power to start the pump again. 2. If the pump runs for 10 seconds and then stops, then disconnect the pump and empty the liquid from the drive unit. 3. If the pump acts in any different way, then contact a sales or authorized service representative or use the Dirigo™ Service Tool application to read the alarm codes.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.5 The pump stops

Cause	Remedy
There is no power supply to the pump.	Check the power supply.
There is no connection between the pump and the controller / RTU / PLC.	1. Check the power supply to the controller. 2. Restart the controller. 3. Check T3 and T4.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.6 The pump does not receive commands from the controller / RTU / PLC

Cause	Remedy
There is no communication between the pump and the controller.	1. Check the power supply to the controller. 2. Make sure that the indicator PUMP COMMS is lit on the gateway. 3. Restart the controller. 4. Check T3 and T4.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.7 The pump starts-stops-starts in rapid sequence

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: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

Cause	Remedy
The pump starts due to back-flow. The back-flow fills the sump to the start level again.	Check the following: • The distance between the start and stop levels is sufficient. • The non-return valves work correctly. • 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 following: • 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 • The voltage drop in the line at the starting surge, if it causes the self-holding malfunction of the contactor or not
The power supply is incorrect. The sum alarm is active after ten cycles.	Contact a sales or authorized service representative or use the Dirigo™ Service Tool application to read the alarm codes.

If the problem persists, then contact a sales or authorized service representative.

Always state the product number and the serial number of the product.

9.8 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.

WARNING: Electrical Hazard

The permanent-magnet motor generates voltage when the shaft rotates, even if power sources are disconnected. Never perform any electrical work if the shaft could rotate.

NOTICE:

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

Cause	Remedy
One or more of the valves are set in the incorrect positions.	• Reset the valves that are set in the incorrect position. • If necessary, replace the valves. • Check that all the valves are installed correctly according to the media flow. • Check that all the valves open correctly.
The impeller is difficult to rotate by hand.	• Clean the impeller. • Clean the sump. • Check that the impeller is trimmed correctly.
The pipes are obstructed.	To make sure that there is a free flow, clean the pipes.
The pipes and joints leak.	Find the leaks and seal them.
There are signs of wear on the impeller, pump, and casing.	Replace the worn parts.
The liquid level is too low.	• Check that the level sensor is set correctly. • Depending on the installation type, provide equipment for the pump priming, for example, a foot valve.
The Set Power or the Set Speed parameter is too low.	Change the settings. For more information, see the User Guide.
The impeller rotates in the incorrect direction. The connections inside the connection housing are incorrect.	Contact a sales or authorized service representative.

If the problem persists, then contact a sales or authorized service representative.
Always state the product number and the serial number of the product.

9.9 Dirigo™ Service Tool: The communication with the unit fails

Cause	Remedy
The control leads are not correctly connected.	1. Connect the leads correctly. 2. Try again to run Dirigo™ Service Tool.
The value for **Com port** under **Control** > **Pump communication** is not correct.	1. Select the correct value. 2. Try again to run Dirigo™ Service Tool.

If the problem persists, then contact a sales or authorized service representative.
Always state the product number and the serial number of the product.

10 Technical Reference

10.1 Motor data

The drive unit includes a synchronous motor with IE4 equivalent efficiency.

NOTICE:

Do not connect a starter or a Variable Frequency Drive (VFD) to this unit.

Feature	Description
Input frequency	50–60 Hz
Input supply	3-phase • 380–480 V • 200–240 V
Maximum starts per hour	Concertor™ N: 60 Concertor™ EA, Concertor™ DP: 240
Design in applicable parts	According to IEC 60034–1
Voltage variation	• Continuously running: Maximum ±5% • Intermittently running: Maximum ±10%
Voltage imbalance between the phases	Maximum of 2%
Stator insulation class	In accordance with class H (180°C, 356°F)

10.2 Application limits

Data	Description
Liquid temperature	Maximum 40°C (104°F)
Liquid density	Maximum 1100 kg/m3 (9.2 lb per US gal)
pH of the pumped liquid	5.5–14
Depth of immersion	Maximum 20 m (65 ft)

10.3 Minimum permitted liquid level

In hazardous areas, this information is critical for the safety of the installation of this product.

The pump housing (volute) must be filled with water before starting the pump, and during operation.

Xylem |ˈzīləm|

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

We're a global team unified in a common purpose: creating advanced technology solutions to the world's water challenges. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. Our products and services move, treat, analyze, monitor and return water to the environment, in public utility, industrial, residential and commercial building services, and agricultural settings. With its October 2016 acquisition of Sensus, Xylem added smart metering, network technologies and advanced data analytics for water, gas and electric utilities to its portfolio of solutions. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise with a strong focus on developing comprehensive, sustainable solutions.

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

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

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

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